GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

by

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JULY 2020

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DECLARATION

I, Petronella Christina Vorster de Wet, declare that the thesis that I herewith submit for the Doctoral Degree (PhD Health Professions Education) at the University of the Free State, is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

PC Vorster de Wet	**Date**

I hereby cede copyright of this product in favour of the University of the Free State.

PC Vorster de Wet	**Date**

DEDICATION

I dedicate this study to
my son, Henro.

You always inspire me with your unconditional love
and energy to discover more of life.

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***SOLI DEO GLORIA* - TO GOD ALONE THE GLORY**

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LIST OF ACRONYMS

ADI	Argument-Driven Inquiry
BSc	Bachelor of Sciences
CUT	Central University of Technology
HSREC	Health Sciences Research Ethics Committee
KIE	Knowledge Integration Environment
MSLQ	Motivated Strategies for Learning Questionnaire
NCV	National Certificate Vocational
NGSS	Next Generation Science Standards
NSC	National Senior Certificate
NSSE	National Survey of Student Engagement
NST	Need Supportive Teaching
SA	South Africa
SCT	Social Cognitive Theory
SDT	Self-Determination Theory
SELF	Self-efficacy for Learning Questionnaire
SET	Self-efficacy Theory
UFS	University of the Free State

SUMMARY

Key terms: **Self-efficacy, teaching and learning environment, undergraduate, Natural Sciences, mixed-methods research, guidelines, self-regulated learning, self-regulated motivation, student engagement, student autonomy, industry requirements, academic achievement.**

In this thesis, the researcher conducted an in-depth study on student self-efficacy in the teaching and learning environment of undergraduate students in Natural Sciences at the University of the Free State (UFS). This was done with the aim to develop guidelines to improve student self-efficacy. Self-efficacy refers to people's beliefs in their capabilities to achieve (Bandura 1993). Students with high self-efficacy generally have adequate levels of academic achievement and use more effective learning strategies (Bressington *et al*. 2018:48). Self-efficacy theory postulates a bi-directional influence between self-efficacy and achievement (Olivier *et al*. 2019:326). The current status of undergraduate student self-efficacy and issues influencing it, was determined. This research originated in response to the recognition of a gap regarding guidelines to improve student self-efficacy. Self-efficacy theory, in conjunction with its determining issues, provided the platform to develop guidelines to improve student self-efficacy to bridge the identified gap.

The study used a mixed-methods sequential explanatory research design with a quantitative and qualitative phase. This design answered the research questions within a pragmatist paradigm. The research methods in Phase 1 of the study comprised a literature study, instrument development and a questionnaire, yielding quantitative data. In Phase 2, semi-structured interviews with students and lecturers were conducted, yielding qualitative data.

This study generated comprehensive knowledge of issues interrelated with self-efficacy among undergraduate students in Natural Sciences. These interrelated issues were incorporated to develop three guidelines to improve self-efficacy in these students. It also culminated in developing guidelines with emphasis on self-regulated learning, self-regulated motivation, student engagement, student autonomy and future careers in the teaching and learning environment. The guidelines were developed to assist lecturers in supporting the issues that are interrelated with self-efficacy. By implementing guidelines developed in this study to improve self-efficacy in undergraduate students in Natural Sciences, a valuable contribution may be made to the teaching and learning environment. Recommendations for future research in this regard were made.

GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

In this thesis, an in-depth study was done to identify and address issues in the teaching and learning environment that influence the self-efficacy of undergraduate students in Natural Sciences. The issues identified were viewed in conjunction with the self-efficacy theory. This provided the foundation for the development of guidelines to be used by lecturers in the Natural Sciences teaching and learning environment at the University of the Free State (UFS) to improve self-efficacy.

The development of guidelines was supported by Multon *et al*. (1991:36), who emphasized the value of constructing and evaluating strategies to improve self-efficacy beliefs among diverse student types. The guidelines aim to improve student self-efficacy and, therefore, increase undergraduate student success by enhancing their self-regulation. Students who display high levels of self-efficacy are more likely to work hard, persist and seek help to complete a task (Linnenbrink & Pintrich 2003). Zimmerman (2002:66) emphasized the importance of self-regulated learning, which is a significant function of education, to develop life-long learning skills. Studies on self-regulated learning have shown that learners spontaneously control their behaviours, motions, thoughts and wills to achieve specific learning goals (Wang 2018:462). The guidelines developed in this study emulate Dewey's concept of learning, which is "*learning by doing*" (English 2016:1049). This refers to guiding students to be more actively involved in learning and to improve their belief in their capabilities; therefore, self-efficacy.

According to the learning theorist Bandura, who is also regarded as the "father" of self-efficacy research, self-efficacy is concerned with people's beliefs in their capabilities to produce given attainments (Bandura 1993) (cf. Chapter 2, Section 2.4.1). Since 1977, Bandura (1977:211) argued that self-efficacy might be a predictor of performance because people predict their future performance from their past behaviour.

For students to become more successful and, therefore, more self-effective, they need guidance, reinforcing their intrinsic motivation towards self-efficacy. Specific guidelines for student self-efficacy still lack in South Africa (SA), specifically within the teaching and learning environment of undergraduate students in the Natural Sciences. To develop guidelines for the higher education teaching and learning environment, researchers should align guidelines with teaching theories.

The development of guidelines in this study focused on level 3 of the teaching theory proposed by Biggs and Tang that refers to "*what the student does*" (cf. Chapter 2, Section 2.8). Therefore, guidelines for lecturers should concentrate on learning activities in the classroom that may improve student self-efficacy. Guidelines should concentrate on learning activities that may improve student self-efficacy. Guidelines that were developed attempted to follow a motivational perspective, according to Deci and Ryan (2002) and, therefore included activities for learning to stimulate students' interest.

This chapter aims to orient the reader to the study. It provides background to the research problem, followed by an overall goal, aim, research questions, objectives, methodology and the implementation of the findings of the study. These are followed by a brief overview of the research paradigm, design and methods of investigation. Thereafter follows the demarcation of the research and the significance and value of the study. The chapter is concluded by a lay-out of the arrangement of the subsequent chapters and a short conclusion.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

Procedural understanding refers to the need for students to know how to use and apply scientific concepts of evidence to critically evaluate scientific evidence (Duggan & Gott 2002:674). This seems to be the essential use for science, after secondary education (*op. cit.:*677). The complexity of procedural understanding lies not only in how students learn and apply science, but that not a single construct can explain all the variations in learning processes and outcomes (Thomas *et al.* 2008:1702). The role of self-efficacy appears to be crucial to improve science education (*op.cit*.:1701). Self-efficacy is a subset of self-regulation that refers to the ability to understand and control the learning environment (Schraw *et al*. 2006:111). Self-regulation determines learning outcomes (*op.cit*.). Until 2016, the focus was on the evaluation of self-efficacy only and not the guidance to improve self-efficacy, therefore, contributing to self-regulation. Training students in self-regulated

learning and improving their self-efficacy could lead to enhanced student success in SA (Moseki & Shulze 2010:358).

The Bachelor of Science (BSc) degree offered at the UFS includes five undergraduate learning programmes. Students enrolled in these programmes in the Faculty of Natural and Agricultural Sciences must fulfil minimum academic admission requirements only without being selected (Faculty of Natural and Agricultural Sciences, UFS, Rule book 2020). These learning programmes focus on the study of science in general and not on the qualification towards a specific vocation or professional qualification. General capabilities (competencies) are developed during BSc degree programmes at the UFS, with no explicit focus on developing self-efficacy.

1.3 PROBLEM STATEMENT

This study addressed the lack of guidelines for developing student self-efficacy in the teaching and learning environment of undergraduate students in Natural Sciences of the UFS.

Literature searches were conducted on the following databases: NEXUS, NRF, SA Information theses/dissertations, ENATURAL SCIENCES, EBSCOhost web, ERIC, Academic search complete, African wide information, PsycARTICLES, PsycEXTRA, PsycINFO, PsycTESTS, Proquest and Teacher Reference Centre. As far as could be ascertained, no studies had been conducted at the UFS on the topic of self-efficacy within the teaching and learning environment of Natural Sciences students. Some studies on student self-efficacy have been done at other higher education institutions in SA, but these only measured academic self-efficacy (cf. Chapter 2, Section 2.6.1.1).

1.4 OVERALL GOAL OF THE STUDY

The overall goal of the study was to develop guidelines to improve student self-efficacy by addressing issues identified in the teaching and learning environment that influence the self-efficacy of undergraduate students in Natural Sciences. Implementing these guidelines may empower students to become self-regulated (life-long) learners.

1.5 AIM OF THE STUDY

The study aimed to develop guidelines to improve student self-efficacy within the teaching and learning environment of undergraduate students in Natural Sciences.

1.6 RESEARCH QUESTIONS

The following research questions were formulated:

i. *What is the current status of self-efficacy among undergraduate students in Natural Sciences?*
ii. *Which issues in the teaching and learning environment influence self-efficacy of undergraduate students in Natural Sciences?*
iii. *Which guidelines can be developed, based on the identified issues that will improve self-efficacy amongst undergraduate students in Natural Sciences?*

1.7 OBJECTIVES OF THE STUDY

The following objectives were pursued to achieve the aim:

i. *To determine the undergraduate students' current status of self-efficacy in Physiology modules in the Faculty of Health Sciences. This objective addressed the first research question. This was done through a literature study and a self-efficacy questionnaire.*
ii. *To identify issues in the teaching and learning environment that influence student self-efficacy in Physiology modules. This objective addressed the second research question. This was done by means of a thematic analysis of the semi-structured interviews.*
iii. *To develop guidelines to improve the self-efficacy of undergraduate students in Natural Sciences with regard to their Physiology modules. This objective addressed the third research question. Thematic analysis by means of an inductive approach with the identification of constructs, themes, categories and subcategories was done. This contributed to the identification of central ideas that were incorporated to formulate the development of guidelines.*

1.8 RESEARCH PARADIGM, DESIGN OF THE STUDY AND METHODS OF INVESTIGATION

1.8.1 Research paradigm

1.8.1.1 *Philosophical paradigm*

The philosophical paradigm of constructivism informed this study (cf. Chapter 2, Section 2.5). The ontological direction of this study was the investigation of the existence of student self-efficacy within the teaching and learning environment. The epistemology of this study focused on the development of guidelines for student self-efficacy. The methodology of this study could only happen by assessment of the current status of self-efficacy and by gaining depth through individual semi-structured interviews with students and lecturers.

1.8.1.2 *Research paradigm*

This study used a pragmatic research paradigm. Pragmatism has specific implications for the ontology as it implies that the physical world is real and external to ourselves and we can interact with and impact on the external world. The epistemology implication is considered as the knowledge that can create a change in the physical or social functioning of an individual or the surrounding environment. Pragmatism as a research paradigm also has specific implications for the methodology, stating that there are multiple ways to identify the effects of objects and actions, all of which should be explored to increase the understanding of a physical or social issue (Creswell & Plano Clark 2007:388). Within this paradigm, a mixed-methods approach was the most suitable to answer the research questions (cf. Chapter 1, Section 1.8.2.1).

1.8.2 Design of the study

A detailed description of the mixed-methods approach followed in this study is provided in Chapter 3.

1.8.2.1 *Research design and methodology*

A mixed-methods research approach with a sequential explanatory design (two phases) was chosen to ensure an in-depth and comprehensive understanding of the research

questions. The two phases consisted of:

i. Phase 1: Quantitative data collection (Self-efficacy questionnaires)
ii. Phase 2: Qualitative data collection (Semi-structured interviews)

A mixed-methods design utilizes strengths and minimizes weaknesses of quantitative and qualitative methods respectively (Brewer & Hunter 1989). In this study, the quantitative method measured the reactions of many students with standardized questions that could limit the responses to predetermined categories contributing to the breadth of data. The qualitative method inquired into selected issues that provided great depth with careful attention to detail, context and nuance (Patton 2015:257). By following the questionnaire survey (quantitative data collection) with semi-structured interviews (qualitative data collection) sequentially, the findings from Phase 1 could be explained in Phase 2 (cf. Figure 1.1).

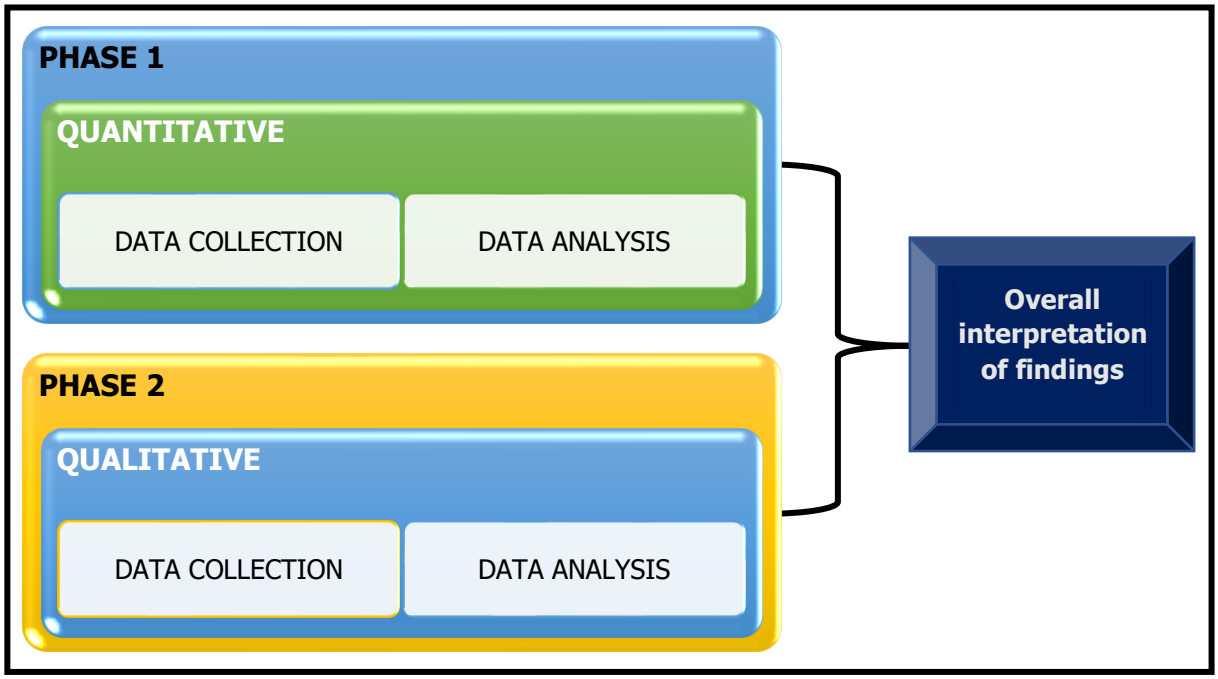

Figure 1.1: Sequential explanatory design (adapted by the researcher, Vorster de Wet from Creswell 2009:209)

1.8.3 Methods of investigation

The methods comprised a literature study, instrument development, implementation of the instrument (self-efficacy questionnaire) (Phase 1) and semi-structured interviews (Phase 2). The literature study explored international, national and local contexts to develop the instrument to be used, while also contextualizing the concepts to be included in the questionnaire (Phase 1).

The self-efficacy questionnaire (cf. Appendix 3.2) used in Phase 1 of the study obtained self-reported (quantitative) data from students.

When interpreting the concept of self-efficacy, it is essential to note that self-efficacy is not an objective, numerical measurable construct or an interval construct as such. It should instead be interpreted on a sliding scale or continuum, from a lower category to a higher category. Bandura (2006a:307) stated that the patterning and degree of generality of people's sense of personal efficacy are revealed by multidomain measures. The efficacy belief system is not a global trait but a differentiated set of self-beliefs linked to distinct realms of functioning and an all-purpose measure or approach for self-efficacy cannot be applied (*op.cit*.:307). Therefore, the self-efficacy results were interpreted according to the context in which self-efficacy was discussed. The applicable terms used were:

i. Current status of self-efficacy (self-efficacy levels at the particular time of questionnaire completion) and
ii. Low or high self-efficacy (differentiation between the two categories of self-efficacy) (cf. Section 3.3.3.3).

In Phase 2, individual semi-structured interviews were conducted with students and lecturers. These interviews included a combination of open- and closed-ended items and were based on the findings of the student self-efficacy questionnaire. Interview questions for the lecturers were adapted to a lecturer's perspective about students' self-efficacy within the teaching and learning environment. The semi-structured interviews assisted in the identification and in-depth understanding of issues influencing self-efficacy in the teaching and learning environment, to be addressed by the guidelines developed in this study. In the final stages of the study, both quantitative and qualitative findings were combined to develop the guidelines for student self-efficacy.

A detailed description of the sample, sample size, sampling method, research methods, data collection, data analysis and reporting and ethical considerations are given in Chapter 3. Figure 1.2 provides a schematic overview of the study.

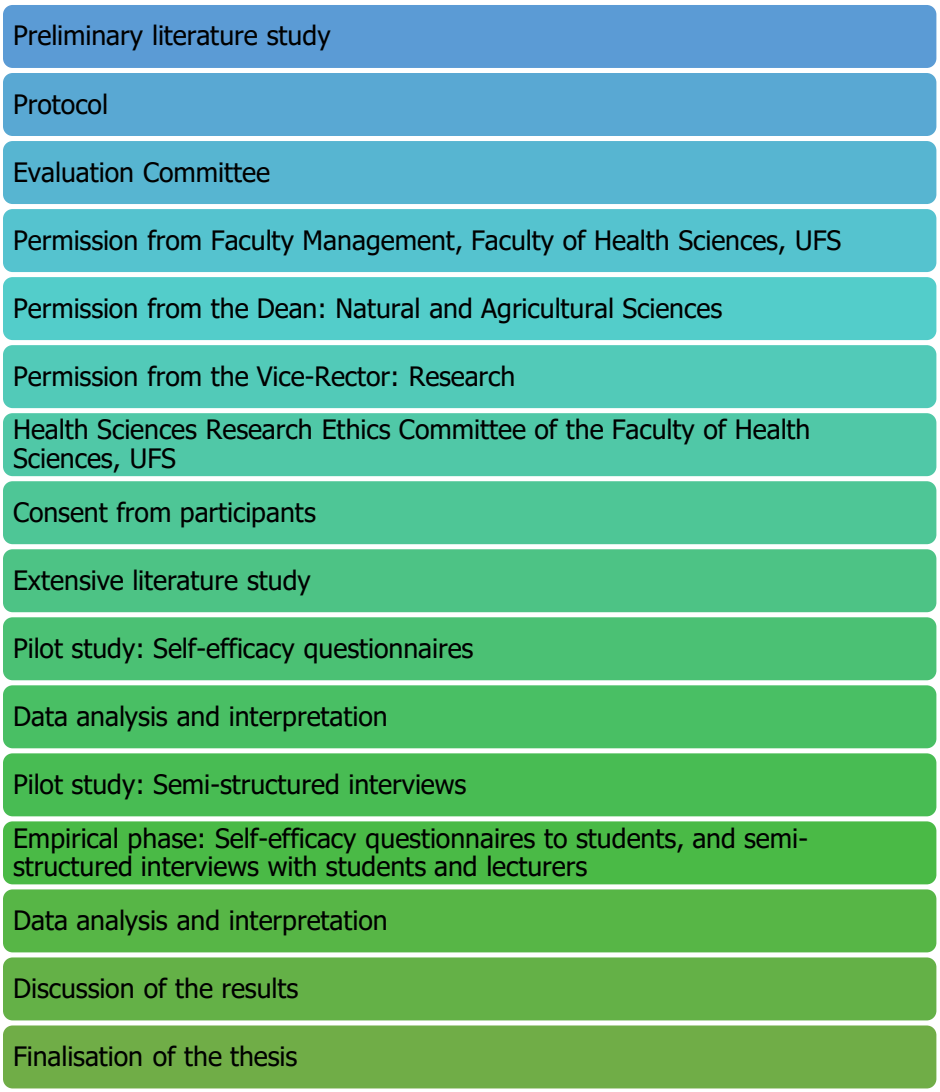

Figure 1.2: Schematic overview of the study (compiled by researcher, Vorster de Wet 2020)

1.9 DEMARCATION OF THE FIELD AND SCOPE OF THE STUDY

As indicated in Section 1.7 (iii), the study aimed to develop guidelines to improve student self-efficacy in the Faculty of Natural and Agricultural Sciences. This study, therefore, falls within the field of Health Professions Education and is interdisciplinary with the field of Natural Sciences.

In a personal context, the researcher of this study is a lecturer who obtained the degree MSc (Physiology) from the University of Stellenbosch in 1997. She has been involved in undergraduate and postgraduate Natural Sciences student training since 1998 at both the University of the Western Cape (1998) and the UFS (1999-present). The researcher's interest in student self-efficacy arose from reflection upon the observation and interaction

with undergraduate students in the teaching and learning environment, as well as from informal discussions with colleagues and reading of scholarly literature on self-efficacy in higher education. A lack of self-efficacy (especially a lack of learning and studying skills as well as effective use of classroom activities) amongst students seemed to be the pervasive factor requiring further investigation. Based on the researcher's ontology and epistemology, it is likely that the teaching and learning environment, especially the classroom, maybe an excellent environment where self-efficacy can be improved.

1.10 SIGNIFICANCE, VALUE AND CONTRIBUTION OF THE STUDY

1.10.1 Significance

This study contributes to the identification of issues in the teaching and learning environment of undergraduate students in Natural Sciences that were interrelated with self-efficacy. It further contributes to the development of guidelines to improve student self-efficacy in Physiology modules. The implementation of these guidelines should contribute to improving academic outcomes that motivate students to become self-regulated (life-long) learners. The guidelines may be implemented in similar contexts, for example, in Natural Sciences programmes in similar higher education institutions (other than the UFS) and other faculties at the UFS (besides Natural Sciences).

1.10.2 Value

The value of this research study lies in the assessment of the self-efficacy of undergraduate Natural Sciences students enrolled in Physiology modules. Quantitative data obtained from the self-efficacy questionnaire and qualitative data from the semi-structured interviews were used to develop guidelines to promote self-efficacy in this context. As far as the researcher could ascertain from literature searches, these guidelines are the first of its kind in SA to focus on the specific population of students.

1.10.3 Contribution of the study

The findings from this study identified issues influencing self-efficacy of undergraduate students in Natural Sciences. These issues, in conjunction with the self-efficacy theory, contributed to developing guidelines to promote student self-efficacy. Application of these guidelines should improve academic outcomes (academic performance) for undergraduate

students enrolled in Physiology modules and motivate them to become self-regulated (life-long) learners. The guidelines provide practical strategies for lecturers to guide students in promoting self-efficacy within the teaching and learning environment. The guidelines developed for the undergraduate population that is transferable to national and international universities, provide a significant contribution to knowledge.

1.11 IMPLEMENTATION OF THE FINDINGS

The guidelines will be implemented in second- and third-year Physiology modules at the UFS. The findings of the study will also be communicated to the management of the Faculty of Natural and Agricultural Sciences for possible implementation in other modules in undergraduate programmes at the UFS. Further afield, the findings will be communicated to other higher education institutions for possible implementation in similar Natural Sciences programmes. Finally, the research will be submitted to academic journals for publication and presented at national and international conferences.

1.12 ARRANGEMENT OF THIS THESIS

The thesis is arranged as follows to provide insight into the topic:

Chapter 1: Orientation to the study

In this chapter, a brief introduction and background to the study are presented. In addition, the problem statement, overall goal, aim, research questions and objectives are stated. The research paradigm, design, methods of investigation, the demarcation and scope of the study, the significance, value and contribution of the study are provided. Finally, the implementation of the findings, arrangement of the thesis and concluding remarks are listed.

Chapter 2: Student self-efficacy in the higher education teaching and learning environment

This chapter provides a review of existing literature and the theoretical framework for the research questions. The review explores theories and literature to conceptualize and contextualize student self-efficacy within the teaching and learning environment of undergraduate students in Natural Sciences.

Chapter 3: Research design and methodology

This chapter delineates the research design and methods used in this study. A theoretical perspective on the philosophical and research paradigms of the research design and mixed-methods approach is given. The research design and methods which were used to address the objectives of the study are described in detail. This is followed by a detailed explanation of the data collection and analysis. The issues of validity, reliability and trustworthiness, as well as the ethical considerations, are addressed.

Chapter 4: Results of Phase 1 (quantitative data): questionnaire

This chapter presents and discusses the quantitative research findings of the self-efficacy questionnaire.

Chapter 5: Results of Phase 2 (qualitative data): Semi-structured interviews

This chapter presents and discusses the qualitative research findings of the semi-structured interviews.

Chapter 6: Development of guidelines for student self-efficacy in the teaching and learning environment of undergraduate Natural Sciences

This chapter presents the guidelines for student self-efficacy as developed after triangulation and corroboration of the results of Phases 1 and 2 of the study.

Chapter 7: Conclusions, strengths, limitations and recommendations of the study

This chapter concludes the study with the final presentation and contextualization of the research findings drawn from the discussions of the preceding three chapters. It also describes and discusses the strengths and limitations of the study and offers practical recommendations for future research.

References and appendices are included at the end of the thesis.

1.13 CONCLUSION

Chapter 1 aimed to provide an orientation to this study that is titled: *Guidelines for student self-efficacy in the teaching and learning environment of undergraduate Natural Sciences*. It briefly introduced the background to the research, the problem statement and overall goal and stated the aim, research questions and objectives of the study. The chapter briefly addressed the research paradigm, design and methods, and the significance, contribution and implementation of the findings of the study. The chapter concluded with an outline of the arrangement of the thesis and the chapters to follow.

Chapter 2, titled *Student self-efficacy in the higher education teaching and learning environment*, will provide a discussion of the relevant literature.

CHAPTER 2

STUDENT SELF-EFFICACY IN THE HIGHER EDUCATION TEACHING AND LEARNING ENVIRONMENT

"Teaching is a highly contextualized activity because it is shaped by the students we have, advancements in our respective fields and changes in technology. Therefore our teaching must constantly adapt to changing parameters."
(Ambrose, 2010:218)

2.1 INTRODUCTION

The above quote by Susan Ambrose is an indication of the challenges experienced by students and lecturers in the domain of higher education during the last decade. This was supported by Van der Merwe (2011:19) mentioning that as in many other fields, education is an arena inundated by change and the need to evolve and to adapt to the global village.

In this study, literature searches were conducted on the following databases: NEXUS, NRF, SA Information theses/dissertations, ENATURAL SCIENCES, EBSCOhost web, ERIC, Academic search complete, African wide information, PsycARTICLES, PsycEXTRA, PsycINFO, PsycTESTS, Proquest and Teacher Reference Centre. Keywords used in the literature search were: student self-efficacy; undergraduate students; higher education; guidelines. The literature study aimed to describe self-efficacy theories, as well as its history and current status in the teaching and learning environment. The theoretical basis of this study is Bandura's self-efficacy theory, developed in 1977. References to this theoretical source are therefore dated from 1977.

This chapter provides the theoretical perspectives and conceptual framework underpinning this study.

2.2 BACKGROUND

The five undergraduate learning programmes in the Biological Sciences offered for a Bachelor of Science (BSc) degree at the UFS include the disciplines of Biochemistry, Genetics, Behavioural Genetics, Genetics and Physiology, and Biochemistry and Physiology. The modules of the learning programmes consist of natural sciences subjects such as Physiology. The minimum admission requirements applicable to students for admission to BSc programmes are the National Senior Certificate (NSC) with a minimum admission point

(AP) of 32, 50% in an official language of learning, 60% in Mathematics and 60% in both Life Sciences and Physical Sciences (Faculty of Natural and Agricultural Sciences, UFS, Rule book 2020).

Learning, according to Barradell and Kennedy-Jones (2015:543) is directed towards acquiring the necessary capabilities to enter and practise a specific vocation; however, this is apparently lacking in the Natural Sciences learning programmes. These undergraduate programmes focus on the study of sciences in general and not on acquiring a qualification towards a specific vocation or a professional qualification. For example, although students study the subject of Physiology, there is no training for the profession of a physiologist with specific vocational tasks in SA. Physiology is regarded as an ancillary subject to become a scientist in the Natural Sciences context. The vocation of being a scientist is unclear because a scientist may follow an occupation in a variety of fields. For example, within Genetics or Biochemistry, there are possible occupations within the academic field, the research field, and many more. Therefore, only general capabilities (competencies) are developed during the degree. Focus on specific capabilities concerning skilled self-efficacy within the teaching and learning environment are not explicitly addressed in these curricula, as far as could be ascertained. Therefore, research to develop guidelines to improve self-efficacy within the teaching and learning environment among the Natural Sciences is necessary.

As far as could be ascertained, guidelines for self-efficacy within the teaching and learning environment of undergraduate students in Natural Sciences at the UFS and other South African universities alike, have not yet been developed.

The idea for the study emerged from personal experience as a lecturer in Physiology modules to undergraduate students in Natural Sciences at the UFS for the past 20 years. An apparently pervasive, general lack of self-management and low self-efficacy among these students manifest in poor academic performance. Therefore, self-efficacy seems to be one of the challenges that should be addressed in the teaching and learning environment of these undergraduate students. This is supported by Bandura (1993), who stated that "*self-efficacy beliefs contribute to academic performance over and above actual ability*". Linnenbrink and Pintrich (2003) assert that students who display high levels of self-efficacy are more likely to work hard, persist and seek help to complete a task.

> "*The knowing-gap is the critical difference between what a student knows and what he or she can do*" (Hodge *et al.* 2014:2).

This study will attempt to identify issues causing the so-called knowing-gap among

undergraduate students in Natural Sciences. The knowing-gap is the critical difference between what a student knows and what he or she can do (Hodge et al. 2014:2). By identifying issues in the teaching and learning environment and aligning these with self-efficacy theory, proactive student behaviour may be encouraged (Lorsbach & Jinks 1999:165). Therefore, research to develop guidelines to improve self-efficacy within the teaching and learning environment among the Natural Sciences is necessary.

2.3 OVERVIEW OF ASPECTS TO BE DISCUSSED

In the following sections, the concept of student self-efficacy in the unique context of the undergraduate Natural Sciences in the teaching and learning environment at the UFS will be presented. Figure 2.1 presents a schematic overview of the literature, discussed in Chapter 2.

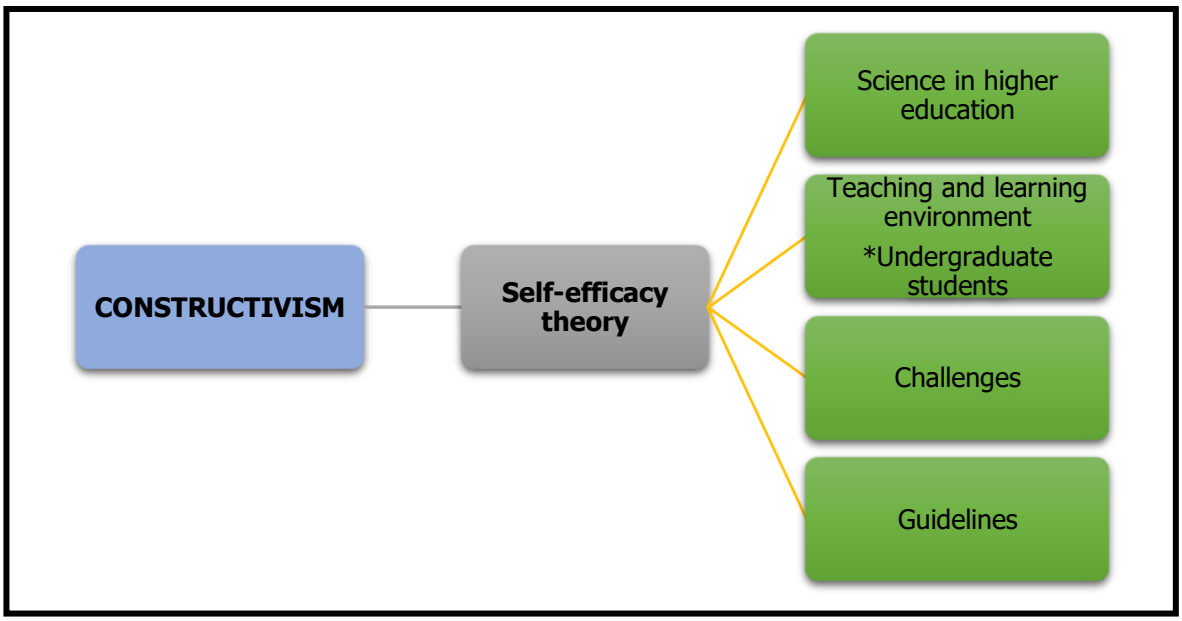

Figure 2.1: Schematic overview of the literature to be discussed in Chapter 2

2.4 SELF-EFFICACY THEORY

2.4.1 Background and theory development

Albert Bandura, a contemporary learning theorist, regarded as the "father" of self-efficacy, developed the self-efficacy theory in 1977. Bandura's concept of self-efficacy descended from Tolman's expectancy principle (Yancey 2013:2). He sought to develop a theory that explained the processes of human behavioural change. He claimed that self-efficacy was the core cognitive facet responsible for such change (Cave *et al*. 2017:84). Self-efficacy, as

defined by Bandura (1977), is the belief a person holds about their abilities to perform a task. Self-efficacy is therefore concerned with people's beliefs in their capabilities to produce given attainments; merely possessing knowledge and skills will not necessarily translate to effective use under different conditions (Bandura 1993). The construct of self-efficacy differs from the colloquial term "confidence". Confidence is a non-descriptive term that refers to the strength of belief but does not necessarily specify what the certainty is about (Gore 2006:94). Self-efficacy can easily be misunderstood as implying the overall agency of an individual's efficacy to produce outcomes (Pekrun 2006:218). In the context of producing outcomes, efficacy refers to the action-outcome expectancy (*op.cit.:*218).

Rutherford *et al*. (2017:23) explained self-efficacy as the beliefs that a person holds about their ability to perform a task, being the beliefs that influence the level of effort that people expend; their persistence when working through challenges, and resilience in the face of failure. This explanation followed forty years after Bandura had defined self-efficacy. Therefore, it is the strength of people's conviction in their effectiveness which is likely to affect whether they will try to cope with a given situation (Rutherford *et al.* 2017). In addition, self-efficacy is also defined as personal judgments of one's capability to organize and execute courses of action to attain designated types of educational performances (Bandura 1993:117; Zimmerman 1995:218).

The development of the self-efficacy theory was based on an integrative theoretical framework to explain and predict psychological changes achieved through different therapies. This theoretical framework stated that psychological procedures, whatever their form, alter the level and strength of self-efficacy. Therefore, the concept of self-efficacy was assigned a central role, especially in analysing changes achieved in fearful and avoidant behaviour. The self-efficacy theory was further developed by observation of behavioural change, which reflected two divergent trends. One trend comprised acquired formulation and regulating mechanisms of human behaviour in terms of cognitive processes. The other trend observed was performance-based procedures that proved to be the most successful for effecting psychological changes (Bandura 1977:191). Bandura (1977:193) mentioned that in this conceptual system of self-efficacy, expectations of personal mastery affect both initiation and persistence of coping behaviour. The Oxford English Dictionary defines "mastery" as comprehensive knowledge or skill in a subject or activity (http://oxforddictionaries.com/definition/english/mastery). The most powerful source of creating a strong sense of efficacy within higher educational settings is that of enabling mastery experiences (Van Dinther *et al.* 2011:99). Layered learning was proposed as the

most influential source of self-efficacy through the demonstration of mastery (Cooke *et al*. 2017:14; cf. Section 2.7.3). To foster a climate of mastery, application of the achievement goal approach was suggested (Ommundsen & Kvalø 2007:388). This approach supports the idea that students who have goals will achieve. On this level, perceived self-efficacy influences the choice of activities and behavioural settings. Perceived self-efficacy refers to the belief in one's agentive capabilities that one can produce, given the level of attainment (Bandura 2006a). It is through expectations of eventual success that perceived self-efficacy can affect coping efforts and determine how much effort people will expend in the process.

Further analysis of perceived self-efficacy demonstrated that expectation alone would not produce the desired performance if capabilities are lacking. Through analysis of social learning, Bandura (1997) came across the four primary sources of information on which expectations of self-efficacy are based, namely:

i. Performance accomplishments (successes raise mastery expectations and failures lower it),
ii. Vicarious experience (seeing others succeed generates expectations in the observers that they will improve if they persist in their efforts);
iii. Verbal persuasion (suggestion leads people to believe that they will cope with success in situations which previously overwhelmed them); and
iv. Physiological states of emotional arousal (high aversive arousal debilitates performance).

These sources increase self-efficacy in an individual by consciously or subconsciously receiving, processing and acting on these sources of information. In addition, students who observe vicarious learning regarding a peer performing a task are motivated to attempt the task, leading to increased self-efficacy (Huang 2017:291; Artino 2012:83; Schunk 1991:216). Bandura (1977) mentioned the importance of students attributing their success to skills rather than chance, as well as the need for varied opportunities to build self-efficacy. Multon *et al.* (1991:36) suggested that self-efficacy beliefs are generally related to academic behaviours in ways that support Bandura's theory and its extension to educational-vocational behaviour. These beliefs provide a framework for analysing human thought, motivation and action (Bartimote-Aufflick *et al*. 2016:1919). Bandura highlights the value of reasonably accurate self-appraisals and suggests that large misjudgements in either a positive or negative direction can have harmful consequences. Conditions that increase, decrease or effect no change in performance over time, contributing to self-

efficacy, are specified by the self-efficacy theory (Bandura 1997).

Through the years, the construct of self-efficacy has been a subject of interest in many human behaviour theories but with different perspectives on the origin and nature of personal efficacy. Bandura's self-efficacy theory described in 1977 is based on the principal assumption that psychological procedures, whatever their form, serve as a means of creating and strengthening expectations of personal efficacy (Bandura 1977:193). Therefore, perceived self-efficacy can influence the choice of activity directly as well as through expectations of eventual success. This affects coping efforts once these efforts are initiated (Bandura 1977:194). The influential role of perceived self-efficacy in human self-development, adaptation and change was confirmed with a meta-analysis across different spheres of functioning (Bandura 2006a:308). Bandura (1977:211) argued that self-efficacy might be a predictor of performance because people predict their future performance from their past behaviour. For example, success builds a strong sense of self-efficacy and failure lowers it (Bandura 1997). Perceived self-efficacy helps to account for diverse phenomena such as achievement strivings (Bandura 1982:122), and self-efficacy involves a generative capability in which cognitive, social and behavioural skills should be organized into integrated courses of action (Bandura 1982:122).

In 1986 Bandura described self-efficacy in the social cognitive theory as being the first of a specific set of cognitive structural pathways that work within the decision-making portion of the brain (prefrontal cortex). Since this claim in the late 1980s, various studies and meta-analyses have been conducted to investigate the effectiveness of self-efficacy. It is, therefore, not surprising that self-efficacy has been the most influential predictor of behavioural change in any human endeavour (Cave *et al*. 2017:83). Social cognitive theory has become one of the most researched learning theories (Kakaew & Damnet 2017:2,4). Bandura (1986) theorized about the effectiveness of self-efficacy beliefs that strongly influence students' academic motivation, their self-regulated learning strategies and academic success.

Bandura's self-efficacy theory further developed and confirmed self-efficacy as a multidimensional construct in 1989. This construct is fundamental to the social-cognitive approach and conceptualizes individuals as being purposeful, proactive, self-evaluative and self-regulatory agents (Komarraju & Nadler 2013:67).

A new line of thought developed, focusing on self-influence. Bandura (1991:248) stated

that the ongoing exercise of self-influence motivates and regulates human behaviour. The social cognitive theory suggests that individuals hold beliefs about their ability to make things happen through their actions (Ng & Lucianetti 2016:14). Unless people believe they can produce desired results by their actions, they have little incentive to act or to persevere in the face of difficulties (Bandura 2001:10). Guided mastery is a suggested method of assistance that may enhance not only the change in self-efficacy beliefs but the self-efficacy performance relationships as well (Multon *et al.* 1991:34). Guided mastery is offered as a therapeutic process through which new competencies for actions can be acquired to improve self-efficacy (Bandura 2001).

Bandura concluded after years of self-efficacy research that perceived self-efficacy should be distinguished from other factors such as self-esteem, locus of control and outcome expectancies and was more significant than effort in obtaining outcomes (Bandura 2006a:309; Bandura 1993:117). Social-learning theorists define perceived self-efficacy as a sense of confidence regarding the performance of specific tasks (Lorsbach & Jinks 1999:157). It operates at three different levels as an important contributor to academic development, exerting its influences through cognitive, motivational, affective and selection processes. The three levels are:

i. Students' beliefs in their efficacy to regulate their learning;
ii. Teachers' beliefs in their efficacy to motivate and promote learning; and
iii. Faculties' beliefs in their collective instructional efficacy (Bandura 1993:117).

In a meta-analysis done on 241 recent studies (up to 2016), self-efficacy was found to be the strongest correlate with the average grades of university students (Bartimote-Aufflick *et al*. 2016). In this meta-analysis, self-efficacy was described as a psychological construct that has been embraced recently by higher education research. Self-efficacy is, therefore, not a general trait or characteristic that is manifest uniformly across tasks and contexts but is a context- and task-specific attitude of belief about one's capabilities in any domain of endeavour (Bandura 2012:13). Regardless of capability, those with higher levels of self-efficacy surpass those with lower levels in any area of human endeavour examined thus far.

2.4.2 Goals and challenges in higher education

Mindful of the above three levels at which perceived self-efficacy operate, a question that

must be asked is what the critical goals of higher education should be to enable a student to improve and ultimately achieve self-efficacy. Boud (1995) stated that one of the critical goals of higher education in this context can be expressed in broad terms as enabling students to become autonomous, independent learners.

In the 1980s, research studies started to investigate the possible situational and instructional factors within the educational context of primary and secondary levels affecting self-efficacy. Only in the 1990s did studies regarding this topic start to emerge, focusing on the higher education level. Eighty per cent of intervention programmes (1981-2011) that focused on students' self-efficacy on the higher education level across several domains revealed significance in their relation to self-efficacy (Van Dinther *et al.* 2011:104). The focus on developing (through support systems) and rewarding (through assessment) of deep learning approaches is of fundamental importance to higher education institutions (*op.cit*.:834). Students utilizing deep learning approaches tend to have higher self-efficacy for learning (Lin & Tsai 2013; Phan 2011).

2.4.3 Teacher efficacy

Teacher efficacy emerged as a factor that could influence student self-efficacy in the teaching and learning environment (Bandura, 1997). The teacher's belief in their personal and professional efficacy, or teacher efficacy, is a necessary component for creating conducive learning environments. Teacher self-efficacy has been shown to predict the quality of the relationship teachers have with their students and the type of learning environment they create (Miller *et al.* 2017:261). Fackler and Malmberg (2016:187) emphasized that more efficacious teachers are more likely to introduce new teaching approaches and stricter classroom management. These teachers use more instructional teaching strategies, helping students to set clear, specific, but reasonable goals and are therefore able to influence how well students learn (Artino 2012:81). This strategy contributes more to motivate students to perform than merely telling students to try their best (Locke & Latham 1990).

Changes in students' needs in a classroom environment over the past decades resulted in noticeable changes towards classroom distinguished instructions and encouragements (Zaidi *et al*. 2017:547). Chao *et al.* (2017:366) reported that teachers with a high sense of teacher efficacy encouraged student autonomy and focused substantially on the needs of low-performing students. Therefore, teacher efficacy is related with teacher behaviour in

the classroom. Miller *et al.* (2017:261) and Rutherford *et al*. (2017:23) have shown that teachers with higher efficacy are more likely to:

i. effectively implement curriculum innovations;
ii. use instructional strategies;
iii. use a greater variety of instructional strategies including those that may be more difficult to implement;
iv. manage classroom problems effectively;
v. keep students on task; and
vi. have good collaborative relationships with colleagues.

Classroom practice and student outcomes, including students' self-efficacy beliefs, motivation and achievement, are factors found to be related to teachers' sense of efficacy (Rutherford *et al.* 2017:23). In addition, the teacher's perception of their students' abilities influence a teacher's effort, strategy and instructional methods (Miller *et al.* 2017:262). The impact of perceptions seems to be reciprocal between teachers and students. For example, students' perceptions about teacher efficacy influence their decisions about how to interact and engage in learning in class (Miller *et al.* 2017).

Goddard *et al.* (2000:503) developed an instrument to measure collective teacher efficacy. The results proved that the teacher's beliefs about the capabilities of their faculty are systematically related to student achievement. There is compelling evidence indicating that teachers' beliefs in their abilities to instruct students may account for individual differences in teacher effectiveness. Teachers with high efficacy create more supportive and student-centred classroom environments (Pintrich & De Groot 1990; Sarac & Aslan-Tutak 2017:69).

A model developed by Watson (2006) found that professional development has a sustained effect on teacher self-efficacy towards using technology in the classroom. Self-efficacy levels of teachers who participated in teacher training remained high for six years after training. This model predicts that teachers who value professional development should engage more with professional development that could lead to increases in both self-efficacy and the value for teaching (Rutherford *et al*. 2017:24).

Pajares (2002:117) proposed that students' self-efficacy beliefs and self-regulatory strategies that are essential components of motivation and academic achievement should combine in a focused professional practice. Teachers should emphasize these components

for professional practice. Therefore, educational programmes must endeavour to maximize the potential for success by nurturing the belief that one can indeed succeed and provide the self-regulatory strategies required to help (Pajares 2002:121).

2.4.4 Academic self-efficacy in the teaching and learning environment

Concepts associated with academic self-efficacy could serve as a status report in the teaching and learning environment, helping teachers and students to improve student self-efficacy (Lorsbach & Jinks 1999:164). Academic self-efficacy is defined as one's confidence in one's ability to successfully perform pro-academic self-regulatory behaviours, or an individual's conviction that they can successfully perform given academic tasks at designated levels (Gore 2006:94; Ferla *et al.* 2009). Pintrich (2000) believes that the most important assumption shared by nearly all theories of academic self-efficacy is the "*active constructivist assumption*". Findings presented by Gore (2006:109) state that when academic self-efficacy is measured at the beginning of the first semester of college, academic self-efficacy beliefs are relatively weak predictors of academic performance. Also, students' academic efficacy beliefs depend on the extent to which the students have experience in the academic arena. These findings contributed to the growing body of literature suggesting that academic self-efficacy beliefs are a predictor for students' academic performance and persistence (Gore 2006:112). This argument originated in 1977 when Bandura (1977:211) stated that people predict their future performance from their past behaviour. Therefore, self-efficacy tends to be a predictor of performance (cf. Section 2.4.1).

2.4.5 Factors related to self-efficacy

Research about self-efficacy as a construct increased since 2006. Bartimote-Aufflick *et al*. (2016) performed a review of 64 articles on self-efficacy from 2000-2016. All these authors regarded self-efficacy as a psychological construct; it was only recently embraced by higher education researchers. Many studies on self-efficacy within the domain of higher education have been published, especially from 2016-2019. Some of these studies focused on issues contributing to the difference between high and low self-efficacy. Until 2016, the evaluation of self-efficacy focused on teaching strategies applying once-off interventions only (e.g., tutorial software used and a video lecture). However, no guidelines to improve self-efficacy were mentioned.

2.4.5.1 *Cognitive and metacognitive strategies*

Students with a high sense of self-efficacy tend to use cognitive and metacognitive strategies and will continue working on difficult or uninteresting tasks (Neber & Schommer-Aikins 2002; Shu-Shen 2002, Anam & Stracke 2016). Metacognition refers to students' awareness of their thinking or learning strategies and comprises of declarative, procedural and conditional knowledge (Negretti 2012:145). Declarative knowledge refers to the awareness of strategies and concepts that are important in relation to a specific task. Procedural knowledge implies awareness of how to apply concepts and strategies to perform the task. Conditional knowledge comprises awareness of when and why to apply certain knowledge and strategies (Schraw 1998:113). Metacognition is important for learning flow and this relationship is influenced by self-efficacy (Han & Kim 2017:73). Young learners with high self-efficacy sought persistently for practice opportunities outside the classroom. They perceived this strategy to be effective despite having less supportive environments or increasing their fear of making mistakes (Anam & Stracke 2016:8).

The link between metacognition and academic performance has been highlighted in several domains. In a review by Duit and Treagust (2003:679), students' conceptions regarding metacognition were found to be limited and naive. Students with high self-efficacy tend to use metacognitive strategies to generate successful performance outcomes (Braten *et al.* 2016:241). Metacognition refers to students' awareness of their thinking or learning strategies and comprises of declarative, procedural and conditional knowledge (Negretti 2012:145). Duggan and Gott (2002:677) explored the question of what sort of science people use in their lives when they leave school. These researchers concluded that procedural understanding lies at the heart of science education that adults need after secondary level education. Self-efficacy is especially important in the development and evaluation of science students' metacognition for improving science education (Thomas *et al.* 2008:1701). These authors also mentioned the necessity to recognize the complexity of how students learn science. Not one construct – such as metacognition – can account for all variations in learning processes and outcomes (Thomas *et al.* 2008:1702). Schraw *et al.* (2006:111) argued that metacognition and self-efficacy are subsets of self-regulation, of which the latter is influential in determining learning outcomes.

2.4.5.2 *Motivation*

As early as 1991, Schunk (1991:209,211,213) observed self-efficacy as motivation-generating, motivation-enhancing and motivation-sustaining and a key term in motivational

literature (Moos & Azevedo 2009:578). Therefore, Yi and Hwang (2003) suggested that students can actively adjust their learning motivation through self-efficacy adjustment. This would result in improved performance (stimulus behaviour) and learning in different learning environments. There seems to be a dual effect between self-efficacy and motivation. This is revealed by highly efficacious students that demonstrate increased motivation, persistence and performance indicating the beneficial effects of self-efficacy on learning outcomes (Pintrich & De Groot 1990; Kuh *et al*. 2006; Cave *et al*. 2017:83). Students who have enhanced intrinsic motivation possess a solid feeling of self-efficacy (high self-efficacy) and are more apt to try new things and not afraid of challenges (Tabernero & Hernandez 2011; Smith & Hung 2017:331). These students tend to exert themselves to achieve success and if a failure occurs, blame themselves and not the situation outside their control (Markman *et al.* 2002).

A possible motivational mediator for self-efficacy has been reported as student academic engagement (Spedding *et al.* 2017). Academic engagement can be defined as positive feelings of motivation, fulfilment, psychological presence and personal commitment to educational outcomes (Schaufeli *et al.* 2002). Therefore, academic engagement is a complex and multifaceted construct often conceptualized as consisting of behavioural, cognitive, emotional and agentic components (Spedding *et al.* 2017). The mediating effect might be between the positive feelings of motivation and the motivational value of self-efficacy through academic engagement (Bandura 1997).

Physiological processes that influence motivation are involved in the direction, vigour, and persistence of behaviour (Bergin *et al.* 1993:437). People initially motivate themselves through proactive control by setting themselves challenging goals that create a state of disequilibrium. They then mobilize their efforts to attain the desired level. After they attain the standard they have been pursuing, those of high self-efficacy set a higher standard for themselves (Bandura 2012:19). Motivation is a component of self-regulation and self-efficacy is a subset of self-regulation (Schraw *et al.* 2006:112). Therefore, it can be argued that motivation is necessary for self-efficacy to lead to self-regulation. There seems to be a further interrelatedness between motivation and self-efficacy due to the foundation for human motivation that is constituted by self-efficacy beliefs (Zaidi *et al*. 2017:547). The regulation of motivation and action, a cognitive skill, relies on an anticipatory, proactive system rather than on a reactive, negative feedback system (Bandura 1991:282).

The self-motivated quality of self-regulated learners depends on underlying beliefs,

including perceived self-efficacy (Zimmerman 2002:66). According to Walker (2003:174), self-efficacy is also linked to motivational beliefs and these characteristics of self-efficacy demonstrate a relationship between self-efficacy and academic performance. Significant correlations have been shown between student use of self-efficacy building strategies and improvement in both self-efficacy and motivation, supporting the view that significant self-efficacy levels enhance motivation (Cave *et al*. 2017:83, 91). According to Bandura (2001), people have only the incentive to act or to persevere through difficulties if they believe they can produce the desired results by their actions.

The importance of understanding and incorporating motivational research into teacher education programmes have been emphasized (Campbell *et al.* 2012:163). The majority of recent research on autonomy is linked to Need Supportive Teaching (NST) based on a study by Ayllon *et al*. (2019:1), assuming teachers to be the key to the motivation of students. Teachers motivate through the provision of autonomy support, structure (support of competence) and involvement (support of relatedness). The literature on motivation concluded that an autonomous, motivated student displays greater psychological well-being (Nunez & Leon 2015:276). Autonomy needs to be supported by the lecturer; this refers to an atmosphere where students are not pressured to behave in a specific way and where they are instead encouraged to be themselves (Ryan & Deci 2004). Autonomy, or the ability to think, feel and make decisions by oneself, is achieved as part of a normal developmental process (Nunez & Leon 2015:276). In an academic context, autonomy can be promoted when instructors enhance students' internal motivation for competent behaviour (Eakman *et al*. 2019:1008).

Educators should strive to maintain the highest level of motivation of their students to allow for continued learning and, hence, self-determination (Campbell *et al.* 2012:165). Motivation is enhanced by activities conducive to personal exploration, which will establish the indispensable components necessary for fostering student motivation (*op.cit*.:171). Dupont *et al*. (2009:37) showed that the perception of competence was the most important predictor of self-determined motivation.

Deci and Ryan (2002) identified three facets of motivation:

i. intrinsic motivation,
ii. extrinsic motivation, and
iii. amotivation.

Intrinsic motivation (self-regulated motivation) is the most self-determined type of motivation and involves partaking in an activity for enjoyment, learning or task accomplishment reasons. Extrinsic motivation is reward-driven behaviour and amotivation is the state of lacking the intention to act (op.cit:17). Ryan and Deci's self-determination theory (SDT) states this motivation as autonomously self-regulated, which may lead to deeper learning and potentially better academic performance (John *et al*. 2018:e43). Bonsaksen *et al.* (2017:335) found a positive relationship between intrinsic motivation and productive approaches to studying, whereas extrinsic motivation is associated with a surface approach to studying. Self-efficacy has also been closely related to intrinsic motivation. The influence of student motivation and learning environment on one another has been emphasized (Reeve 2012:157). Findings by John *et al*. (2018:e43) supported the self-determination theory, demonstrating autonomy (choice), competence and relatedness as factors identified by students that could increase their intrinsic motivation.

Since 1966, studies have provided strong support that individuals with a strong belief that they can control their destiny are likely to be more alert to those aspects of the environment that provide useful information for future behaviour. They act to improve their environmental condition, place a higher value on skill or achievement reinforcement and are concerned more with their ability than failures and are resistant to insidious influences (Rotter 1966:25). The expected relationship between the tendency to perceive what happens to a person as dependent upon his actions and greater motivation in achievement is generally supported (Rotter 1966).

2.4.5.3 *Stress and anxiety*

Yancey (2013:3) stated that physiological factors could influence self-efficacy. When people with low self-efficacy attempt to accomplish a specific task, they may experience fear or anxiety. Stress and anxiety can impair their performance, lowering self-efficacy even more. These negative signals from the body may further reduce self-efficacy and influence the individual's thoughts and understanding of the concept of ability. According to social cognitive theory, increased anxiety and fear are likely to inhibit improvement in self-efficacy due to the negative emotions that signal vulnerability to poor performance to these individuals (Bandura 1977). Vulnerability to stress and depression or the quality of emotional life is affected by efficacy beliefs (Bandura 2006b:171). A positive cognitive state (motivation) is necessary to achieve the desired learning objectives (Bandura 2006b:171). For students to successfully face such challenges, cognitive interventions may be required

to counteract the negative states that students might experience. One such state is a lack of self-efficacy (Bandura 2006b:171).

Low self-efficacy would lead to less effort (Yancey 2013:4) and impaired ability to cope with academic challenges (Zimmerman & Schunk 2001). On the other hand, people who have high coping self-efficacy are more capable and comfortable taking on threatening tasks. Students who experience high levels of self-efficacy cope better with stress (Lyrakos 2012:144). Students with high self-efficacy have greater resilience and those with low self-efficacy will fail, regardless of effort (Smith & Hung 2017:331). More benefits experienced by students with high levels of self-efficacy are the following:

i. a firmer commitment to given undertakings;
ii. an openness to unfamiliar experiences;
iii. increased emotional stability amid stress;
iv. stronger social proactivity in interpersonal relationships;
v. an elevated sense of vision in goal setting; and
vi. a more vigorous effort to reach higher goals (Cave *et al*. 2017:84).

It is, therefore, important to understand how to increase students' self-efficacy to empower the above benefits (i-vi) (*op.cit*.:85). Therefore, human well-being is enhanced by a strong sense of self-efficacy, that influences the amount of stress and anxiety people are prone to experience as they engage in an activity (Pajares & Schunk 2001).

2.4.6 Self-regulated learning

In his social cognitive theory, Bandura (1991:248) states that human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence. Self-efficacy beliefs contribute to academic performance over and above actual ability (Bandura 1993). The social-cognitive theory, therefore, suggests that individuals hold beliefs about their ability to make things happen through their actions (Ng & Lucianetti 2016:14). According to Pintrich (2000:451-501) and Zimmerman (2000:13-39), only a few students are entirely self-regulated. Self-regulated learning refers to "*learning that occurs largely from the influence of students' self-generated thoughts, feelings, strategies and behaviours, which are oriented toward the attainment of goals*" (Schunk & Zimmerman 1998:viii). It is defined as a self-conscious process to monitor one's cognitive activities, the elements used, and the results effected by applying skills, e.g. analysis and evaluation, and encompasses self-

efficacy (Schraw *et al.* 2006:111; Facione 2015:7). Therefore, it may be characterized as an active and constructive process to understand and control the learning environment (Schraw *et al.* 2006:111; Roick & Ringeisen 2018:148). An individual has to progress through three levels of development (observational, imitative and self-controlled) before reaching the fourth level that is self-regulation (Zimmerman 2000).

Well-established findings support the importance of self-regulation for effective learning and performance in traditional classrooms (Artino 2008:43). Attention has been drawn to the role that students' thoughts and beliefs play in the learning process (Van Dinther *et al.* 2011:96). Self-regulation theory originated from social cognitive learning theory (cf. section 2.4.1) that postulates learning as the result of personal, environmental and behavioural factors. This phenomenon is referred to as *triadic reciprocality* (Schraw *et al.* 2006:111; Matoti 2011:151). When applied to self-efficacy in learning situations, Matoti (2011:151) translated it to students' academic performance (behavioural factors) that is influenced by how learners are affected (cognitive factors) through instructional strategies (environmental factors).

Self-efficacy influences people's self-regulating behaviour and may be regarded as a subset of self-regulation (Schraw *et al.* 2006:111; Sitzman & Ely 2011:421; Bandura 2012). In this context, self-efficacy refers to the ability to understand and control one's learning environment and is considered a predictor of task value, asking the question: "*Why should I do this task*?" (Doménech-Betoret *et al.* 2017:3). Those more confident in their ability tend to see the difficulties as manageable through some effort (Bandura 2012). Self-regulating behaviour is also related to emotions; higher self-efficacy is associated with positive emotions (Sarac & Aslan-Tutak 2017:67, 69). The process of self-regulation is moderated by self-efficacy (Schunk & Ertmer 2000). Self-efficacy, therefore, moderates the affective, cognitive and behavioural processes throughout a learning experience to reach the desired level of achievement (Schraw *et al.* 2006:111; Sitzman & Ely 2011:421). This moderation allows for higher cognitive strategies resulting in academic achievement. Individuals with higher self-efficacy outperform their counterparts with lower self-efficacy and are more likely to exhibit greater persistence in achieving success (Bandura, 1993; Tuan *et al.* 2005; Artino 2012:85).

The influential role of self-efficacy on self-regulated learning has been demonstrated. For example, Roick and Ringeisen (2018) explained that learners set goals for their learning and then attempt to monitor, regulate and control their cognition, motivation and

behaviour. Self-regulation is guided and constrained by their goals and the contextual features in the environment. They found that successful students oversee the effectiveness of a strategy and modify its use for a different context. In contrast, low-achieving students depend on external guidance (Roick & Ringeisen 2018:149). They emphasized that increasing self-efficacy should foster the application of successful learning strategies in subsequent learning periods. By the same token, increasing self-efficacy would result in the modified use of a less successful strategy.

Zimmerman (2002:65) stated that self-regulation is not a mental ability but rather a self-directive process by which learners transform their mental abilities into academic skills. It also refers to the degree in which students are active participants in their learning (Moseki & Shulze 2010:358). Many publications indicate that self-efficacy affects students' performance and learning behaviour in the form of the tasks they choose, their exertion, perseverance and performance (Bandura 1977; Bandura 1986; Schunk 1995; Schunk 2003). Students with high self-efficacy generally have adequate levels of academic achievement and use more effective learning strategies (Bressington *et al*. 2018:48). Zimmerman (2000) suggested a model to develop self-regulation. It consists of the following:

i. the highest levels of self-regulatory competence;
ii. the adaptation of skills and strategies to personal needs and contextual conditions; and
iii. it requires learners to develop a metacognitive awareness of *what*?, *how*? and *why?* when assessing options.

Pajares (2002:117) mentioned that the relationship between self-efficacy beliefs and academic self-regulation had become a prominent area of research. According to Pintrich (2000:451-501) and Zimmerman (2000:13-39), only a few students are entirely self-regulated. It was found to be similar in the South African higher education environment with the challenge of culturally diverse students (Matoti 2011:153). Siwatu (2011) emphasized the necessity of improving self-efficacy beliefs for culturally diverse students in academic areas, as developed self-efficacy leads to students engaging in positive academic behaviours that set a foundation conducive to academic success.

Although the necessity for students to use self-regulatory processes has been strongly supported, only a few teachers prepare students to learn on their own (Zimmerman *et al.* 1996). Another aspect of self-regulation is efficient time management that is positively associated with academic success (Indreica 2014:236). Following a scheduled timetable to

study contributes to active self-management that improves self-efficacy (Komarraju & Nadler 2013:68).

2.4.7 The role of self-efficacy in academic achievement

A review by Bartimote-Aufflick *et al*. (2016:1919) brought the importance and potential utility of self-efficacy as a psychological construct (maximizing student learning outcomes) to the attention of the higher education community. Self-efficacy beliefs influence people's behaviour, thoughts and feelings. The result of these beliefs for people are that they choose activities they feel capable of and avoid those they do not feel capable of (Van Dinther *et al.* 2011:96). Therefore, student self-efficacy is one of the key constructs for academic achievement influencing motivation (Fredricks *et al.* 2004; Olivier *et al*. 2019:326). Other key constructs are behavioural and emotional engagement (Olivier *et al*. 2019:326). The developmental cascades linking these constructs still have to be identified. Theoretical frameworks (self-efficacy theory, self-system model of motivational development and expectancy-value theory) argue toward self-efficacy, classroom engagement and academic achievement as a complex set of interrelations (Olivier *et al*. 2019:326). Zhang *et al*. (2015:69) demonstrated a significant, positive correlation between self-efficacy and motivation for academic achievement. Self-efficacy theory postulates a bi-directional influence between self-efficacy and achievement (Olivier *et al*. 2019:326).

Students are often unable to prove their optimal academic achievement according to their abilities due to insecurity about their capabilities (Sahara *et al.* 2017:1), therefore, the belief about their capabilities, which is self-efficacy (cf. section 2.4.1). Bandura described an indirect link between self-efficacy and academic achievement through goal setting or effort regulation strategies that serve as a crucial internal source (Bandura 2012:68). Students with high self-efficacy exert more effort than those with low self-efficacy (Kakaew & Damnet 2017; Bandura 1997; Zimmermann 2000). Bembenutty (2009:19) confirmed that self-efficacy is the strongest predictor of academic performance. A low perception of self-efficacy can undermine an individual's actual levels of ability, talent and potential (Eymur 2018:714). Self-efficacy beliefs are associated with performance because they affect motivation, thought processes and behaviour (e.g. procrastination) and therefore predict course satisfaction in traditional face-to-face classrooms (Eymur 2018). In a study on procrastination and achievement, Balkis (2011) found that when students are confident in their abilities, they may be more motivated to initiate their assignments without procrastination. According to Balkis (2011), higher levels of academic self-efficacy have

been shown to relate to factors negatively correlated to academic achievements, such as academic procrastination. Educators should acknowledge the critical components of academic achievement, namely academic procrastination and academic efficacy (Balkis 2011:9).

2.4.8 The role of self-concept in academic achievement

Self-efficacy is sometimes conflated with other psychological constructs in education research, such as self-esteem and self-concept (Bartimote-Aufflick *et al*. 2016:1919). Self-concept is broader than self-efficacy as it includes self-confidence, self-worth, self-acceptance, competence and ability and self-efficacy more constricted to self-confidence (Olivier *et al*. 2019:326). After nearly 30 years of research on *self-concept*, Marsh and collaborators postulate that achievement and self-concept are closely linked (Ferla *et al.* 2009:502). Individuals' knowledge and perceptions about themselves in academic achievement situations, referred to as academic self-concept, strongly influence their academic self-efficacy beliefs (*op.cit.*:499, 502). However, academic self-efficacy beliefs do not influence academic self-concept. Self-confidence, therefore, is the characteristic feature between self-concept and self-efficacy.

2.4.9 Theories contributing to self-efficacy

2.4.9.1 *Self-determination theory*

Self-determination theory (SDT), according to Ryan and Deci (2000:68), states that human motivation is regulated by an individual's propensity for assessing their current needs and constructing their actions in a way that addresses those needs. This theory states further that the psychological needs for autonomy, competence and relatedness must be met through supportive social contexts (e.g. the educational/learning environment) before self-motivation can be cultivated. Both autonomy and competence are completely determined by the social environment (Ryan *et al.* 2009:110).

From the perspective of social determination theory (Reeve 2012:153), student engagement is a multidimensional construct. According to this theory, student engagement during a learning activity has four interrelated aspects, namely behavioural, emotional, cognitive and agentic engagement. The teacher and the learning environment provide instrumental support.

2.4.9.2 *Social cognitive theory*

The social cognitive theory states that what people think, believe and feel, have an impact on how they behave, and these behaviours influence and are influenced by an individual's personal factors and the environment (Miller *et al*. 2017:261). The social cognitive theory supports the central role of self-efficacy in learners' actions, and how motivation and self-knowledge influence self-efficacy. Bandura (1991:248) states that human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence. These reciprocal interactions are key to understanding the complex relationship between teachers and students. The social cognitive theory explains one's actions through triadic reciprocal determinism, or the idea that personal factors, the environment and behaviour influence one another in a shared manner (Miller *et al*. 2017:261). According to social cognitive theory, four primary sources create students' self-efficacy (Bandura 1997; Van Dinther *et al.* 2011:97; cf. Section 2.4.1), namely:

i. enactive mastery experiences,
ii. vicarious learning (observational),
iii. social persuasions, and
iv. psychological states.

Research on situational and instructional factors in educational contexts that influence student self-efficacy found that social persuasion is helpful to develop beliefs of self-efficacy. For example, persuasive communication and evaluative feedback are most effective when students view people who provide this information as knowledgeable and reliable (Bong & Skaalvik 2003). By increasing attention to the role of students' thoughts and beliefs, self-efficacy is included in the learning process. Self-efficacy, a key element of social cognitive theory, appears to be an important variable because it affects students' motivation and learning (Van Dinther *et al.* 2011:97).

2.4.9.3 *Learning theories related to self-efficacy*

Several learning theories contribute to self-efficacy. Self-efficacy will affect what individuals choose to learn, how well they will learn it and whether they will stick with it or give up on it (Yancey 2013). Similarly, self-efficacy might be a predictor of performance because people predict their future performance on the experience of their past behaviour (Bandura 1977; cf. Section 2.4.1). This is supported by experiential learning theories described by Kolb and Knowles; Dewey's learning theory of reflective thought; Vygotsky's zone of

proximal development and Eymur's argument-driven inquiry (ADI). Kolb's learning theory defines experiential learning as a process by which knowledge is created through the transformation of experience in an experiential learning cycle (Kolb 1984). The experiential learning cycle for effective learning occurs if a learner can execute all four stages of the model only, which are:

i. Concrete experience,
ii. Reflective observation of new experience,
iii. Abstract conceptualization, and
iv. Active experimentation.

Self-efficacy is central to people's actions. The action to observe others (vicarious observation), an information source that self-efficacy arises from (Bandura 1986; 1997) can be regarded as a concrete experience, part of Kolb's learning cycle, from which to draw conclusions. This provides knowledge to the learner and influences self-efficacy (Bandura 1986). Knowles (1985), a theorist on experiential learning, defines andragogy as adult learning. The principles of adult learning (in which students are regarded as adults), state that learning is most effective if one can relate to previous experiences; therefore, previous concrete experiences that influence self-efficacy. Dewey's learning theory of reflective thought and action focuses on individual observations (concrete experiences) as embedded with prior conceptualization and interpretation (reflective observation) where learners need reliable guidance by peers and facilitators (Miettinen 2000). Verbal persuasion (guidance) is another source of information from which self-efficacy arises (Bandura 1986; 1997) and therefore influences self-efficacy. Vygotsky's theory corresponds with the guidance through the zone of proximal development that illustrates the place of expert assistance (Stocker *et al.* 2014) and the influence on self-efficacy through verbal persuasion. The denominator between the above learning theories that influences self-efficacy is, therefore, concrete experiences or observation of others. Eymur (2018:710) proposed a model for learning, namely, the argument-driven inquiry (ADI) that is based on social constructivist theories of learning. This model proposes that learning includes both personal (construction of knowledge & understanding) and social (supportive & educative interactions with people) processes. The personal processes correspond with the four stages of Kolb's learning cycle that provide knowledge and influence self-efficacy.

2.5 THEORETICAL FOUNDATION: CONSTRUCTIVISM

From a constructivist perspective, the reality is dependent on the "eye of the beholder"

(Kay & Kibble 2015:21). Constructivism as a learning theory defines learning as an individual construction process (Schcolink *et al.* 2006:12; Kay & Kibble 2016:21). Knowledge is subjective and actively constructed as learners engage with and make meaning of their lived experience (Fincher *et al*. 2000). Therefore, the principle of constructivism is the construction of new knowledge as learners take on an active role and observe and interact with their environment. The response to the environment is one of interaction versus reaction. Bandura's theories align with constructivism in the sense that the instructor (the teacher) has to set the example and reacts upon and interacts with this environment. De Leòn (2012:147) suggested that to precipitate sufficient challenge in a task; learners require a guide for the learning process. Therefore, the teacher has to assemble a scaffold to support knowledge. This suggestion was based on the sociocultural theory described by Vygotsky, who believed that adults foster children's learning and development intentionally and systematically (Vygotsky: online video recording).

2.6 STUDENT SELF-EFFICACY IN SCIENCE HIGHER EDUCATION

Worldwide reform in science higher education has occurred since 2004. There has been a paradigm shift in educational goals, from the traditional lower-order cognitive skills of teaching towards higher-order cognitive skills. This shift promotes learning that will enable students to become more successful (Zoller 2004:116). The application of this reform to emphasize higher-order skills involves transformative learning, which is also described as second-order learning (Ambrose 2010). An urgency to address science teaching appropriately in primary school already was emphasized and compounded after international assessments revealed a lack of student achievement (Rangasammy 2017:10). Three interrelated international goals were proposed on how all science teachers can effectively support student learning (Rangasammy 2017:3-4):

i. Focus on core ideas: The emphasis is moved away from too much content to a focus on the in-depth development of core explanatory ideas;
ii. Focus on practices: The central role of science and engineering practices is emphasized so that students can develop explanatory ideas and models through investigations and apply them to make sense of phenomena; and
iii. Focus on coherence: Science learning is managed as a coherent learning progression in which learners build ideas across time and between scientific disciplines.

Lecturers must deal with the educational challenges and establish the above goals in a

conducive teaching and learning environment to improve student self-efficacy. Walker (2003:174) suggested that if teachers can understand the situational nature of self-efficacy, they will be able to design classroom procedures to reinforce positive features for specific tasks. According to Linnenbrink and Pintrich (2003), classroom procedures can positively reinforce students' judgment about tasks. This is closely related to a student's actual engagement in the task. With the student-centred approach in mind, Naudé *et al.* (2014:214) hold the opinion that the teacher as part of the teaching and learning environment should be a facilitator and focus on creating an enabling environment. This should stimulate the natural propensity to learn, Rogers (1969) postulated that all humans have. This eagerness to learn can probably be regarded as the affective and behavioural processes that are moderated by self-efficacy (Schraw *et al.* 2006:111; Sitzman & Ely 2011:421; cf. Section 2.4.6).

2.6.1 Challenges in the South African higher education environment

2.6.1.1 *Heterogeneous student populations*

The worldwide paradigm shift presents particular educational challenges due to the increasing numbers of multinational and heterogeneous (different cultural, social & economic backgrounds) student cohorts in many higher education institutions (Dennehy 2015:818; Engelbrecht *et al.* 2006). Higher education institutions must prepare these students for life-long learning and increase the number of graduating students (Masui & De Corte 2005; Moseki & Shulze 2010:357). An investigation by Matoti (2011:153) at the Central University of Technology of the Free State (CUT) measured academic self-efficacy and concluded that first-time entering higher education students in SA experience problems in adjusting to the demands of the new learning environment. Lecturers must deal with this challenge. The importance of lecturer efficacy regarding students' culturally diverse backgrounds has been established through a study, focusing on the effect of lecturer efficacy on student achievement, particularly low-income culturally diverse students (Chakravarthi *et al.* 2010:161).

Another challenge demonstrated influencing learning approaches are students' attitudes regarding sciences and the learning of science. Therefore, a need to develop positive attitudes towards sciences already in secondary school was emphasized (Juan *et al*. 2016). Though the results of the 2010 and 2013 South African Social Attitudes Survey indicated positive attitudes about science, negative attitudes about the benefits of science has

increased since 1999. This decrease was attributable to students' experience that science learned in schools was not useful in their daily lives (Juan *et al.* 2018:48). This is evidenced through statements measuring scepticism towards science and that South Africans have become more concerned about the impact of science (Reddy *et al*. 2013; Reddy *et al*. 2015). Currently, there is concern about the attitude and comprehension of students when they start their higher education science training. The role of attitude in academic science achievement needs to be acknowledged by policymakers, parents and teachers. This must be accompanied by initiatives that actively develop a positive sense of self-efficacy in students (Juan *et al*. 2018:53).

A further challenge is the role of the socio-economic status in SA that cannot be overlooked when examining academic achievement. This is evident in students from schools in the wealthiest quintile that outperformed students from schools in the other four quintiles significantly (Van der Berg 2008). A quintile refers to five equal groups into which a population can be divided according to the distribution of values of a particular variable (online Thesaurus Dictionary). The question which arises from the latter statement concerns the impact of socio-economic status on students' academic performance at the higher education level.

2.6.1.2 *Modularized system*

A modularized system refers to the structure of the curricula of university degree programmes that consist of modules, representing the different subjects of the programme. Assessment of a module is independent of other modules (subjects). A module continues for a semester or one year followed by assessment (formative and/or summative). Usually, successful completion of the module serves as a prerequisite to continue with a subsequent module. A modularized system intends to provide flexibility and choice. Roick and Ringeisen (2018:157) state that many students have problems monitoring and regulating their use of learning strategies through metacognition. This often happens when students are in a university degree programme with a modularized structure (*op.cit*.:157). The modularized system of a university degree programme can pose a further challenge. Less successful learners lack adequate control strategies and use fewer strategies. Successful students, on the other hand, are better at selecting, combining and monitoring cognitive strategies like establishing associations that are required to manage the task at hand. Roick and Ringeisen (2018) recommend that it might be beneficial for universities to offer students teaching practices (training) on how to increase the effective use of learning strategies. Teaching

practices that incorporate progress feedback, modelled strategies, self-evaluation and goal setting may improve self-efficacy and achievement (Juan *et al*. 2018:49).

2.6.1.3 *Students' relationship with the institution*

A high-quality relationship between lecturers and students enhances learning. To provide a high-quality relationship with the students, a lecturer should apply attunement, relatedness, supportiveness and gentle discipline (Reeve 2006:232). Kriner (2016:iii) demonstrated that fostering relationships among students with the institution forms a significant component of building effective pathways to student success. At the UFS, the student-institution relationship is addressed through policies focusing on student-centred education. From 2018, these policies include "*Open, blended and engaged learning at the UFS*", the "*Integrated Transformation Plan*" and "*Engaging the student voice*" (UFS Annual Report 2018). Another attempt of the UFS to overcome these higher education challenges was to compile a strategic plan with specified goals for the period 2018-2022. The context of this study aligns to the second key performance area of the UFS Strategic Plan, namely "*Revise the structure of the curricula in terms of pathways and graduate employability*". When the institution revises the structure of curricula to be aligned with and complement graduate employability, the most effective strategy to motivate students' learning, namely an instructional approach, should be applied (Lin-Siegler *et al*. 2016:297).

A possible solution for all the educational challenges that could lead to enhanced student success in SA is addresssing student self-regulated learning and improving their self-efficacy (Moseki & Shulze 2010:358).

2.7 TEACHING AND LEARNING ENVIRONMENT FOR UNDERGRADUATE STUDENTS IN NATURAL SCIENCES

Factors in the teaching and learning environment relating to and applicable to the context of the study will be discussed.

2.7.1 The classroom

The classroom was identified as one of twenty critical factors in the teaching and learning environment that contributes to the educational climate (McAleer *et al.* 2009:65). Management of the classroom is intrinsically linked to both the content being taught and

the pedagogical process through which content is delivered and considered as fundamental to successful teaching and learning (Wolff *et al*. 2017:296). For management of a conducive and productive learning context in the teaching and learning environment (classroom management), seven characteristics should be included (Biggs & Tang 2011:60), namely:

i. Metacognitive control (reflective learning),
ii. Relevant learner activity,
iii. Formative feedback,
iv. Appropriate motivation,
v. A base of interconnected knowledge,
vi. Social learning, and
vii. Teaching quality.

Classroom management, therefore, is essential to support learning in the teaching and learning environment.

A dialectic framework, compiled by Reeve (2012:150) aligned with self-determination theory, explains how classroom conditions sometimes support but at other times neglect and frustrate students' motivation, engagement, and positive functioning in class. This dialectical framework also refers to the fact that a student's inner motivation and the classroom's surrounding influences are dynamically interactive (Reeve *et al.* 2004:31-60). According to Linnenbrink and Pintrich (2003) classroom procedures can therefore, positively reinforce students' judgment that is closely related to a student's actual engagement in the task. Classroom conditions should contribute to an autonomy-supportive environment that will support students' needs and not be controlling. Students experience a sense of competence, increased self-regulation, engagement and academic motivations, as well as lower anxiety in an autonomy-supportive environment (Black & Deci 2000; Hardre & Reeve 2003; Jang *et al.* 2012; Jang *et al.* 2010; Patall *et al.* 2010). Environmental structuring regarding the classroom and teaching strategies supporting student engagement in the educational context have been proposed as examples of nine self-regulatory processes that influence self-efficacy for learning resulting in improved student achievement (Sitzman & Ely 2011:436; Fackler & Malmberg 2016:187). The importance of positive classroom experiences, including engagement between teachers and students, has been highlighted (Juan *et al*. 2018:52). This emphasizes the importance of classroom engagement on academic achievement (Fong *et al.* 2019:94). Burger and Schmidt (2017:479) emphasized the vital role of the classroom environment and its interaction with trait goals when looking

at achievement and well-being goals. Trait goals are goals that are stable and generalized across learning contexts (*op.cit.:* 465). These authors further encouraged educational practitioners to provide educational designs that foster students' autonomy if they want to promote and sustain students' adaptive goals for learning situations. Miller *et al*. (2017:262) emphasized that respectful classroom environments motivate students to participate.

2.7.2 The teacher

The teacher (lecturer) has an influential role in the classroom through classroom management, skills to create the learning environment, to encourage students and to apply the appropriate teaching approach (McAleer *et al.* 2009:65; Fackler & Malmberg 2016; Wolff *et al.* 2017; Juan *et al*. 2018:49). These multifaceted actions performed by a teacher should maximize learning, which is the primary purpose of teaching (Wolff *et al*. 2017:296). A safe learning environment contributes to learning and supports students to demonstrate creativity, intellectual curiosity and higher-level thinking (Cornelius-White 2007). In the affirmative presence of security and support, students are more open and willing to involve themselves in the learning process, facilitating autonomy and adding to the affective value of learning (Naudé *et al.* 2014:224). The multifaceted actions contribute to teacher efficacy, which is a critical component for successful classrooms and include creating, supporting and facilitating goals of instruction and learning through classroom events (Miller *et al*. 2017:262; Wolff *et al*. 2017:296). The teaching approach in a classroom environment should focus on clear instructions and encouragement; although stressful, a supportive environment will facilitate student growth and skills development (Cooke *et al*. 2017:1; Zaidi *et al*. 2017:547). Therefore, the teaching approach contributes to the learning environment created (Pajares 2002).

The influential role of the teacher is emphasized through the contents of a classroom event that depends on the teacher's perception and interpretation of a given classroom situation (Wolff *et al.* 2017:296). Classroom environments are perplexing, unpredictable and multidimensional, and therefore interpretation of the abundant array of classroom events can be arduous (Wolff *et al*. 2017:297; Brophy 1988). Teachers will be able to design classroom events to reinforce positive attributions for specific tasks if they understand the situational nature of self-efficacy (Walker 2003:174). Therefore, it seems that successful teaching requires more than professional knowledge. Teacher enthusiasm in conveying knowledge improves student performance (Mahler *et al.* 2018:14).

2.7.3 Teaching strategies

Teaching strategies or techniques refer to a designed plan of action with methods used in a lecture. The methods include a structure, instructional objectives and an outline of the planned tactics necessary to implement the strategies. This assists students to learn the desired subject contents which include structure, instructional objectives and an outline of planned tactics necessary to implement the strategies. Teaching strategies should contribute to enabling students to develop achievable goals in the future (Stones & Morris:online). Teaching and learning strategies have a substantial impact on self-efficacy, motivation and student performance. Diverse teaching techniques in the classroom should be used to dynamically involve students to achieve advanced levels of learning (Zaidi *et al*. 2017:547). Dent and Harden (2009:13) describe good teachers as those who use a range of teaching methods and apply these methods most appropriately.

Teaching strategies also include a range from the traditional face-to-face classrooms towards technology-infused strategies, for example, the flipped classroom. This strategy includes student-centred activities and participation in discussion, allowing students to effectively control the content, organize effective experiences, think creatively, reinforce cognitive development and improve their academic performance (Al-Jaser 2017:67). A student-centred approach allows learning to be more authentic, enjoyable and intrinsically motivating (Deboer 2002:407). Content attainment is shifted forward to outside of class and then followed by instructor-facilitated concept application activities in class (Jensen *et al*. 2018:1). The flipped classroom integrates two learning theories, namely traditional learning and active learning (Al-Jaser 2017:68). It contributes to encourage and improve higher-order thinking skills in the domains of application, analysis, synthesis and evaluation. This might serve as a solution for Mclaughlin's (2014) concern about the skills of application, analysis, synthesis and evaluation that should be reached to prevent a lower quality of higher education.

Students' performance in science learning activities is related to self-efficacy (Capa Aydin & Uzuntiryaki 2009). The Knowledge Integration Environment (KIE) framework proposes some identified goals for science learning to be accomplished with the use of specific teaching strategies (Linn 2000). These goals are: making science accessible, making thinking visible, helping students learn from each other, and promoting life-long science learning. These goals support science learning activities and are aligned with the Next Generation Science Standards (NGSS), introduced in 2013. The 2013 NGSS differ from

earlier standards in their focus on having students understand and demonstrate their science knowledge by using it (Roseman & Koppal 2015:24) and culminate in the concept of three-dimensional learning. The three dimensions consist of the student engaging in science practices, using disciplinary core ideas and crosscutting concepts to make sense of new information. This should enable students to explain phenomena in the world around them, solve problems, and make informed decisions. Teachers may need to assist students to relate the new material with what is already known about the topic (Shen *et al*. 2016:1540) and to apply their knowledge for problem-solving and encourage them to adopt deep learning strategies (Roseman & Koppal 2015:24). The learning environment should support and promote deep learning strategies (Bonsaksen *et al.* 2017:327). Deep learning strategies may promote advanced self-efficacy and further produce excellent learning performance.

Layered learning is a teaching strategy that facilitates skill development. It consists of basic activities (vicarious experiences), directed activities (building essential skills) and collective activities (application of multiple skills) (Cooke *et al*. 2017:1). From the literature on self-efficacy and teaching strategies, a close link between self-efficacy and strategy use was clear (Anam & Stracke 2016:8). This link highlights the motivational role of self-efficacy in strategic learning. It also supports the argument that students need not only skills or strategies but also motivational beliefs for successful attainments. Schraw *et al.* (2006:117) identified six general instructional strategies within the teaching and learning environment for improving science learning. The following areas were identified, based on an international review of selected science education journals:

i. inquiry-based learning;
ii. the role of collaborative support,
iii. the instruction regarding a strategy to promote problem-solving and critical thinking,
iv. strategies for helping students construct mental models and to experience conceptual change,
v. the use of technology, and
vi. the impact of student and teacher beliefs.

The application of inquiry-based learning (cf. 2.7.3i), supported with authentic research laboratory activities (research-inspired laboratory modules), increased students' self-efficacy beliefs in their ability to complete inquiry activities. The research laboratory activities allowed students' experimental results to contribute to real research projects

conducted by scientists (Winkelman *et al*. 2015:247, 254). Core skills to promote critical thinking (cf. 2.7.3iii), regarded as a metacognitive process (Dwyer 2017:47) that should be taught explicitly, include interpretation, evaluation, explanation, analysis, self-regulation and interference (Facione 2015:5). Despite the current rapid technological development and widespread use of technology among students, Shin (2015) remarked that teachers have not yet fully adopted technology to improve classroom teaching.

If the aim of the teacher is the improvement of self-efficacy in science, classroom teaching should incorporate practices that motivate and support students to enhance their confidence in their abilities (Juan *et al*. 2018:52; Fong *et al*. 2019:94; Reeve 2012:151). Student engagement cannot be separated from the social context in which it occurs. Therefore, strategies in the classroom to promote inclusive teaching, starting at primary school already, should be applied (Lai *et al*. 2016). These strategies include clear and appropriate communication of instructions, collaborative effort to succeed and management of students' behaviours.

2.7.4 The learning process

Learning is considered a continuous process that entails rapid changes; therefore, educators need to examine their teaching methods frequently to see if they continue to meet the needs of learners (Zaidi *et al*. 2017:551). Regulated learning as characterized by Pintrich (2000) is an active, constructive process whereby learners set goals for their learning, and a further attempt to monitor, regulate and control their cognition, motivation and behaviour. These attempts are guided or constrained by learners' goals and the contextual features in the environment. Säljö (1982) describes students as having one of five conceptions regarding learning, namely:

i. learning as a passive receipt of information;
ii. learning as active memorization of information or procedures to be used in the future;
iii. learning as understanding;
iv. learning as a change in personal reality; or
v. learning to see the world differently.

The abovementioned conceptions of learning (cf. 2.7.4i-iii) referred to as unsophisticated, are characteristic of traditional lower-order cognitive skills that do not allow for transformative learning (Gibbs & Simpson 2005:22). The students with these conceptions

of learning might experience difficulty to understand feedback. Transformative learning, referring to higher-order cognitive skills, is necessary to promote learning that will enable students to become more successful (Zoller 2004:117). This entails a qualitative shift in perception and meaning formation and happens in a particular learning experience (Sterling 2010:19). Dweck (1986:1043) states that one of the hallmarks of effective learning and intelligent thinking is the tendency to apply or transfer. A model developed to enhance effective students' learning, directs learning towards acquiring the necessary capabilities to enter and practice a particular vocation within the health sciences (Barradell & Kennedy-Jones 2015:538). It introduces threshold concepts moving the emphasis from "*what*" (content) to the "*how*" and "*why*" of a curriculum task.

Academic hardiness, defined as the courage and motivation needed to turn stressful changes from burdens and disasters into advantageous growth in academic settings, plays a vital role in explaining the structure of self-efficacy in science learning (Wang & Tsai 2016:537). According to these authors, intrapersonal and interpersonal experiences (students' science hardiness) may influence self-efficacy (*op.cit*.:540).

Procrastination negatively affects learning and academic achievement culminating in widely-experienced problematic behaviour among college students (Balkis 2011:2). A high level of procrastination is related to low self-efficacy and poor academic achievement. Students with confidence in their ability are less likely to procrastinate (Balkis 2011).

2.7.5 Learning approaches

Ramsden's theory (1992:52) on teaching and learning states that each individual has a tendency to take a particular approach to learn on a continuum ranging from meaning-oriented to reproduction-oriented. A learning approach, in general, refers to the motivations that drive students' learning (Feely & Biggerstaff 2015:238). Meaning-oriented learners have an internal focus to gain in-depth understanding, while reproduction-oriented learners use a more external focus to complete surface level tasks. Dart *et al*. (2000) investigated the association between students' conceptions and their approaches to learning science. They found that students with more sophisticated conceptions of learning science are more likely to draw on more in-depth, meaningful approaches. They also tend to have higher self-efficacy for learning. Bonsaksen *et al.* (2017:326) confirmed that students with high academic self-efficacy were more prone to use a deep or strategic approach to studying, whereas students with low academic self-efficacy use a surface approach *(op.cit.*:329).

2.7.6 Factors relating to academic achievement

Factors related to academic achievement other than self-efficacy beliefs will be discussed.

2.7.6.1 *Lecturer's role*

To be able to guide students to learn, progress and achieve, a lecturer should have theoretical and conceptual integrity and act as a facilitator of their inner motivation (West 2013:19). The lecturer as the facilitator should focus on creating an enabling environment to facilitate the development of students (Naudé *et al.* 2014:214). Lecturers who believe student learning can be influenced by effective teaching and have confidence in their teaching abilities, persist longer to provide a greater academic focus in the classroom (Gibson & Dembo 1984:570).

2.7.6.2 *Emotion*

In the context of enabling students to become more successful, factors independent to the teaching and learning environment should be kept in mind as well. One such factor is the specific life phase experienced by undergraduate students as emerging adults. Naudé *et al.* (2014:212) note that young adult students are undeniably involved in the complex processes of learning and development. These authors mentioned that the complex and continuous interplay between the intellectual and the emotional should be acknowledged in students' realities. This statement points to an essential question regarding the role of the teaching and learning environment to enable the development and success of emerging adults through learning.

Psychologists agree that four primary routes exist through which affect (emotions) might influence learning and performance (Artino *et al*. 2012b:241). These routes exist through storage and retrieval processes (mood dependent memory), the use of different cognitive and metacognitive thinking strategies, the impact on cognitive resources and its effects on intrinsic and extrinsic motivational processes. According to these routes, the following became apparent:

i. students who experience negative affect are less likely to use more in-depth processing strategies and require a much more positive approach to engage in an academic task;
ii. emotions take up working memory space and can negatively impact an individual's cognitive load and leave fewer cognitive resources for processing activities essential for

task completion; and

iii. extrinsic motivation influencing learning and performance is less beneficial in the long term than intrinsic motivation.

Allowing students to engage with the subject on a deeper than purely theoretical level (activities, e.g. groups tasks & discussions) has been indicated as a possibility to increase the level of emotional self-efficacy through teaching or training (Pool & Qualter 2012:309). This level of engagement would fit with Bandura's idea of providing mastery experiences that is proposed as the most effective way of creating a strong sense of self-efficacy (Van Dinther *et al.* 2011:99; Pool & Qualter 2012:310).

Understanding emotions in education is essential (Pekrun 2006:317). According to the control-value theory, a comprehensive, integrative approach to understanding emotions in education is necessary (Pekrun 2006:315). Pekrun focused on achievement emotions defined as emotions tied directly to achievement activities or achievement outcomes (Pekrun 2006:317). It is assumed that distal factors influence achievement emotions through their effect on control and value appraisals. Distal factors refer to environmental antecedents, e.g. the characteristics and cognitive demands of the task (Artino *et al*. 2012a:e150). The control-value theory predicts how achievement emotions influence cognitive resources, motivation, use of strategies and self-regulation (Pekrun *et al*. 2007:16). From the perspective of the control-value theory, it became apparent that emotion, motivation and cognition are conceptually separate, although these three are often integrated (Pekrun 2006:330).

2.7.7 Student engagement

Student engagement in the classroom is viewed as a multidimensional construct from the perspective of self-determination theory. It is a construct relating to basic needs, organismic integration theory, goal contents theory, cognitive evaluation theory and causality orientations theory (Vansteenkiste *et al.* 2010; Reeve 2012:153). These are the five key principles of the self-determination theory. Student engagement fully mediates and explains the motivation-to-achievement relation. Changes in engagement produce changes in the learning environment and motivation, as students' behavioural, emotional, cognitive and agentic engagements (interrelated aspects of students' engagement) represent actions taken not only to learn but also to meet psychological needs (Reeve 2012:149). Therefore, engagement during learning activities must have behavioural, emotional, cognitive and

agentic components (Reeve 2012:151). The teacher and the learning environment are instrumental in support. The emphasis should be on self-efficacy as an important construct to understand students' involvement in learning activities (Jaeger & Adair 2018:773). Self-efficacy's influence on students' choice of learning activities, willingness to persist and their decisions on how much effort to invest, should be the focus to understand students' engagement (Bandura 1982, 1986; Bandura & Cervone 1986).

Student engagement cannot be separated from the social context in which it occurs (Reeve 2012:151). Constantine *et al*. (2019:2) mentioned that the physical presence of students in the classroom does not necessarily guarantee that they will learn. Active participation in the learning environment is necessary to activate students' thought processes. Similarly, task engagement has a strong correlation with self-efficacy (Ouweneel *et al.* 2013:238).

In conclusion, there are many challenges in higher education teaching and learning environment. The UFS Annual Report (2018:23) "*Engaging the student's voice*", addresses criteria that strive to create a deeply contextualized, effective and efficient higher education system, namely:

i. A "*living*" differentiated mission and lived educational philosophy;
ii. Creating learning environments (physical and psychological) that promote inclusion and educational enrichment;
iii. Clarifying the pathways that maximize student success;
iv. Facilitating an improvement-orientated institutional culture and ethos; and
v. Making sure that everyone in the institution owns the quality of learning and student success.

What comprises a successful student? According to Brookhart (2001:153), successful students use both their marks (academic outcome) and feedback in the process of active self-assessment to learn and to self-direct their future studying. The most significant variables may be related to the student rather than the teacher (Gibbs & Simpson 2005:25). A few authors agree that successful students have a greater sense of self-efficacy and attribute their success to controllable factors such as effort, strategy use and perseverance. Self-efficacy relates positively to achievement outcomes (Moos & Azevedo 2009:578) and it seems that self-efficacy may positively influence students' choice of future learning activities (Artino 2010:275). Aurah (2013:334) concluded that self-efficacy is especially important in learning challenging subjects such as biology and sciences. Hassan (2008)

examined the influence of attitudes on science in secondary and higher education levels in terms of enjoyment and value. The latter author was of the opinion that students' enjoyment of science and the value they place on it in terms of its usefulness, can affect their commitment and motivation to learn the subject. Findings of Pekrun *et al*. (2007:26) confirm that enjoyment, regarded as a positive activating emotion, increases interest and strengthens motivation. Therefore, there are a variety of critical factors contributing to successful teaching and learning.

2.8 GUIDELINES FOR STUDENT SELF-EFFICACY

Guidelines applied by lecturers are necessary to guide students towards correct choices to achieve success. This statement is emphasized by Bandura (2012) stating: "*"By their choices of activities and environments, people set the course of their life paths and what they become."* The process of guideline development should follow the logic that a problem first needs to be understood before ideas are developed (Ohly *et al*. 2017:126). Students' self-efficacy beliefs can increase when they receive support through teaching and learning strategies (Kakaew & Damnet 2017:20). Therefore, guidelines to improve self-efficacy in the teaching and learning environment should be aligned with teaching approaches and strategies. Constantine *et al*. (2019:5) reported six instructional practices to build positive student self-efficacy in the classroom:

i. Task engagement;
ii. Social-communicative engagement;
iii. Self-regulated learning;
iv. Multi-sensory learning activities;
v. Supportive feedback and
vi. Student-centred learning.

According to Constantine's six instructional practices, student self-efficacy will be positively developed if students are active participants in tasks (task engagement) to access the learning environment and activate their thought processes. Their physical presence in the classroom does not guarantee access to learning. Engagement through effective communication with teachers and other students (social-communicative engagement) is critical to achieve academic success and therefore builds self-efficacy. Motivation through verbal encouragement (persuasion) by an authority figure influences students' self-efficacy. When in a difficult situation, adaptation is highly related to one's motivation. It is the main

factor in successfully improving adaptive functioning to apply self-regulating behaviour (self-regulated learning). Multi-sensory learning activities stimulate the biological, emotional and social domains to incorporate metacognitive skills for regulation. Supportive feedback through a particular communication style and teaching strategy have a direct impact on students' development of self-efficacy. The focus in the classroom should be on the student perspectives (student-centred learning) to support student self-efficacy by adapting teaching approaches.

Achievement of successful academic outcomes should focus on teaching approaches that actively engage students in taking responsibility for their learning (Van der Merwe 2011:49). Active engagement of students is based on and aligned with the teaching approach "(*what the student does*)" as proposed by Biggs and Tang (2011:16-20). Active engagement of students can be done by incorporating teaching and learning activities that encourage active, deep learning (Van der Merwe 2011:49). Teaching activities should occur in a motivational context that allows enjoyment while students learn through concrete experience, reflection, conceptualization and experimentation. This will address the engagement of students (Deci & Ryan 2002; Stocker *et al.* 2014). Guidelines should focus on teaching strategies aligned with an instructional approach to motivate student learning (Lin-Siegler *et al*. 2016:297; cf. Section 2.6.1.4) and address the gap between students' longer term academic desires and their shorter-term actions (Corno & Mandinach 2004). These teaching strategies should include stated goals, i.e. momentary, context-specific goals that are significant predictors of proximal learning behaviour (Bürger & Schmidt 2017:464). Focus on student autonomy support and the relevance of the contents to learn contribute to successful goal-setting for achievement in learning environments (*op.cit*.:479). Bandura and others have suggested that teachers should implement instructional practices not only to foster knowledge and skills attainment but also to promote the development of the necessary accompanying confidence (Bandura 1997; Pajares 1996). The attention should not only be on achievement goals, but well-being goals should also be considered in learning settings. Well-being goals include emotions that undoubtedly influence motivation, effort and study strategies (Artino *et al*. 2012b:240). In addition, instructional goals should be structured clearly to attain equilibrium between the amount of challenge in academic activities and students' capabilities. This equilibrium will influence not only emotions positively, but also subsequent motivation, learning and performance due to the potential to increase appraisals of control and value (Artino 2012).

Anam and Stracke (2016:7) motivate the need for guidelines for student self-efficacy

through the teaching of strategies for efficacy. Students who perceive themselves as capable of performing tasks tend to use learning strategies more often (Anam & Stracke 2016). These learning strategies are effective despite less supportive environments or increased fear of making mistakes (*op.cit*.:8).

In conclusion, although instructional practices to develop student self-efficacy are indicated, guidelines for student self-efficacy in the specific context of the teaching and learning environment of undergraduate students in Natural Sciences, are lacking.

2.9 CONCLUSION

Chapter 2 aimed to provide a review of existing literature and the theoretical framework. The review explored theories and literature to conceptualize and contextualize student self-efficacy in the teaching and learning environment of undergraduate students in Natural Sciences. This review supported the experimental phase of the study.

In Chapter 3, *Research design and methodology*, the research design, methods used to address the objectives of the study, data collection and analysis will be presented.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research design and research methodology used in the study. A mixed-methods sequential explanatory design (cf. Figure 3.1) was used to address the research questions posed in Chapter 1. Furthermore, this chapter provides an explanation, motivation and discussion of the methods used in each phase. This study comprised of two phases, each with its own objectives and methodology:

i. Phase 1 (quantitative research)
   a. Quantitative data were collected by means of a self-efficacy questionnaire to determine the current status (low or high) of student self-efficacy in the Natural Sciences teaching and learning environment at the UFS.
   b. Academic performance (most recent assessment marks in Physiology modules) was used to identify participants for the semi-structured interviews by purposive sampling for Phase 2.

ii. Phase 2 (qualitative research)
   a. Qualitative data were collected by means of semi-structured interviews with 26 students and 20 lecturers. Questions for these interviews were constructed from the results of the questionnaires in Phase 1.

Data were analysed (cf. Sections 3.3.3.2f & 3.3.3.3f) and the results used to compile guidelines for lecturers to improve student self-efficacy in the Natural Sciences teaching and learning environment at the UFS.

In the following section, a description of the theoretical perspectives on the research paradigm and design will be given, followed by an explanation of the research methods, the target population and sample, data collection, data analysis, trustworthiness and ethical considerations.

3.2 THEORETICAL PERSPECTIVES ON THE RESEARCH PARADIGM AND DESIGN

3.2.1 Research paradigm

A research paradigm is the researcher's philosophical departure point or worldview as the study relates to a methodological approach and research design (Trafford & Leshem 2008:94-97).

3.2.1.1 *Philosophical paradigm*

The term paradigm refers to the summation of ontology, epistemology and methodology. It has been used by researchers in the past to refer to different models and factors that reflect a driving force in determining an individual's orientation to research (Guba & Lincoln 2004:107). The ontology (perceptions or beliefs about knowledge) and epistemology (ways of acquiring knowledge) of the researcher must be considered when deciding on the most appropriate design to answer a research question (Bazely 2004:2). The investigation of the objectives of this study were informed by the philosophical paradigm of constructivism.

The ontological orientation of constructivism is related to investigation of local and constructed realities. In this study, the ontological orientation focused on the investigation of the reality of student self-efficacy in the teaching and learning environment. The epistemological view is transactional, focusing on the created findings. In this study, the epistemology focused on the theory of knowledge about the methods, validity and scope of this study to development guidelines for student self-efficacy. The methodological view is hermeneutical, which is the interpretation of meaning, suggesting that the nature of the factors can be elicited and refined only through interaction between and among investigator and respondents (Guba & Lincoln 2004:108). Therefore, hermeneutics focuses on developing inter-subjectivity to clarify the interpretive meaning. According to Lopez and Willis (2004:729), the focus of hermeneutic inquiry is what the individual's narratives imply about his or her experiences every day. In this study, the methodology focused on the determination of the current status of self-efficacy and gaining depth through individual semi-structured interviews with students and lecturers.

3.2.1.2 *Research paradigm*

The investigation of the objectives of this study were approached by means of a pragmatic

research paradigm (Creswell 2009:10). Research paradigms arise from the individual's philosophical orientation and refer to how perceived understanding and judgements of ontology, epistemology and methodology impact the conduct of research (Guba & Lincoln 2004:108). Pragmatism as a worldview arises out of actions, situations and consequences rather than antecedent conditions (Creswell 2009:10). Datta (1997), pioneer for pragmatism as the foundation for mixed-methods, proposed "*pragmatic*" as the essential criterion for making design decisions practical, contextually responsive and consequential. The focus is on solutions to problems and therefore the basis for mixed-methods. Within this paradigm, a mixed-methods design was therefore the best approach to answer the research questions of this study.

In the following sections, the rationale for the mixed-methods research design approach as well as the specific mixed-methods design used will be discussed.

3.2.2 Theory building

Quantitative research may historically be viewed as a scientific prediction or explanation that is still valid as a theory today (Creswell 2009:51). Johnson and Christensen (2014:86) added to this definition of theory that it is an explanation that discusses how a phenomenon operates and why it operates as it does. Another of these historical examples is Kerlinger's (1979:64) definition, viewing a theory as a set of interrelated constructs. The interrelated constructs are formed into propositions that present a systematic view of phenomena by specifying the relation between the constructs. Its purpose is the explanation of natural phenomena. Therefore, theories are devices that systematize or organize experience (Bendassolli 2013).

There are multiple methods and designs to collect and analyse data. Mixed-methods design has a theory-data relationship where the data verify the theory. When the *Handbook of Mixed-Methods in the Social & Behavior Sciences* by authors Tashakkori and Teddlie was published in 2003, giving a comprehensive overview of this strategy of inquiry, it emphasized the mixed-methods design as providing impetus to its further development. Patton (2015:1) stated that theory informs practice and practice informs theory. According to Greene (2007:xii), a mixed-methods way of thinking involves an openness to multiple ways of seeing and hearing, and to multiple ways of making sense of the social world on what is important and to be valued.

The research paradigm, pragmatism, provides the opportunity to use different forms of data collection and analysis within a mixed-methods design (Creswell 2009:11). Mixed-methods research is a research approach (or methodology) in which the researcher collects, analyses, and mixes (integrates or connects) both quantitative and qualitative data in a single study or a multiphase programme of inquiry (Creswell 2015:17). It can also be referred to as corroboration which is the examination (convergence) of evidence from different data sources, using it to build a coherent justification for themes (Creswell 2009:213).

According to Greene (2007:xii),

> "*the core meaning of mixed-methods social inquiry is to invite multiple mental models into the same inquiry space for purposes of respectful conversation, dialogue and learning one from the other, toward a collective generation of better understanding of the phenomena being studied".*

Therefore by definition Greene (2007:xii) stated that mixed-methods social inquiry involves a plurality of philosophical paradigms, theoretical assumptions, methodological traditions, data gathering and analysis techniques and personalised understandings.

Mixed-methods designs are either concurrent or sequential. In this study, a sequential design was used. The following types of sequential designs have been described by Creswell (2009:209):

i. *Sequential explanatory strategy*: Collection and analysis of quantitative data in one phase and followed by collection and analysis of qualitative data. Mixing of data occurs when the initial quantitative results informs the secondary qualitative data collection;
ii. *Sequential exploratory strategy*: Collection and analysis of qualitative data in one phase followed by quantitative data collection and analysis that builds on the results of the first qualitative phase; and
iii. *Sequential transformative strategy*: The initial phase can be either quantitative or qualitative followed by a second phase, either qualitative or quantitative that builds on phase one.

The mixed-method design suitable and applicable for this study was a sequential explanatory strategy (cf. Figure 3.1). The initial quantitative results informed the secondary qualitative data collection that contributed to the mixing of data.

3.2.3 Strategy of inquiry and research approach

Mixed-methods have gained interest because this research design continues to evolve and develop, utilizing the strengths of both quantitative and qualitative research (Creswell 2009:203). According to Halcolm's Laws of Inquiry, qualitative inquiry:

> *"There is no burden of proof. There is only the world to experience and understand. Shed the burden of proof to lighten the load for the journey of experience"* (cited in Patton 2015:1).

The strength of quantitative methods is to measure the reactions of many respondents, asking standardized questions that limit the responses to predetermined categories with more breadth of data and less depth than qualitative methods. The strength of qualitative methods permits inquiry into selected issues in great depth with careful attention to detail, context and nuance (Patton 2015:257). This type of data collection is not constrained by predetermined categories. Halcolm quoted the following on pragmatic qualitative inquiry:

> *"Utility is its own demonstration of truth. Thus, what is useful is true" (*cited in Patton 2015:152).

The strengths of quantitative and qualitative methods support each other to explore the breadth and depth of data as utilised in this study. The current status of student self-efficacy was determined with a questionnaire (quantitative data) to provide a broad view of self-efficacy. Semi-structured interviews (qualitative data) with students and lecturers followed thereafter to gain depth and insight regarding the results from the questionnaire. Corroboration of information across these sources and the inductive approach to the qualitative analysis made it possible for the researcher to compile guidelines for student self-efficacy in the teaching and learning environment. The inductive approach for the qualitative data analysis is aimed at the generation of new concepts, explanations and results.

According to Creswell and Plano-Clark (2007:207), qualitative and quantitative data can be integrated at several stages, e.g. at the time of data collection, during analysis or during interpretation. In this study, quantitative data were analysed to inform the qualitative data collection. Quantitative and qualitative data were combined and integrated at the time of interpretation of the data to address the aim, research questions and objectives comprehensively.

3.3 RESEARCH METHODS

Research methods involve the forms of data collection, analysis and interpretation that researchers propose for their studies (Creswell 2009:15). In this section, information on the research design, methods of investigation, sampling, data collection, data analysis, validation and ethical considerations is provided.

3.3.1 Research questions

The research design and methods were chosen to answer the research questions appropriately, which were:

i. What is the current status of self-efficacy among undergraduate students in the Natural Sciences?
ii. Which issues in the teaching and learning environment influence self-efficacy of undergraduate students in the Natural Sciences?
iii. Which guidelines can be suggested based on the identified issues that will improve self-efficacy amongst undergraduate students in Natural Sciences?

3.3.2 Research design of the study

The research design was a mixed-methods approach with a sequential explanatory design (Creswell 2009:211; cf. Figure 3.1) in two phases (cf. Section 3.1).

The rationale for the mixed-methods approach is explained in Section 3.2.3. The sequential explanatory design used, gave the researcher the opportunity to explain and verify the findings from Phase 1 during Phase 2.

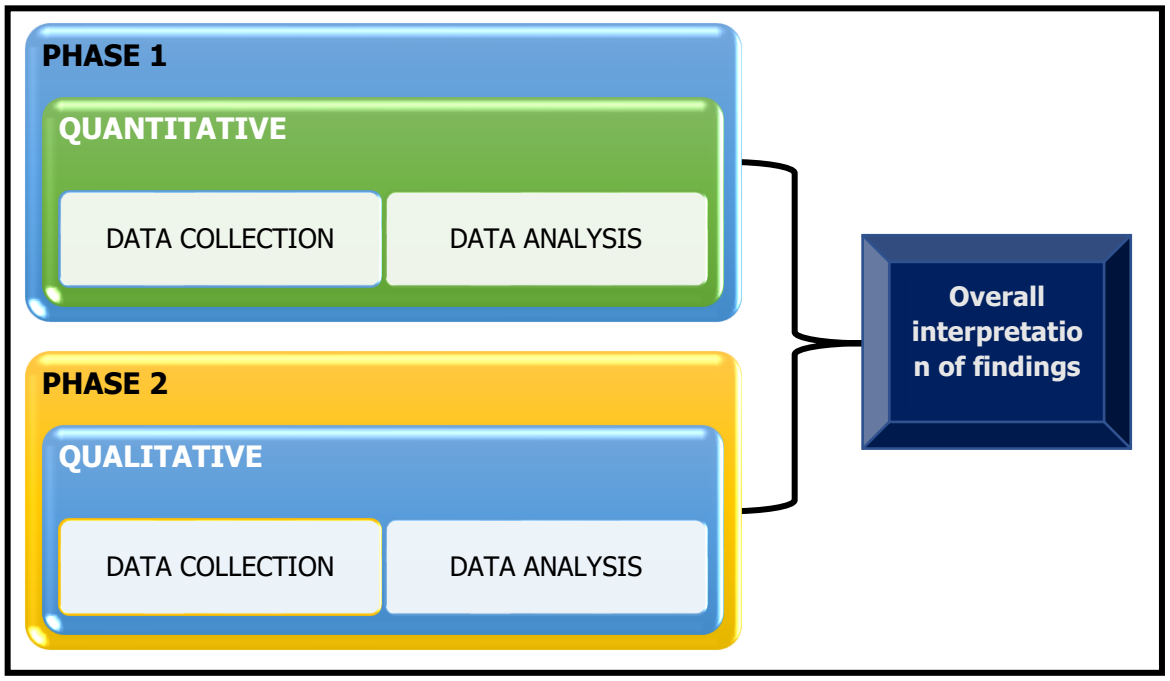

Figure 3.1: Sequential explanatory design (adapted by the researcher, Vorster de Wet from Creswell 2009:209)

3.3.2.1 *Phase 1: Questionnaire (Quantitative)*

In Phase 1 of this study (quantitative data collection and analysis), data were collected by means of a questionnaire to determine the current status of self-efficacy among undergraduate students in Natural Sciences, at the UFS, SA, enrolled in undergraduate Physiology modules. The questionnaire data were statistically analysed and findings used to develop questions used in Phase 2 (semi-structured interviews).

The questionnaire (cf. Appendices 3.2A & B) that was used in Phase 1 of the study, obtained self-reported data (quantitative) from students regarding self-efficacy. The following strengths of a questionnaire were applicable for the instrument that was developed in this study: It was a good instrument to measure attitudes; it was inexpensive and could be administered to a large group (Johnson & Turner 2003:303).

3.3.2.2 *Phase 2: Semi-structured interviews*

In Phase 2 of this study, once-off face-to-face semi-structured interviews (cf. Appendices 3.3A & B) were conducted with 26 students and 20 lecturers, lasting 25-45 minutes, to explore students' perceptions of their self-efficacy and lecturers' experience of students' self-efficacy. These interviews included a combination of both open- and closed-ended questions and were based on the findings of the questionnaire results in Phase 1. The close-

ended questions refer to the demographic data. Semi-structured interviews refer to a conversation with a goal, as part of qualitative research to inquire about things we cannot directly observe and to understand what we have observed (Patton 2015:426). In this study, the interview focused on different constructs within the teaching and learning environment related to students' self-efficacy. Open-ended questions revealed students' views of these constructs that might influence their self-efficacy as well as their view of self-efficacy. Constructs that were addressed were:

i. Student learning in the teaching and learning environment (*Self*);
ii. Motivational strategies (*Motivate*);
iii. Student engagement in class (*Class*) and
iv. Student engagement with studying (*Study*).

The findings from the semi-structured interviews assisted in identifying issues regarding self-efficacy in the teaching and learning environment to be addressed by the guidelines developed in this study.

The use of and corroboration of multiple sources of information as well as multiple participant groups (students and lecturers) allowed the researcher to examine the breadth and depth of the current status of student self-efficacy to be able to compile guidelines to improve student self-efficacy.

3.3.3 Methods of investigation

The research methods were chosen to answer the research questions appropriately.

3.3.3.1 *Literature study*

Trafford and Leshem (2008:67) believe a literature search and literature study (analytical reading) are an integral part of any serious research. The term "literature" refers to a corpus of published works on a specific topic which gives the opportunity to engage with certain theories. The aim of a literature study is to conceptualise a research problem and locate it in a body of theory. It also serves to explore what has been done and to become familiar with the body of accumulated scholarship in the field of study interest (Mouton 2001:87). Literature therefore adds to the development of theoretical perspectives which will contribute to the practical solutions of crucial research questions.

In this study, literature searches were conducted on the following databases: NEXUS, NRF, SA Information thesis/dissertations, ENATURAL SCIENCES, EBSCOhost web, ERIC, Academic search complete, African wide information, PsycARTICLES, PsycEXTRA, PsycINFO, PsycTESTS, Proquest and Teacher Reference Centre. Keywords used for the literature search were: undergraduate students, student self-efficacy, self-efficacy, student motivation, student engagement, higher education, learning approaches, learning theories, teaching and learning environment and student guidelines.

The literature study aimed to describe the theories, history and current status of the teaching and learning environment with regard to self-efficacy. This provided the necessary background and context to the stated problem and provided information to identify the knowledge gap. The literature study also served to provide the information to compile the questionnaire. It also formed the basis for the development of the semi-structured interviews in the study as well as for providing content for the final development of guidelines for student self-efficacy.

A literature search was done for a self-efficacy instrument (questionnaire) specifically contextualised for the teaching and learning environment.

3.3.3.2 *Instrument development*

Phase 1 of the study was preceded by a literature search to explore the literature in international, national and local context and to develop the instrument to be used during Phase 1 of the study. The literature search contextualised the concepts to be included in the questionnaire in order to refine the instrument used for data collection. The instrument had to enable the researcher to determine the status of self-efficacy of undergraduate students in the teaching and learning environment. Based on the literature consulted, a single suitable questionnaire was not available and therefore certain questions were adapted (constructs to be measured) from four different questionnaires. The questionnaire was compiled after consultation with an expert on the design of questionnaires (Dr Marianne Viljoen personal communication: 28 July 2016). She advised the researcher that applicable questions from different questionnaires could be taken to compile a new questionnaire which would be valid. The four questionnaires chosen may be reproduced and used for non-commercial research and educational purposes without seeking written permission (PsycTESTS database). If calculated internal consistency estimates of reliability for each questionnaire indicate high Cronbach alpha reliability coefficients (close to 1), combination of multiple questionnaires will maintain reliability (cf. Section 3.3.3.2a) (Dr Marianne Viljoen

personal communication: 28 July 2016). The questionnaire was compiled according to Viljoen's (2015:145) description of how to go about compiling a rating scale. This questionnaire consisted of 53 closed-ended questions and obtained self-reported data from students on the current status of their self-efficacy in the teaching and learning environment. Questions selected for the questionnaire were chosen and adapted based on measuring the following hypothetical constructs:

i. Self-efficacy related to student learning in the teaching and learning environment (*Self,* questions 1-22),
ii. Motivational strategies for student learning in the teaching and learning environment (*Motivation*, questions 23-44),
iii. Student engagement in class (*Class*, questions 45-51) and
iv. Student engagement with studying (*Study*, questions 52-53).

The authors of the four scales (see below i-iv) established the validity of their instruments by confirmatory factor analyses which allow for quantitative testing of the theoretical model; all showed reasonable construct validity (Zimmerman & Kitsantas 2005:412; Pintrich *et al.* 1991:1-87; Vogt 2016:9; Hamby 2015:90). Construct validity is fostered by having a good definition and explanation of the meaning of the construct of interest (Johnson & Christensen 2014:296).

The four questionnaires used to develop the instrument used in Phase 1 of this study were:

i. Self-efficacy for Learning (SELF) (Zimmerman & Kitsantas 2005:412) which consists of 57 questions (PsychTESTS). Questions 1-22 of the current scale were adapted for the questionnaire. The SELF examined the quantity and quality of students' homework practices, the mediational role of self-efficacy for learning and perceived academic responsibility beliefs.
ii. Motivated strategies for learning questionnaire (MSLQ; Pintrich *et al.* 1991) which consists of 44 questions. Questions 23-44 of the current scale were adapted from the self-efficacy scale of the MSLQ. The MSLQ examined student motivation, cognitive strategy use, metacognitive strategy use and management of effort.
iii. National Survey of Student Engagement (NSSE; 2013 Center for Postsecondary Research, Indiana University) which consists of 82 questions. Questions 45–51 of the current scale were adapted for this study. The NSSE examined student engagement and is the single largest data source for research on student engagement in North

America (Vogt 2016:9).

iv. Online Student Engagement Questionnaire (Hamby 2015) which consists of 23 questions. Questions 52-53 of the current scale were adapted. Hamby's study examined student perceptions of course level engagement.

All the questions from the four questionnaires (i-iv) that fit the four hypothetical constructs were chosen for the questionnaire (cf. Appendices 3.2A & B) in Phase 1 of the study. These questionnaires (i-iv) were chosen to develop the questionnaire for Phase 1 of this study due to the following:

i. All the questionnaires were developed for tertiary students;
ii. All the questionnaires showed reasonable construct validity (cf. Section 3.3.3.2a);
iii. All of the questionnaires had questions suitable to use for the four hypothetical constructs of questionnaire for Phase 1; and
iv. Of all the questionnaires screened during the search for appropriate questionnaires, these were the most suitable due to measuring constructs in the teaching and learning environment in a university context.

3.3.3.3 *Reliability*

Internal consistency estimates of reliability were calculated for the four questionnaires. The Self-efficacy for Learning questionnaire, the MSLQ and the Online Student Engagement questionnaires have Cronbach alpha reliability coefficients of 0.79, 0.89 and 0.76 respectively for the factor of performance engagement (cf. Section 3.3.3.2). The psychometric properties of the NSSE were very good in Johnson's study (2015:24) with the majority of the items meeting or exceeding recommended measurement levels and construct validity.

Answers for the closed-ended questions were given according to a Likert scale as adapted for each of the questions from the four questionnaires (cf. Table 3.1).

Table 3.1: Likert scale (Adapted from Hamby 2015)

Likert scale	Likert description
1	Not at all characteristic of me
2	Not somewhat characteristic of me
3	Somewhat characteristic of me
4	Very characteristic of me

The total score for the questionnaire used in this study was calculated for the number of responses for all 53 items. Table 3.2 shows the scale for the highest and lowest total scores that could be obtained. The scores were converted into percentages.

Table 3.2: Scale for the highest and lowest total scores for questionnaire (Adapted by the researcher, Vorster de Wet 2017)

Likert scale	Likert description	Scores
1	Not at all characteristic of me	1 x 53 = 53 (lowest score)
2	Not somewhat characteristic of me	2 x 53 = 106
3	Somewhat characteristic of me	3 x 53 = 159
4	Very characteristic of me	4 x 53 = 212 (highest score)

A subscale (cf. Table 3.3) was used to determine the percentages of each of the four constructs from which the questionnaire was compiled.

Table 3.3: Subscales for four hypothetical constructs of the questionnaire

	Hypothetical Construct	Score
1.	Student learning in the teaching and learning environment (question 1-22)	1 x 22 = 22 (lowest score) 4 x 22 = 88 (highest score)
2.	Motivational strategies (question 23-44)	1 x 22 = 22 (lowest score) 4 x 22 = 88 (highest score)
3.	Student engagement in class (question 45-51)	1 x 7 = 7 (lowest score) 4 x 7 = 28 (highest score)
4.	Student engagement with studying (question 52-53)	1 x 2 = 2 (lowest score) 4 x 2 = 8 (highest score)

The frequencies of responses for subscales of hypothetical constructs were converted to percentages. Subscale score percentages for self-efficacy of hypothetical constructs (cf. Chapter 4, Table 4.10) were classified into two categories as follows:

i. 1 if <75%, categorised as low self-efficacy; and
ii. 2 if $\geq$75%, categorised as high self-efficacy.

The interpretation of the data was according to these two categories.

The highest scores on the Likert scale for options 1 and 2 and the lowest scores on the Likert scale for options 3 and 4 within all four hypothetical constructs, reflected lower self-efficacy. Questions for the semi-structured interview were based on these findings. Scores for individual Likert scale options (cf. Appendix 4.5) as well as grouped (1 & 2; 3 & 4) options were used to determine the questions indicating lower self-efficacy (cf. Chapter 4, Table 4.16).

These questions were:

i. q6: "You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture";
ii. q29: "You think what you are learning in this class is useful for you to know";
iii. q34: "It is hard for you to decide what the main ideas are in what you read";
iv. q41: "You find that when the lecturer is talking you think of other things and don't really listen to what is being said";
v. q45: "You ask questions in class or contribute to class discussions" and
vi. q50: "You discuss grades or assignments with the lecturer".

With the interpretation of the concept of self-efficacy, it is important to note that self-efficacy is neither an objective measurable construct nor an interval construct as such. It should rather be interpreted on a sliding scale or continuum, from a lower category to a higher category. Therefore, the discussion of the self-efficacy results was interpreted according to the context (which determined the value) in which self-efficacy was discussed. The applicable terms used were:

i. level of self-efficacy;
ii. current status of self-efficacy; and
iii. low(er) or high(er) self-efficacy.

3.3.4 Mixed-methods research: Phase 1

The study consisted of two phases (Phase 1 quantitative; Phase 2, qualitative). Phase 1 will be discussed first, followed by the discussion of Phase 2.

3.3.4.1 *Questionnaire (Quantitative data)*

a. Target population

The target population was undergraduate students in the Faculty of Natural and Agricultural Sciences at the UFS during 2017.

b. Survey population

The survey population is a subset of the target population, often resulting from practical

survey considerations (Fricker 19 May 2016:online lecture). The survey population in this study was second- and third-year undergraduate students enrolled for Physiology modules as part of degree programmes in the Faculty of Natural and Agricultural Sciences at the UFS.

Students were informed about the study during the last 20 minutes of a Physiology lecture (information session). An information document was given to the students to inform them about the confidentiality of the information as well as the voluntary nature of their participation.

c. Description of sample and sample size

The sample size included all the registered undergraduate students enrolled in Physiology modules (n=157), PHBG2616 and PHBG3716, at the Faculty of Natural and Agricultural Sciences, UFS. Students who were repeating a Physiology module (PHBG2616 & PHBG3716) were also included in the survey population. The participation rate was 100%. Data regarding students' most recent assessment marks (Physiology examination marks) were obtained after students had given consent. These marks were used to identify participants for the semi-structured interviews by purposive sampling (cf. Table 3.4).

d. The pilot study

A pilot study was done during the first semester of 2017 with five second-year undergraduate students in Natural Sciences, registered for an Anatomy module (ANBG2616 & ANBA2616). The five participants were recruited through convenience sampling. The results of the pilot study were not included in the main study. The pilot study was done to ensure that the questions were clear and not biased. It also indicated the logistical challenges accompanied by the completion of the questionnaire, including the time needed for completion. No changes were made to the questionnaire after the pilot study.

e. Data collection

The empiric phase (Phase 1) commenced after ethical clearance from the Health Sciences Research Ethics Committee (HSREC) (UFS-HSD 2017/0040) (cf. Appendix 4.1). Students in the sample population were requested to meet the researcher at the computer laboratory during a Physiology lecture on the main campus of the UFS. Before completion of the

questionnaire, an information session was given to ensure that the students comprehended what was expected of them as well as the instructions to complete the questionnaire. Informed consent was obtained (cf. Appendices 3.1A & B). Each student had his/her own workstation in the computer laboratory to complete the questionnaire by opening the internet link to the questionnaire. Students completed the questionnaires via the *Evasys* education system in their language of preference (Afrikaans or English). Translation of the English questionnaire in Afrikaans was done by a professional translator. All the students registered for the Physiology modules PHBG2616 and PHBG3716 (n=157) were present and completed the questionnaire. This was done on 24 and 25 April 2017, directly after a Physiology lecture. Refreshments were served afterwards. The researcher retrieved the completed questionnaires from the *Evasys* education system in Excel data sheet format to be analysed by the biostatistician. Participants were not identified.

The most recent assessment marks for Physiology of students were retrieved from the database of the Department of Basic Medical Sciences, Faculty of Health Sciences and matched with their student numbers, to identify participants by purposive sampling for participation in the semi-structured interviews. The selection criteria (cf. Table 3.4) were used to select participants representative of a range of academic performance.

e. Data analysis

Quantitative data were analysed by the Department of Biostatistics, UFS. Basic demographic information and self-efficacy scores were described using frequencies and percentages for categorical data. Subscale scores were calculated as the median across items per construct. The total score for the questionnaire was calculated for the number of responses for all 53 items.

The reliability of the questionnaire to determine self-efficacy was tested through the calculation of a Cronbach alpha coefficient for all 53 items (cf. Appendix 4.2). Reliability is a fundamental element in the evaluation of a measurement instrument. In this study the alpha coefficient was used to provide a measure of internal consistency of the scale, expressed as a number between 0 and 1. Internal consistency of the questionnaire was determined after completion by the participating students, therefore after data collection. Reliability analysis was performed on each subscale (construct). A scree plot was used to determine whether there was an ideal number of factors.

f. Data security

Questionnaires were completed online with the *Evasys* educational system (cf. Section 4.2.2.1). All information was managed in a strictly professional and confidential manner. Number coding was assigned to each participant by the researcher and was used to ensure the confidentiality of the participants' responses in the questionnaire. No names or personal identifiers appeared on any data sheet that was sent for statistical analysis. Online questionnaire responses and statistical data were saved on the researcher's computer with a password, for access only by the researcher.

3.3.4.2 *Mixed-methods research: Phase 2 Semi-structured interviews (Qualitative data)*

a. Target population

The target population in Phase 2 of the study included both undergraduate students in Natural Sciences enrolled in Physiology modules and permanently employed lecturers who taught these students at the UFS. This included 24 students and 18 lecturers.

b. Description of sample and sample size

Informed consent was obtained from students and lecturers for the interviews. Purposive sampling of students (n=24) from the study population and pilot student sampling (n=2) were done. Students were selected for the semi-structured interviews according to the most recent assessment marks for Physiology, to be representative of a range of academic performance, as indicated in Table 3.4. The information document informed and invited students to participate aim in the study (cf. Appendices 3.1C & D). Students were informed that the study aimed to learn about the self-efficacy of students in the classroom. All the students invited for the semi-structured interviews participated.

Table 3.4: Selection criteria used for purposive sampling for semi-structured interviews

Most recent assessment results in a Physiology module	Sample size
<50%	n = 6
50 - 69%	n = 13
70 - 79%	n = 4
>80%	n = 3

The following criteria were used to invite lecturers to participate in the semi-structured interviews:

i. Lecturers who taught undergraduate students in Natural Sciences;
ii. Lecturers who had more than five years' experience of teaching at university; and
iii. Permanently appointed lecturers in the Faculty of Health Sciences of Faculty of Natural and Agricultural Sciences.

All the lecturers who teach the participating students (n=18) and fitted the criteria were interviewed. The participation rate was 100%.

The strengths of semi-structured interviews applicable to this study were:

i. They were suitable for exploring attitudes and other content of interest;
ii. They could provide in-depth information;
iii. They allowed for solid interpretive validity;
iv. Relatively high response rates were attainable; and
v. They were useful for exploration and confirmation.

These interviews are most appropriate when a little is already known about the study phenomena or when detailed insights are required from individual participants (Gill *et al*. 2008:292). The interviews included both open- and closed-ended questions and were based on the findings of the questionnaire. The open-ended questions revealed students' views of the positive and negative issues within the teaching and learning environment that influenced self-efficacy. It also revealed lecturers' views and experience of student self-efficacy. Recorded interviews were transcribed and used in thematic analysis.

The semi-structured interviews assisted in identifying the issues regarding self-efficacy in the teaching and learning environment that had to be addressed by the guidelines developed in this study.

c. Exploratory interviews

Exploratory interviews (pilot study) were conducted to ensure that the questions of the semi-structured interview were clear and not leading. Exploratory interviews (approximately 30-45 minutes) were conducted with two students (undergraduate students in Natural Sciences not registered for a Physiology module) and with two lecturers (teaching Anatomy

and Histology to Natural Sciences students). They were selected using convenience sampling. The pilot study also indicated logistical challenges associated with the semi-structured interviews such as being prepared for the unexpected, being present throughout the interview, carefully observing and acknowledging what was said, probing appropriately, and clarity in asking questions (Patton 2015:428).

In addition, the exploratory interviews determined whether the questions were suitable to elicit rich data. It was noted from these interviews that an interview with a more experienced lecturer lasted approximately 45 minutes, while an interview with a less experienced lecturer lasted approximately 24 minutes. The more experienced the lecturer, the more detailed and nuanced the information obtained, possibly due to more experiences to reflect on. No changes were made to the interview questions after the exploratory interviews with students and lecturers. Students and lecturers were informed about possible inclusion of the data of their interviews if no change to questions were made. Therefore, these four interviews were included in the data analysis.

d. Data collection

The semi-structured interviews with students were conducted by an experienced, objective interviewer from the Centre for Teaching and Learning at the University of the Free State. Interviews were completed over a three-month period. Semi-structured interviews were also conducted with 18 lecturers. Caution was taken not to result in any conflict of interest. These lecturers were either from the Faculty of Health Sciences, where the Physiology modules are presented, or the Faculty of Natural and Agricultural Sciences, where all the other Natural Sciences subjects are presented. Interviews were audio-recorded in the language of preference (Afrikaans or English). The interview schedule (questions) helped to answer research question two, namely, "*Which issues in the teaching and learning environment influence self-efficacy*?" The focus areas in the Phase 1 questionnaire were:

i. Student learning;
ii. Motivation for learning;
iii. Student engagement in class; and
iv. Student engagement in their studies.

The semi-structured interview schedule was submitted to the HSREC of the Faculty of Health Sciences at the UFS, as an amendment to the study. The questions were formulated after data analysis of the questionnaire survey results (Phase 1).

Students and lecturers were informed that they had been purposively selected for the interviews via email. The students had received the information document about the study before the completion of the questionnaire, explaining the possibility that they might be selected for an interview as well. The information document was sent to lecturers when appointments were scheduled via email using *www.whenisgood.net*. If no response was received, participants were contacted via telephone to set up an appointment.

Students from each level of academic performance was interviewed (cf. Table 3.4). The interviews helped to gain an in-depth understanding of the findings of Phase 1 and to investigate possibly sensitive topics.

e. Data analysis

After analysis of the questionnaire data, results were used to compile questions for the semi-structured interviews. Constructs to be included in the questions were identified from the results of the questionnaire. This was done according to the domains and themes identified to have the lowest scoring for self-efficacy. This included category 1, reflecting low self-efficacy (cf. Section 3.3.3.2a). The items with the lowest scoring for self-efficacy were:

i. Hypothetical construct of *Self-efficacy related to student learning in the teaching and learning environment*:
    a. question 6: "You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture";
ii. Hypothetical construct of *Motivational strategies for learning in the teaching and learning environment:*
    a. question 29: "Your study skills are excellent compared to other students in this class";
    b. question 37: "You work on practice exercises and answer end of chapter questions even when you don't have to" and
    c. question 41: "You find that when the lecturer is talking you think of other things and don't really listen to what is being said";
iii. Hypothetical construct of *Student engagement in class*:
    a. question 45: "You ask questions in class or contribute to class discussions" and
    b. question 50: "You discuss grades or assignments with the lecturer".

These statements with the lowest scoring for self-efficacy were rephrased into questions to compile the semi-structured interview questions (cf. Appendices 3.3A & B). These questions aimed to identify and address influences responsible for low self-efficacy to gain understanding of the self-efficacy dynamics. These same statements were then adapted for questions to be used in the interviews with lecturers.

Qualitative data from exploratory interviews (pilot study) and semi-structured interviews (n = 26 students; n = 20 lecturers) were analysed by means of thematic analysis with an inductive approach. All transcribed data were decoded and thematically analysed according to the codes-to-theory model of Creswell (2009:185; cf. Figure 3.2), combined with the framework (six phases) of Braun and Clarke (2006:87-93; 2012:60-69) and a model suggested by Bernard and Ryan (2010:126). This model was the basis for the identification of issues to develop the guidelines discussed in Chapter 6.

Coding was done manually followed by seven iterations of defining and naming of themes. Braun and Clarke (2012:57) state thematic analysis to be "*a method for systematically identifying, organizing, and offering insight into patterns of meaning (themes) across a data set*". The framework of Braun and Clarke consists of six phases with a short description of each phase provided:

i. familiarization with the data (reading and rereading of interview transcripts);
ii. generation of initial codes (codes are the building blocks of analysis and identify and provide a label for a feature of the data that is potentially relevant to the data);
iii. search themes (it involves reviewing the coded data to identify areas of similarity and overlap between codes);
iv. reviewing potential themes (a recursive process reviewing the developing themes in relation to the coded data and entire data set);
v. define and name themes (involves deep analytic work and further reduce themes to categories and sub categories, based on Creswell's codes-to-theory model selecting extracts to present and setting out the story); and
vi. producing the product (writing up).

Bernard and Ryan's three steps model (2010:126) consists of:

i. identification of the key constructs to be included;
ii. show linkages among the constructs, that is, identify how the constructs are related

and represent the relationships visually; and

iii. test that the relationships hold for at least the majority of the cases being modelled.

From literature on qualitative analysis, authors agree that the advantage of thematic analysis is the flexibility of the method. The flexibility is especially an advantage in the diversity of work in teaching and learning (Maguire & Delahunt 2017:3351) which made it applicable for this study. An additional advantage is the ability to move beyond the interviews and transcriptions to focus on the interpretation and explanation thereof (*op.cit.*:3353). In other words, to go beyond observable material to more implicit and tacit themes (Merton 1975:335). More advantages of thematic analysis are stated by Braun and Clarke (2006:97), including generation of unanticipated insights, emphasis on similarities and differences across the data set and value for producing qualitative analysis suited to informing policy development. Gerald Horton, the founder of thematic analysis, referred to the tacit preferences of concepts which are shared in groups without conscious recognition (Horton cited in Joffe 2012:211). These assets of thematic analysis were applied in this study to answer research question 2: "*Which issues in the teaching and learning environment influence self-efficacy of the undergraduate students in the Natural Sciences?*" Thematic analysis illuminated issues in the teaching and learning environment which influence self-efficacy. The researcher could contextualize the findings (thick description) encompassing a wider picture in which to make sense (Bendassolli 2013). This inductive approach equipped the researcher to formulate guidelines for student self-efficacy in the teaching and learning environment of undergraduate Natural Sciences.

An inductive approach for data analysis was used, being a qualitative method for building causal explanations for certain characteristics observed in a small number of cases. It involved discovery of patterns, themes and categories and aimed at the generation of new concepts, explanations and results. Induction, therefore, is reasoning from observation to formulate rules to address and explain these characteristics (Bernard & Ryan 2010:325).
The most descriptive keyword of each sentence from transcribed data was considered a code. While analysis took place, certain patterns or themes and categories emerged and inductively revealed themselves to the researcher from the interaction with the data. The coding procedure is complemented by categorization and conceptualization. At this point, the purpose of analysis is to reduce the material even further, at the same time raising its level of abstraction (Bendassolli 2013). Nowell *et al.* (2017:1) described the pragmatic approach of conducting thematic analysis in a rigorous and methodical manner to yield meaningful results. The experience of thematic analysis of this study was similar to that

experienced by Nowell *et al*. (2017:4):

> "*Although thematic analysis documented by Braun and Clarke (2006) …as a linear six-phased method, it is actually an iterative and reflective process that develops over time and involves a constant moving back and forward between phases.*"

Bernard and Ryan (2010:1,109) state that analysis is the essential qualitative act, looking for regularities. It is the search for patterns in data and for ideas that help explain why those patterns are there in the first place (*op.cit*.:109). Thematic analysis specifically aims at identification of themes which are patterns in the data that are important and then using these themes to address the research (Maguire & Delahunt 2017:3353).

The researcher transcribed the audio-recordings of the semi-structured interviews *verbatim* per question to engage with the data before analysis. The *verbatim* transcriptions were done and kept exactly in participants' language (cf. Appendices 5.1; 5.2). In other words, non-standard English was transcribed to stay true to the spoken word. If a student mentioned the name of a lecturer in an interview, the name was replaced by [...]. This was to ensure anonymity due to possible sensitive information sharing. The transcriptions in Afrikaans were translated into English by a professional translator. The researcher double-checked the interview transcriptions after the translations were completed (cf. Appendices 5.1; 5.2).

Coding of the transcribed semi-structured interviews (qualitative data) identified frequent themes in the teaching and learning environment mentioned by students and lecturers. The themes were categorised within domains of the teaching and learning environment and were placed in a data matrix for guideline development (cf. Figure 3.2). Saldana (2009:8) refers to coding as the process of segregating, grouping, regrouping and relinking of data that helps to consolidate meaning and explanation. Figure 3.2 illustrates how the coding of the data was done.

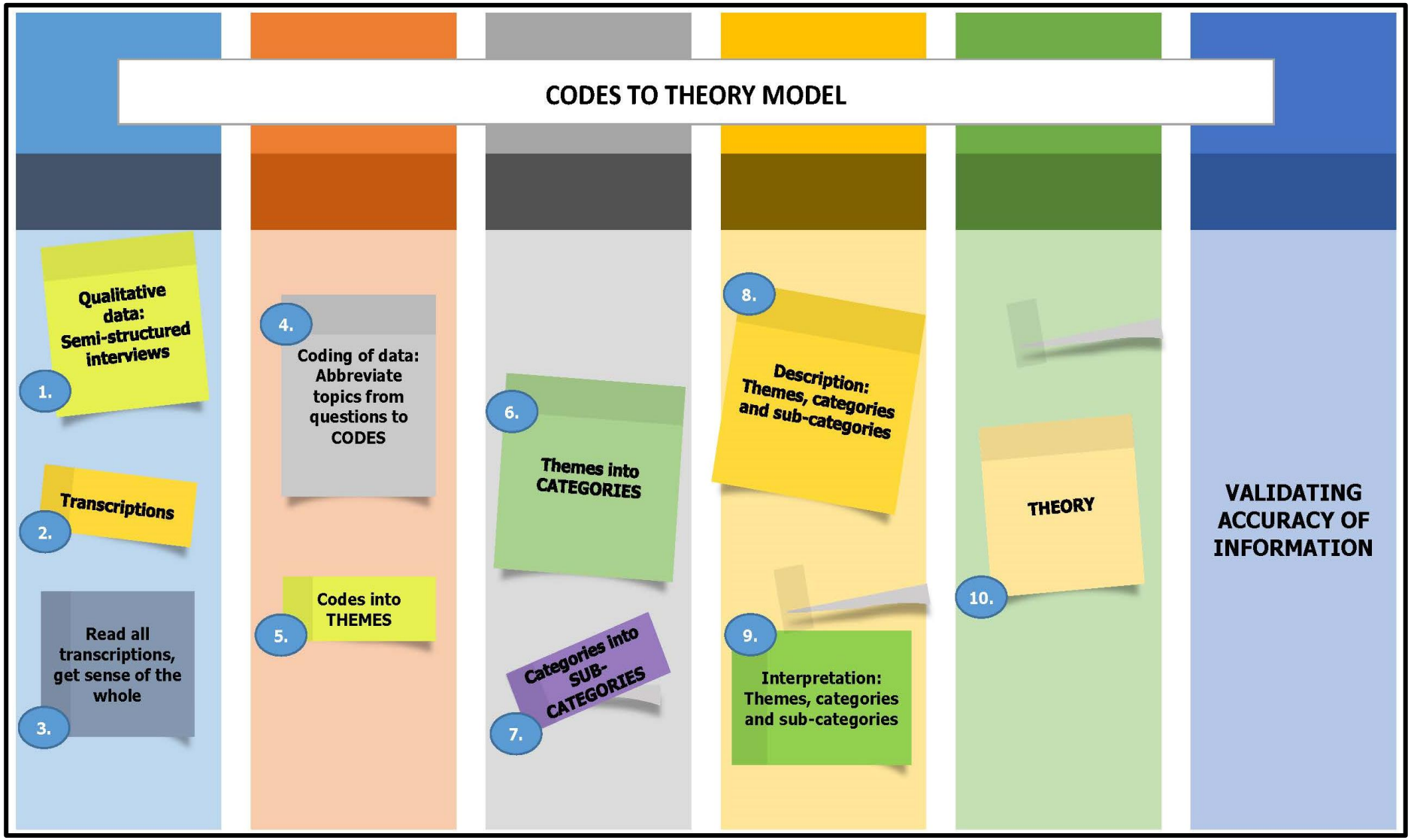

Figure 3.2: The codes-to-theory model for qualitative research (adapted by the researcher, Vorster de Wet from Tesch 1990:142-145)

Analysis of the lecturers' and students' transcriptions was done separately to identify specific codes, categories, themes and sub-themes for each group of participants. After analysis, the themes and sub-themes were combined to identify possible overlapping and interrelating themes and sub-themes. This was done to add to the development of guidelines as contribution of this study. The data resulted in 450 pages printed (condensed to 216 pages for thesis formatting) of transcriptions. The analysis of this vast amount of qualitative data was challenging and resulted initially in seventy-nine categories.

f. Data interpretation

Interviews provide in-depth information about participants' experiences and views on a particular topic (Turner 2010:754). The purpose of interviews are: "*...to find out from the participants those things we cannot directly observe and to understand what we have observed*" Patton (2015:426). The interviews contributed to gain in-depth understanding of student self-efficacy and possible sensitive topics to be addressed. It further served in answering research question number 2: "*Which issues in the teaching and learning environment influence self-efficacy of the undergraduate students in the Natural Sciences?*"

Transcribed and decoded data were validated and interpreted by the researcher (cf. Figure 3.2). Validation of transcribed data was done by relistening all the recordings twice, checking for completeness and mistakes in the transcriptions. Coding was validated by the seven iterations of defining and naming of themes (cf. Section 3.3.3.4e). Issues were identified to be addressed and development of guidelines to improve undergraduate student self-efficacy. Corroboration of literature, information from findings from questionnaires, semi-structured interview data as well as the researcher's experience as a lecturer was done to inform the development of guidelines for self-efficacy.

The development of guidelines in this study was guided by the perspective of the teaching theory proposed by Biggs and Tang on level 3, that refers to "*what the student does*" (cf. Chapter 2, Section 2.8). This teaching theory suggests the learning activities that students do in an effective teaching and learning context as the main determinant of learning. The focus for guideline development was mainly student engagement, with emphasis on reflective learning (metacognitive control, e.g. reflecting on their assessment results) and relevant learner activity (e.g. preparation before class attendance). This aimed to improve student self-efficacy to achieve the intended learning outcomes and assisting the teaching and learning environment to be effective. Improved student engagement in learning

activities activates different sense modalities, aligned with an academic outcome that improves self-efficacy (Biggs & Tang 2011:60-63). The developed guidelines aimed at creating constructive alignment.

3.4 ENSURING THE QUALITY OF THE STUDY

3.4.1 Phase 1: Quantitative data

To ensure the quality of the research, the validity, reliability and trustworthiness were addressed as discussed in the following section.

3.4.1.1 *Validity*

Validity is defined as the extent to which the instrument measures what it purports to measure or how truthful the research results are (Joppe 2000). Validity of the quantitative data was ensured by including items in the questionnaire (quantitative data) that accurately reflected the factors identified. The items were phrased in terms of "can do" rather than "will do" because self-efficacy is concerned with perceived capability (Bandura 2006a). "Can" is a judgement of capability and "will" is a statement of intention.

The questionnaire was validated by asking the students to read through their answers again to make sure they completed every question. The questionnaire was divided into four hypothetical constructs (cf. Section 3.3.3.2). Construct validity refers to whether the operational definition of a variable reflects the theoretical meaning of a concept; in other words, the degree to which a test measures what it claims (Trochim 2006:online). The construct validity approach seeks to establish a validity argument based on an interpretation of the target construct (Colliver *et al.* 2012:368). Construct validity in this study was fostered by a standardised definition and explanation of the meaning of student self-efficacy (Johnson & Christensen 2014:296). Construct validity was established by performing a exploratory factor analysis using oblique rotation (cf. Section 4.3.1).

3.4.1.2 *Reliability*

Reliability in quantitative research is defined as the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials (Gibbs 2007) and is therefore a fundamental element in the evaluation of a measurement instrument.

The construct reliability of all 53 items of the questionnaire was determined by the Cronbach alpha coefficient to add to the validity and accuracy of the interpretation of the quantitative data. Reliability for the questionnaire was ensured by:

i. calculation of Cronbach's alpha coefficient for all 53 items; and
ii. calculation of a homogeneous test.

3.4.1.3 *Trustworthiness*

Trustworthiness is best defined as the "believability" of a researcher's findings (Maykut 1994). There are four criteria for trustworthiness in quantitative research, namely internal and external validity, reliability and objectivity. Trustworthiness of Phase 1 of the study was assured by applying certain principles. These principles were:

i. the researcher gave close attention to validity and reliability throughout the research process; and
ii. the researcher analysed the quantitative data objectively.

3.4.2 Phase 2: Qualitative data

To ensure the quality of the research, the trustworthiness, (including credibility, dependability, confirmability and transferability) were addressed as described in the following section.

3.4.2.1 *Trustworthiness*

As already mentioned, trustworthiness is defined as the "believability" of a researcher's findings (Maykut 1994) and is especially applicable in qualitative research. Guba (1981:80) established four criteria for trustworthiness in qualitative research, namely credibility, transferability, dependability and confirmability, as opposed to the four criteria for trustworthiness in quantitative research, namely internal validity and external validity, reliability and objectivity. Credibility is parallel to internal validity, transferability is parallel to external validity, dependability is parallel to reliability, and confirmability is parallel to objectivity (*op.cit.*). Patton (2015:685) summarizes it by saying that the credibility of findings and interpretations depends on careful attention to establishing trustworthiness. Van der Merwe (2011:111) mentioned that trustworthiness is ensured by paying close attention to how data are collected and analysed.

The credibility and competence of the qualitative researcher as well as factors such as objectivity and truth are more difficult to assess than with quantitative research methodology but will depend largely on the epistemological background of the researcher doing the analysis (Patton 1999:online).

Trustworthiness of Phase 2 of the study was assured by applying certain principles. These principles were:

i. credibility through prolonged engagement with the study;
ii. persistent observation (semi-structured interviews);
iii. double-checking of the interview transcriptions;
iv. corroboration (literature, questionnaire, semi-structured interviews and the researcher's experience);
v. transferability through in-depth description (close attention given to correct coding and interpretation of qualitative data, providing detailed descriptions of qualitative data); and
vi. referential adequacy (archiving/storing of qualitative data from semi-structured interviews).

a. Credibility

Credibility is when the researcher checks for the accuracy of the findings by employing certain procedures (Creswell 2009:190). One of these procedures is "*member checking*" to test the credibility, by "*testing the data with members of the relevant human data source groups"* (Guba 1981:80). Johnson and Christensen (2014:299) stated that when qualitative researchers speak of research validity, they are referring to research findings that are plausible, credible, trustworthy and therefore defensible. In this study, the quality of the qualitative data was ensured by a quality control process for data collection and analyses. The process or validity strategies consisted of the following aspects:

i. The researcher attended several training sessions in qualitative research at the UFS;
ii. Exploratory semi-structured interviews (pilot study) were done;
iii. A good quality dictaphone was used to hear every word to be transcribed;
iv. Confidentiality between participants and interviewers;
v. Allowing suitable time per interview for participants not to become stressed but to be able to speak honestly and allow for in-depth fieldwork that yields high-quality data;

vi. Objective interviewers were used. The students were interviewed by an experienced interviewer from the Centre for Teaching and Learning at the University of the Free State. The lecturers were interviewed by the researcher. The quality and success of the information obtained during an interview is mostly dependent on the interviewer (Patton 1990 cited in Bamball & While 1994:333);
vii. Enough time was spent with the recordings and transcriptions of the semi-structured interviews for the researcher to develop an in-depth understanding of self-efficacy and the hypothetical constructs in this study; and
viii. Systematic and conscientious analysis of the semi-structured interviews through,
    a. *Verbatim* transcriptions of the audio-recorded interviews done in the preferred language (Afrikaans or English) to ensure authenticity;
    b. Afrikaans transcriptions were translated by a professional translator as truthfully as possible;
    c. The researcher double-checked the recordings and transcriptions for apparent mistakes;
    d. Engagement with the data and coding thereof; and
    e. The researcher stayed open to the data by aggregating and integrating the data, while also standing vigilant to notice unexpected patterns.

b. Dependability

Dependability in qualitative research indicates that the researcher's approach is consistent across different researchers and different projects (Gibbs 2007). Semi-structured interviews can provide reliable, comparable qualitative data (Robert Wood Johnson Foundation 2008). The following steps ensured reliability for the semi-structured interviews (qualitative component):

i. transcripts from recorded interviews were checked to make sure that it did not contain apparent mistakes made during transcription; and
ii. the researcher made sure there was no drift in the definition of codes and no shift in the meaning of the codes during the process of coding.

Close attention was given to ensure trustworthiness for both phases of the study by applying all the principles mentioned (cf. Sections 3.4.1.3 & 3.4.2.1) with care and vigilance.

c. Confirmability

Confirmability is also termed neutrality or objectivity and is guaranteed by methodology (Guba 1981:81). According to Guba (1981:81), if the methods are explicated, open to public scrutiny and replicable, then objectivity is assured. These principles were applied in this study; therefore, the biases of the investigator were adequately screened out.

d. Transferability

Transferability refers to the degree to which the results of qualitative research can be generalised and applied in other contexts (Guba 1981:80). In this study, transferability was reached though thick description of the study's sample and context. The sample in this study was representative of an undergraduate population at national and international universities.

3.5 ETHICAL CONSIDERATIONS

3.5.1 Approval

Approval for the research study was obtained from the:

i. Health Sciences Research Ethics Committee (HSREC) of the Faculty of Health Sciences at the UFS (UFS-HSD 2017/0040) (cf. Appendix 4.1);
ii. Dean of the Faculty of Natural and Agricultural Sciences at the UFS (cf. Appendix 3.4A);
iii. Vice-Rector: Research at the UFS (cf. Appendix 3.4B); and
iv. Dean of Student Affairs, UFS (cf. Appendix 3.4C).

3.5.2 Informed consent

3.5.2.1 *Phase 1: Quantitative data*

Informed consent (cf. Appendices 3.1A & B) was sought for students' participation in the questionnaire and to obtain students' most recent Physiology marks.

3.5.2.2 *Phase 2: Qualitative data*

Informed consent (cf. Appendices 3.1A & B) was sought for students' and lecturers'

participation in the semi-structured interviews.

A short overview of the study (cf. Information document, Appendices 3.1C & D) and its purpose was provided to participants with an explanation of what was required from them for both phases of the study.

3.5.3 Right to privacy and confidentiality

All information was managed in a strictly professional and confidential manner.

3.5.3.1 *Phase 1: Quantitative data*

Number coding was used to ensure the confidentiality of the participants' responses in the questionnaire. No names or personal identifiers appeared on any data sheet that was sent for statistical analysis.

3.5.3.2 *Phase 2: Qualitative data*

The objective interviewer from the Centre for Teaching and Learning at the University of the Free State remained neutral during the interview. Only the researcher as decoder had access to recordings of the interviews for the sole purpose of research. Interviews and recordings were done anonymously. The researcher saved and locked the transcribed data away. If confidential issues arose during the interview, the researcher protected the privacy and anonymity of the participants (cf. Section 3.3.3.4e).

3.6 CONCLUSION

Chapter 3 provided an overview of the research methodology used in the two phases of this study.

In Chapter 4, *Results of Phase 1 (quantitative data): Questionnaire*, the results from Phase 1 will be presented. The results described the current status of self-efficacy among undergraduate students in Natural Sciences and compared students' self-efficacy scores with recent assessment results in Physiology modules.

CHAPTER 4

RESULTS OF PHASE 1 (QUANTITATIVE DATA): QUESTIONNAIRE

4.1 INTRODUCTION

This chapter presents the quantitative results of Phase 1 of the current study (cf. Figure 4.1). A questionnaire was utilised for data collection to determine the current status of students' self-efficacy in the undergraduate Natural Sciences teaching and learning environment, focusing on Physiology modules at the UFS. This chapter presents limited discussion of the quantitative results. Extended discussion of the results is presented in chapter 6 to integrate the quantitative and qualitative data analysis.

Figure 4.1 highlights the quantitative analysis in Phase 1.

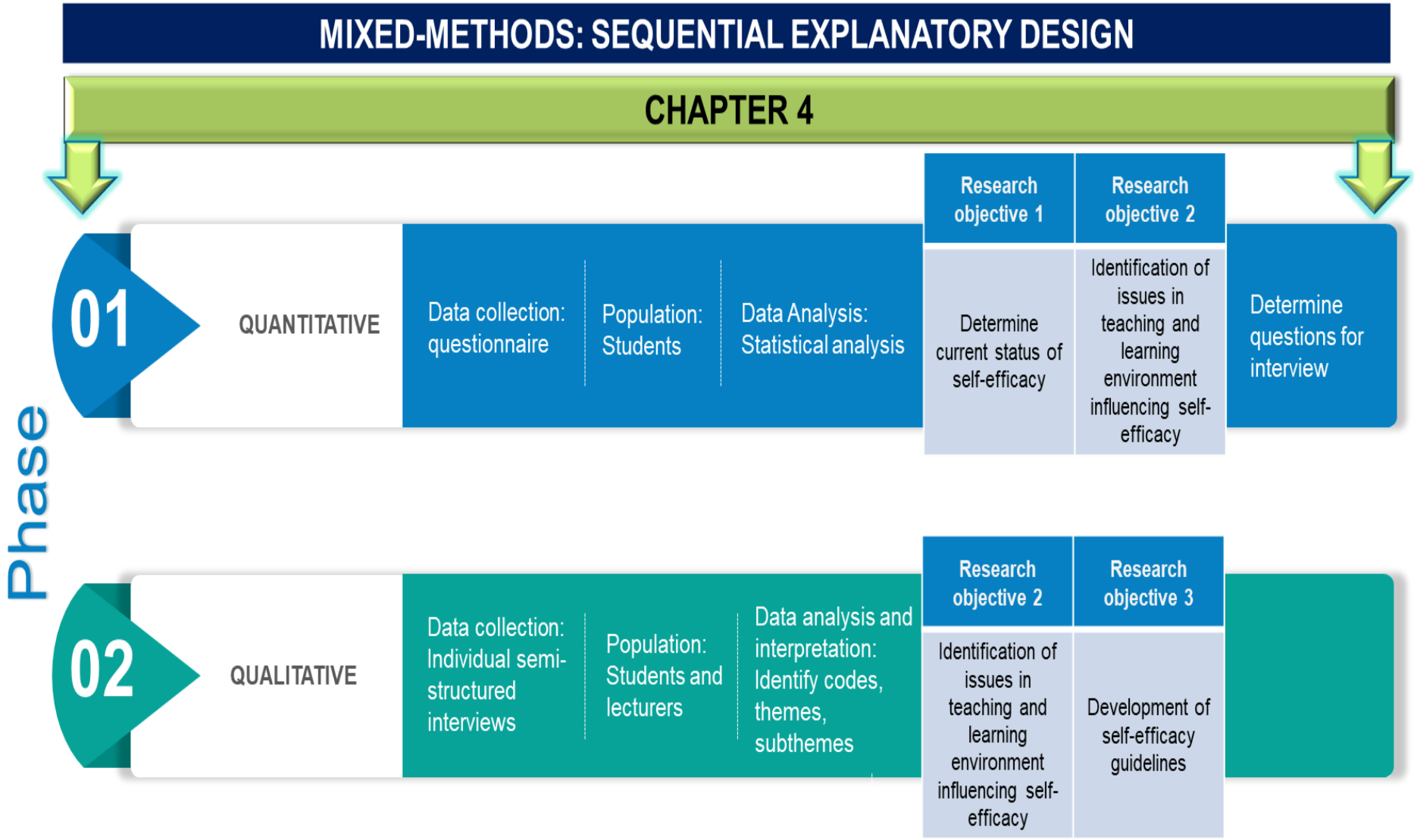

Figure 4.1: Illustration of quantitative analysis and interpretation from Phase 1 (highlighted) (adapted from Creswell 2009:209)

4.2 DEMOGRAPHIC INFORMATION

4.2.1 Sample population

The sample population in this study consisted of second- and third-year undergraduate students enrolled for Physiology modules (PHBG2616 & PHBG3716) as part of degree programmes in the Faculty of Natural and Agricultural Sciences at the UFS. The sample size was 157. Students repeating a Physiology module were also included in the sample population (cf. Section 3.3.3.3c).

4.2.2 Demographic data

Table 4.1 presents the demographic data of the participants per year of study and the rate of response to the questionnaire. All the students registered for the Physiology modules PHBG2616 and PHBG3716 (n=157) were present and completed the questionnaire.

Table 4.1: Demographic data (year of study)

Physiology Module	Responses (n=157)	Percentage (%)
PHBG2616 (2nd year)	123	78.3
PHBG3716 (3rd year)	34	21.7
Total	**157**	**100**

A total of 123 second-year and 34 third-year participants completed the questionnaire.

Table 4.2 indicates demographic data on the language in which the questionnaire was completed.

Table 4.2: Demographic data (language)

Physiology Module	Responses (n=157)	Percentage (%)
Afrikaans	23	14.7
English	134	85.3
Total	**157**	**100**

The majority of students completed the questionnaire in English.

4.2.2.1 *Questionnaire distribution*

The questionnaire was made available electronically to the undergraduate students in

Natural Sciences. They were invited to open the link that was made available to them via the *Evasys* education system after a Physiology lecture (contact session). Informed consent was obtained from each participant (cf. Chapter 3, Section 3.3.3.3e). The questionnaires were available in the students' language of preference (Afrikaans or English) according to the language policy of the UFS and completed in the computer labs on campus.

4.3 PSYCHOMETRIC PROPERTIES OF QUESTIONNAIRE

The questionnaire (cf. Appendices 3.2A & B) outlined in Chapter 3 (cf. Section 3.3.3.2) determined the current status of student self-efficacy in the Natural Sciences teaching and learning environment. The questionnaire consisted of 53 closed-end questions and obtained self-reported data from students. Questions for the questionnaire were chosen and adapted on the basis of measuring the following hypothetical constructs:

i. *Self:* Self-efficacy related to student learning in the teaching and learning environment (questions 1-22);
ii. *Motivation*: Motivational strategies for learning in the teaching and learning environment (questions 23-44);
iii. *Class:* Student engagement in class (questions 45-51); and
iv. *Study*: Student engagement with studying (questions 52-53).

Options for answering the closed-end questions were given using a Likert scale as adapted for the questionnaire (cf. Chapter 3, Table 3.1).

4.3.1 Reliability of questionnaire

The reliability of the composite self-efficacy scale was tested through the calculation of the Cronbach alpha coefficient for all 53 items. The Cronbach alpha coefficient provides a measure of the internal consistency of a scale. Internal consistency describes the extent to which all items in a scale measure the same construct (Tavakol & Dennick 2011:53). If the Cronbach alpha coefficient decreases after removing a variable from the construct, then this variable is strongly correlated with other variables in the scale. On the other hand, if the Cronbach alpha coefficient increases after removing a variable from the construct, then removing this variable from the scale makes the construct more reliable.

In this study the alpha coefficient was used to provide a measure of internal consistency of the scale, therefore to determine whether all 53 items consistently determined self-efficacy,

expressed as a number between 0 and 1. The construct validity was examined by performing a maximum likelihood exploratory factor analysis using oblique rotation. Reliability analyses were performed on each hypothetical construct as a subscale.

Questions 34, 35, 40 and 41 were asked in a negative manner and were converted to a positive statement by reversing the Likert scale before analysis. Data checking was conducted and revealed that 21 students (13.3%) did not mark one or more questions. These incomplete questionnaires were omitted for calculation of the Cronbach alpha coefficient (cf. Table 4.3). The Cronbach alpha coefficient was calculated for:

i. all 53 items of the questionnaire; and
ii. each hypothetical construct.

The Cronbach alpha coefficient for all 53 items of the questionnaire was alpha = 0.91 (cf. Appendix 4.2). Therefore all 53 items were relevant and applicable to determine self-efficacy and no questions had to be removed from the questionnaire. The alpha coefficient confirmed a high reliabilty and internal consistency.

The Cronbach alpha coefficient value for each of the hypothetical constructs as subscales was calculated and indicated that all four the hypothetical constructs determined self-efficacy reliably among the students, as shown in Table 4.3. The highest alpha value was for the hypothetical construct of "*self*" (alpha = 0.86), making it the most reliable subscale to determine self-efficacy, and the lowest alpha value was for the hypothetical construct of "*class*" (alpha = 0.61).

Table 4.3: Cronbach alpha coefficient values for each hypothetical construct

Questions	Cronbach alpha
All 53 questions	0.91
Subscale "*self*" (22 questions)	0.86
Subscale "*motivate*" (22 questions)	0.77
Subscale "*class*" (7 questions)	0.61
Subscale "*study*" (2 questions)	0.83

From these results, the questionnaire could be seen as a reliable instrument to determine students' self-efficacy.

4.3.2 Validity of questionnaire

Validity is described by the word *accuracy* (Huck 2012:81) which refers to the accuracy of the instrument (questionnaire) being used; in other words, does the instrument truly reflect

the construct being measured? Construct validity attempts to answer the question: "What is the instrument really measuring?" Before doing a maximum likelihood exploratory factor analysis using oblique rotation, data were checked for suitability for a factor analysis. Factor analysis is a statistical technique which has correlation at its core. It attempts to reduce the complexity of a multi-variable data set, so it becomes easier for people to use the data in applied settings or in the development/refinement of theory (Huck 2012:479). The statistical approach of factor analysis examines construct validity which examines clusters of related variables and groups each item under a specific construct. The aim of factor analysis is to test the hypotheses for which the researcher has established interrelationships among the items in the instrument, and identifies which items belong together in specific constructs (Polit & Beck 2017:398).

The relatively small sample size (n=157), in comparison to the number of items of the study, resulted in Heywood cases in the factor analysis and made the data unsuitable for factor analysis. The n-to-variable ratio should be at least 10 to 1 (Huck 2012:487). In other words, for the data to be suitable, at least 530 participants (53 questions) were necessary. The sample size was too small, which meant that an exploratory factor analysis could not be done. The sample size could not be increased due to only 157 available as sample population. The analysis was simplified to a principal component analysis with varimax rotation. None of the 53 questions of the questionnaire could be omitted, as discussed in Section 4.3.1, and the four hypothetical constructs therefore remained as is.

A scree plot is used to reveal the number of factors visually and helps to determine the best possible number of factors. The scree plot indicated in Figure 4.2 revealed 17 factors confirming the four factors. It further revealed only one factor with a value above an *Eigenvalue* of ten which could explain only 10.2% of the variation (cf. Figure 4.2). Too much variation was revealed, and a factor analysis was not suitable to use. Spearman correlations were used instead to describe the construct validity.

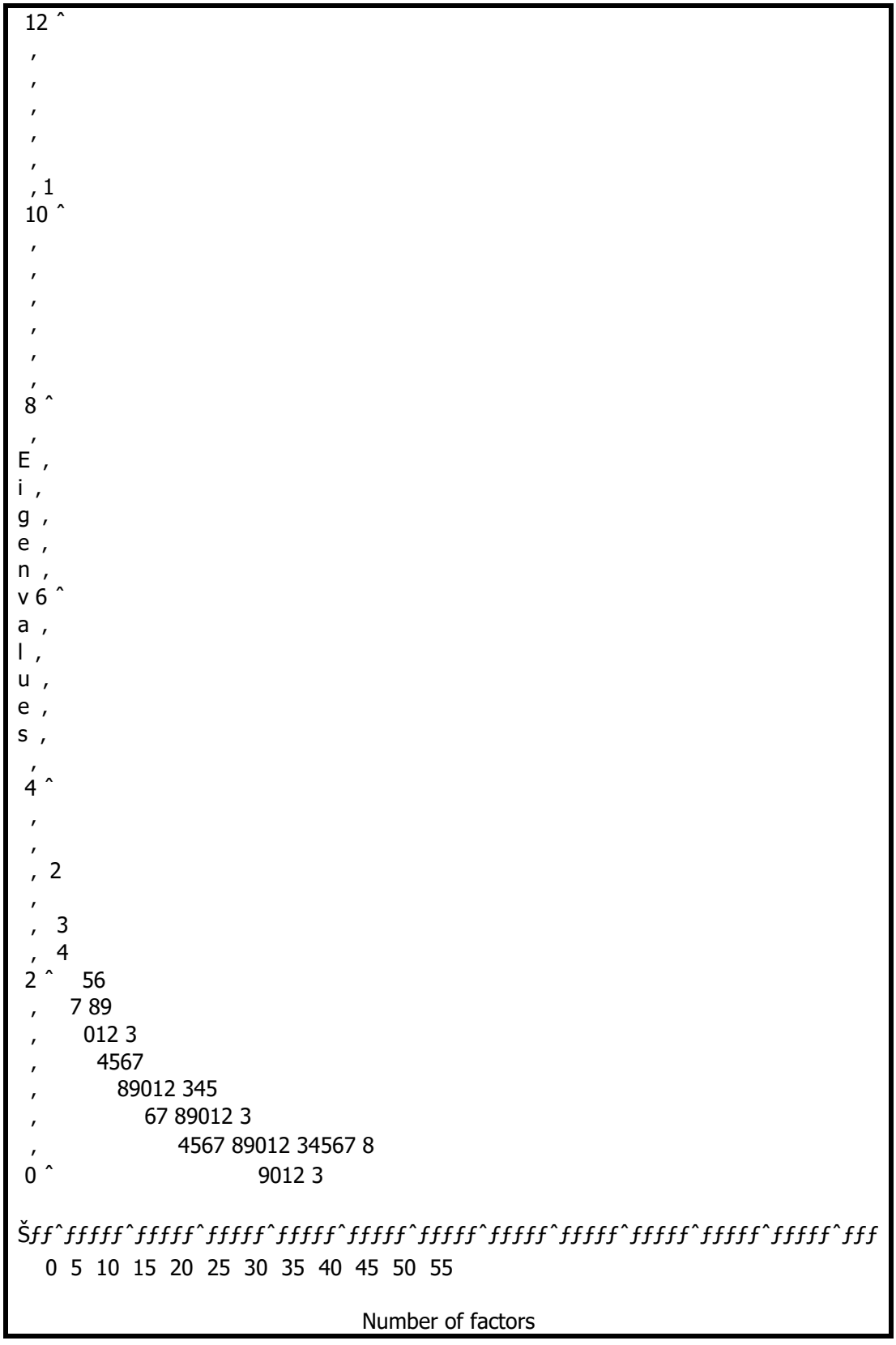

Figure 4.2: Scree plot of Eigenvalues

The total scores for self-efficacy and subscale scores of the hypothetical constructs were compared with language (Afrikaans & English) by means of Spearman's correlation

coefficients to measure the strength of association between the two ranks. Significance was determined based on the associated p-value of the correlation being less than 0.05.

The Kruskal-Wallis test was performed to test whether samples originated from the same distribution. The Kruskal-Wallis test (p-values) indicated whether total scores and subscale scores of the hypothetical constructs in the two languages (Afrikaans & English) had significant differences. The p-values for language were as follows: *Self* (0.14), *Motivate* (0.12), *Class* (<0.01), *Study* (<0.01) and total scores (0.92).

Results indicated a significant difference between language and *Class* as well as between language and *Study*.

The total scores for self-efficacy and subscale scores of the hypothetical constructs were compared with students' year of study (second year or third year) by means of Spearman's correlation coefficients to measure the strength of association between the two ranks. Significance was determined based on the correlation's associated p-value being less than 0.05.

Table 4.4 displays the Kruskal-Wallis test (p-values), which indicated whether total scores and subscale scores of the hypothetical constructs in the second-year and third-year groups had significant differences.

Table 4.4: p-Values of the Kruskal-Wallis test for year groups

	Year groups (p-values)
Self	0.58
Motivate	0.25
Class	0.93
Study	0.93
Total scores	**0.53**

Results indicated no significant difference between year groups and total scores for self-efficacy. There were also no differences between year groups and subscale scores of hypothetical constructs.

4.4 RESULTS OF THE QUESTIONNAIRE

Basic demographic information and self-efficacy subscale scores of the hypothetical constructs were described using frequencies and percentages for categorical data and medians for continuous data.

4.4.1 Total scores

a. Calculation of scores

The total score for the questionnaire was calculated for the number of responses for all 53 items. Table 4.5 shows the possible range for total scores (53-212) which can be obtained for the questionnaire. The scores were converted to percentages for presenting results.

Table 4.5: Self-efficacy scores and percentages

Likert scale	Description	Scores	Total score percentage	Self-efficacy score
1	Not at all characteristic of me	1x 53 = 53 (lowest)	53/212x100 =25	0%-74% Low self-efficacy
2	Not somewhat characteristic of me	2 x 53 = 106	106/212x10 =50	
3	Somewhat characteristic of me	3 x 53 = 159	159/212x100 =75	75%-100% High self-efficacy
4	Very characteristic of me	4x 53 = 212 (highest)	212/212 =100	

Total score percentages for self-efficacy (table 4.5) were classified in two categories as follows:

i. Total self-efficacy scores (0%-74%): Low self-efficacy
ii. Total self-efficacy score (75%-100%): High self-efficacy.

b. Total score results

Frequencies of responses and percentages of total score per student were used to determine the status of self-efficacy per student (cf. Appendix 4.3).

Total self-efficacy score results were as follows:

i. Category 1: Low self-efficacy (<75%): 59 students (43.4%); score range [38.2% - 74.5%]
ii. Category 2: High self-efficacy (≥75%): 77 students (56.6%); score range [75% - 92.5%].

Total scores for self-efficacy were as follows:

i. The median was 159 (75%) [81-196] indicating high self-efficacy;
ii. The 25% percentile was 146 (68.9%);

iii. The 75% percentile was 171 (80.7%);
iv. The minimum percentage was 81 (38.2%) and
v. The maximum percentage was 196 (92.5%).

c. Analysis of total scores

Students' self-efficacy scores were compared with recent assessment results in the Physiology modules they were enrolled for by means of Spearman's correlation coefficients to measure the strength of association between the two ranks (cf. Table 4.6). It was expected that these correlation coefficients would show relatively small effect sizes, as there are many other factors which may also potentially influence academic performance. Significance was determined based on the correlation's associated p-value being less than 0.05, and not on the basis of effect size.

Table 4.6 presents a comparison of the median, percentiles, minimum and maximum percentage of the self-efficacy categories.

Table 4.6: Total scores for self-efficacy

	Score	Percentage	Range
Median	159	75 (high self-efficacy)	81-196
25% percentile	146	68.9	
75% percentile	171	80.7	
Minimum percentage	81	38.2	
Maximum percentage	196	92.5	

Table 4.7 demonstrates a comparison between the self-efficacy categories and recent assessment results.

Table 4.7: Comparison between self-efficacy categories and recent assessment results

Self-efficacy category	Recent assessment results					
	n	Minimum %	25% percentile	Median %	75% percentile	Maximum %
Category 1: <75%	59	39	49	56	63	81
Category 2: >75%	77	39	52	58	65	92

The Kruskal-Wallis test was performed to indicate whether there were significant differences in assessment results of students in Category 1 (<75%) and Category 2 (≥75%). A p-value (0.19) was calculated indicating no significance difference in assessment results between the two categories of student self-efficacy.

4.4.2 Construct scores

a. Calculation of scores

Hypothetical constructs were measured as subscales of the total score. Each subscale was determined by a number of the questions. Frequencies of responses and percentages of total score per hypothetical construct (subscale) were used to determine the status of self-efficacy per student (cf. Appendix 4.4). Medians (percentage) for each construct were calculated.

b. Score results

Table 4.8 demonstrates the calculation of the subscale scores, medians, percentiles, minimum and maximum subscale scores for each hypothetical construct of the questionnaire.

Table 4.8: Medians, percentiles, minimum and maximum subscale scores for each hypothetical construct of the questionnaire

Hypothetical construct	Subscale scores	Minimum score %	25% percentile	Median %	75% percentile	Maximum score %
Self Question 1-22	1 x 22 = 22 (lowest) 4 x 22 = 88 (highest)	40.9	67	**73.8**	80.7	97.7
Motivation Question 23-44	1 x 22 = 22 (lowest) 4 x 22 = 88 (highest)	37.5	73.9	**79.5**	84.1	94.3
Class Question 45-51	1 x 7 = 7 (lowest) 4 x 7 = 28 (highest)	28.5	57.1	**67.8**	75	100
Study Question 52-53	1 x 2 = 2 (lowest) 4 x 2 = 8 (highest)	25	75	**87.5**	100	100

According to Table 4.8, the order for hypothetical constructs from widest to narrowest range between minimum and maximum percentages was as follows:

i. *Study*: 2/8 (25%) – 8/8 (100%);
ii. *Class*: 8/28 (28.5%) – 28/28 (100%);
iii. *Motivation*: 33/88 (37.5%) – 83/88 (94.3%) and
iv. *Self*: 36/88 (41%) – 86/88 (97.7%).

These ranges between minimum and maximum scores for each hypothetical construct are illustrated by Figure 4.3.

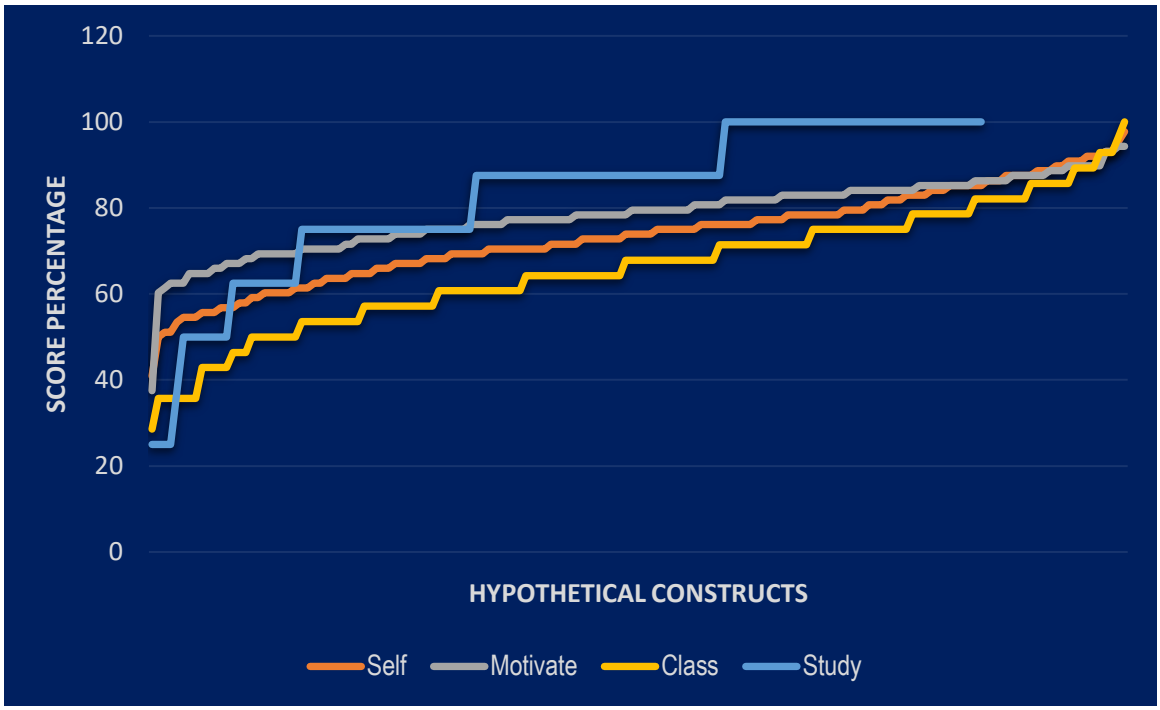

Figure 4.3: Ranges from minimum to maximum scores of hypothetical constructs

According to Table 4.8 the order from highest to lowest median percentage for hypothetical constructs was as follows:

i. *Study*: Student engagement with studying 87.5%;
ii. *Motivate:* Motivational strategies for learning in the teaching and learning environment 79.5%;
iii. *Self*: Self-efficacy related to student learning in the teaching and learning environment 73.8% and
iv. *Class:* Student engagement in class 67.8%.

c. Analysis of construct scores

All students scored different score distributions across the hypothetical constructs with no repetition in scores among students. The hypothetical construct *class* revealed the lowest scores (cf. Figure 4.3) reflecting lower self-efficacy in the teaching and learning environment regarding student engagement in class. It also had the second largest range of scores (28.5%-100%). The hypothetical construct *study* had the largest range of scores (25%-100%). As there were only two questions in the questionnaire addressing *study*, this

should be interpreted with caution. Table 4.9 demonstrates the results of hypothetical construct score categories for self-efficacy.

Table 4.9: Results of hypothetical construct score categories

	Hypothetical construct score percentage			
Self-efficacy category	**Self**	**Motivate**	**Class**	**Study**
Low	51.6	28	67.5	30
High	48.5	72	32.5	70

As seen in Table 4.9, students revealed the lowest self-efficacy for the hypothetical constructs *class* (67.5%) and *self* (51.6%). Students revealed the highest self-efficacy for the hypothetical constructs *motivate* (71.9%) and s*tudy* (70.1%).

Frequencies of responses were also combined for constructs according to the Likert scale (1 & 2 grouped together; 3 & 4 grouped together) using categories 1 (<75%) and 2 (≥75%) with the following results (cf. Appendix 4.5): Forty-four (24.2%) scored in the low self-efficacy category for all constructs (<75%); 113 (62.4%) in a combination of the low and high category, indicating low self-efficacy in some hypothetical constructs and high self-efficacy in the other and 25 (13.7%) scored in the high self-efficacy category (≥75%).

Table 4.10 demonstrates the percentages per combination of hypothetical constructs for low self-efficacy (cf. Appendix 4.5). The results indicated the specific combination of hypothetical constructs that presented with low self-efficacy scores to identify possible areas in the teaching and learning environment that need to be addressed in the semi-structured interviews.

Table 4.10: Students with low self-efficacy scores per hypothetical constructs

Hypothetical constructs	Students with low self-efficacy scores (%)
Self; Motivate; Class and *Study*	10.4
Self; Motivate and *Class*	8.8
Self and *Motivate*	11.6
Motivate; Class and *Study*	0.6
Motivate and *Class*	20.9

The highest percentage students had lowest self-efficacy for two constructs, namely *motivate* and *class*.

Table 4.11 demonstrates the percentages per combination of hypothetical constructs for high self-efficacy (cf. Appendix 4.5).

Table 4.11: Students with high self-efficacy scores per hypothetical constructs

Hypothetical constructs	Students with high self-efficacy scores (%)
Self; Motivate; Class and *Study*	13.7
Motivate; Class and *Study*	16.5
Self; Motivate and *Class*	20.3
Self and *Motivate*	39.5
Motivate and *Class*	23.1
Class and *Study*	18.2
Self and *Study*	32.9
Self and *Class*	20.3

The highest percentage students had highest self-efficacy for two constructs, namely *self* and *motivate.*

Subscale scores of the hypothetical constructs were compared with recent assessment results in the Physiology module by means of Spearman's correlation coefficients (cf. Table 4.11) to measure the strength of association between the two ranks. It was expected that these correlation coefficients would show relatively small effect sizes, as there are many other factors which also influence academic performance. Significance was determined based on the correlation's associated p-value being less than 0.05, and not on the basis of effect size.

Table 4.12: Spearman's correlation coefficients for association between hypothetical constructs and assessment results

Hypothetical construct	Spearman's correlation r	p- value
Self	0.12	0.16
Motivate	0.07	0.40
Class	0.19	**0.03**
Study	-0.11	0.22

Spearman's correlation indicated a weak association between student engagement in class and assessment results. Therefore, the chances of finding this association in an undergraduate student population in which the true effect is zero, is 3%. Table 4.13 demonstrates the Kruskal-Wallis test (p-values) for assessment results between the two self-efficacy categories, in the subscale scores of the four hypothetical constructs.

Table 4.13: Differences in assessment results

Hypothetical construct	Kruskal-Wallis test (p-value)
Self	0.21
Motivate	0.20
Class	0.11
Study	0.14

The p-values demonstrated no statistical significance in assessment results between the four hypothetical constructs for student self-efficacy.

4.4.3 Question scores

a. Score results

Frequencies of responses and percentages per question (53 questions) were used to determine the status of self-efficacy per question for all participants. Questions with the lowest frequency were used to develop questions used in Phase 2 (semi-structured interviews). These questions identified possible issues in the teaching and learning environment that need to be addressed in the semi-structured interviews. The complete set of frequencies of responses and percentages per question is available in Appendix 4.6.

Table 4.14 demonstrates the frequencies of responses for all 53 questions, with 1 and 2 grouped together, reflecting lower self-efficacy, as well as 3 and 4 grouped together, reflecting higher self-efficacy. Lowest and highest frequencies per question are indicated.

Table 4.14: Frequencies and percentages of responses per question (q) of the questionnaire according to the grouped Likert scale (n=157) Hypothetical construct: *Self* (student learning; q1-22)

Question		Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
q1:	You can clarify a paragraph you have just read and don't understand, by carefully reading it.	7 (4.5)	150 (95.5)
q2:	You can find a way to remember key facts in a reading assignment when you have trouble recalling it two weeks later.	37 (23.6)	120 (76.4)
q3:	You can redefine complex definitions from a textbook and recall it when you have trouble remembering it.	43 (27.6)	113 (72.4)
q4:	You can set and attain an important study goal during your remaining time when you have tried unsuccessfully to study for an hour.	36 (23.4)	118 (76.6)
q5:	You can ask the right question to clarify matters when you don't understand your lecturer.	50 (32.1)	106 (67.9)
q6:	You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture.	80 (50.9)	77 (49.1)
q7:	You can catch up on the work within a week when you have missed several classes.	37 (23.6)	120 (76.4)
q8:	You can interpret an assignment you are reading that doesn't make sense, by using text clues such as headings or italics.	35 (22.4)	121 (77.6)
q9:	You can find a way to motivate yourself to learn it fully when the assigned reading is boring.	29 (18.5)	128 (81.5)
q10:	You can make it into an exciting challenge when a homework assignment is repetitive and uninteresting.	61 (39.3)	94 (60.7)
q11:	You can find a way to get the information clarified before the next class meeting when a lecturer's class is over your head.	48 (30.8)	108 (69.2)
q12:	You can associate new concepts with old ones sufficiently well to remember them when you are trying to understand a new topic.	24 (15.3)	131 (84.5)
q13:	You can motivate yourself to keep good notes when a lecture is especially boring.	42 (26.8)	115 (73.3)
q14:	You can create self-questions to help you review the material successfully when you suddenly realise that you can't.	61(38.9)	96 (61.2)
q15:	You can think of good examples that will help you remember it in a test when you have trouble recalling an abstract concept.	23 (14.7)	133 (85.3)
q16:	You can condense your notes down to just the essential facts when you are taking a module covering a huge amount of material.	37 (23.7)	119 (76.3)
q17:	You can find a way to associate the technical detail of a concept for a test that will ensure recall, when you are struggling to remember.	38 (24.4)	118 (75.6)
q18:	You can record all the important points in your notes when your lecturer's class is so rapid that you are	53 (34)	103 (66)

Question	Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
unable to write everything down.		
q19: You can refocus sufficiently when your concentration wanders while listening in class.	43 (27.7)	112 (72.3)
q20: You can create your own analogy that a reader will understand when describing a complex principle in a written paper.	40 (25.5)	117 (74.5)
q21: You can go back to your notes and locate all the information you had forgotten when you think you did poorly in a test you just finished.	24 (15.3)	133 (84.7)
q22: You can diagram a body of information, or chart it for a test in order to remember it all two weeks later when you are struggling to understand it	49 (31.2)	108 (68.8)

*Lowest frequencies

** Highest frequencies

Hypothetical construct: *Motivation* (q23-44)

Question	Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
q23: You prefer class work that is challenging in order to learn new things.	19 (12.2)	137 (87.8)
q24: It is important for you to learn what is being taught in this class.	*2 (1.3)	*155 (98.7)
q25: You like what you are learning in this class.	8 (5.1)	149 (94.9)
q26: You are certain you can understand the ideas taught in this course.	8 (5)	107 (95)
q27: You think that you will be able to use what you learn in this class in other classes.	13 (8.3)	144 (91.7)
q28: You think that what you are learning in this class is useful for you to know.	12 (7.7)	144 (92.3)
q29: Your study skills are excellent compared to other students in this class.	83 (52.6)	74 (47.4)
q30: You know that you will be able to learn the material for this class.	10 (6.4)	147 (93.6)
q31: When you study for a test you try to combine the information from the lecture and from the book.	14 (9)	142 (91)
q32: When you do homework, you try to remember what the teacher said in class in order to answer the questions correctly.	20 (12.7)	137 (87.3)
q33: You ask yourself questions to make sure you know the material you have been studying.	40 (25.4)	117 (74.5)
q34: It is hard for you to decide what the main ideas are in what you read.	60 (35.5)	96 (61.5)

Question	Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
q35: When the work is difficult for you, I either give up or study only the easy parts.	61 (38.8)	96 (61.2)
q36: When you study, you put the important ideas into your own words.	26 (22.9)	121 (77.1)
q37: You work on practice exercises and answer end of chapter questions even when you don't have to.	71 (45.7)	84 (54.2)
q38: Before you begin studying you think about things you will need to do to learn.	45 (28.7)	112 (71.3)
q39: You use what you have learned from old homework assignments as well as the textbook to do new assignments.	50 (31.9)	107 (68.2)
q40: You often find that you have been reading for class but don't know what it is all about.	60 (38.5)	96 (61.5)
q41: You find that when the lecturer is talking you think of other things and don't really listen to what is being said.	83 (52.9)	74 (47.1)
q42: You work hard to get good marks even when you don't like the subject.	21 (13.38)	136 (86.62)
q43: You work hard to get good marks even when you don't like the lecturer.	23 (14.7)	134 (85.4)
q44: When reading, you try to connect the things you are reading with what you already know.	12 (7.6)	145 (92.4)

Hypothetical construct: *Class* (q45-51)

Question	Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
q45: You ask questions in class or contribute to class discussions.	93 (59.2)	64 (40.8)
q46: You never come to class without completing readings or assignments.	55 (35)	102 (65)
q47: You work with classmates outside of class to prepare class assignments.	48 (30.6)	109 (69.4)
q48: You put together ideas or concepts from different courses when completing assignments or during class discussions.	49 (31.2)	108 (68.8)
q49: You use e-mail to communicate with the lecturer.	73 (46.5)	84 (53.5)
q50: You discuss grades or assignments with the lecturer.	*115 (73.2)	42 (26.8)
q51: You discuss ideas from your readings or classes with others outside class (students, family members, co-workers etc.)	28 (17.8)	129 (82.2)

Hypothetical construct: *Study* (q52-53)

Question	Low self-efficacy Frequency (Percentage)	High self-efficacy Frequency (Percentage)
q52: You put a lot of effort into this subject.	16 (10.2)	141 (89.8)
q53: You make sure to study on a regular basis.	25 (18.7)	109 (81.3(

b. Analysis of question scores

Analysis of questions was done according to the following classification:

i. High self-efficacy:
   a. Lowest frequency on Likert scale 1 and 2, and
   b. Highest frequency on Likert scale 3 and 4.
ii. Low self-efficacy:
   a. Highest frequency on Likert scale 1 and 2, and
   b. Lowest frequency on Likert scale 3 and 4.

Analysis of question (q) scores indicated questions which reflected low and high self-efficacy respectively. Questions scoring low self-efficacy were:

i. q6: *You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture* (Hypothetical construct: *Self*);
ii. q29: *You think what you are learning in this class is useful for you to know* (Hypothetical construct: *Motivate*);
iii. q34: *It is hard for you to decide what the main ideas are in what you read* (Hypothetical construct: *Motivate*);
iv. q41: *You find that when the lecturer is talking you think of other things and don't really listen to what is being said* (Hypothetical construct: *Motivate*);
v. q45: Y*ou ask questions in class or contribute to class discussions* (Hypothetical construct: *Class*) and
vi. q50: *You discuss grades or assignments with the lecturer* (Hypothetical construct: *Class*).

Questions scoring high self-efficacy were:

i. q1: *You can clarify a paragraph you have just read and don't understand, by carefully rereading it* (Hypothetical construct: *Self*)
ii. q24: *It is important for you to learn what is being taught in this class* (Hypothetical construct: *Motivate*)
iii. q26: *You are certain you can understand the ideas taught in this course* (Hypothetical construct: *Motivate*)
iv. q27: *You think that you will be able to use what you learn in this class in other classes* (Hypothetical construct: *Motivate*)

v. q30: *You know that you will be able to learn the material for this class* (Hypothetical construct: *Motivate*).

Results in table 4.13 indicated that the majority of questions had high frequencies for high self-efficacy in comparison with for low self-efficacy. The exception was q6 (hypothetical construct: *Self*); q26, q29 and q41 (hypothetical construct: *Motivate*); q45 and q50 (hypothetical construct: *Class)* which had higher frequencies for low self-efficacy.

The question with the highest frequency for low self-efficacy was q50: "*You discuss grades or assignments with the lecturer*" (Hypothetical construct: *Class*). The question with the highest frequency for high self-efficacy was q24*: "It is important for you to learn what is being taught in this class"* (Hypothetical construct: *Motivate*).

4.5 SUMMARY OF RESULTS

Total scores for self-efficacy indicated overall low and high self-efficacy among 43.4% and 56.6% participants respectively. There was no significant correlation between self-efficacy scores and recent assessment results. There was no significant difference between the assessment results of students in the two categories (<75% & $\geq$75%) of low and high self-efficacy respectively.

Participants demonstrated the lowest self-efficacy for the hypothetical construct *Class* (student engagement in class) followed by *Self* (self-efficacy related to student learning in the teaching and learning environment). Participants demonstrated the highest self-efficacy for hypothetical constructs *Motivate* (motivational strategies for learning in the teaching and learning environment) followed by *Study* (student engagement with studying). No correlations were demonstrated between the hypothetical constructs and assessment results, but a strong association was seen between *Class* and assessment results.

The Spearman correlation demonstrated a significant difference in student engagement in class between the preferred student language (Afrikaans or English) in class. A significant difference was also demonstrated in student engagement with studying between the preferred student language (Afrikaans or English) in class.

Analysis of question scores revealed that 6 of the 53 questions scored in the low self-efficacy category and were in the hypothetical constructs *Self* (1 question), *Motivate* (3 questions)*,*

Class (1 question) and *Study* (1 question). Five of the 53 questions scored in the high self-efficacy category and were in hypothetical constructs *Self* (1 question) and *Motivate* (4 questions).

Questions for the semi-structured interview were based on the six questions which demonstrated low self-efficacy.

4.6 CONCLUSION

Chapter 4 presented the quantitative results of Phase 1 (questionnaire).

Various questions and hypothetical constructs were identified as factors that influence the status of self-efficacy. The identified questions were used to compile the questions of the semi-structured interview.

In Chapter 5, *Results of Phase 2 (qualitative data): Semi-structured interviews*, the results from Phase 2 about the qualitative component will be presented and discussed.

CHAPTER 5

RESULTS OF PHASE 2 (QUALITATIVE DATA): SEMI-STRUCTURED INTERVIEWS

"Medieval alchemy aimed to transmute base metals into gold.
Modern alchemy aims to transform raw data into knowledge."
(Patton 2015:521)

5.1 INTRODUCTION

This chapter presents the results and discussion of qualitative data from Phase 2 of the study (cf. Figure 5.1). Qualitative data were collected through once-off, face-to-face, semi-structured interviews (cf. Chapter 3, Section 3.3.2.2). Transcribed data are presented in Appendices 5.1 and 5.2.

In Figure 5.1, highlights the qualitative analysis in Phase 2.

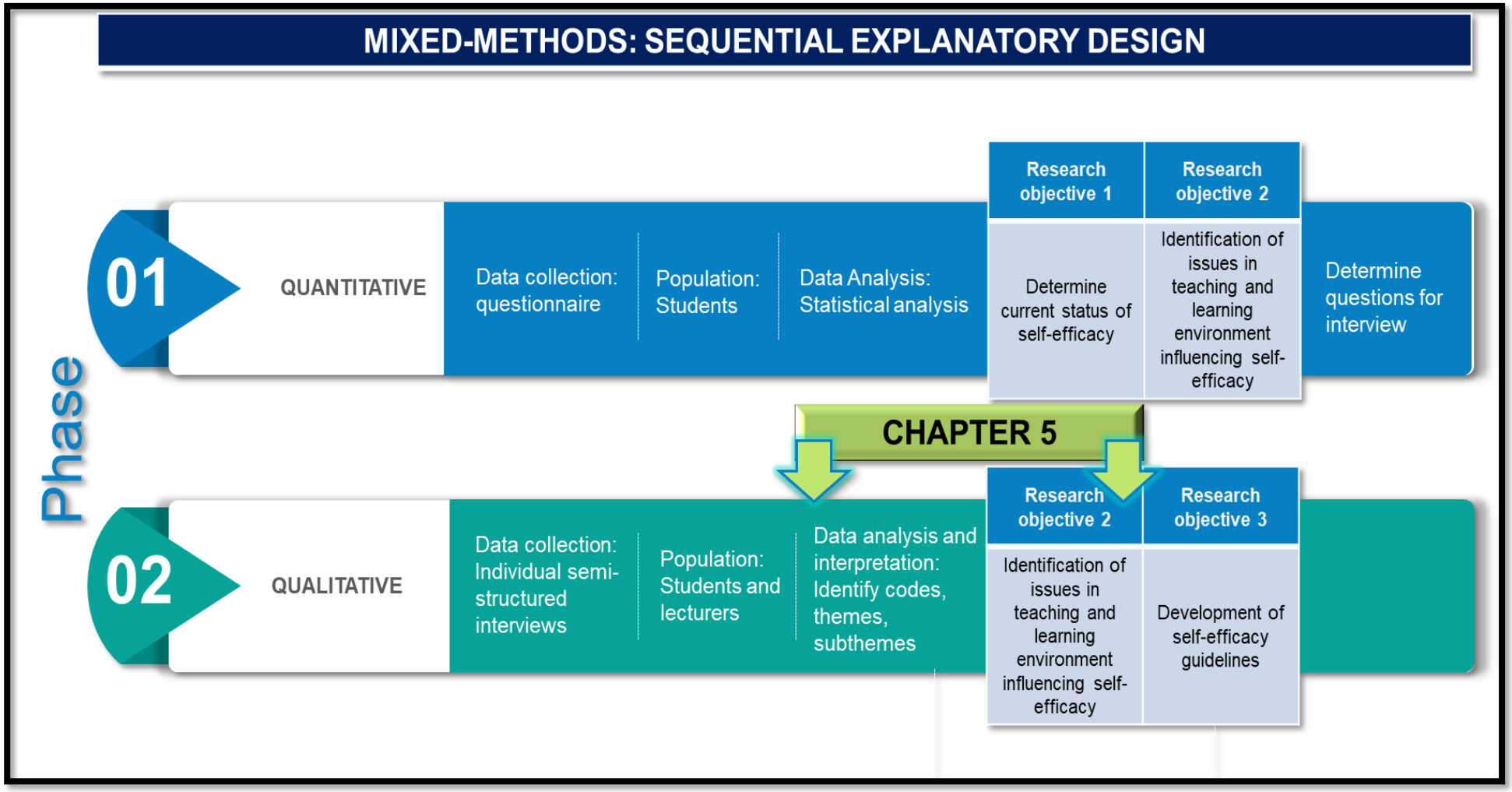

Figure 5.1: Illustration of qualitative analysis and interpretation from Phase 2 (highlighted) (adapted by the researcher, Vorster de Wet from Creswell 2009:209)

5.2 SAMPLE POPULATION AND PROCEDURE

5.2.1 Sample population

Purposive sampling of second-year and third-year students (n=24) was done according to the most recent assessment marks (examination) for the Physiology module, to be representative of a wide range of academic performance [<40% ->80%] (cf. Table 3.4). Informed consent (cf. Appendices 3.1A & B) was obtained from undergraduate students (n=24) as well as from lecturers (n=18) for the interviews. Sampling of lecturers was according to the following criteria:

i. Lecturers who lecture undergraduate Natural Sciences students;
ii. Lecturers who have more than five years' experience of teaching at a university; and
iii. Permanently appointed lecturers in the Faculties of Health Sciences and Natural and Agricultural Sciences.

Pilot data from four exploratory interviews (two students & two lecturers) were added to the data obtained from the sample population (cf. Chapter 3, Section 3.3.3.4b). Therefore, 26 student interviews and 20 lecturer interviews were analysed and interpreted.

5.3 DATA ANALYSIS OF SEMI-STRUCTURED INTERVIEWS

5.3.1 Background to and rationale for the use of semi-structured interviews

In this section, analysis of the semi-structured interviews refers to reduction and display of the data to make conclusions. According to Creswell (2009:183), the process of data analysis concerns moving deeper into understanding the data to be able to interpret the larger meaning of the data. Both lecturers' and students' perceptions of each other as well as their views of the classroom are essential to improve understanding of the complex dynamics of motivation and learning (Miller *et al*. 2017:262). After analysis of the data from Phase 1 (questionnaires), results were used to compile questions for the semi-structured interviews (cf. Appendices 3.3A & B). The data from Phase 2 (semi-structured interviews) were analysed and interpreted using thematic analysis (cf. Chapter 3, Figure 3.2 & Section 3.3.3.4e). The primary aim of the semi-structured interviews was to gain an understanding of student self-efficacy in the teaching and learning environment of Natural Sciences (cf. Research objective 2).

Interview questions focused on the four constructs within the teaching and learning environment on which the questionnaire was based. For ease of reference, the four hypothetical constructs (cf. Chapter 3, Section 3.3.2.2) are presented again:

i. Student learning in the teaching and learning environment (*Self*);
ii. Motivational strategies (*Motivate*);
iii. Student engagement in class (*Class*) and
iv. Student engagement with studying (*Study*).

Responses of <75% to questions in the questionnaire regarding the four hypothetical constructs were identified as issues that influence self-efficacy (cf. Chapter 4, Section 4.4.3c).

5.3.2 Data security

Students and lecturers gave informed consent to participate in the study (cf. Appendices 3.1A & B). All data were managed in a confidential manner. Number coding was used, and therefore data were anonymous and non-traceable. Interview recordings and transcriptions were stored on the researcher's desktop computer with password protection and will be destroyed by digital deletion five years after the study has been finalised.

5.4 REPORTING AND DESCRIPTION OF THE FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS

The coding of data enabled the researcher to organise and interpret the data.

5.4.1 Identification of issues influencing student self-efficacy in the teaching and learning environment

Thematic analysis of data revealed seven codes which were organised in three constructs, four themes and eight categories. Multiple iterations are necessary to make the best decision for relevance in terms of the conceptual framework and the practical implications for the field (Miles & Huberman 1994; Rocco 2003:346). In this study, seven iterations of identifying, defining and reviewing were done to finalise constructs, themes and categories.

In this study, a construct is a collective term for the themes and a theme refers to a

collective term for the categories. A category refers to a topic mentioned frequently by participants. After defining, reviewing and grouping themes according to psychological and educational definitions, constructs were conceptually identified. Themes were grouped according to a cognitive approach (construct: *attitudes and approaches*), an affective approach (construct: *motivational dynamics*) and an educational approach (construct: *teaching practices*). Figure 5.2 illustrates the constructs, themes and categories identified that influenced student self-efficacy.

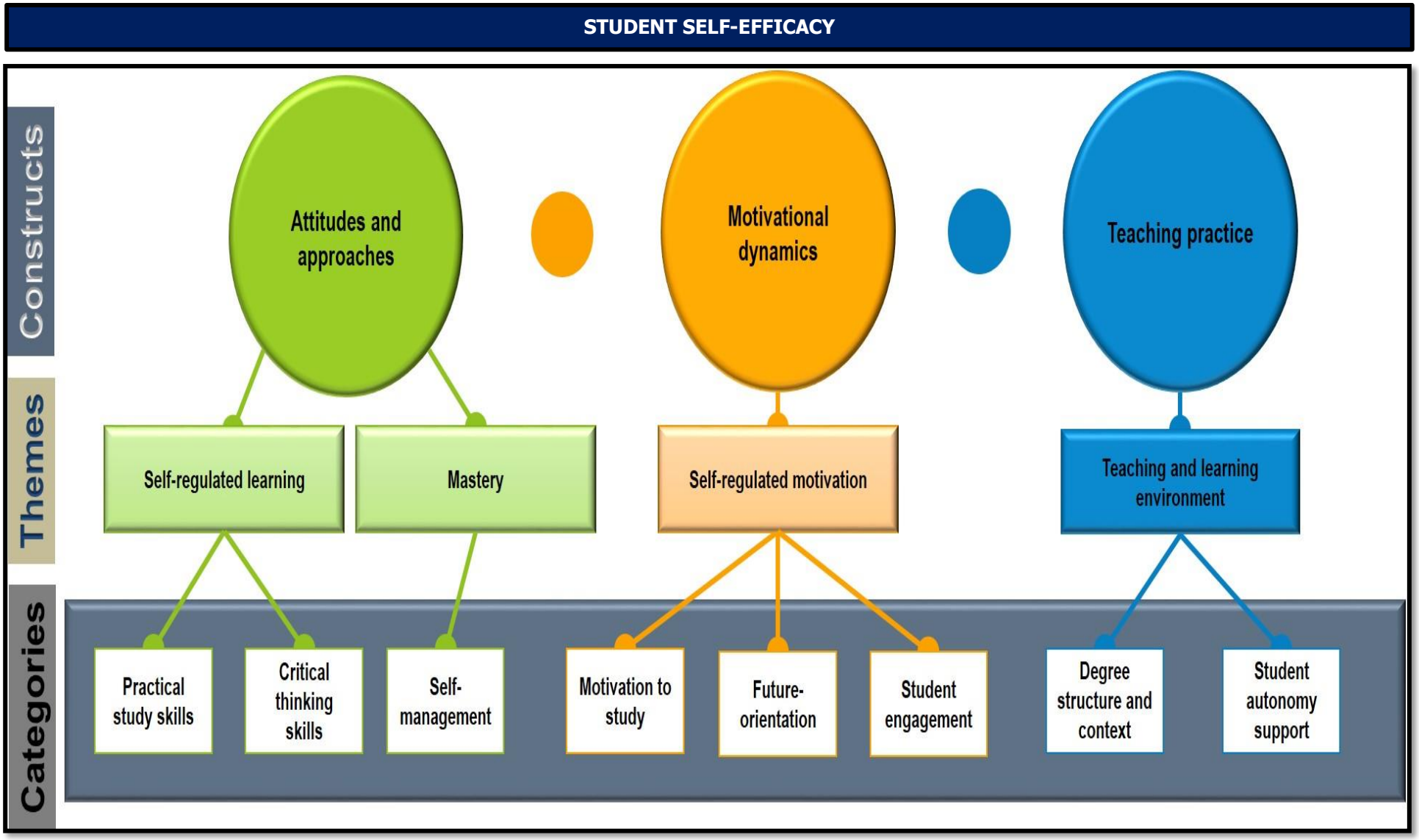

Figure 5.2: Constructs, themes and categories influencing student self-efficacy

5.4.2 Construct 1: Attitudes and approaches

Themes and categories for the construct *Attitudes and approaches* are presented in Figure 5.3.

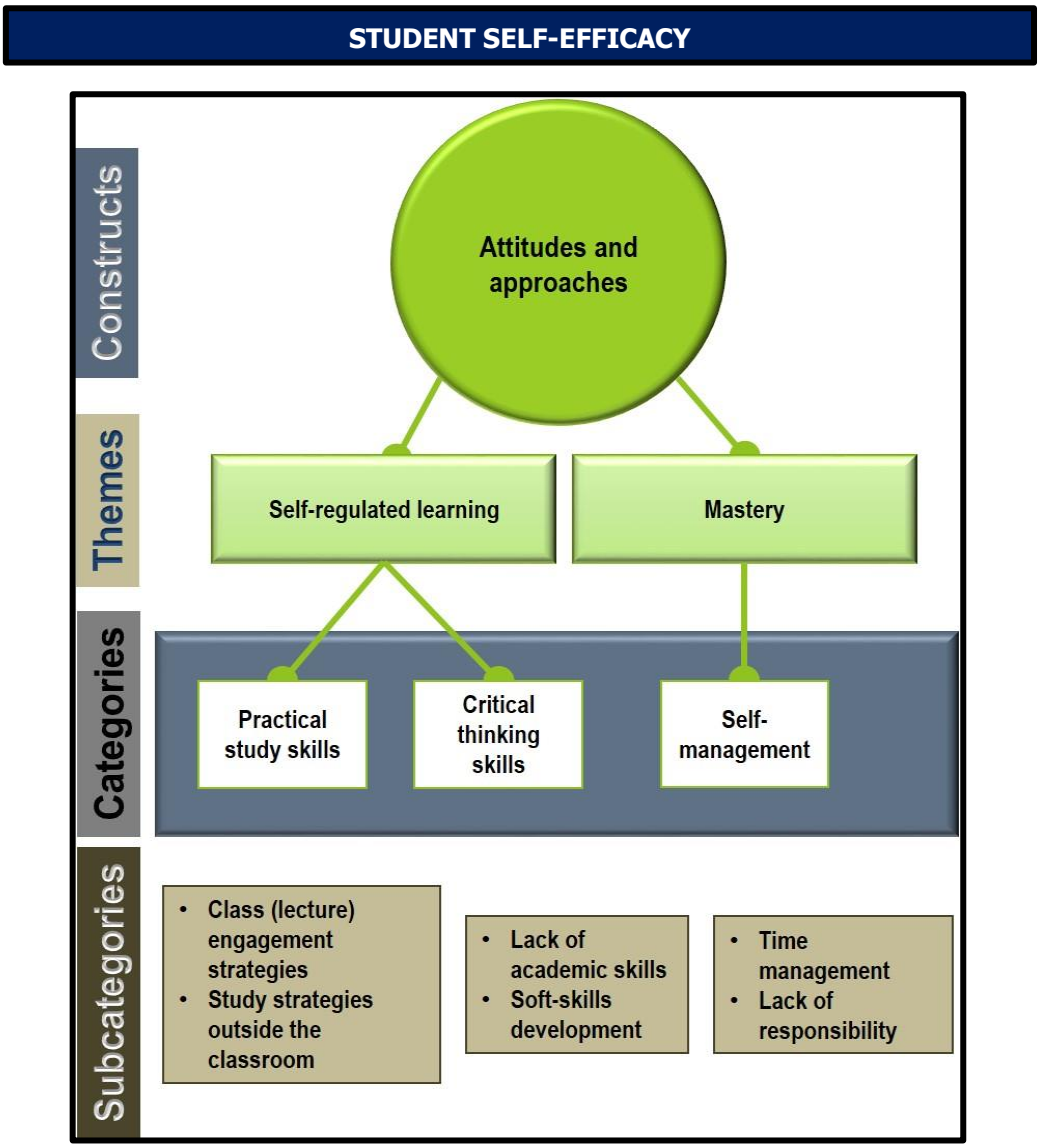

Figure 5.3: Themes and categories for the construct Attitudes and approaches

5.4.3 Theme one: Self-regulated learning

In Theme 1, two categories were identified, namely *practical study skills* and *critical thinking skills* (cf. Figure 5.3). The importance of self-regulated learning was emphasised as a major function of education in order to develop life-long learning skills (Zimmerman 2002:66) (cf. Chapter 1, Section 1.1). It refers to spontaneous control of behaviours, motions, thoughts and wills in order to achieve certain learning goals (Wang 2018:462; cf. Chapter 1 Section 1.1).

5.4.4 Category 1: Practical study skills

Two subcategories were identified, namely *class (lecture) engagement strategies* and *study strategies outside the classroom* (cf. Figure 5.3). In the context of this study, practical study skills refer to strategies and approaches for learning (knowledge construction). Learning is a process of individual knowledge construction as students observe and interact with their environment (Schcolink *et al.* 2006:12; Kay & Kibble 2016:21; cf. Chapter 2, Section 2.5). In this study, when lecturers and students mentioned "class" in the interview transcriptions, depending on the context, it either referred to the classroom, a lecture or the students receiving the lecture.

5.4.4.1 *Class (lecture) engagement strategies*

Lecturers indicated only one strategy (asking questions) used by some students to engage during lectures:

> *"They ask questions and we talk during the lecture"*
> *"I see they ask questions…"*
> *"…usually 3-4 individuals in each year group who ask questions frequently throughout the year…."*

Students reported that they use a variety of strategies to engage during lectures. These strategies were:

> Asking questions:
> *"… I am somebody who asks questions no matter what…"*
> *"… try to as far as possible ask questions…when I don't understand something…"*

> Making notes:
> *"…in class I make notes …I keep busy by writing and keep my focus on the lecture…"*

> Listening:
> *"I am sort of…. audio like not visual like. I can just sit in class and listen…"*

> Lecture attendance and interaction with the lecturer:
> *"…I try as far as possible to stick with the lecturer as she speaks … if I attend classes I do much better …it feels I must be interactive with the lecturer"*
>
> Use of textbooks:
> *"…normally take my textbook with me to class. I only use the textbook in class for marking where I should focus on…"*

5.4.4.2 *Study strategies outside the classroom*

Lecturers indicated preparation for a lecture as an important practical study skill that would improve self-regulated learning:

> *"A student that is prepared, has a basic concept even just through reading, would make it much easier"*
> *"… prepare themselves for their classes which I feel is one component of self-efficacy, preparation ahead of time…"*

They indicated that the majority of students do not prepare for lectures:

> *"…majority of the heads are nodding saying they do not want to study and prepare and one can see it…"*
> *"… very few of them take time to prepare themselves for their classes…"*

Lecturers proposed that smaller groups of students in lectures and improved self-discipline could contribute to lecture preparation and self-regulated learning and indicated discipline as key to success:

> *"…but with the smaller class you get more involvement, prepare and come to class prepared…"*
> *"…This year there are only 7 students and they are much more independent… I get much more interaction from them and they prepare more…"*
> *"…mainly about discipline because if a student wants to be effective at university, understanding that the attendance of lectures are important, keeping up with the regular work, the consultation, making use of the resources to ensure you understand the work and if you put all of those factors together and you do well, you do not even have to do it excellent, then you are successful at university…"*
> *"…it is all about discipline…because that thing can become a problem in class when it is not being managed"*

According to lecturers, students had difficulty in assimilating information outside their framework:

> *"A gap I've experienced is that students struggle to think and function outside of the given context and framework…"*

Some students had inappropriate ideas about study strategies:

> *"They also come with question papers from before I lectured… not relevant anymore, and then they study that…"*

In addition, students' lecture attendance dropped when they were preparing for tests in other modules:

> *"…they say they write this and this test, so then they do not cope."*
> *"…still have the trend of writing tests then the lecture attendance decrease…"*

Some students showed insight regarding their lack of study strategies by referring to themselves as being lazy with a tendency to procrastinate:

> *"I wouldn't lie to you and say that I do my notes at home, I don't, I am very lazy…I cram my work too much…"*
> *"…I tend to procrastinate a lot…"*

Students' effort with studying differed:

> *"…I didn't take it that serious …did not put so much effort …if too much effort and too much pressure on myself things just seem to go, my marks just deteriorating…"*
> *"…put in maybe four hours a day …I feel like I study just to pass the exams. I feel like I forget that I acquire knowledge that I have to use…",*
> *"…very conscientious so I like all my things to be done beforehand, it must be on time… I work very hard"*

Some study strategies included:

> Making summaries:
> *"I summarize all my modules and do it early so that it is summarized before all my tests"*

> Lecture attendance:
> *"…go to classes because …when I am in a test I kind of remember what the lecturer had said…."*

> Concentration during a lecture:
> *"I feel if I concentrate in class it is sufficient for me to remember what I must do and then before tests study all the work and go through it again. I usually try to start my studying about 3-4 days before my tests"*

> Reading:
> *"…I read through the work to get an overview and then to pinpoint what is important…I feel I don't know the work if I don't have an overview and then the detail"*

> Revision:
> *"I realized that if you don't go through the work constantly, then it becomes difficult when the tests start"*

> Research on the internet and social media:
> *"…if you don't understand you just read and type in on Google or Youtube and there is an explanation…"*
> *"…me and my friends we take notes and afterward we try to combine …even have a Whatsapp group…"*

> Peer collaboration:
> *"….study partner …about four days before the test we will start testing each other"*

> Answering questions in text books and past examination papers:
> *"We do past question papers and ask each other like if I don't understand."*

In summary, lecturers and students agreed that lack of preparation and self-discipline contributed to challenges with self-regulated learning. Though students indicated a variety

of study strategies, lecturers indicated students' lack of practical study skills.

5.4.5 Category 2: Critical thinking skills

In category 2, two subcategories were identified, namely *lack of academic skills* and *soft skills development* (cf. Figure 5.3). In the context of this study, critical thinking skills refer to competency for interpretation, analysis, evaluation, inference, explanation and self-regulation (Facione 2011:5). Higher education is compromised by the lack of these skills (Mclaughlin 2014).

5.4.5.1 *Lack of academic skills*

Lecturers indicated that students lack skills e.g.:

> Transition from theory to practice:
> "*…those that are not self-efficient, they can't make that everyday simple connotation with an example, even though I give the example…"*
> "*…as if the students are unable to put themselves in the position to think…"*

> Independent reasoning to apply knowledge in different contexts:
> "*…information they've learned in one context to apply it in another context and to make conclusions even if it's not in the context in which they've learned it."*

> Integration of scientific knowledge for scientific insight:
> "*They fragment everything and do not see it as a whole…"*
> *"…if they have completed the module, they regard it as done and they do not see the necessity of modules building on one another, the knowledge must be integrated."*
> "*…they see the class as a single unit, and that creates a big problem because they do not integrate information"*

They suggested that students should be guided through applied strategies towards the construction and integration of knowledge:

> *"…ask them in a tutorial or test to give information to practice their reasoning ability and synthesis of information"*
> *"I design specific MCQs which demand the integration of information and I must say it's a bit of a challenge and that's another problem…"*

According to lecturers, lack of these skills could result in low self-confidence and low self-efficacy. A possible reason for the lack of these skills could be students' background:

> *"…self-confidence is very low and there are students in my class whom I think should not be there…"*
> *"I assign it to the beginning of the primary and secondary school system where students are not taught to think independently and function without a framework…"*
> *"…not much of a reading background, so their general knowledge is very poor and there is no general retention of knowledge…"*

This was confirmed by students who indicated that confidence in their capabilities influenced their academic success:

> *"…It felt as if I would not have been here if I wasn't smart enough…"*
> *"… feel like I am one person who can study a lot of information in a short space of time that's quite a skill …I can read something now and catch the whole concept …so my capabilities are good"*
> *"…confident that I will reach my goals"*

5.4.5.2 *Soft skills development*

Lecturers indicated that an existing soft skills development module (UFS101)[1] should be adjusted to be more valuable for specific skills:

> *"The so-called 'soft skills' such as time planning, how you learn, study methods. Much of this stuff they do on the South campus. We have experienced that South campus students do far much better …I think with their undergraduate studies there are many skills to develop…"*
> *"…the quality…much better especially those …through the extended programmes …they're given the soft skills…they seem to be more prepared for varsity than the guys that came straight from school"*
> *"…At some stage, we now get a lot of pressure from the top, to adapt to the students we now have, should the students not also adapt to how a university is supposed to work?".*
> *"…UFS 101 and as it is, it is a total waste of time, in my opinion…put other things in that course that will be of more value to students. The so-called soft skills' such as time planning…".*

According to lecturers, some students came from backgrounds where soft skills were not addressed:

> *"…Not all of them come from backgrounds where they were given the soft skills to be self-starters…"*

In summary, lecturers and students agreed that lack of academic skills could result in low self-efficacy. Lecturers proposed soft skills development as a possible solution.

5.4.6 Theme 2: Mastery

In Theme 2, one category was identified, namely *self-management* (cf. Figure 5.3). Mastery is a comprehensive knowledge or skill in a particular subject or activity (Oxford English Dictionary) and is determined in educational settings through assessment (Guskey & Anderman 2013:19). Mastery is the most influential source of self-efficacy (Cooke *et al*. 2017:13).

[1] UFS101 is 16-credit year-long module that teaches students academic skills and is compulsory and a prerequisite for degree completion. Students register for the module in their first year of registration at the UFS.

5.4.7 Category 1: Self-management

Two subcategories were identified, namely *time management* and *lack of responsibility* (cf. Figure 5.3). In the context of this study, self-management refers to the responsibility and competent control of one's own behaviour, to manage and master studying, in the teaching and learning environment. Roick and Ringeisen (2018:157) stated that less successful learners in higher education lack adequate control strategies and use fewer strategies. These strategies refer to selection, combination and monitoring of cognitive strategies, such as establishing associations required to manage the task at hand. Successful students, compared to less successful learners, have better control strategies.

5.4.7.1 *Time management*

Lecturers indicated that students experienced difficulty with time management:

> *"…it's as if their time management isn't right. They can't attend class and do all these things but it's a trend"*
> *"…time…not as efficient as they could…dedicating their study time I would estimate it to be 60-70%"*
> *"…second year there is a drastic decrease in the number of classes and they have a lot of free time and somewhere in that process they lose that drive…"*

Students also indicated that they experienced time management as a challenge:

> *"…can't study 2 weeks ahead of time for a test, usually a week or so or 3 days before the time is the best, but it is actually bad…"*
> *"...when I came to varsity I didn't know how to handle time management…"*
> *"…time management obviously…without time it just gets hard to study effectively".*

5.4.7.2 *Lack of responsibility*

Lecturers emphasised the importance of students' responsibility for self-management and their realization thereof:

> *"…to take responsibility for their studies on their own and to have that drive and ambition to go and sit down or do something to improve their learning by themselves…"*
> *"…they must take responsibility and not just wait until I say something to them, but they must go and learn effectively. They must take responsibility for their process"*
> *"…we provide a service but they've got their part of the bargain as well…"*
> *"I am a firm believer of when you want responsibility you need to give responsibility. I think that is a big part of self-efficacy…"*

They reported students' lack of responsibility and tendency to shift responsibility towards the lecturer:

> *"I think they expect from me …I will get the knowledge into their heads. I get the idea they put the minimal effort in and think it is my responsibility…"*
> *"…they come with old test papers and say I must work it out which I do not do"*
> *"…they sit back more and expect more of you and it's a problem…"*

In summary, lecturers and students agreed about students' challenges with time management. Lecturers emphasised students' responsibility for study achievement through mastering self-management while students apparently did not grasp this responsibility.

5.4.7.3 *Construct 2: Motivational dynamics*

Themes and categories for the construct *Motivational dynamics* are presented in Figure 5.4.

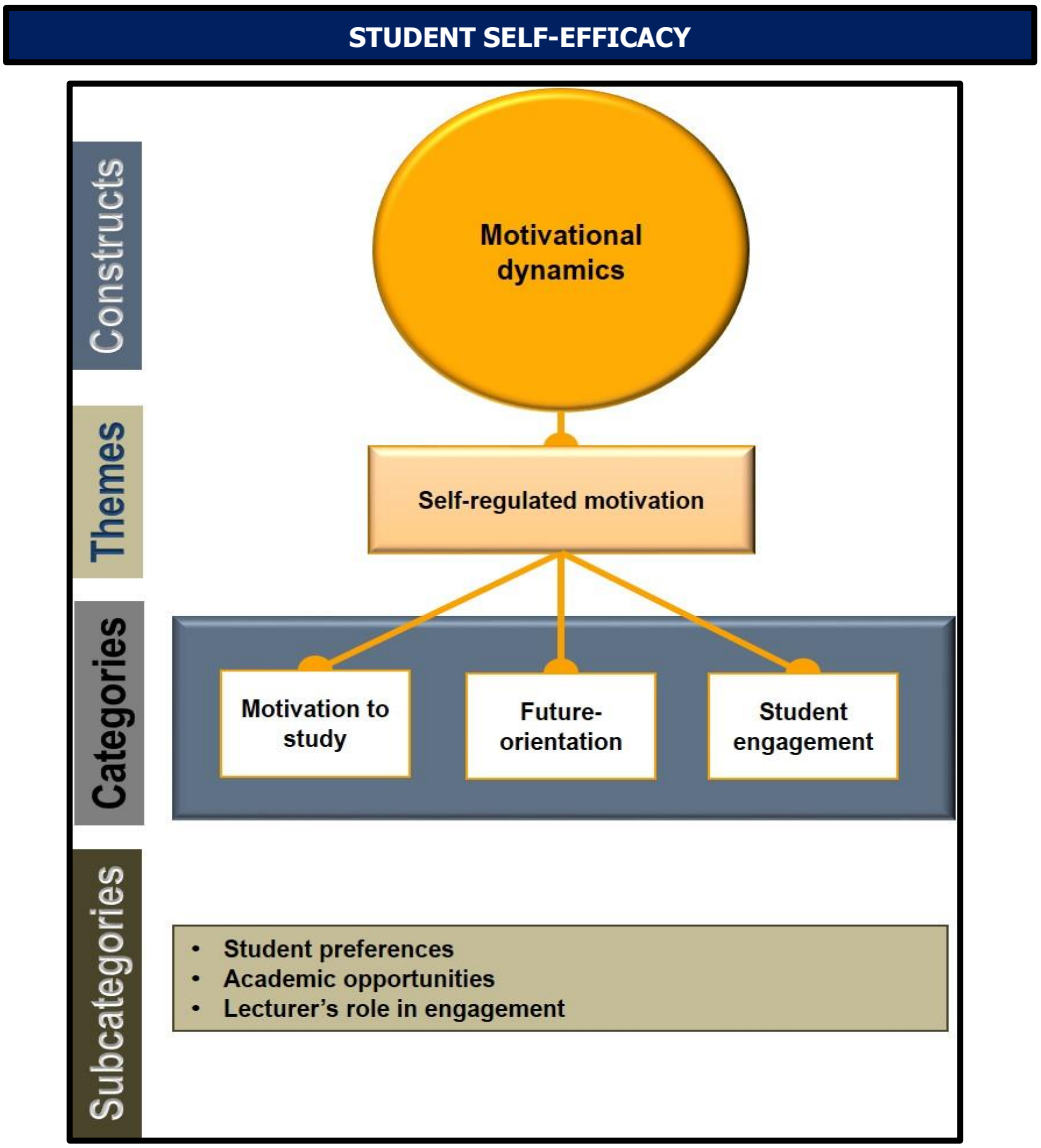

Figure 5.4: Themes and categories for the construct Motivational dynamics

5.4.8 Theme 1: Self-regulated motivation

In Theme 1, three categories were identified, namely *motivation to study, future-*

orientedness and *student engagement* (cf. Figure 5.4). Self-regulatory strategies are important components of motivation and academic achievement (Pajares 2002:117; cf. Chapter 2, Section 2.4.3).

5.4.9 Category 1: Motivation to study

In the context of this study, motivation to study refers to challenges influencing self-regulated motivation. Regulation of motivation and action is a cognitive skill and relies on an anticipatory proactive system rather than on a reactive negative feedback system (Bandura 1991:282; cf. Chapter 2, Section 2.4.5.2). Lecturers were of opinion that students enrolled in modules merely to obtain the required credits towards a degree, and were not necessarily motivated due to specific interest in the modules:

> *"…we find a large group of students only taking it for the credits and not because of interest…"*
> *"…my experience is that students aren't always effective…I think many of the problems stem from credit-bearing"*
> *"…their marks depend on their interest in a subject…"*
> *"The one group wants credits and is not interested. They have no self-efficacy in class and their marks showcase it…"*

Students seemed to have different levels of motivation to study:

> *"There is just a spectrum. Those who want to, will and those who do not want to, will not"*
> *"You find the absolute dedicated ones that want to go further, the ones that work very hard, those that do not care, those that had a fright and try again"*
> "I *don't think there are many who is motivated to do well. They want 50% and that's that*"

In addition, students' varied levels of motivation to study resulted in a range of academic performances. This was a challenge for lecturers to accommodate:

> *"Nowadays we have two curves, the first curve below the pass rate, a small percentage with 50-65% and then a curve of 70% and above and even people who get 90% …"*
> *"…you have the full spectrum of students who do things differently …"*
> *"…is a challenge for me is this diverse group of mine….I tried to get points of reference so that they can understand."*
> *"…the extremes…student just comes and are part of the furniture and you have the more open students and feel free to stop me during the lecture and ask the question"*

There seemed to be a decline in students' motivation over time:

> *"… In general much worse than in the past…"*
> *"…very low…the last 2-3 years…I get the impression, it is a punishment to be here…"*
> *"…students went from real interest to I just want to get through this class to the next one…"*

The decline in motivation to study could be attributed to lack of passion, seen in the majority of students:

> *"They have been told go to varsity and study and they end up here for something they not even passionate about so there is no motivation"*

However, there were small numbers of students with intrinsic motivation:

> *"Nowadays you still find a percentage that is in class out of interest…"*
> *"… it's linked to the individual, and some of the students are motivated, they realize the opportunity given and succeed"*

On the other hand, extrinsic motivating issues had a positive and negative influence on students. Positive influences were e.g. family and academic results:

> *"They want to make their families proud…"*
> *"…I always have a group of students driven by marks…if they get 98% they want 99% and they are never satisfied. For them it's all about achievement…"*

Pressure and stress from the family were extrinsic motivating issues with a negative influence:

> *"…experience stress from outside from family or bursaries…"*
> *"…the majority of students study because…pressure from the parents…"*

Students indicated the influence of family as a positive extrinsic motivator:

> *"…make my parents proud or teachers…a little bit of how people see me as well"*
> *"…my financial situation at home, I am really under pressure to get a job and help at home..."*
> *"...most is internal motivation…the first child in my family to get a degree…"*

In addition, the political situation in the country was an extrinsic factor with a negative influence:

> *"…we have huge unemployment in our country… young people between 18 and 25… if they do not perform they will be part of that statistic."*
> *"...in this country you can't do really anything if you haven't gone to tertiary education..."*

Students reported intrinsic motivators to study e.g.:

> <u>Easier comprehension of information that stimulated their interest</u>:
> *"…it is easier to pertain information that is interesting and I have a way of making sense of it and that makes it easier to study…don't study that much, but mostly study in class"*

> <u>Enjoyment of the study material</u>:
> *"I always thought Physiology was fun I've always loved it from high school…I enjoy it"*
> *"I think if you enjoy it, motivation comes much easier. I almost couldn't wait to go to class in the mornings"*

> <u>Goals to reach</u>:
> *"…I have goals…to pass everything and hopefully get distinctions for my modules"*

> <u>Postgraduate studies</u>:
> *"…one of my motivations to do well is I want to be selected for Honours and later masters…"*

Fear of failure:
"*…would like to pass everything…too scared of failures, I'll rather work hard"*

Students experienced challenges to their motivation to study, including:

Laziness:
"*…I'll do it later and then I think I must really do it now and then I think there is still a bit of time…you feel a bit lazier and you need motivation…"*

Procrastination:
"I *often procrastinate…"*

These challenges, as well as the realisation of their attitude towards studying, as being lazy and procrastinating, disadvantaged them (cf. Construct 1: Attitudes and approaches).

Another challenge was distractions due to social life and stress:

"*…finding that balance between your social life and your work…my biggest obstacle at the moment…*"
"*…I think I possess the abilities to do well, but stress and tension play a role which disadvantage you in a way…one doubt yourself…"*
"*…so stressed…that cripples me and my marks drop…I stress myself to death…"*

An additional factor influencing motivation was the interaction between capabilities and motivation:

"*…I think it is 50-50 capabilities and motivation and I think my capabilities and motivation are both there to pass the module, I think you can be clever but if you aren't motivated then you won't pass"*

The effect of the secondary education system (school) on the tertiary education system was also mentioned:

"*…at high school they wanted you to write down definition exactly like that"*
"*…background with a very small school and the system you were on, you work at your own rate so you determine how much work how often kind of thing"*

In summary, lecturers and students agreed that information that stimulate their interest contributed to self-regulated motivation. Students indicated intrinsic and extrinsic issues that influenced their motivation though it seemed to lecturers that extrinsic issues dominated. Extrinsic issues had either a positive or negative effect on self-regulated motivation.

5.4.10 Category 2: Future-orientedness

In the context of this study, future-orientedness refers to students' orientation and

expectation about their future career goals, contributing to self-regulated motivation (cf. Figure 5.4). Self-efficacy might be a predictor of performance due to people predicting their future performance from their past behaviour (Bandura 1977:211; cf. Chapter 2, Section 2.4.4). Lecturers reported that students had difficulty to envisage their future and this had a negative influence on their self-regulated motivation:

> *"I think future stress or what is the next step… something future or planning wise may work in with them."*
> *"…some of them come and say 'I don't really know how am I going to use my studies', 'where am I going to go with my studies?' 'where am I going to get a job?'"*
> *"…feels like if you are in a situation where you as Afrikaans male will struggle to get a job, more than in the past, you must work so much harder and I see the opposite with the students. They sit back because 'I will in anyway struggle'…"*

However, their future vision improved from the beginning towards the end of the semester:

> *"…worry me in the beginning of the semester…then towards the end of the semester there is actually a lot of seriousness shining through and then the performance in the module is not that bad at the end of the day…"*
> *"…final-year students that want to get their degree and I think that is a great motivator"*

Students' short-term focus (to pass the module) and lack of long-term focus (vision and preparation for a career) influenced future vision. However, those who aimed at and expected an opportunity to enrol in the degree of Medicine, showed future vision, though it had a negative influence on their current self-regulated motivation:

> "I *think they are still very naive about life after university and you can realize they expect more of you to spoon-feed them…*"
> *"…they don't see the necessity of modules building on one another, the knowledge must be integrated…".*

However, those who aimed at and expected an opportunity to enrol in a medical degree, displayed more future vision, though it had a negative influence on their current self-regulated motivation:

> *"Some of them came to university because they want to do Medicine…in that sense they might have built a negative attitude towards the course".*

This was echoed by students who indicated their current degree as a "stepping stone" for envisioned career goals:

> *"… do to study medicine…I want to use it as stepping stone for other things…"*
> *"…to study BSc was not the original plan, I wanted to do Medicine so Physiology was the module to take to improve my chances which contributed to the motivation to study"*
> "*Physiology modules make me feel so much closer to my goal…Medicine…motivates me to work harder…"*

In summary, lecturers and students agreed that students' future vision influences motivation. Lecturers were of the opinion that students' short-term goals (to pass the module) dominated the long-term goals (future vision of career goals). This reflected limited future vision.

5.4.11 Category 3: Student engagement

Three subcategories were identified, namely *student preferences, academic opportunities* and *lecturer's role in engagement* (cf. Figure 5.4). In the context of this study, student engagement refers to students' engagement in the classroom. Student engagement mediates and explains the motivation-to-achievement relation (Reeve 2012:149; cf. Chapter 2, Section 2.7.7).

5.4.11.1 ***Student preferences***

Lecturers indicated the value of practicums for student engagement, although students do not necessarily realise its value. They suggested more practicums would increase and support student engagement:

> *"…different when you get to the practicums …you give them sort of practical meaning of what you teach in class …they starting to put 2 and 2 together …then ask you questions and you see them come alive in practicums but not so much in class…"*
> *"…theory work together with the practicums just to give them more experience of how this theory fits into practice…"*
> *"…practicums you see them come out more lively and more interactive…"*
> *"…were super interesting to them, because it had application…"*
> *"Through the practicums the relevance come…"*

However, limitations to present practicums and fieldwork, due to financial constraints, were reported:

> *"…do practicums outside. Now with 70 students and transport costs…we don't have the finances…I had to change my practicums and we now do a lot of educational documentaries…"*
> *"…used microscopes but we don't have it anymore. There is no funding for that…"*
> *"…personal demonstrations or visits to places…module leans towards that, but it's not always practically possible, be it costs or infrastructure…"*

Group work was indicated as students' preference to engage in a practicum:

> *"In the practical settings they prefer group work compared to individual work because one of them actually told me that in group work they learn how another individual will tackle a question on their level",*

Although students do not prefer to be assessed in groups:

> *"My experience is students do not like group work, do not like group marks…"*

Students indicated issues that motivated them to engage in the classroom during a lecture, including:

> Application of theory (fieldwork and practicums):
> *"…practicums …you learn how it works and nice to see it and touch it …it makes you more motivated to study it further"*
> *"…is nice if you can practically apply the things that you study in class…"*

> Lecturers' motivational contribution:
> *"…lecturer is like very positive about the module and she tries very hard and help so then it motivates one…"*
> *"…lecturer comes prepared…you shoot a question out of nowhere she will just know…motivates you more and keep you interested"*

> The quality of study material:
> *"...our lecturer do a lot of effort with the slides…the slides is very comprehensive …it also helps…"*
> *"…material in class…it is very well presented and brings everything nicely together and it is better for me to study…for me the slides are sufficient"*

> Interactive teaching strategies:
> *"…many group discussions…it improves the class participation"*
> *"…one thing I love most of them they are very interactive. That motivates us…"*

> Peer interaction in the classroom environment:
> *"...most of the students …you can sense they want to be there and try to do effort …it makes it easier for me to then engage…"*
> *"…respect about this class…discuss it and we share a question paper… it's like a community…"*

5.4.11.2 *Academic opportunities*

Lecturers indicated that students did not realize nor utilize the value of available opportunities to engage:

> *"…not sure if it is a type of avoidance on the students' side or not having time or just not caring… It's not seen as a learning opportunity."*
> *"…additional help there are so many that needs it…I offered that if some of them struggle with the work come to me and nobody has come…"*
> *"…this year I've started with the tutoring thing…actually shocking how few attend"*

For example, lecturers' consultation hours were not realized as an opportunity to engage:

> "*They* won't ask questions, *they do not come to your office if they do not understand something…*"
> "*I have 6 hours that appear on my door for consultancy, available for students every week. Guess how many have been used? Zero".*

According to lecturers, absence from the lectures, resulted in students' lacking theoretical background and subsequently poor academic results:

> *"…you create the background in the theory and apply in the practical, and the lecture attendance is actually very poor this year and then students come to practical very badly prepared."*

Therefore, lecturers emphasized the need to enforce compulsory lecture attendance:

> *"I think if we make lecture attendance compulsory, then we reach that student at home who does not cope and who does not realize if I sit in class it will help…"*

A way of motivating students to attend lectures could be by using assignments during the lecture:

> *"…students get motivated through assessment, through marks. If you do not connect a mark to something, it won't happen…last two classes I presented, where no assessment or tests were connected, I had less than 20% lecture attendance…"*
> *"Lecture attendance… they all come for practicums because they get a mark."*
> *"…marks are the reward and the university …students get motivated through assessment, through marks. If you do not connect a mark to something, it won't happen…"*

The number of students during lectures affected student engagement, teaching approach as well as logistical challenges with practicums:

> *"…smaller class you get more involvement, prepare and come to class prepared"*
> *"This is a little difficult with the large classes…backbenchers…sometimes disappear…in the mass."*
> *"…accommodating the class size. We just always take more and more, and the class bigger, because the throughput decreases…told that…to take so many students in for first year and so many goes to the second year…"*
> *"…student numbers increased tremendously, but our infrastructure did not"*
> *"…limitations…class is still too big…10 students need to sit with one Ipad"*

Lecturers mentioned pressure from top management regarding increased student numbers. Pressure to increase student numbers was experienced as challenging for academic engagement opportunities:

> *"…in a very dangerous cycle of you need more numbers for more subsidy …must do more with less…"*

Students echoed the challenge of increased student numbers in lectures. They mentioned that a smaller group of students present in a lecture, helped them to engage during a lecture:

> *"…the smaller class makes it easier for me with my personality"*
> "…smaller class…I will just open up with this question thing"
> *"…this semester the group is smaller and we can communicate…"*

Lecturers reported that those students who did academically engage, preferred electronic communication, one on one office consultations and asking questions after a lecture as communication platform:

> *"They send me many emails, but this year I had less than previous years, every now and then one will come in and ask…"*
> *"They would rather come to the office or send an email…"*
> *"So some of them may not have the courage to ask me during class but immediately after class they do come…"*

Individualized communication with students (one on one and a smaller group of students in lectures) could be a strategy to improve engagement and self-regulated motivation. However, lecturers experienced that students did not use this opportunity sufficiently:

> *"…individualized attention…where I see that there is an improvement…"*
> *"…individualized attention…I see the most impact…"*
> *"…still a very few students who will take that opportunity and come and see me."*

Student apathy in the classroom also seemed to inhibit engagement:

> *"…few that realize 'I do not understand this basic concept and must ask a question on it in class to understand better'…"*
> *"…they are being taught to ask questions to be independent but they still expect to be spoon-fed…"*
> *"…they only sit and stare at me and then I say previous years I have asked this in a test and then they still only sit and don't write down"*
> *"…they do not really open up a lot in class unless you force them to do something…"*

It was suggested that teaching strategies should focus on activities to stimulate and engage students during lectures. Creating opportunities for students to challenge the lecturer were indicated:

> *"…to explore possible interest…they get motivated merely based on the way the class is managed…"*
> *"…important for us …to help them to make that connection and once they have the connection, they take more of an interest. They will go and read up a little bit wider. We need to stimulate them"*
> *"…use the opportunity to let the students challenge you with regards to how you lecture"*

Lecturers were of the opinion that educational systems, especially outcomes-based education, drove students' academic focus towards outcomes only, without deeper comprehension. This had an impact on engagement with academic opportunities:

> *"…when we moved to outcome-based education learning plan the students started to only focus on the outcomes without understanding that there is underlying information…"*
> *"…some of them that come and ask they do not find the outcomes…"*

A difference in engagement between the Afrikaans and English students was noted. English students seemed to engage more than Afrikaans students. However, some lecturers indicated the opposite, possibly due to Afrikaans students being a smaller group attending lectures than the English students:

> *"Afrikaans students are quiet…very difficult to trigger them to ask questions…"*
> *"…English groups do better with the interactive classes… but nowadays the Afrikaans classes also pick up, you get more interaction".*
> *"The English class has always been more vocal. When you ask them, they answer or say that they do not know"*
> *"Maybe because the English group is larger and potentially more people who can speak. More spontaneous and open"*
> *"…with the Afrikaans group, everybody asks questions…they are a smaller group"*
> *"…get some interaction from the Afrikaans class but is it really difficult to get it from the English class".*

Although students indicated themselves as a reason not to ask questions during a lecture that hinders class (lecture) engagement:

> *"…my weak point is asking questions because I have that thing of no self-esteem…".*
> *"I fear that people will think …that is my fear of asking in front of the whole class",*
> *"I just feel like I might sound stupid people will laugh…it's fear of peers…"*

They reported that the use of technology contributed to their class (lecture) engagement:

> *"I think a whatsapp group because you get instant answers*
> *"…it's on Blackboard…discussion groups…"*
> *"…the Blackboard thing, the notes are complete and very informative and indicates to you what is important"*
> *"we have their email and telephone numbers…experience it as accessible…"*

Students made suggestions for improved communication with the lecturer, namely:

> *"….a suggestion box or something because some people don't like writing emails or can't afford buying data…"*
> *"…maybe a whatsapp group but we don't want the lecturer in the group…"*
> *"…interact with my lecturers more, I think I can perform better".*

5.4.11.3 *Lecturer's role in engagement*

Lecturers mentioned the significant effect of their teaching approach on students' motivation:

"…approach of a lecturer has a significant impact on students … students really reach out and show interest…lecturer can play a big role to stimulate the student further."
"…there are students I have experienced, they get motivated merely based on the way the class is managed..."
"Our passion for the subject rubs off on the students."
"…motivation …we can by what we give them…ignite a little bit of passion"
"…where students really reach out and show interest in a certain module, a lecturer can play a big role to stimulate the student further." |
"…are very responsive in class…my way of lecturing…a lot of interaction with the student …"

This was echoed by students, who found the following to be motivational:

Lecturer's approach and passion:
She sees the ability, and motivate us to get there and if you have done well she sees it and say good…"
"…motivates the way she is just passionate about this module just brings you enlightenment…I want to learn more about this",

Individualized communication with the lecturer:
"…face-to face…I will do it because it is easier…"
"…going to her after class is the best approach"

Available and approachable lecturers:
"…accommodate everyone who is shy and if you have questions you can come after class…"
"…our lecturers have an open-door policy. You can email them and go to their office if you have problems…"

Support systems:
"… a supportive class environment…it's not a stiff environment…"
"…have a very good support system. We have like groups on WhatsApp…parents are also good support…"

In summary, lecturers and students agreed on the value of practicums regarding improved student engagement, the challenge of increased student numbers in lectures, the importance of communication platforms to improve student engagement and the motivational approach of lecturers had a significant effect on students' motivation.

5.4.12 Construct 3: Teaching practices

Themes and categories for the construct *teaching practices* are presented in Figure 5.5.

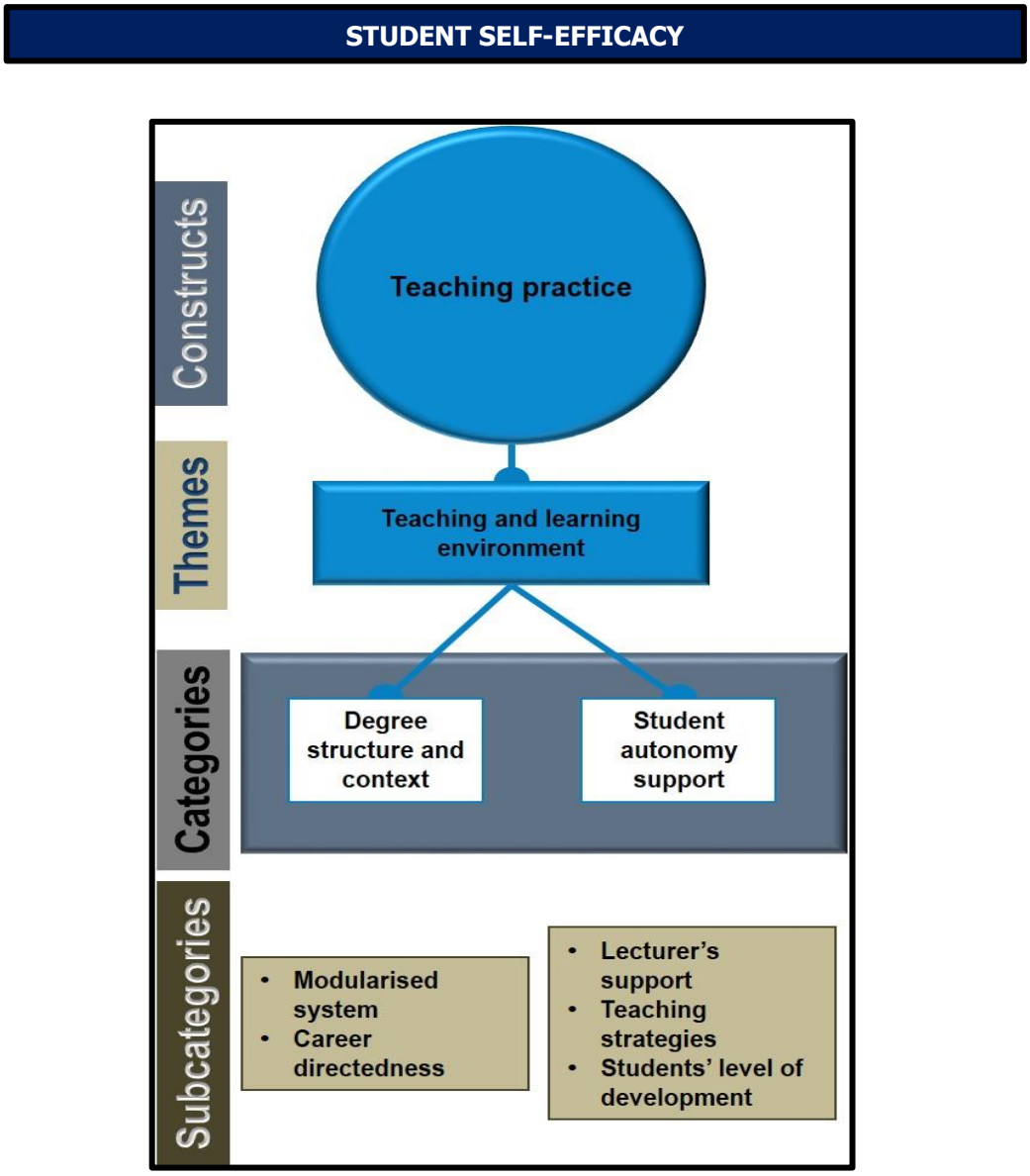

Figure 5.5: Themes and categories for the construct Teaching practices

5.4.13 Theme 1: Teaching and learning environment

In Theme 1, two categories were identified, namely *degree structure and context* and *student autonomy support* (cf. Figure 5.5). Management of the classroom can be considered fundamental to successful teaching and learning. It is intrinsically linked to both the content being taught and the pedagogical process through which content is delivered (Wolff *et al*. 2017:296; cf. Chapter 2, Section 2.7.1). Support of students' learning strategies through teaching strategies can increase students' self-efficacy beliefs (Kakaew & Damnet 2017:20; cf. Chapter 2, Section 8).

5.4.14 Category 1: Degree structure and context

Two subcategories were identified, namely a *modularised system* and *career directedness* (cf. Figure 5.5). In the context of this study, degree structure and context refer to the specific structure, curriculum and focus of the general undergraduate degree in Natural Sciences. Many students have difficulty to monitor and regulate their use of learning strategies with metacognition. This happens especially when students are in the midst of a modularised system of a university degree programme (Roick & Ringeisen 2018:157; cf. Chapter 2, Section 2.6.1.2).

5.4.14.1 *Modularised system*

Lecturers indicated that the degree structure (a semester modularised system) influenced academic focus:

> *"… students get a minimum foundation in the modules…problem…on postgraduate level should they continue… we spoke about the intentional outcomes…now we train people in Natural Sciences with a very focused direction but the problem is they must choose that focused direction without knowing what they really want to do…"*
> *"…the module level and there are students with a mixed variety of modules from different disciplines and they have a bit but not enough to really be able to say there is enough foundation and building on that basis, and that's also a gap".*

Therefore, interdepartmental and inter-faculty integration and collaboration should be in place:

> *"…see from the student's reaction that they feel there is a lack in the link between the subjects that they do… students see each subject as a separate thing but they need to realise all of these are one…"*
> *"…not only from an academic point of view, but also from a logistical point…would really want more liaisons with Natural Sciences especially with regards to the academic programmes…"*

The integration and collaboration were apparently lacking:

> *"I haven't had contact with their specific faculties and don't know what their other subjects are. So I think there is a gap…"*
> *"…I have many times asked lecturers from other places 'just give me your content' but I didn't get feedback…"*
> *"…managed on departmental level…bring changes in their programs if they think it's critically necessary they will talk, but there aren't really between the disciplines sufficient discussions…"*

5.4.14.2 *Career directedness*

Lecturers were of the opinion that the focus of the general degree in science lacks career

directedness. However, they reported the relevance of modules regarding postgraduate studies and some relevance to a career:

> *"It is the golden thread that runs from undergraduates, your honours, your masters, your PhD and finally if you are a lecturer it's your foundation of your research which you are doing. And I think for me that's the key…"*
> *"…the general directed degree…diverse groups of careers in which they go…don't work career orientated…I doubt how many students enter an academic programme with a future vision for a career…refer to general forming degrees…I would not have considered a general degree, because there is no motivation to work towards…".*
> *"It depends on what they want to do in the future... must have some understanding of the science…has relevance to the food industry, pharmaceutical industry, in law, business …what I teach is basically introduction…based on the fundamentals …basis will always be there and which is why my module is so important going forward…"*

Therefore, logistical adjustments could contribute to the degree structure:

> Adjustments to the timetable:
> *"…the timetable, you have a theory period and a practical period and I think that is obsolete…a situation whereby there is no distinction…now I lecture and now I stand back and now you work for half an hour and now we continue with class which we maybe not do it in the current model*'

> A new approach to study material:
> *"…a lot of things need to be changed with the material given to students e.g. this is the prescribed book for the course and this book is an old book…start to change material for the entire course …realized of how much of the material been taught is been outdated. People have to be up to date using your current journals and read."*

> More practical exposure:
> *"…wishes you could do more personal demonstrations or visits to places, because your module leans towards that, but it's not always practically possible, be it costs or infrastructure"*

> A new approach to the degree structure to align with universities abroad:
> *"…all the universities around the world have moved away from those very narrow splits. Everything that falls in Genetics, Botany, Zoology, Entomology is all collided into one thing, Biological Sciences and that make sense because you want to bring scientifically trained individuals and they are more competitive out in the field…"*

Restructuring and integration of modules to address the degree outcome towards improved employability was proposed. Improved alignment with the industry could be a solution:

> *"…unfortunately industry is continuously changing and continuously engaging industry and if you are not changing then you are not doing your students any favor…"*
> *"…I think the biggest thing is we need to start looking at our content with a fresh perspective where people need to start saying 'what is it we are doing?' and exactly is it translated to the performance of our students out in the industry"*
> *"…a module is not structured by one person but several players coming into it, from all perspectives…we need to start looking at our content with a fresh perspective-is it translated to the performance of our students out in the industry…"*

In summary, lecturers were concerned about lack of career-directedness in the general

sciences degree programmes and lack of inter-faculty and inter-departmental collaboration and integration. Therefore, they suggested logistical adjustments to the degree structure and module system to improve alignment with industry as well as universities abroad. This could contribute to improve students' future-orientedness.

5.4.14.3 *Supporting students' autonomy*

In the context of this study, supporting students' autonomy refers to facilitated student support through teaching strategies. Three subcategories were identified, namely *lecturer's support*, *teaching strategies* and *students' level of development* (cf. Figure 5.5). Autonomy, or the ability to think, feel and make decisions by oneself, is achieved as part of a normal developmental process (Nunez & Leon 2015:276; cf. Chapter 2, Section 2.4.5.2) but needs to be supported by the teacher (Ryan & Deci 2004). This process will occur in an atmosphere where students are not pressured to behave in a specific way and where they are encouraged to be themselves instead (Ryan & Deci 2004; cf. Chapter 2, Section 2.4.5.2).

5.4.14.4 *Lecturer support*

Lecturers perceived that they had multiple, complex roles as facilitators or guides, for student learning:

> *"I think the role of a lecturer is very complex lately. Multiple…"*
> *"…are appointed as lectures to develop the student technical, module technical and as well as a person…"*
> *"Usually the lecturer is actually a facilitator or a guide to say this is important and this is what you need to know for this"*
> *"…to guide them and I think that's a critical part that I have to play in this whole thing."*

There seemed to be a greater need for personal and emotional support of students:

> *"Many students come to me with psychological or emotional problems"*
> *"Our students have many personal problems which they carry and I think it comes from home."*

This was supported by students who indicated the value of support provided by the lecturer:

> *"I feel the lecturer also knows us personally…she knows how to handle us with our personalities…is also a positive point…"*
> *"…she likes this thing of making us think outside the box. She would just ask questions and that make you concentrate and I actually like that…"*
> *"…interacts with the people …made it an enjoyable class"*
> *"…gets you involved in class…gets us out of our comfort zone…"*

Lecturers reported a range of teaching strategies utilised by them, varying from traditional to more technology enhanced strategies. The use of applied examples guide students towards the relevance of study material:

> *"…we do traditional way of classes, PowerPoints but there are also videos that I use…*
> *"…formal in the sense that I stand in front and talk, but I like to do it in an interactive way and the students must stop me and ask questions".*
> *"… strategy which works well is 'Facebook'…I communicate on 'Facebook'…. When I saw an interesting 'pot cast' or 'TED talks', I share it on the group on* 'Blackboard'….*showed them an app last week which they can download…"*
> *"…use the lab tutor system just to give it a practical component …to see something physically, then it makes more sense…"*
> *"…the examples you use to really make it as applicable as possible for them"*

Lecturers admitted that an ideal format for teaching strategies would vary and would be determined by a variety of issues and preferences:

> *"I do not think there is a single format which is ideal for a lecturer, because each lecturer is unique…"*
> *"…young lecturer will remember how it was to be a student…they are more adaptable to technology…"*

They perceived that interaction with students in lectures was essential, and therefore students' absence from the lecture reflected poor self-regulated motivation. Reasons for the absence, could include lack of self-discipline, writing other tests, being apathetic repeaters of a module or the use of technology:

> *"…unfortunately a large group who does not attend classes…"*
> *"…actually shocking how few attend…"*
> *"If they write a test on the day, they do not attend classes"*

Technology enhanced teaching contributed to students' motivation to attend and engage in lectures:

> *"It keeps them involved. Students like for example to go to an 'app class jojo' or something alike which you can download on a phone and the entire class can be involved immediately…"*
> *"In class they expect everything to be given in different formats so that they can use technology".*

There were both advantages and disadvantages of technology enhanced teaching:

"…the information and what people can do in terms of technology causes you to remain up to date…"
"…technology helps us to create additional material for students to learn in various ways"
"I think that technology makes some things easier, but I think that one should not get too involved in this".
"…many of the students do not even know the basic concepts and then to make use of advanced technology for me is risky…"

Therefore, not all lecturers were convinced about the efficacy of technology enhanced teaching:

"I do not think technology is important for effective training or effective teaching…"
"…many of the students do not even know the basic concepts and then to make use of advanced technology for me is risky…"
"I think that technology makes some things easier, but I think that one should not get too involved in this".

And indicated students should not focus on technology only to learn:

"…pass rate with and without technology should be the same. Technology is not where it lies. It must come from the students' side".
"…technology has its place, but the human interaction has a big component in education"

Lecturers emphasized the importance of aligning teaching strategies with the current student cohort's frame of reference, including technology, to improve self-regulated motivation:

"…current generation is more IT savvy…"
"I try to keep it quite modern because we are working with the dynamic youth. They want to be able to use their technology…"

Students valued lecturers making use of examples during the lecture:

"…sometimes my lecturer specifically makes examples based on scenarios… you just going to remember the scenario…"

And preferred well-organized lectures:

"…disorganized lectures…my attention is totally distracted and then I would rather try and do something on my own…"

5.4.14.5 *Students' level of development*

Lecturers indicated students' lack of academic background that resulted in an increased need for academic student support:

"…school system...definitely a problem… see with our postgraduate students…write a basic test …entry test to see where they are at that moment… each year it gets worse… across all domains…"
"…it also comes from school if you are taught how to study. How to use your time and how to plan and that bit of self-confidence"
"…the solution would be that we improve the school system, because then it will immediately improve our work here…"
"…there is much more exposure on school level necessary where they integrate the broad scientific fields…"

In summary, lecturers commented on their complex and multiple support role and impact on students' autonomy. Students acknowledged the value of support provided by lecturers. Lecturers indicated their teaching strategies ranging from traditional towards technology enhanced teaching.

5.5 SUMMARY OF FINDINGS

The questions in the semi-structured interviews guided the participants to share their opinions about the constructs "attitudes and approaches", "motivational dynamics" and "teaching practices" in the context of student self-efficacy. Constructs, themes and categories were identified from the participants' responses, illustrated by quotes in order to answer research question 2 (cf. Chapter 3, Section 3.3.1ii).

In Chapter 6 the *development of guidelines for student self-efficacy in the teaching and learning environment of Natural Sciences* will be proposed and discussed.

CHAPTER 6

DEVELOPMENT OF GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

"The major goal of formal education should be to equip students with the intellectual tools, efficacy beliefs and intrinsic interests needed to educate themselves in a variety of pursuits throughout their lifetime" (Albert Bandura 2006a)

"Teaching and learning strategies have a strong impact upon the self-efficacy, motivation and performance of the students" (Zaidi *et al.* 2017)

6.1 INTRODUCTION

This chapter presents the unique contribution of this study by addressing the third research objective (cf. Figure 6.1) aimed at answering research question three (cf. Chapter 1, Section 1.6). A discussion of the combined findings of both the quantitative (cf. Chapter 4 *Results of Phase 1 (Quantitative data): Questionnaire)* and qualitative (cf. Chapter 5, *Results of Phase 1 (Qualitative data): Semi-structured interview*) data are presented. In this mixed-methods design, data from both phases of the study were used for the development of guidelines for student self-efficacy.

Figure 6.1 highlights the third research objective addressed in this chapter.

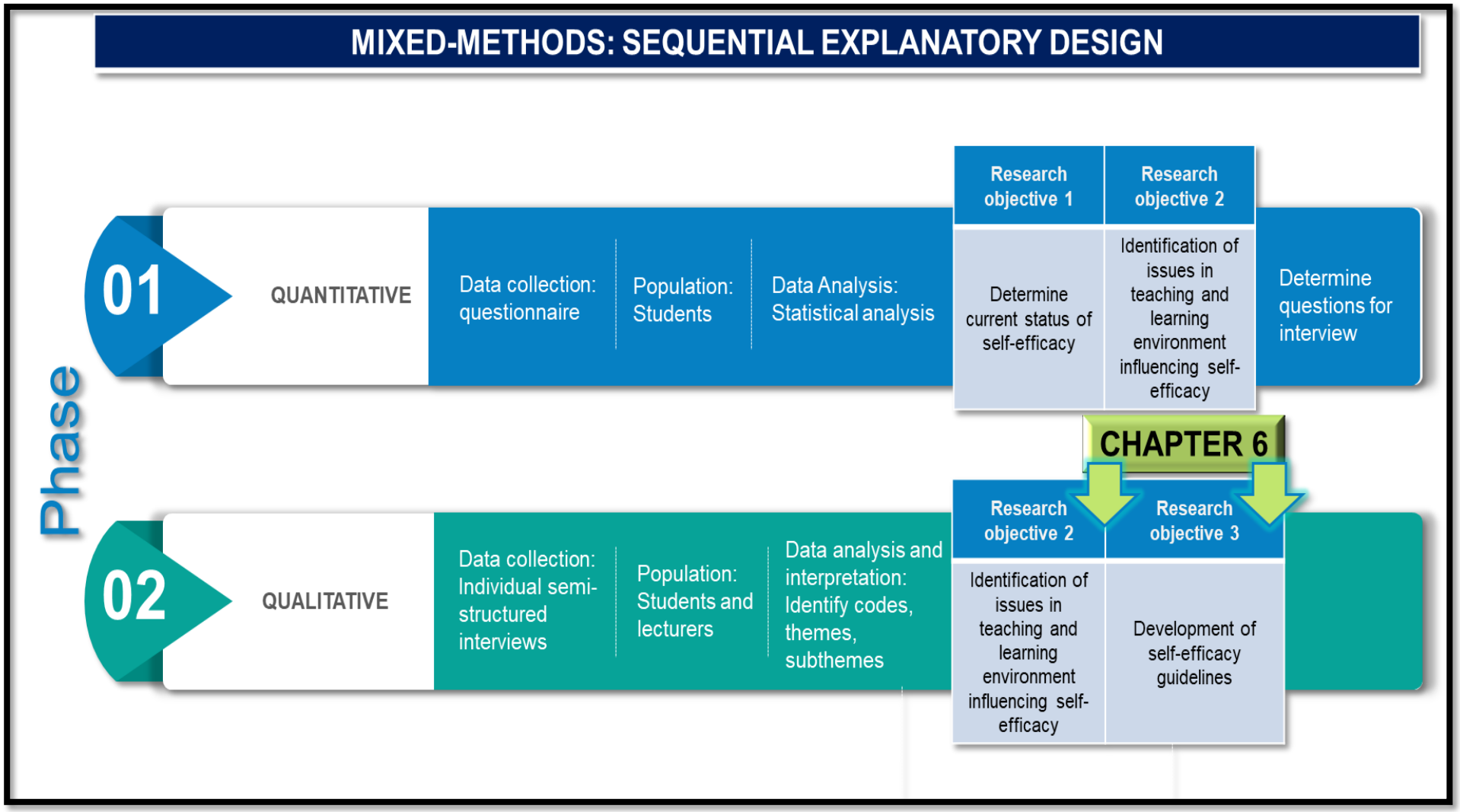

Figure 6.1: Illustration of the development of self-efficacy guidelines (highlighted) (adapted by Vorster de Wet from Creswell 2009:209)

6.2 OVERVIEW OF FINDINGS

6.2.1 Summary of findings of Phase 1: Questionnaire

The main aim of the questionnaire (cf. Chapter 3, Section 3.3.2.1 & Chapter 4, Section 4.5) was to address the first and second research objective (cf. Figure 6.1). The first research objective determined the status of self-efficacy among undergraduate students in Natural Sciences. The second research objective determined the questions for the semi-structured interview (Phase 2) (cf. Chapter 3, Section 3.3.3.2a).

In Table 6.1, an overview of the questionnaire findings is presented.

Table 6.1: Overview of the questionnaire findings

Self-efficacy category	Self-efficacy scores (percentage of students)	Individual hypothetical construct score (percentage of students)	Combined hypothetical construct score (percentage of students)	Question (q)
Low	43.4% (n=59)	*Class* (Questions 45-51; 67.5%)	*Motivate* and *class* (Questions 23-44 and 45 -51; 20.9%)	q6: You can reorganize and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganized lecture q29: You think what you are learning in this class is useful for you to know q34: It is hard for you to decide what the main ideas are in what you read q41: You find that when the lecturer is talking you think of other things and don't really listen to what is being said q45: You ask questions in class or contribute to class discussions q50: You discuss grades or assignments with the lecture
		Self (Questions 1-22; 51.6%)		
High	56.6% (n=77)	*Motivate* (Questions 23-44; 71.9%)	*Self* and *motivate* (Questions 1-22 and 23-44; 39.5%)	q1: You can clarify a paragraph you have just read and don't understand, by carefully rereading it q24: It is important for you to learn what is being taught in this class q26: You are certain you can understand the ideas taught in this course q27: You think that you will be able to use what you learn in this class in other classes q30: You know that you will be able to learn the material for this class
		Study (Questions 52-53; 70.1%)		

For ease of reference, the hypothetical constructs are presented again (cf. Chapter 4, Section 4.3):

i. *Self:* Self-efficacy related to student learning in the teaching and learning environment (questions 1-22);
ii. *Motivation*: Motivational strategies for learning in the teaching and learning environment (questions 23-44);
iii. *Class:* Student engagement in class (questions 45-51); and
iv. *Study*: Student engagement with studying (questions 52-53).

Self-efficacy is defined as the beliefs a person holds about their abilities to perform a particular task (Bandura 1977; cf. Chapter 2, Section 2.4.1). Results showed that 43.4% of students (n=59) were in the low self-efficacy category and 56.6% in the high self-efficacy category (n= 77). The higher percentage of students that self-reported their self-efficacy as high might be due to the Dunning-Kruger effect indicating subjectivity (Dent *et al*. 2018:30). Dunning and Kruger stated the tendency that beginners or inexperienced students tend to over-estimate their skills (*op.cit.:*30). This tendency indicates high self-efficacy due to the subjective belief a person holds about their abilities to perform a task.

Although no significant correlation could be demonstrated between the self-efficacy categories, constructs and assessment results, a weak association was revealed between low student self-efficacy for student engagement in class and low assessment results. Self-efficacy theory postulates a bidirectional influence between self-efficacy and achievement (Olivier *et al*. 2019:328). Bandura (2012:68) states that self-efficacy may be linked indirectly to academic achievement through goal setting or effort regulation strategies that serve as a crucial internal source.

Juan *et al*. (2018:49; cf. Chapter 2, Section 2.6.1.2) confirm Bandura's statement that self-efficacy and achievement may be enhanced through teaching practices that incorporate goal setting. Teaching practices should include clear and specific goal setting for students due to the motivational influence of goal setting for students (Artino 2012:81). Students are often unable to prove their academic achievement according to their abilities. One reason for this is that they may feel uncertain whether they are capable of completing the tasks assigned to them. These low self-efficacy beliefs influence student achievement negatively (Sahara *et al.* 2017:1; cf. Chapter 2, Section 2.4.7). Improved student self-efficacy should enhance academic progress. Students with high self-efficacy generally have

good levels of academic achievement and use more effective learning strategies (Bressington *et al*. 2018:48).

The findings of this study showed that most of the students have poor self-efficacy beliefs for student engagement in class and student learning in the teaching and learning environment. The lack of self-efficacy may be shown in poor confidence in their abilities to learn and engage in the classroom. These inabilities may be a result of poor motivational and learning strategies. Student engagement is often conceptualized as a complex and multifaceted construct and can be seen as the collective term for positive feelings of motivation, fulfilment, psychological presence and personal commitment to educational outcomes (Schaufeli *et al*. 2002; cf. Chapter 2, Section 2.4.5.2). Bandura (1997) states that self-efficacy is a motivation trait or motivational state. In various studies (Kuh *et al*. 2006; Pintrich & De Groot 1990) highly efficacious students demonstrated increased motivation, persistence and performance. Siwatu (2011; cf. Chapter 2, Section 2.4.6) indicates that it is crucial to increase self-efficacy beliefs for culturally diverse students in academic areas, as increased self-efficacy leads to students engaging in positive academic behaviours that set a foundation conducive for academic success. This was evidenced in this study with a significant difference between Afrikaans and English students' engagement in class and studying (cf. Chapter 4, Section 4.3.2). Afrikaans students scored significantly higher for engagement in class, indicating higher self-efficacy to engage, interact and focus in the classroom. English students scored significantly higher for engagement with studying, indicating higher self-efficacy to apply self-directed study.

Questions for the semi-structured interviews (cf. Appendices 3.3A & B) were based on the questionnaire findings that demonstrated low self-efficacy (cf. Table 6.1).

6.2.2 Summary of findings of Phase 2: Semi-structured interviews

The main aim of the semi-structured interviews (cf. Chapter 5, Appendices 5.1 & 5.2) was to address the second research objective (cf. Figure 6.1), namely identifying issues in the teaching and learning environment of Natural Sciences that influence student self-efficacy. Data from Phase 2 assisted the researcher in addressing the third research objective (cf. Figure 6.1).

In Table 6.2 a summary of the central ideas about student self-efficacy is presented.

Table 6.2: Summary of the central ideas about student self-efficacy

Construct	Themes	Categories	Central ideas
Attitudes and approaches	**Self-regulated learning**	**Practical study skills**	1. Students' lack of responsibility to master self-management is of concern. 2. Soft skills development may be a solution for an apparent lack of critical thinking skills. 3. Improvement of students' time management skills could contribute to improved self-management. 4. Lack of practical study skills and self-discipline resulted in challenges with self-regulated learning.
		Critical thinking skills	
	Mastery	**Self-management**	
Motivational dynamics	**Self-regulated motivation**	**Motivation to study**	5. Intrinsic and extrinsic issues that contributed to motivation to study, influenced self-regulated motivation. 6. Future–orientedness contributed to self-regulated motivation. 7. Strategies aimed at improving student engagement may contribute positively to self-regulated motivation.
		Future-orientedness	
		Student engagement	
Teaching practices	**Teaching and Learning environment**	**Degree structure and context**	8. Logistical adjustments to the modularized system might improve the alignment between the degree structure and context, and the industry. 9. Inter-faculty and inter-departmental collaboration and integration of module content might contribute to improving the alignment of the degree structure and context, with industry. 10. An increased need for support of student autonomy led to lecturers adopting multifaceted roles.
		Support students' autonomy	

The central ideas for each construct on student self-efficacy (cf. Table 6.2) will be discussed below.

6.2.2.1 *Central ideas*

The central ideas represent areas that were identified in which students appear to need development, with possible solutions put forward and certain issues to be addressed in each construct.

6.2.3 Construct 1: Attitudes and approaches

Self-regulated learning and mastery, identified as a more cognitive domain, emerged as prominent themes in this construct. These findings led to the formulation of central ideas 1-4. Bandura's self-efficacy theory links with attitudes and approaches regarding performance-based procedures that proved to be the most successful for effecting psychological changes (Bandura 1977:193; cf. Chapter 2, Section 2.4.1).

6.2.3.1 *Central idea one: Students' lack of responsibility to master self-management is of concern*

Self-management is the ability to properly plan activities and rationally use working time and resources, as well as conscious acceptance of responsibility for one's destiny, career, and success (Lukianova 2019:55). Success with academic achievement is based on students taking responsibility for their learning by active engagement (Van der Merwe 2011:49; cf. Chapter 2, Section 2.8). Improvement of academic achievement does not occur on its own. Both students and teachers should take responsibility (Chickering & Gamson 1987:5). In this study, it appeared that participants did not realize their responsibility to master self-management.

To address academic achievement, lecturers could apply the achievement goal approach that fosters a climate of mastery (Ommundsen & Kvalø 2007:388). This approach is applied through a focus on learning, self-improvement and engagement behaviour to focus on challenging tasks and effort. A possible solution for the lack of responsibility in this study could be more emphasis on student-centred education. This emphasis could encourage students to accept their responsibility to self-manage and learn (UFS Policies 2018; cf. Chapter 2, Section 2.6.1.3).

6.2.3.2 *Central idea two: Soft skills development may be a solution for an apparent lack of critical thinking skills*

In the context of this study, critical thinking skills refer to higher-order thinking skills, including application, analysis, construction and evaluation that are necessary for self-regulated learning. The absence of these skills results in a lower quality of higher education (Mclaughlin 2014; cf. Chapter 2, Section 2.7.3). In this study, the development of soft skills was indicated as a possible solution to improve critical thinking. In the teaching and learning environment, soft skills refer to a combination of skills that enable students to regulate their environment, e.g. critical observation, problem solving, communication and time management. Pajares (2002:121) states that habitual ways of behaviour have a powerful influence on the choices people make. In this study it appeared that if the lack of critical thinking skills could be transformed into habitual critical thinking, students' self-regulated learning could improve. Self-regulated learning strategies used by students and the academic success they ultimately attain are strongly influenced by their self-efficacy beliefs (Bandura 1986).

6.2.3.3 *Central idea three: Improvement of students' time management skills could contribute to improved self-management*

Students who used a scheduled timetable to manage their time in both the internal and external environment demonstrated improved self-efficacy (Komarraju & Nadler 2013:68; cf. Chapter 2, Section 2.4.6). Indreica (2014:236) showed that academic achievement is positively associated with efficient time management. Bandura proposed mastery experiences as the most effective way of creating a strong sense of self-efficacy (Pool & Qualter 2012:310; Van Dinther *et al.* 2011:99; cf. Chapter 2, Section 2.7.6.2). Guided mastery, referred to as a process through which new competencies can be acquired based on the current status of self-efficacy (Bandura 2001), is suggested as an enhancing manipulator to change self-efficacy beliefs and self-efficacy performance relationships (Multon *et al.* 1991:34).

In this study, participants experienced time management challenging. It was indicated that if students could be guided to master time management, their self-management could improve.

6.2.3.4 *Central idea four: Lack of practical study skills and self-discipline resulted in challenges with self-regulated learning*

Practical study skills refer to strategies and approaches for learning (knowledge construction) (cf. Chapter 5, Section 5.4.1.1) in the context of this study. In this study, it appeared that teaching strategies to guide students towards the construction and integration of knowledge could encourage students to apply deep learning strategies. Emphasis on real-life applications may facilitate self-efficacy (Shen *et al.* 2016:1540; cf. Chapter 2, Section 2.7.3). This may result in the ability to integrate knowledge across different disciplines of science. The most influential source of self-efficacy is when students can use, improve and combine their skills (integration of knowledge) and demonstrate mastery (Cooke *et al*. 2017; cf. Chapter 2, Section 2.7.3). An individual must be self-controlled (self-discipline) before becoming self-regulated (Zimmerman 2000; cf. Chapter 2, Section 2.4.6). Students with confidence in their ability (self-efficacy) are less likely to procrastinate and are, therefore, more self-disciplined (Balkis 2011:1). In this study, participants experienced challenges with self-discipline and this could improve if their self-efficacy could increase.

6.2.4 Construct 2: Motivational dynamics

Self-regulated motivation, identified as a more affective domain, emerged as a prominent theme in this construct. These findings led to the formulation of central ideas 5-7. Self-efficacy beliefs are the foundation for human motivation (Zaidi *et al*. 2017:547; cf. Chapter 2, Section 2.4.5.2). Self-efficacy's link with motivational beliefs (motivation-generating, e.g. interest, motivation-enhancing, e.g. utility, and motivation-sustaining, e.g. positive affective reactions) (Schunk 1991:209, 211, 213; cf. Chapter 2, Section 2.4.5.2) collectively demonstrates a relationship between self-efficacy and academic performance (Walker 2003:174; cf. Chapter 2, Section 2.4.5.2).

6.2.4.1 *Central idea five: Intrinsic and extrinsic issues that contributed to motivation to study, influenced self-regulated motivation*

Self-regulated motivation, also referred to as intrinsic motivation, can be cultivated (Ryan & Deci 2000:68; cf. Chapter 2, Section 2.4.9.1). It refers to the most self-determined type of motivation and involves partaking in an activity for enjoyment, learning or task accomplishment (Ryan & Deci, 2000) that may lead to deeper learning and potentially better

academic performance (John *et al*. 2018:e43; cf. Chapter 2, Section 2.4.5.2). Self-regulatory strategies, e.g. self-regulated motivation combined with self-efficacy beliefs, are essential components of motivation and academic achievement (Pajares 2002:121; cf. Chapter 2, Section 2.4.3). Self-regulated motivation could improve if teaching strategies focus on students' autonomy (choice), competence and relatedness (inclusion) (John *et al*. 2018:e43; cf. Chapter 2, Section 2.4.5.2).

In this study, extrinsic issues dominated motivation to study and had both a positive and negative influence on self-regulated motivation. According to the organismic integration theory, one of the five key principles of the self-determination theory (Vansteenkiste *et al.* 2010; cf. Chapter 2, Section 2.7.7), student engagement cannot be separated from the social context in which it occurs (Reeve 2012:151; cf. Chapter 2, Section 2.7.7). In this study, family, social life and the state in the country (South Africa) were all indicated as extrinsic issues. Data of the semi-structured interviews in this study indicated a perceived decline in self-regulated motivation in the current student cohort compared to students in the past.

Interest and passion were indicated as motivators, contributing to improved self-regulated motivation to study. If teaching strategies focus on cognitive, motivational and especially affective processes, it might stimulate students' passion for the modules content. These three processes play a role in academic development, evidenced by the contribution of perceived self-efficacy on cognitive development (Bandura 2006b:309; Bandura 1993:117; cf. Chapter 2, Section 2.4.1). In this study, technology-enhanced teaching strategies were indicated as a possibility to increase students' interest and, therefore, motivation. This supports the use of technology as an instructional strategy to improve science learning (Schraw *et al.* 2006:117; cf. Chapter 2, Section 2.7.3).

6.2.4.2 *Central idea six: Future-orientedness contributed to self-regulated motivation*

In this study, the absence of a future vision and lack of long-term goals influenced future-orientedness negatively. There is a gap between students' longer term academic desires and their shorter term actions (Corno & Mandinach 2004; cf. Chapter 2, Section 2.8). This gap was also identified in this study. To address this gap, an instructional approach to motivate students' learning was suggested to be the most effective strategy (Lin-Siegler & Cohen 2016:297; cf. Chapter 2, Section 2.6.1.3). The approach should focus on goal setting

that is clear and specific to enhance students' motivation to perform (Artino 2012:81; cf. Chapter 2, Section 2.4.3). If students develop to become self-regulated learners, they may spontaneously control their behaviours, motions, thoughts and wills to achieve certain learning goals (Wang 2018:462; cf. Chapter 1, Section 1.1). A student with high self-efficacy will try new strategies and will embrace challenges due to enhanced self-regulated motivation (Tabernero & Hernandez 2011; cf. Chapter 2, Section 2.4.5.2). Although long-term goals are important, students may experience these as overwhelming and it may negatively influence their motivation. This could be addressed by breaking down a long-term goal into many short-term goals that appear more manageable, increasing self-efficacy (Pajares 2002:121; cf. Chapter 2, Section 2.4.3). When short-term goals are achieved, students may experience higher levels of competence that may motivate them (Pintrich 2003:671).

6.2.4.3 *Central idea seven: Strategies aimed at improving student engagement may contribute positively to self-regulated motivation*

Student engagement is a constructive process of learning through active participation in the learning environment (Reeve 2012:151; Roick & Ringeisen 2018:148; cf. Chapter 2, Section 2.4.6). This supports student self-efficacy (Constantine *et al*. 2019:8). Students with high self- efficacy engage in more effective self-regulatory strategies (Pajares 2002:117; cf. Chapter 2, Section 2.4.6). The use of teaching strategies that support student engagement is a key factor to promote student achievement growth (Fackler & Malmberg 2016:187; cf. Chapter 2, Section 2.7.1). In this study, four strategies were thought by participants to be likely to improve student engagement.

Firstly, practicums contribute to layered learning; a teaching strategy that facilitates the development of skills through activities. Practicums could contribute to skills development through directed activities (building key skills) and collective activities (application of multiple skills to use, improve and combine skills) (Cooke *et al*. 2017:14; cf. Chapter 2, Section 2.7.3). Practicums are examples of implementation of Kolb's experiential learning theory (Kolb 1984; cf. Chapter 2, Section 2.4.9.3) and the third level of Biggs and Tang's teaching theory (Biggs & Tang 2011; cf. Chapter 2, Section 2.8). Practicums assist in developing mastery, the most influential source of self-efficacy (Cooke *et al.* 2017:14; cf. Chapter 2, Section 2.4.1). Practicums also contribute to peer modelling as recommended by Artino (2012:83), as observing others succeed builds self-efficacy for students through motivating students to attempt tasks (Schunk 1991:216).

Secondly, a smaller number of students in classes contribute to the social system of motivational partnerships, increasing student motivation and self-efficacy (Cave *et al.* 2017:91; cf. Chapter 2, Section 2.4.5.2). It also contributes to individualized (persuasive) communication between lecturers and students. Persuasive communication and evaluative feedback are most effective when it comes from people who are viewed as knowledgeable and reliable. Application of individualized communication is more accessible with a smaller group of students in class and it contributes to self-efficacy beliefs (Bong & Skaalvik 2003; cf. Chapter 2, Section 2.4.9.2).

Thirdly, lecturers' motivational approaches as a concept of "triadic reciprocality" (Schraw *et al*. 2006:111; Matoti 2011:151) may improve self-efficacy. It can be interpreted as students' academic performances (behavioural factors) that are influenced by how learners are affected (cognitive factors) by instructional strategies (environmental factors) (Matoti 2011:151; cf. Chapter 2, Section 2.4.6). In the context of this study, behavioural factors refer to students' motivation, which drove their academic performance. Environmental factors refer to the learning environment created by the lecturer. A lecturer's approach and encouragement play a vital role in the classroom (McAleer *et al.* 2009:65; Fackler & Malmberg 2016; Wolff *et al*. 2017; Juan *et al*. 2018:49; cf. Chapter 2, Section 2.7.2). Lecturers' classroom practices contribute to students' motivation, achievement and self-efficacy beliefs through their sense of efficacy (Rutherford *et al.* 2017; cf. Chapter 2, Section 2.4.3). Self-efficacy beliefs strongly influence students' academic motivation, self-regulated learning strategies and the academic success ultimately attained (Bandura 1986; cf. Chapter 2, Section 2.4.1).

Finally, technology-enhanced teaching strategies may improve student engagement and increase self-regulated motivation. Diverse teaching strategies should accommodate students' varied academic approaches (Zaidi *et al.* 2017:547; cf. Chapter 2, Section 2.7.3). In the context of this study, teaching strategies that accommodate the current cohort of students' frames of reference seemed to improved student engagement. Undergraduate students as emerging adults are involved in complex processes of learning and development (Naudé *et al*. 2014:212; cf. Chapter 2, Section 2.7.6.2). This should be considered when applying teaching strategies. The use of diverse teaching strategies in the classroom with dynamic student engagement will promote advanced levels of learning. This has a strong impact on the self-efficacy, motivation and performance of students (Zaidi *et al*. 2017:547; cf. Chapter 2, Section 2.7.3).

6.2.5 Construct 3: Teaching practices

The teaching and learning environment, identified as an educational domain, emerged as a prominent theme in this construct, leading to the formulation of central ideas 8-10. The teaching and learning environment refers to twenty key factors, listed by McAleer *et al.* (2009:65) that contribute to the educational climate (cf. Chapter 2, Section 2.7.1). The degree structure, context and support of students' autonomy were highlighted.

6.2.5.1 *Central idea eight: Logistical adjustments to the modularized system might improve the alignment between the degree structure and context, and the industry*

Students experience difficulty with metacognitive processes regarding their learning strategies, mainly when their university degree programme is structured as a modularized system (Roick & Ringeisen 2018:157; cf. Chapter 2, Section 2.6.1.2). From the findings of this study, certain logistical adjustments to programme structure might contribute to improving the teaching and learning environment. Proposed adjustments refer to restructuring and integrating modules towards the outcome of a degree that is aligned with industry requirements in order to improve employability.

6.2.5.2 *Central idea nine: Inter-faculty and inter-departmental collaboration and integration of module content might contribute to improving the alignment of the degree structure and context, with industry*

The findings of this study revealed that collaboration and integration between faculties and departments play a key role in adjusting and improving the modularized system towards alignment with industry. The role of collaborative support was identified as an instructional strategy that could improve science learning (Schraw *et al.* 2006:117; cf. Chapter 2, Section 2.7.3). An operational level in which perceived self-efficacy contributes to academic development, is through the beliefs held by a faculty of a university in its collective instructional efficacy (Bandura 1993:117; cf. Chapter 2, Section 2.4.1). In this study, management of the teaching and learning environment with emphasis on collaboration (inter-faculty and inter-departmental), is intrinsically linked to the pedagogical process through which content is delivered and also taught (Wolff *et al*. 2017:296; cf. Chapter 2, Section 2.7.1).

6.2.5.3 *Central idea ten: An increased need for support of student autonomy led to lecturers adopting multifaceted roles*

The study found an increased need among students for academic and personal support. Low achieving students who do not apply self-regulated learning depend on external guidance (Roick & Ringeisen 2018:149; cf. Chapter 2, Section 2.4.6). Therefore, there is an increased need for the support of student autonomy. Strategies helping students to construct mental models and to experience conceptual change were identified instructional strategies that may improve science learning (Schraw *et al.* 2006:117; cf. Chapter 2, Section 2.7.3). These strategies support students' autonomy. Ryan and Deci (2000:68; cf. Chapter 2, Section 2.4.9.1) suggest that besides academic needs, students' psychological needs for autonomy and competence must be met through supportive social contexts.

The interrelatedness of student engagement, student motivation and the learning environment mediated the motivation-to-achievement relation (Reeve 2012:149; cf. Chapter 2, Section 2.7.7) and was confirmed in two constructs in this study. Furthermore, the strong association of self-efficacy with self-regulation, student achievement, motivation and strategy (Bartimote-Aufflick *et al*. 2016:1919; cf. Chapter 2, Section 2.4.7) is supported by the central ideas of all three constructs in this study.

6.3 GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

In this study, the development of guidelines to improve self-efficacy in undergraduate students aimed at an instructional approach (Lin-Siegler & Cohen 2016:297; cf. Chapter 2, Section 2.6.1.3) for the higher education teaching and learning environment. It was advised by Van der Merwe (2011:49) to achieve successful academic outcomes, teaching approaches should focus on actively engaging students taking responsibility for their learning. This was based on the teaching theory of Biggs and Tang (cf. Chapter 2, Section 2.8). This theory suggests that the main determinant of learning is what students do through learning activities (Biggs & Tang 2011:20; cf. Chapter 2, Section 2.8). This should be guided by a teacher in an effective and conducive teaching and learning context (Van der Merwe 2011:49; Biggs & Tang 2011:60; cf. Chapter 2, Sections 2.7.1, 2.8). In the context of this study, it refers to how learning should be managed in the teaching and learning environment of undergraduate Natural Sciences to ensure that students are actively engaged in their learning. The method used to develop guidelines was based on

the understanding that a problem first needs to be understood before ideas are developed (Ohly *et al*. 2017:126; cf. Chapter 2, Section 2.8).

Figure 6.2 presents the issues that are interrelated with self-efficacy. Figure 6.3 presents the process from data analysis (cf. Chapters 4 & 5) to guideline development in this study. Three guidelines for lecturers regarding the improvement of student self-efficacy were developed through an inductive process; one guideline from each construct. Central ideas 1-4 were combined to develop guideline one, focusing on the mastery of self-regulation outside the classroom. Implementation of the guidelines guide the lecturers to equip students to master and apply the interrelated issues with self-efficacy. The implementation of the three guidelines could improve student self-efficacy.

Implementation of guideline one, focused on the interrelated issues, namely practical study skills, critical thinking skills and self-management. Central ideas 5-7 were combined to develop guideline two, emphasizing how to foster motivation, engagement and autonomy in the classroom. Implementation of guideline two focused on the interrelated issues, namely motivation to study, future orientedness and student engagement. Guideline three was developed from the collective central ideas 8-10, focusing on the designing of programmes in the teaching and learning environment outside the classroom. Implementation of guideline three focused on the interrelated issues, namely degree structure in its context and the support of student autonomy.

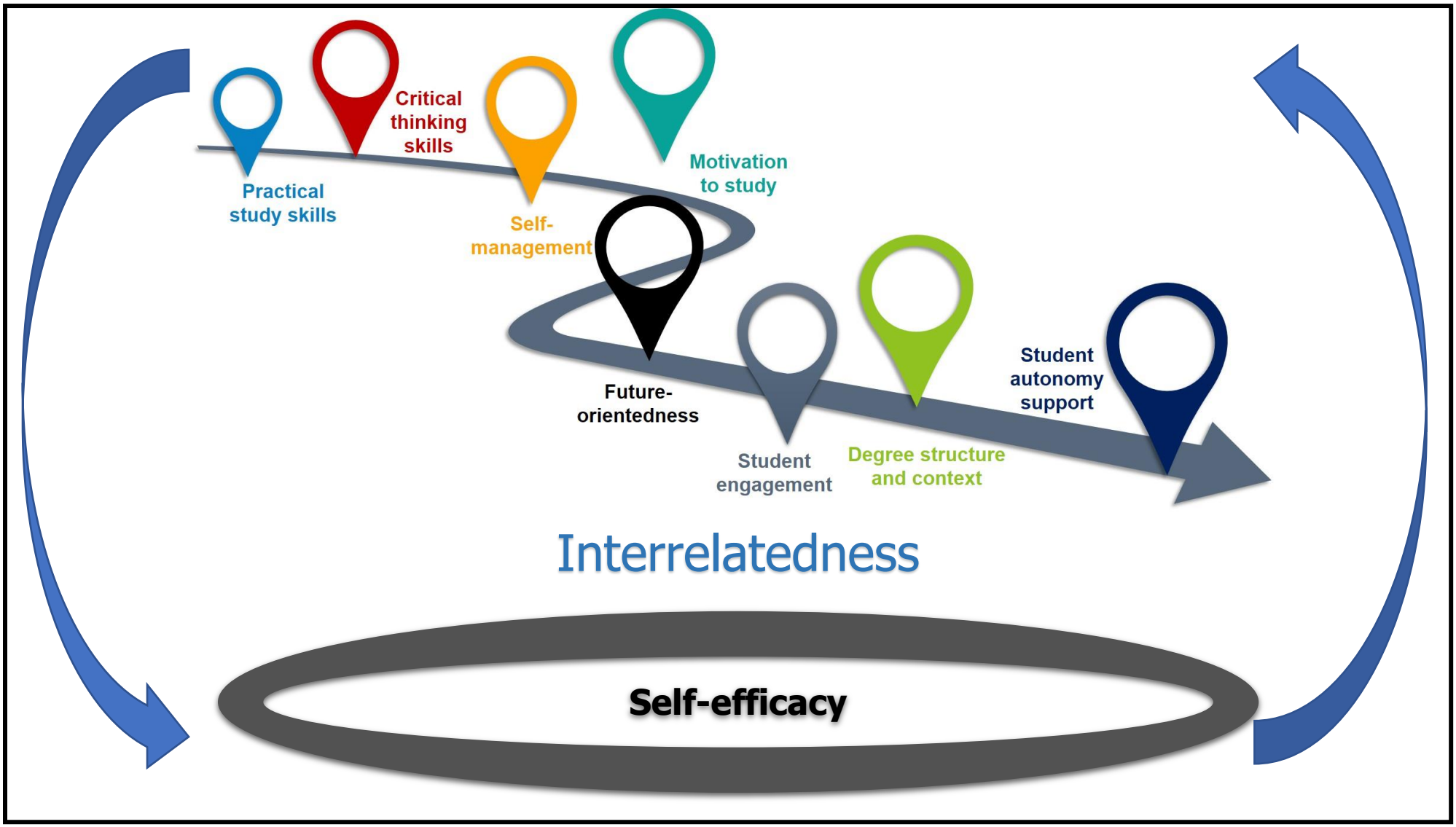

Figure 6.2: Issues interrelating with self-efficacy (developed by the researcher, Vorster de Wet 2020)

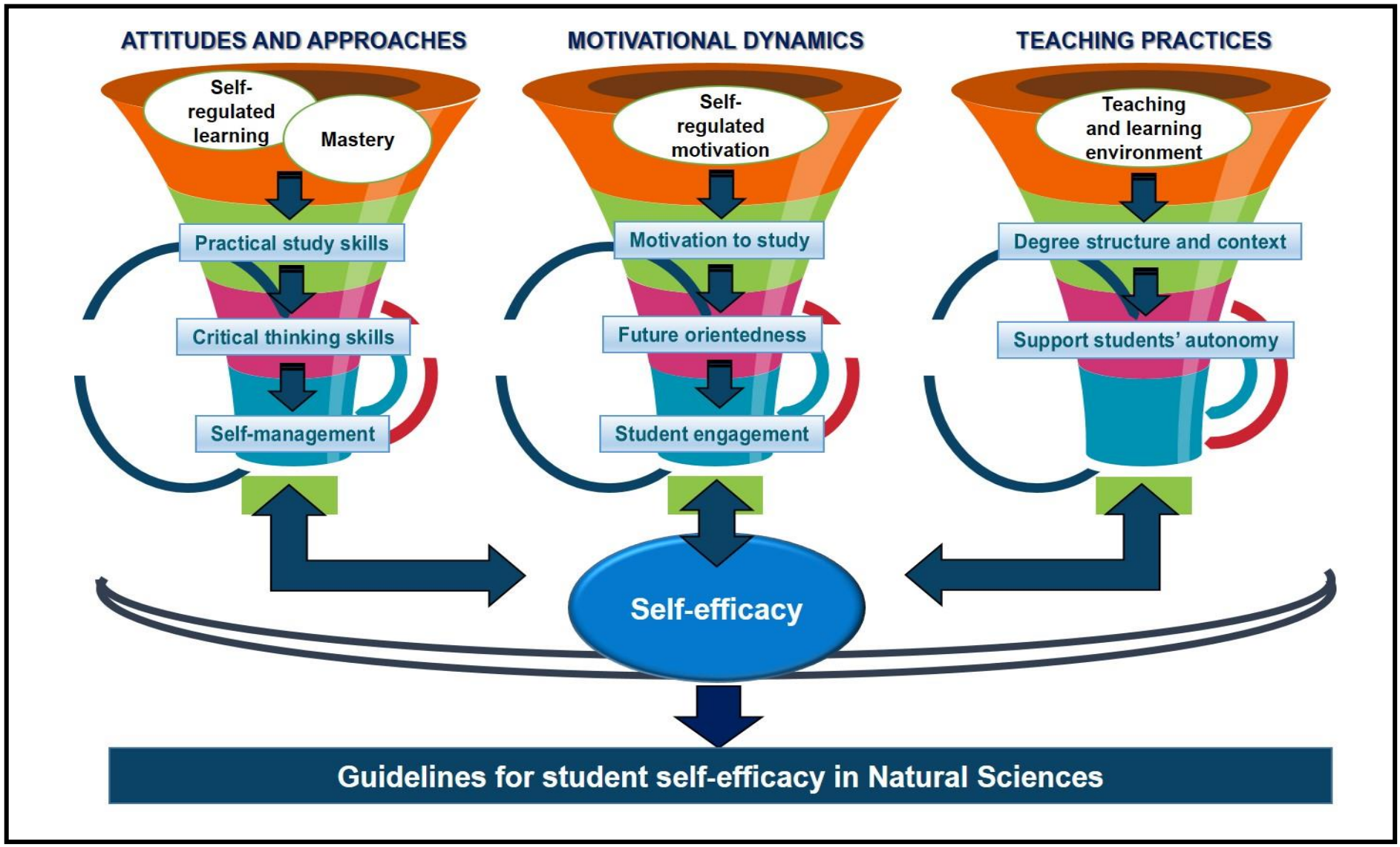

Figure 6.3: Process of guideline development (developed by the researcher, Vorster de Wet 2020)

6.3.1 Guidelines for student self-efficacy

The guidelines developed in this study will be discussed below. Before the implementation of the guidelines for self-efficacy, students and lecturers should be familiarised with the meaning of the construct "self-efficacy". This will support the correct interpretation if the construct and implementation of the guidelines.

6.3.1.1 *Guideline one: Address students' lack of self-regulated learning explicitly*

Implement this guideline by supplying students with assignments aimed at improving self-regulated learning:

i. Provide a task schedule for the assignment with specific timelines and a definite due date for submission with clear instructions. This may contribute to students' ability to manage time.
ii. Provide students with a rubric to assess progress according to the schedule. Students should report their progress according to the timeline for assessment and should receive feedback after each progress report. The results from this assessment mark should be incorporated in the final module mark. This may contribute to self-discipline.
iii. Assignments should include tasks supporting skills development activities, e.g. interpretation, analysis, evaluation, inference and explanation of module content. This may contribute to knowledge construction.

Implementation of this guideline aims to develop self-regulated learning through enhancing critical thinking skills, practical study skills and time management. Self-regulated learning is strongly influenced by students' self-efficacy beliefs (Bandura 1986; cf. Chapter 2, Section 2.4.1). Successful implementation of this guideline will depend on appropriate and clear communication by lecturers who are skilled in inclusive classroom teaching (Lai *et al*. 2016; cf. Chapter 2, Section 2.7.3). Implementation of this guideline supports effective instructional strategies that foster both knowledge and skill attainment, and concomitant self-efficacy (Constantine *et al.* 2019; cf. Chapter 2, Section 2.8). It also supports the principle of interconnected knowledge and metacognitive control (reflective learning) proposed by Biggs and Tang (2011:60; cf. Chapter 2, Section 2.7.1) as a characteristic of a conducive and effective learning context. In this study, a lack of self-regulated learning was demonstrated by 51.6% of students scoring low self-efficacy in student learning, regarding self-regulation in the teaching and learning environment (cf. Table 6.1). The vital

role of self-regulated learning to improve self-efficacy is emphasized by Constantine *et al*. (2019), and therefore, supports this guideline to address self-regulated learning explicitly (cf. Chapter 2, Section 2.8).

6.3.1.2 *Guideline two: Foster self-regulated motivation, student engagement and student autonomy in the classroom*

Implement this guideline by addressing the following in the module content and educational strategy:

i. Guide students to understand and relate to the relevance of the content of the module. Explain module content with applied examples relating to students' daily lives, future occupation/career and with an emphasis on the alignment with other modules in Natural Sciences. This may improve students' integrated understanding of science, stimulate interest and improve future employment possibilities.
ii. Restructure a theoretical lecture of approximately 50-minutes into a shorter didactic lecture (35 minutes) followed by a student-centred interactive session (e.g. flipped classroom), allowing for application of theory (15 minutes). This restructuring will allow informal and individualized communication between the lecturer and students. Appropriate interaction with students and regular feedback through evaluation forms will enhance the lecturer's awareness of students' academic, personal and emotional needs, to allow for support of student autonomy. The educational climate should create a physically and emotionally secure environment that may enhance students' ability to think, feel and make decisions and support self-efficacy.
iii. Present regular practicums ("hands-on" experiments) and fieldwork opportunities for students to apply the theory. An example will be to expose Physiology students to the practice of an infertility treatment clinic while presenting the reproductive system in the module. Students should work in small groups (5-10 students) and be individually assessed during the practical session. This may improve student engagement, stimulate interest and self-regulated motivation.

This guideline aims to present relevant module content (cf. i) in a conducive environment (exposure to practicums and fieldwork opportunities) (cf. iii) to improve self-regulated motivation, student engagement (student-centred interactive sessions and small groups) (cf. ii; iii) and support for student autonomy (awareness of students' needs) (cf. ii) in the classroom. In this study, students scored low self-efficacy in motivational strategies for

learning and engaging in class (cf. Table 6.1). This guideline supports several theories. According to the self-determination theory (Ryan & Deci 2000:68), the psychological need for relatedness must be met through supportive social contexts (e.g. the learning environment) before self-motivation can be cultivated (cf. Chapter 2, Section 2.4.9.1).

If students can relate, even in a distal sense (Ryan & Deci 2000:71) to the contents of the module presented, it may contribute in facilitating optimal functioning of the natural propensities for growth and integration (Ryan & Deci 2000:68), cultivating intrinsic/self-regulated motivation and therefore, supporting self-efficacy. In addition, Bandura (1997) stated that expectations of personal efficacy are based on performance accomplishments (successes raise mastery expectations and failures lower them) and vicarious experience (seeing others succeed generates expectations in the observers that they will improve if they persist in their efforts; cf. Chapter 2, Section 2.4.1). Thirdly, Cooke *et al*. (2017:1) described layered learning composed of basic activities (vicarious experiences), directed activities (building key skills) and collective activities (use, improve and combination of the skills; cf. Chapter 2, Section 2.7.3). Activities that are mastered in class will result in increased self-efficacy (Cooke *et al*. 2017). According to Kolb (1984), experiential learning, a process by which knowledge is created through the transformation of experience, is regarded as crucial for effective learning (cf. Chapter 2, Section 2.4.9.3). Finally, interactive learning theory described activating different sense modalities, aligned with an academic outcome that should improve self-efficacy (Biggs & Tang 2011:60-61; cf. Chapter 3, Section 2.7.1).

Autonomy is supported through a secure and supportive learning environment characterized by an affirmative presence because students are encouraged to be open and willing to become involved in the learning process (Naudé *et al.* 2014:224). It also contributes to the affective value of learning (cf. Chapter 2, Section 2.7.2). Supporting student autonomy is one of the multifaceted roles lecturers have to fulfil to maximize learning. Maximum learning is the primary purpose of and considered fundamental to successful teaching and learning (Wolff *et al.* 2017:296; cf. Chapter 2, Section 2.7.2).

Implementation of this guideline will address student engagement and student autonomy in the classroom through the need to improve self-regulated motivation.

6.3.1.3 *Guideline three: Design programmes aligned with industry requirements and built on effective stakeholders (e.g. inter-faculty and inter-departmental) collaboration*

Implement this guideline by applying the following:

i. Regular (once per semester) meetings with stakeholders, e.g. inter-faculty and inter-departmental meetings should be held to allow for collaboration and integration of module content. Ideally, these meetings should take place when planning the upcoming semester. This will contribute to inter-faculty and inter-departmental collaboration to inform lecturers on each module's content and improve alignment between modules.
ii. Research the requirements of industries where students are employed after their graduation. These requirements should be incorporated in both teaching practice and module content to ensure alignment with industry expectations. Implement an "industry advisory board" for each faculty. The advisory board should liaise with industries to align with industry requirements for new employees. This might improve employability.
iii. Make adjustments to the logistics of programmes, e.g., the timetable, the design of the study material, practical exposure to aim at career directedness. For example:
    a. Combine theory and application sessions by scheduling interactive sessions and practicums in the timetable (cf. guideline 2);
    b. Incorporate recent journal articles into study material and ensure that textbooks are up to date;
    c. Incorporate more practical exposure, e.g., fieldwork and demonstrations, into module content and teaching and learning activities (cf. guideline 2).

Implementation of this guideline might contribute to the design of programmes and improve students' employability.

In a modularized system followed by many university degree programmes, students have difficulty in monitoring and regulating their learning strategies (Roick & Ringeisen 2018:157; cf. Chapter 2, Section 2.6.1.2). Teaching and learning strategies have a strong impact on the self-efficacy of students (Zaidi *et al.* 2017:547; cf. Chapter 2, Section 2.7.2). It is therefore crucial that collaboration and integration of appropriate teaching and learning strategies take place to maximize this. Collaborative, collegial relationships are fostered through high teacher efficacy (Miller *et al*. 2017:261; Rutherford *et al.* 2017:23; cf.

Chapter 2, Section 2.4.3) and are more likely to lead to the introduction of new teaching approaches (Fackler & Malmberg 2016:187; cf. Chapter 2, Section 2.7.1).

In conclusion, the guidelines developed focused on issues that are interrelated with self-efficacy in this specific student cohort (undergraduate Natural Sciences). This is supported by Komarraju and Nadler (2013:67), who demonstrated self-efficacy as a multidimensional construct, fundamental to a social-cognitive approach (cf. Chapter 2, Section 2.4.1). Implementation of these guidelines in the teaching and learning environment of undergraduate Natural Sciences will support the development of student self-efficacy. These guidelines are aligned with those proposed and validated by Constantine *et al*. (2019:5; cf. Chapter 2, Section 2.8) namely task engagement, social-communicative engagement, self-regulated learning, multi-sensory learning activities, supportive feedback and student-centred learning. Alignment with interrelated international goals for science learning (Rangasammy 2017:3-4; cf. Chapter 2, Section 2.6) was addressed as well. These goals emphasize the central role of science as practices for students to develop explanatory ideas and models through investigations and applications to make sense of phenomena (cf. guideline 2iii).

Management of science learning as a coherent learning progression to build ideas across time and between scientific disciplines was addressed as well (cf. guideline 3). The guidelines of this study contribute to promote life-long science learning as proposed by the Knowledge Integration Environment (KIE) framework (Linn 2000; cf. Chapter 2, Section 2.7.3) and aligned with the requirements of industry for students' future careers. The guidelines also support the proposed three-dimensional learning for the Next Generation Sciences Standards (NGSS; cf. Chapter 2, Section 2.7.3).

The findings from this study confirmed the importance of aligning teaching strategies with the frame of reference of a specific student cohort. The life phase of students as emerging adults who are involved in complex processes of learning and development (Naudé *et al.* 2014:212; cf. Chapter 2, Section 2.7.6.2), influences their frame of reference. Despite being emerging adults, students still need lecturer guidance, as stated by Zaidi *et al.* (2017:547), who indicated that students in a classroom environment need distinct instructions and encouragement. The guidelines developed from this study have contextual value to address self-efficacy optimally.

6.4 CONCLUSION

In Chapter 6, guidelines developed for student self-efficacy in the teaching and learning environment of undergraduate Natural Sciences were presented.

Implementation of these guidelines could address attitudes and approaches, motivational dynamics and teaching practices and thereby increase student self-efficacy. This will equip undergraduate students in Natural Sciences with the competence to master the components of self-efficacy, namely critical thinking skills, practical study skills, self-management to learn, student engagement, motivation to study, future-orientedness and student autonomy. In the end, increased student self-efficacy will improve undergraduate students' academic achievement.

In Chapter 7, *Conclusions, recommendations and limitations of the study* will be presented and discussed.

CHAPTER 7

CONCLUSIONS, STRENGTHS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

7.1 INTRODUCTION

The researcher did an in-depth study to determine the current status of undergraduate student self-efficacy and identify issues influencing it in the Natural Sciences teaching and learning environment. The central aim of this study was to develop guidelines for supporting the development of student self-efficacy that may be implemented by lecturers in the Natural Sciences at the UFS. This was based on the hypothesis that "self-efficacy beliefs contribute to academic performance over and above actual ability" (Bandura 1993).

The guidelines developed in this study could improve student self-efficacy and therefore, self-directed (life-long) learning. In this way, student success in undergraduate education may be improved. Although improvement of student success is the responsibility of both students and teachers according to Chickering and Gamson (1987:5), the guidelines developed aim to guide lecturers for their class preparation and engagement with students in the classroom. The guidelines support Dewey's concept of learning which is "learning by doing" (English 2016:1049), i.e. guiding students to be more actively involved in their learning. As far as could be ascertained, such guidelines for self-efficacy in the teaching and learning environment of undergraduate students in Natural Sciences at the UFS and other South African universities, have not yet been developed (cf. Chapter 1, Section 1.3).

The study originated from the researcher's twenty-year experience at the UFS as a lecturer in Physiology modules for undergraduate students in Natural Sciences. An apparent lack of self-efficacy among these students manifests in poor academic performance, according to personal experience as a lecturer and confirmed by informal discussions with colleagues. Hence a lack of self-efficacy seemed to be one of the challenges that should be addressed in the teaching and learning environment of undergraduate students.

This chapter aims to provide a brief overview of the study, presenting comments and some concluding thoughts on the findings. The chapter commences with an overview of the study, followed by conclusions drawn, a short discussion on the strengths and limitations of the study, recommendations on the way forward, the contribution to knowledge, the

significance of the study and a conclusive remark.

7.2 OVERVIEW OF THE STUDY

The research was based on three research questions. The findings of the research were used to develop guidelines for undergraduate student self-efficacy in the Natural Sciences teaching and learning environment.

An exposition of the research questions was presented in Chapter 1 (cf. Chapter 1, Section 1.6). The research questions are reviewed together with the main findings in Section 7.2.1 to 7.2.3.

7.2.1 Research question 1

What is the current status of self-efficacy among undergraduate students in the Natural Sciences?

7.2.1.1 *Research objective*

Determine undergraduate students' current status of self-efficacy in a Physiology module.

This research question explored the current status of self-efficacy of undergraduate students in Natural Sciences enrolled in a Physiology module. It provided data for Phase 1 (quantitative analysis) of the study (cf. Chapter 4). The objective was pursued by developing and implementing a self-efficacy questionnaire. The literature review provided the theoretical background to develop the self-efficacy questionnaire. In the context of self-efficacy theories, the literature was used to determine the questionnaire constructs. These constructs also provided the foundation for the questions of the semi-structured interviews in Phase 2 (qualitative analysis) of the study (cf. Chapter 5).

7.2.2 Research question 2

Which issues in the teaching and learning environment influence the self-efficacy of undergraduate students in Natural Sciences?

7.2.2.1 ***Research objective***

Identify issues in the teaching and learning environment of Physiology modules that influence self-efficacy.

This research question addressed the discovery of issues in the teaching and learning environment that could influence student self-efficacy. The issues were identified through thematic analysis of the semi-structured interviews.

7.2.3 Research question 3

Which guidelines can be developed based on identified issues to improve self-efficacy amongst undergraduate students in Natural Sciences?

7.2.3.1 ***Research objective***

Develop guidelines to improve self-efficacy in undergraduate students in a Natural Sciences (Physiology) module.

Forty-six semi-structured interviews were utilised to explore this research question. The findings from the semi-structured interviews contributed to identifying interrelated self-efficacy issues in the teaching and learning environment of undergraduate students in a Natural Sciences (Physiology) module. These interrelated issues provided the foundation for the development of guidelines for student self-efficacy in this study.

7.3 CONCLUSION

The study is underpinned by the scholarly work of Albert Bandura, who developed a self-efficacy theory aligned with constructivism and provided the foundation for the social-cognitive theory. Bandura claimed self-efficacy to be the core cognitive facet responsible for human behavioural change (cf. Chapter 2, Section 2.4.1). The findings of this study are aligned with the phenomenon of "triadic reciprocality" as described by Bandura, explaining learning as the result of personal, environmental and behavioural factors (Miller *et al*. 2017: 261; cf. Chapter 2, Section 2.4.9.2).

This study is based on the premise that there is a gap between factors that influence student

self-efficacy and guidelines to improve self-efficacy in the teaching and learning environment of undergraduate Natural Sciences. Within a pragmatic research paradigm, a mixed-methods research approach was used to generate quantitative and qualitative data. The findings were analysed, interpreted and integrated with self-efficacy and other theories to develop guidelines for student self-efficacy. This supported suggestions for future research, made by Multon *et al*. (1991:36; cf. Chapter 1, Section 1.1) to focus on the value of constructing and evaluating strategies to improve self-efficacy beliefs among diverse student types.

Analysis of Phase 1 (quantitative data) of the study revealed two constructs in the teaching and learning environment with low self-efficacy, namely *self-efficacy related to student learning* and *student engagement in class*. In addition, an apparent association between student engagement in class and assessment results supported the findings of Phase 2 (qualitative data). Subsequently, interrelated issues affecting student self-efficacy were identified. Through an inductive process, three guidelines were developed, focusing on addressing the lack of self-regulated learning, fostering self-regulated motivation, student engagement and student autonomy in the classroom, and lastly, designing programmes aligned with industry requirements through inter-faculty and inter-departmental collaboration.

Implementing these guidelines could improve self-efficacy by addressing interrelated issues affecting self-efficacy. A resulting behavioural change could improve academic achievement.

The guidelines developed from this study align with two goals of the UFS Strategic Plan (2018-2022), namely to improve student success and well-being, and to renew and transform the curriculum (UFS Annual Report 2018). Undergraduate students across study fields experience similar challenges independent from the study field. The guidelines may be generalised and applied to undergraduate Natural Sciences students at other national and international universities.

7.4 STRENGTHS OF THE STUDY

The study exhibits the following strengths:

i. The choice of a mixed-methods research approach allowed the researcher to gain the

desired in-depth information and was the most appropriate approach to identify issues interrelated with student self-efficacy in the context of the study. This approach ensured the quality, reliability and validity of the research. The completed research may be used to form the basis for the research agenda of further research. No suitable existing questionnaire was available to measure student self-efficacy in the context of this study. Therefore, the researcher developed an instrument to measure self-efficacy contextualised to the undergraduate teaching and learning environment.

ii. A vast amount of qualitative data (450 pages printed and condensed to 216 pages for thesis formatting) with extensive analysis (seven iterations of identification, definition and review) done before finalising the analysis, contributed to the development of the guidelines. This ensured in-depth data to capture the possible interrelated issues with self-efficacy.

iii. The study provides contextualised guidelines to improve self-efficacy of undergraduate students in the Natural Sciences. These guidelines could be adjusted to improve student self-efficacy in other disciplines as well.

iv. The twenty years' experience of the researcher as a lecturer for undergraduate students in Natural Sciences was a strength since it contributed to an empathetic understanding of the context of the study and enhanced the interpretation of the data.

7.5 LIMITATIONS OF THE STUDY

The researcher recognises the following limitations of the study:

i. The study was limited to undergraduate students in Natural Sciences registered for Physiology modules at the Faculty of Natural and Agricultural Sciences at the UFS, restricting the sample size to 157. Findings may therefore not be generalizable to a broader study population, however, paying attention to the principles highlighted through this study's findings, may assist addressing similar challenges in other contexts. Guideline two, for example, can be applied in any student context to increase self-regulated motivation, engagement and autonomy, ensuring students grasp the relevance of the study contents.

ii. The relatively small sample size, in comparison to the number of items in the questionnaire, resulted in Heywood cases in the factor analysis and made the data unsuitable for factor analysis. Spearman correlations were used instead to describe the construct validity.

iii. From the semi-structured interviews, it became apparent that many lecturers and

students were not familiar with the meaning of the construct, "self-efficacy". If there were more self-efficacy awareness among participants, they would possibly have been able to contribute more to the depth of the data, revealing more issues that were interrelated with self-efficacy.

7.6 RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

i. The instrument developed to measure student self-efficacy should be validated before using it in other educational contexts due to the relatively small sample size that made the data unsuitable for factor analysis. Therefore, it is recommended to use a larger sample size to validate the self-efficacy instrument.
ii. Before the implementation of the guidelines for self-efficacy, students and lecturers should be familiarised with the meaning of the construct "self-efficacy". Only a few students had an idea about self-efficacy and interpreted it as a concept regarding time management, self-study and self-discipline. These participants did not indicate their own beliefs about themselves as being in the low self-efficacy category. A question regarding the students' appraisal of their capabilities addressed this possible lack to indicate their beliefs. It cannot be expected from lecturers to guide students with self-efficacy and students to apply self-efficacy if they are not aware or do not comprehend the meaning and relevance of self-efficacy. Therefore, part of the implementation of the guidelines focuses on exposure and teaching lecturers and students about the construct.
iii. The impact of these guidelines should be assessed after implementation. The researcher plans to assess the impact of the guidelines with action research.
iv. Future research on improvement of student self-efficacy should focus specifically on student engagement and student learning in the classroom.
v. Further research on adapting the guidelines in different contexts and disciplines is recommended.
vi. The findings of the study should be submitted to the Faculty of Natural and Agricultural Sciences at the UFS for possible implementation of the guidelines in all undergraduate Natural Sciences modules, as well as to other South African universities.

7.7 CONTRIBUTION OF THE STUDY

The study was a comprehensive investigation of undergraduate student self-efficacy. The research contributes to new knowledge regarding apparent interrelated self-efficacy issues in the teaching and learning environment of undergraduate Natural Sciences. The overall value of this study lies in the provision of guidelines for lecturers to facilitate undergraduate student self-efficacy that may improve academic outcomes (academic performance) in Natural Sciences modules. Transferability of the apparent interrelated self-efficacy issues and therefore, the guidelines developed in the undergraduate population, to national and international universities, provide a significant contribution to knowledge.

The guidelines aim to empower lecturers to implement practical strategies in the classroom addressing the issues that are interrelated with self-efficacy, and that will therefore improve student self-efficacy. It also aims at designing programmes that could improve Natural Sciences students' employability. Successful implementation of the guidelines could empower and motivate students to improve class engagement and autonomy to become self-regulated (life-long) learners that could improve academic performance. Participants of the study benefited from the introduction to and reflection on the construct "self-efficacy". This enhanced their awareness of self-efficacy and its impact on the teaching and learning environment.

The research results will be presented at national and international congresses. The results should be disseminated through the submission of articles to accredited higher education journals.

7.8 CONCLUSIVE REMARK

This study investigated the current status of student self-efficacy in the teaching and learning environment of Natural Sciences. It also identified interrelated self-efficacy issues that were used to develop guidelines to improve student self-efficacy. The researcher believes that implementation of these guidelines may significantly improve students' academic success.

Gaining an in-depth understanding of student self-efficacy and its influencing issues was an extensive and enriching experience that will, hopefully, prove also to be beneficial and useful to improve students' self-efficacy.

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APPENDIX 3.1A

Consent to participate in research
(Phase 1: Academic results and Phase 2: Semi-structured interview)

APPENDIX 3.1A

Consent to participate in research
(Phase 1: Academic results and Phase 2: Semi-structured interview)

CONSENT TO PARTICIPATE IN RESEARCH

GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

You have been asked to participate in a research study.

You have been informed about the study by Mrs Roné Vorster de Wet.

You may contact Mrs Vorster de Wet at 051 4017371 or email her at gnfsrs@ufs.ac.za any time if you have questions about the research or if you are injured as a result of the research.

You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, UFS at telephone number (051) 4017794/5 if you have questions about your rights as a research subject.

Your participation in this research is voluntary, and you will not be penalised or lose benefits if you refuse to participate or decide to terminate participation.

If you agree to participate, you will be given a signed copy of this document as well as the Participant Information sheet, which is a written summary of the research.

- The research study, including the above information, has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

_____	_____
Signature of participant	Date
_____	_____
Signature of witness *(Where applicable)*	Date
_____	_____
Signature of translator *(Where applicable)*	Date

APPENDIX 3.1B

Toestemming om deel te neem aan navorsing
(Fase 1: Akademiese resultate en Fase 2: Semi-gestruktureerde onderhoude)

APPENDIX 3.1B

Toestemming om deel te neem aan navorsing
(Fase 1: Akademiese resultate en Fase 2: Semi-gestruktureerde onderhoude)

TOESTEMMING TOT DEELNAME AAN NAVORSING

RIGLYNE VIR STUDENT SELF-EFFEKTIWITEIT IN DIE ONDERWYS- EN LEEROMGEWING VAN VOORGRAADSE NATUURWETENSKAPPE

U is uitgenooi om aan 'n navorsingstudie deel te neem.

U is oor die studie ingelig deur mev. Roné Vorster De Wet.

U kan mev. Vorster De Wet enige tyd by 051 4017371 of per epos by gnfsrs@ufs.ac.za kontak indien u vrae oor die navorsing het of as gevolg van die navorsing beseer is.

U kan die Sekretariaat van die Gesondheidswetenskappe Navorsingsetiekkomitee, UV, by telefoonnommer (051) 4017794/5 kontak indien u enige vrae het oor u regte as deelnemer.

U deelname aan hierdie navorsing is vrywillig, en u sal nie gepenaliseer word of voordele verbeur indien u weier om deel te neem of besluit om deelname te staak nie.

Indien u instem om deel te neem, sal 'n ondertekende kopie van hierdie dokument sowel as die Deelnemerinligtingsblad, wat 'n geskrewe opsomming van die navorsing is, aan u gegee word.

- Die navorsingstudie, insluitend bogenoemde inligting, is verbaal aan my beskryf. Ek begryp wat my betrokkenheid by die studie beteken en ek stem vrywillig in om deel te neem.

_____ _____
Handtekening van deelnemer Datum

_____ _____
Handtekening van getuie Datum
(Waar van toepassing)

_____ _____
Handtekening van tolk Datum
(Waar van toepassing)

APPENDIX 3.1C

Information document

INFORMATION DOCUMENT

GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

Dear Student

I, Mrs Roné Vorster de Wet, am doing research on student self-efficacy in the Faculty of Natural and Agricultural Sciences. Research is just the process to learn the answer to a question. In this study I want to learn about the self-efficacy of students in the classroom to help students to improve their academic performance.

Invitation to participate: I am requesting you to participate in a research study.

What is involved in the study? The study consists of a survey that will include a questionnaire to be completed by you only once during a Physiology lecture. All the Natural Sciences undergraduate students, registered for Physiology at the University of the Free State, will be asked to participate. In addition, a sample of students will be approached to participate in a semi-structured interview, which will be arranged at a time convenient to the participant.

Risks of being involved in the study: There are no risks involved in participating in the study due to no physical intervention.

Benefits of participating in the study: The results of this study will help you and other students to benefit more from the teaching and learning environment in order to become more self-efficient and improve academic performance.

Participants will be given information on the study while involved in the project as well as after the results are available.

Participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled; the subject may discontinue participation at any time without penalty or loss of benefits to which the subject is otherwise entitled.

Reimbursements: There will be no remuneration in cash but you will receive a soft drink after completion of the questionnaire.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law. Subjects may withdraw from the study without any consequence. If you decide to withdraw, please inform and contact the researcher to notify her about your decision. Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the Health Sciences Research Ethics Committee.

If results are published, this may lead to individual/cohort identification.

Contact details of researcher:
Mrs Roné Vorster de Wet
Telephone number (o/h) 051 4017371
Email: gnfsrs@ufs.ac.za

Contact details of Secretariat and Chair: **Health Sciences Research Ethics Committee of the Faculty of Health Sciences, University of the Free State** for reporting of complaints/problems: Telephone number 051 4017794/5

APPENDIX 3.1D

Inligtingsdokument

INLIGTINGSDOKUMENT

Projektitel: **RIGLYNE VIR STUDENTE SELFEFFEKTIWITEIT IN DIE ONDERWYS- EN LEEROMGEWING VAN VOORGRAADSE NATUURWETENSKAPPE**

Geagte Student

Ek, mev Roné Vorster de Wet, is besig met navorsing oor studente se selfeffektiwiteit. Navorsing is slegs die proses waardeur die antwoord op 'n vraagstuk verkry word. In hierdie studie wil ek meer leer oor studente se selfeffektiwiteit in die lesingsaal om studente sodoende te help om beter te presteer.

Uitnodiging om deel te neem: Ek versoek/nooi u uit om aan 'n navorsingstudie deel te neem.

Wat behels die studie? Die studie betaan uit 'n ondersoek wat die voltooiing van 'n vraelys insluit wat slegs eenmalig deur jou voltooi word tydens 'n Fisiologielesing. Alle voorgraadse Natuurwetenskapstudente wat vir Fisiologie geregistreer is aan die Universiteit van die Vrystaat, gaan gevra word om deel te neem. Gebaseer op akademiese prestasie, sal 'n verdere groep studente genader word om deel te neem aan 'n onderhoud.

Risiko's verbonde aan deelname: Daar is geen risiko aan die studie verbonde nie.

Voordele van betrokkenheid by die studie: Die resultate van die studie sal u en ander studente help om meer baat te vind uit die onderwys- en leeromgewing om sodoende meer selfeffektief te word tydens u studies en sodoende beter akademiese prestasie te behaal.

Deelnemers sal inligting in verband met die studie ontvang tydens betrokkenheid by die projek en ook agterna wanneer die resultate beskikbaar is.

Deelname is vrywillig, en weiering om deel te neem sal geen boete of verlies van voordele waarop die deelnemer andersins geregtig is, behels nie; die deelnemer kan te eniger tyd aan deelname onttrek sonder boete of verlies van voordele waarop sodanige persoon andersins geregtig is.

Vergoeding: Daar sal geen kontantvergoeding wees nie, maar u sal na voltooiing van die vraelys 'n koeldrank ontvang.

Vertroulikheid: Daar sal gepoog word om persoonlike inligting vertroulik te hou. Volkome vertroulikheid kan nie gewaarborg word nie. Persoonlike inligting mag bekend gemaak word indien die wet dit vereis. Deelnemers kan te eniger tyd onttrek sonder enige gevolge. Indien u wil onttrek, stel asseblief die navorser in kennis.

Organisasies wat u navorsingsrekords mag ondersoek en/of kopieer vir kwaliteitsversekering en data-analise, sluit groepe soos die Etiekkomitee vir Opvoedkundige Navorsing in.

Indien resultate gepubliseer word, mag dit tot individuele/groepsidentifikasie lei.

Kontakbesonderhede van navorser(s):
Mev Roné Vorster de Wet
Telefoonnommer (k/u) 051 4017371
Epos: gnfsrs@ufs.ac.za

Kontakbesonderhede van die Sekretariaat en Voorsitter: **Gesondheidswetenskappe Navorsingsetiekkomitee, Universiteit van die Vrystaat** vir rapportering van klagtes/probleme:
Telefoonnommer (051) 4017794/5.

APPENDIX 3.2A

Research instrument: **Self-efficacy questionnaire**

APPENDIX 3.2A

Research instrument: **Self-efficacy questionnaire**

SELF-EFFICACY QUESTIONNAIRE

<u>Instructions</u>: **Please complete the questionnaire by choosing the option for each question that best describes /indicates your**:

- **honest experience of studying/learning Physiology (PHBG2616 or PHBG3716)**;
- **motivation for learning**;
- **engagement in the class and with your studies**, **and**
- **behaviour**, **thoughts and feelings in the PHBG2616/PHBG3716 module**.

1. **Not at all characteristic of me**
2. **Not somewhat characteristic of me**
3. **Somewhat characteristic of me**
4. **Definitely characteristic of me**

Self-efficacy related to student learning in the teaching and learning environment

	1. You can clarify a paragraph you have just read and don't understand, by carefully rereading it.
	2. You can find a way to remember key facts in a reading assignment when you have trouble recalling it two weeks later.
	3. You can redefine complex definitions from a textbook and recall it when you have trouble remembering it.
	4. You can set and attain an important study goal during your remaining time when you have tried unsuccessfully to study for an hour.
	5. You can ask the right question to clarify matters when you don't understand your lecturer.
	6. You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture.
	7. You can catch up on the work within a week when you have missed several classes.
	8. You can interpret an assignment you are reading that doesn't make sense, by using text clues such as headings or italics.
	9. You can find a way to motivate yourself to learn it fully when the assigned reading is boring.
	10. You can make it into an exciting challenge when a homework assignment is repetitive and uninteresting.
	11. You can find a way to get the information clarified before the next class meeting when a lecturer's class is over your head.
	12. You can associate new concepts with old ones sufficiently well to remember them when you are trying to understand a new topic.
	13. You can motivate yourself to keep good notes when a lecture is especially boring.
	14. You can create self-questions to help you review the material successfully when you suddenly realise that you can't remember any material you have read during the last half hour in class.
	15. You can think of good examples that will help you remember it in a test when you have trouble recalling an abstract concept.
	16. You can condense your notes down to just the essential facts when you are taking a module covering a huge amount of material.
	17. You can find a way to associate the technical detail of a concept for a test that will ensure recall, when you are struggling to remember.

	18. You can record all the important points in your notes when your lecturer's class is so rapid that you are unable to write everything down.
	19. You can refocus sufficiently when your concentration wanders while listening in class.
	20. You can create your own analogy that a reader will understand when describing a complex principle in a written paper.
	21. You can go back to your notes and locate all the information you had forgotten when you think you did poorly in a test you just finished.
	22. You can diagram a body of information, or chart it for a test in order to remember it all two weeks later when you are struggling to understand it **Motivational strategies for learning in the teaching and learning environment**
	23. You prefer class work that is challenging in order to learn new things.
	24. It is important for you to learn what is being taught in this class.
	25. You like what you are learning in this class.
	26. You are certain you can understand the ideas taught in this course.
	27. You think that you will be able to use what you learn in this class in other classes.
	28. You think that what you are learning in this class is useful for you to know.
	29. Your study skills are excellent compared to other students in this class.
	30. You know that you will be able to learn the material for this class.
	31. When you study for a test you try to combine the information from the lecture and from the book.
	32. When you do homework, you try to remember what the teacher said in class in order to answer the questions correctly.
	33. You ask yourself questions to make sure you know the material you have been studying.
	34. It is hard for you to decide what the main ideas are in what you read.
	35. When the work is difficult for you, I either give up or study only the easy parts.
	36. When you study, you put the important ideas into your own words.
	37. You work on practice exercises and answer end of chapter questions even when you don't have to.
	38. Before you begin studying you think about things you will need to do to learn.
	39. You use what you have learned from old homework assignments as well as the textbook to do new assignments.
	40. You often find that you have been reading for class but don't know what it is all about.
	41. You find that when the lecturer is talking you think of other things and don't really listen to what is being said.
	42. You work hard to get good marks even when you don't like the subject.
	43. You work hard to get good marks even when you don't like the lecturer.

	44. When reading, you try to connect the things you are reading with what you already know. **Student engagement in class**
	45. You ask questions in class or contribute to class discussions.
	46. You never come to class without completing readings or assignments.
	47. You work with classmates outside of class to prepare class assignments.
	48. You put together ideas or concepts from different courses when completing assignments or during class discussions.
	49. You use e-mail to communicate with the lecturer.
	50. You discuss grades or assignments with the lecturer.
	51. You discuss ideas from your readings or classes with others outside class (students, family members, co-workers etc.) **Student engagement with studying**
	52. You put a lot of effort into this subject.
	53. You make sure to study on a regular basis.

THANK YOU FOR YOUR PARTICIPATION

APPENDIX 3.2B

Navorsingsinstrument: **Selfeffektiwiteitsvraelys**

APPENDIX 3.2B

Navorsingsinstrument: **Selfeffektiwiteitsvraelys**

SELFEFFEKTIWITEITSVRAELYS

Instruksies: **Voltooi asseblief die vraelys deur die opsie te kies wat jou die beste beskryf ten opsigte van**:

- **eerlike ervaring van die studeer/leer van Fisiologie (PHBG2616 of PHBG3716)**;
- **motivering om te leer**;
- **betrokkenheid in die klas en met jou studies**; **en**
- **gedrag**, **denke en gevoelens in die PHBG2616 of PHBG3716 module**.

1. Geensins kenmerkend van my
2. Nie tot 'n mate kenmerkend van my
3. Tot 'n mate kenmerkend van my
4. Definitief kenmerkend van my

Selfeffektiwiteit verbandhoudend met studenteleer in die onderwys en leeromgewing

	1. Jy kan 'n paragraaf wat jy so pas gelees en nie verstaan het nie, vir jouself duidelik maak deur dit weer versigtig deur te lees.
	2. Jy kan 'n manier vind om sleutelfeite in 'n moeilike leesopdrag te onthou sodat jy dit twee weke later kan herroep.
	3. Jy kan komplekse definisies in 'n handboek wat moeilik is om te onthou, herdefinieer en herroep.
	4. Wanneer jy probeer studeer het vir 'n uur, maar onsuksesvol was, kan jy 'n studiedoelwit stel en bereik in die oorblywende tyd.
	5. Jy kan die regte vrae vra om duidelikheid te kry wanneer jy jou dosent nie verstaan nie.
	6. Jy kan jou notas herorganiseer en oorskryf voor die volgende klas indien jou dosent 'n onsamehangende, ongeorganiseerde lesing gegee het.
	7. Jy kan die werk binne 'n week inhaal wanneer jy verskeie klasse gemis het.
	8. Jy kan 'n opdrag wat jy lees en nie vir jou sin maak nie, interpreteer deur teksleidrade soos opskrifte en skuinsdruk te gebruik.
	9. Jy kan 'n manier vind om jouself te motiveer wanneer die leeswerk wat jy moet doen, vervelig is.
	10. Wanneer die huiswerkopdrag herhalend en oninteressant is, kan jy dit omskep in 'n opwindende uitdaging.
	11. Wanneer die dosent se lesing bo jou vuurmaakplek is, kan jy 'n manier vind om die inligting duideliker te maak voor die volgende klasontmoeting.
	12. Wanneer jy probeer om 'n nuwe onderwerp te verstaan, kan jy nuwe konsepte voldoende met oues in verband bring om dit sodoende te onthou.
	13. Jy kan jouself motiveer om goeie notas af te neem wanneer 'n lesing veral vervelig is.
	14. Jy kan vir jouself vrae skep om te help om studiemateriaal suksesvol te hersien wanneer jy skielik besef dat jy die studiemateriaal wat jy die laaste halfuur in die klas gelees het, nie kan onthou nie.
	15. Jy kan aan goeie voorbeelde dink om jou te help om abstrakte konsepte wat jy moeilik onthou, in 'n toets te herroep.
	16. Jy kan jou notas opsom tot net die belangrikste feite wanneer jy 'n module neem wat uit baie werk bestaan.

	17. Wanneer dit vir jou moeilik is om te onthou, kan jy 'n manier vind om die tegniese detail van 'n konsep in verband te bring vir 'n toets sodat jy dit kan herroep.
	18. Jy kan die belangrikste punte in jou notas neerskryf wanneer die dosent so vinnig deur die lesing gaan dat jy nie alles kan neerskryf nie.
	19. Jy kan voldoende herfokus wanneer jou aandag afdwaal terwyl jy in die klas luister.
	20. Jy kan jou eie analogie skep wat 'n leser sal kan verstaan wanneer jy 'n komplekse beginsel in 'n geskrewe vraestel moet beskryf.
	21. Jy kan teruggaan na jou notas en al die inligting vind wat jy vergeet het wanneer jy dink dat jy sleg in 'n toets gevaar het wat jy pas afgelê het.
	22. Jy kan inligting vir 'n toets in 'n diagram of tabel omskep wanneer dit vir jou moeilik is om te verstaan, sodat jy dit twee weke later nog sal onthou. **Motiverende strategieë vir leer in die onderwys en leeromgewing**
	23. Jy verkies werk in die klas wat uitdagend is om sodoende nuwe dinge te leer.
	24. Dit is vir jou belangrik om te leer wat in die klas doseer word.
	25. Jy hou waarvan jy in die klas leer.
	26. Jy is seker dat jy die begrippe wat in hierdie klas geleer word, verstaan.
	27. Jy dink dat jy in staat is om dit wat jy in hierdie klas leer, in ander klasse te gebruik.
	28. Jy dink dit wat jy in hierdie klas leer, is nuttig vir jou.
	29. Jou studievaardighede is uitstekend in vergelyking met ander studente in hierdie klas.
	30. Jy weet dat jy in staat is om die studiemateriaal vir hierdie klas te leer.
	31. Wanneer jy vir 'n toets leer, probeer jy om inligting van die lesing met die van die boek te kombineer.
	32. Wanneer jy huiswerk doen, probeer jy dit wat die dosent in die lesing gesê het, onthou sodat jy die vrae korrek kan beantwoord.
	33. Jy vra vrae aan jouself om seker te maak jy ken die inhoud wat jy bestudeer.
	34. Dit is vir jou moeilik om te besluit wat die belangrikste begrippe is in dit wat jy lees.
	35. Wanneer die werk vir jou moeilik is, gooi jy handdoek in of leer net die maklike gedeeltes.
	36. Wanneer jy studeer, skryf jyk die belangrike begrippe in jou eie woorde neer.
	37. Jy werk vrae uit en beantwoord ook vrae aan die einde van 'n hoofstuk al hoef jy dit nie te doen nie.
	38. Voordat jy begin leer, dink jy aan dinge wat jy sal moet doen om te leer.
	39. Jy gebruik wat jy geleer het uit ou huiswerkopdragte asook die handboek om nuwe opdragte te doen.
	40. Jy vind dikwels dat wanneer jy 'n leesstuk vir die klas voorberei het, jy daarna nie weet waaroor dit gaan nie.
	41. Jy vind dat wanneer die dosent praat, jy aan ander dinge dink en nie regtig luister na wat gesê word nie.
	42. Jy werk hard om goeie punte te kry selfs al hou jy nie van die vak nie.

	43. Jy werk hard om goeie punte te kry selfs al hou jy nie van die dosent nie.
	44. Wanneer jy lees, probeer jy dit wat jy lees koppel aan dit wat jy reeds weet .
	45. Jy vra vrae in die klas of neem deel aan klasbesprekings. **Studente betrokkenheid in die klas**
	46. Jy gaan nooit klas toe sonder dat jy jou leeswerk of opdragte voltooi het nie.
	47. Jy werk saam met klasmaats buite klasverband om klasopdragte voor te berei.
	48. Jy groepeer begrippe of konsepte van verskillende kursusse wanneer jy opdragte voltooi of tydens klasbesprekings.
	49. Jy gebruik e-pos om met die dosent te kommunikeer.
	50. Jy bespreek punte of opdragte met die dosent.
	51. Jy bespreek begrippe van jou leesstukke of klasse met mense buite klasverband (studente, familie, medewerkers ens.) **Studente betrokkenheid met studier**
	52. Jy werk baie hard in hierdie vak.
	53. Jy maak seker dat jy gereeld studeer.

DANKIE VIR U DEELNAME

APPENDIX 3.3 A1

Research instrument: **Semi-structured interview questions for English students**

APPENDIX 3.3 A1

Research instrument: **Semi-structured interview questions for English students**

Students:

Demographic data:

1. Which degree are you currently registered for?
2. In which academic year of study are you?
3. Is this your first degree?
4. How old are you?
5. Name the module of Physiology that you are registered for.
6. Are you registered for the module for the first time or are you repeating it?
7. What is your home language?
8. What is your understanding of this research project?

Self-efficacy questions: (based on questions 6, 29, 37, 41, 45 and 50 of self-efficacy questionnaire which had the lowest count for student self-efficacy)

I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.

1. Tell me about your approach to your studies.

- Describe the amount of effort you put into your studies.
- How do you feel about your answer?

2. Talk to me about your motivational levels with regards to your studies.

3. Which specific skills or strategies do you use when you are in a lecture? / When you study?

4. Let's discuss the class environment (dynamics) and how that may contribute to your performance or motivation:

- How do you manage a rambling disorganised lecture?
- How do you feel about asking questions in class or to contribute to class discussions? Please explain why you feel like this.
- Tell me about the communication between you and your lecturer(s).
- What factors help / hinder your communication with lecturers?

5. Please elaborate on your appraisal of yourself regarding your capabilities, referring to your studies?

6. What do you think is meant by the term student self-efficacy?

APPENDIX 3.3A2

Research instrument: **Semi-structured interview questions for Afrikaans students**

APPENDIX 3.3A2

Research instrument: **Semi-structured interview questions for Afrikaans students**

Studente:

Demografiese data:

1. Vir watter graad is u tans voor geregistreer?
2. In watter akademiese jaar is u tans?
3. Is hierdie u eerste graad?
4. Hoe oud is u?
5. Noem die Fisiologie module waarvoor u geregistreer het.
6. Het u vir die eerste keer vir die module geregistreer of herhaal u dit?
7. Wat is u huistaal?
8. Wat is u verstaan van hierdie navorsingsprojek?

Selfeffektiwiteitsvrae: (gebaseer op vrae 6, 29, 37, 41, 45 en 50 van die selfeffektiwiteitsvraelys wat die laagste telling gehad het vir studente selfeffektiwiteit)

Ek gaan vir jou vrae vra oor jou ondervinding as 'n student in die klas, veral die Fisiologie module. Gee asseblief jou eerlike ervaring van die studeer/leer van Fisiologie.

1.Vertel my meer oor jou benadering tot jou studies.

- Beskryf die hoeveelheid moeite wat jy in jou studies insit.
- Hoe voel jy oor jou antwoord?

2. Praat met my oor jou motiveringsvlakke met verwysing na jou studies.

3. Watter spesifieke vaardigheid of strategie gebruik jy wanneer jy in 'n lesing is? /As jy studeer?

4. Kom ons bespreek die klasomgewing (dinamiek) en hoe dit kan bydra tot jou prestasie of motivering:

- Hoe hanteer jy 'n deurmekaar en ongeorganiseerde lesing?
- Hoe voel jy daaroor om vrae in die klas te vra of om 'n bydrae tot 'n klasbespreking te lewer? Verduidelik asseblief hoekom jy so voel.
- Vertel my meer oor die kommunikasie tussen jou en die dosent(e).
- Watter faktore help / bemoeilik jou kommunikasie met dosente?

5. Brei asseblief uit oor jou beskouing / waardering van jouself ten opsigte van jou vermoëns, verwysende na jou studies.

6. Wat dink jy word bedoel met die term studente selfeffektiwiteit?

APPENDIX 3.3B1

Research instrument: **Semi-structured interview questions for English lecturers**

APPENDIX 3.3B1

Research instrument: **Semi-structured interview questions for English lecturers**

Lecturers:

Demographic data:

1. How long have you been teaching Natural Sciences students at the University of the Free State?
2. Have you taught at other universities as well? Please list these, as well as the duration at each institution.
3. Which subject(s) / module(s) do you teach?

Self-efficacy questions: (based on questions 6, 29, 34, 41, 45 and 50 of self-efficacy questionnaire which had the lowest count for student self-efficacy)

I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.

1. **What is your understanding of the term *student self-efficacy*?**

2. **How do you experience self-efficacy in Natural Sciences students whom you teach?**

3. **How do you see the role of a lecturer? Can the lecturer impact on students' academic performance?**
   - Please explain your answer.

4. **Please explain / elaborate on your teaching strategies**.

5. **What is your opinion of interactive classes?**

6. **Elaborate on students' engagement and communication with you in class and in your office.**

7. **Give your perception regarding the relevance and usefulness of the module content that you teach.**
   - Compare your perceptions with those students may possible have regarding the module and its relevance.

APPENDIX 3.3B2

Research instrument: **Semi-structured interview questions for Afrikaans lecturers**

APPENDIX 3.3B2

Research instrument: **Semi-structured interview questions for Afrikaans lecturers**

Dosente:

Demografiese data:

1. Hoe lank doseer u al vir die Natuurwetenskapstudente aan die Universiteit van die Vrystaat?
2. Het u voorheen al by ander universiteite doseer? Indien wel, lys asb die universiteite asook die duurte van u aanstelling by elke instituut.
3. Watter vak(ke). /module(s) doseer u?

Selfeffektiwiteitsvrae: (gebaseer op vrae 6, 29, 34, 41, 45 en 50 van die selfeffektiwiteitsvraelys wat die laagste telling vir studente selfeffektiwiteit gehad het)

Ek gaan vir u vrae vra oor u ondervinding met die Natuurwetenskapstudente in u klas. Gee asseblief u eerlike ervaring as 'n dosent.

1. **Hoe verstaan u die term studente selfeffektiwiteit?**

2. **Hoe ervaar u die studente vir wie u doseer se selfeffektiwiteit?**

3. **Hoe sien u die rol van 'n dosent? Kan die dosent 'n impak hê op die studente se akademiese prestasie? Verduidelik asseblief u antwoord.**

4. **Verduidelik / brei uit asseblief oor u onderrig strategieë.**

5. **Wat is u opininie van interaktiewe klasse?**

6. **Brei uit oor die studente se betrokkenheid en kommunikasie met u in die klas en by die kantoor**

7. **Gee u waarneming in verband met die toepaslikheid en bruikbaarheid van die module se inhoud wat u doseer.**

- Vergelyk u waarneming met die moontlike waarneming wat die studente mag hê in verband met die module se toepaslikheid.

APPENDIX 3.4A

Letter to the Dean of the Faculty of Natural and Agricultural Sciences to request permission to execute the study

APPENDIX 3.4A

Letter to the Dean of the Faculty of Natural and Agricultural Sciences to request permission to execute the study

Date

Prof D Vermeulen
Dean of the Faculty of Natural and Agricultural Sciences
UFS

Permission to execute a study

PROJECT TITLE: **GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES**

I hereby ask permission to execute a study for the purpose of obtaining the degree PhD (HPE) in the Faculty of Health Sciences. The study will be done on Natural Sciences students registered for the learning programmes of Biological Sciences, in the disciplines of Biochemistry, Genetics, Behavioural genetics, Genetics and Physiology, and Biochemistry and Physiology. These students have the option to register for PHBG2616 and PHBG3716 (Physiology modules presented by the department of Basic Medical Sciences, Faculty of Health Sciences)

The students will have to complete a Self-efficacy questionnaire. Thereafter students will be selected with purposive sampling for semi-structured interviews to determine factors within the teaching and learning environment to be addressed to develop guidelines for self-efficacy. Lecturers teaching these students will also be interviewed.

I trust that you will grant me permission to execute the study.

Yours sincerely

Mrs PC Vorster de Wet
Lecturer
Department of Basic Medical Sciences
051 4017371
Email: gnfsrs@ufs.ac.za

APPENDIX 3.4B

Letter to the Vice-Rector: **Research to request permission to execute the study**

APPENDIX 3.4B

Letter to the Vice-Rector: **Research to request permission to execute the study**

Date

Prof C Witthuhn
Vice-Rector: Research

Permission to execute a study

PROJECT TITLE: **GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES**

I hereby ask permission to execute a study for my PhD (HPE) within the Faculty of Health Sciences. The study will be done on Natural Sciences students registered for the Learning Programmes of Biological Sciences, in the disciplines of Biochemistry, Genetics, Behavioural genetics, Genetics and Physiology, and Biochemistry and Physiology. These students have the option to register for PHBG2616 and PHBG3716 (Physiology modules presented by the department of Basic Medical Sciences, Faculty of Health Sciences).

The students will have to complete a self-efficacy questionnaire. Thereafter students will be selected with purposive sampling for semi-structured interviews to determine factors within the teaching and learning environment to be addressed to develop guidelines for self-efficacy. Lecturers teaching these students will also be interviewed.

I trust that you will grant me permission to execute the study.

Yours sincerely
Mrs PC Vorster de Wet
Lecturer
Department of Basic Medical Sciences
051 4017371
Email: gnfsrs@ufs.ac.za

APPENDIX 3.4C

Letter to the Dean of Student Affairs to request permission to execute the study

APPENDIX 3.4C

Letter to the Dean of Student Affairs to request permission to execute the study

Date

Mr Pura Mgolombane
Dean: Student Affairs

Permission to execute a study

PROJECT TITLE: **GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES**

I hereby ask permission to execute a study for my PhD (HPE) within the Faculty of Health Sciences. The study will be done on Natural Sciences students registered for the Learning Programmes of Biological Sciences, in the disciplines of Biochemistry, Genetics, Behavioural genetics, Genetics and Physiology, and Biochemistry and Physiology. These students have the option to register for PHBG2616 and PHBG3716 (Physiology modules presented by the department of Basic Medical Sciences, Faculty of Health Sciences).

The students will have to complete a self-efficacy questionnaire. Thereafter students will be selected with purposive sampling for semi-structured interviews to determine factors within the teaching and learning environment to be addressed to develop guidelines for self-efficacy. Lecturers teaching these students will also be interviewed.

I trust that you will grant me permission to execute the study.

Yours sincerely

Mrs PC Vorster de Wet
Lecturer
Department of Basic Medical Sciences
051 4017371
Email: gnfsrs@ufs.ac.za

APPENDIX 4.1

Ethical clearance

APPENDIX 4.1

Ethical clearance

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

IRB nr 00006240
REC Reference nr 230408-011
IORG0005187
FWA00012784

15 February 2017

PETRONELLA VORSTER
DEPT OF BASIC MEDICAL SCIENCES
FACULTY OF HEALTH SCENCES
UFS

Dear Petronella Vorster

HSREC 02/2017 (UFS-HSD2017/0040)
PROJECT TITLE: GUIDELINES FOR STUDENT SELF-EFFICACY IN THE TEACHING AND LEARNING ENVIRONMENT OF UNDERGRADUATE NATURAL SCIENCES

1. You are hereby kindly informed that the Health Sciences Research Ethics Committee (HSREC) approved this protocol after all conditions were met. This decision will be ratified at the next meeting to be held on 28 February 2017.
2. The Committee must be informed of any serious adverse event and/or termination of the study.
3. Any amendment, extension or other modifications to the protocol must be submitted to the HSREC for approval.
4. A progress report should be submitted within one year of approval and annually for long term studies.
5. A final report should be submitted at the completion of the study.
6. Kindly use the HSREC NR as reference in correspondence to the HSREC Secretariat.
7. The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services-(HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

Yours faithfully

DR SM LE GRANGE
CHAIR: HEALTH SCIENCES RESEARCH ETHICS COMMITTEE
cc: LJ Van Der Merwe

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | F: +27 (0)51 444 4359 | E: ethicsfhs@ufs.ac.za
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

APPENDIX 4.2

Cronbach alpha coefficient values each question for all 53 items (questions)

APPENDIX 4.2

Cronbach alpha coefficient values each question for all 53 items (questions)

Variable: Question (q)	Raw Variables		Standardized Variables		Cronbach Alpha Coefficient for all 53 items:
	Correlation with Total	Alpha	Correlation with Total	Alpha	Alpha = 0.91
q1	0.319039	0.882829	0.333633	0.892498	
q2	0.473477	0.880729	0.473979	0.890767	
q3	0.453891	0.880968	0.461044	0.890928	
q4	0.461471	0.880834	0.463702	0.890895	
q5	0.482531	0.880297	0.479417	0.8907	
q6	0.376656	0.88185	0.356023	0.892223	
q7	0.242426	0.883874	0.251183	0.893503	
q8	0.400521	0.881512	0.397086	0.891718	
q9	0.423868	0.881261	0.440723	0.891179	
q10	0.364739	0.882093	0.369494	0.892058	
q11	0.451958	0.880901	0.445126	0.891125	
q12	0.495968	0.880473	0.504942	0.890382	
q13	0.460765	0.880583	0.460103	0.890939	
q14	0.408316	0.881404	0.413441	0.891516	
q15	0.427901	0.881358	0.423502	0.891392	
q16	0.365771	0.882053	0.365497	0.892107	
q17	0.46321	0.88094	0.4647	0.890882	
q18	0.42095	0.881155	0.417915	0.891461	
q19	0.406184	0.881412	0.412423	0.891529	
q20	0.470208	0.880749	0.473865	0.890769	
q21	0.463961	0.880655	0.473607	0.890772	
q22	0.332617	0.882501	0.339255	0.892429	
q23	0.38879	0.881977	0.397205	0.891717	
q24	0.421728	0.882444	0.439167	0.891199	
q25	0.363779	0.882373	0.379922	0.891929	
q26	0.259835	0.883434	0.279853	0.893155	
q27	0.471134	0.88116	0.473575	0.890772	
q28	0.238252	0.883618	0.277335	0.893185	
q29	0.358075	0.882176	0.349529	0.892303	
q30	0.285139	0.883144	0.296198	0.892955	
q31	0.483036	0.880796	0.492813	0.890533	
q32	0.425194	0.881459	0.433566	0.891268	
q33	0.319498	0.88267	0.332529	0.892511	
q34	-0.23788	0.89038	-0.24752	0.89942	
q35	-0.18443	0.891251	-0.18612	0.898707	
q36	0.238129	0.883835	0.247356	0.89355	
q37	0.347407	0.882342	0.33858	0.892437	
q38	0.477469	0.880278	0.4678	0.890844	
q39	0.213734	0.884325	0.224193	0.893831	
q40	-0.08201	0.888272	-0.09752	0.89767	
q41	-0.01348	0.888205	-0.02067	0.896764	
q42	0.437693	0.881122	0.429671	0.891316	
q43	0.436897	0.880999	0.439172	0.891198	
q44	0.374605	0.882119	0.400945	0.891671	
q45	0.327352	0.882667	0.31641	0.892708	
q46	0.230781	0.884272	0.222311	0.893854	
q47	0.366924	0.882031	0.366281	0.892097	
q48	0.343726	0.882394	0.346666	0.892338	

Variable: Question (q)	Raw Variables		Standardized Variables		Cronbach Alpha Coefficient for all 53 items:
q49	0.22705	0.884918	0.207194	0.894037	
q50	0.30444	0.883095	0.28059	0.893146	
q51	0.486794	0.880388	0.490477	0.890562	
q52	0.501636	0.880525	0.508165	0.890342	
q53	0.506685	0.880214	0.522053	0.890169	

APPENDIX 4.3

Total score, frequency and percentage of questionnaire per student (n=157)

APPENDIX 4.3

Total score, frequency and percentage of questionnaire per student (n=157)

Total score (/212)	Total score percentage	Frequency of students	Percentage of students	Total score median	Total score minimum	Total score Maximum
81	38.2	1	0.64	159 (75%)	81 (38.2%)	196 (92.5%)
114	53.8	1	0.64			
118	55.7	1	0.64			
121	57.1	1	0.64			
123	58	1	0.64			
126	59.4	1	0.64			
128	60.4	2	1.27			
129	60.8	2	1.27			
130	61.3	1	0.64			
132	62.3	2	1.27			
134	63.2	1	0.64			
135	63.7	1	0.64			
136	64.2	4	2.55			
137	64.6	2	1.27			
138	65.1	1	0.64			
139	65.6	2	1.27			
140	66	5	3.18			
141	66.5	1	0.64			
142	67	1	0.64			
143	67.5	2	1.27			
144	68	3	1.91			
145	68.4	3	1.91			
146	68.9	2	1.27			
148	69.8	5	3.18			
149	70.3	4	2.55			
150	70.8	3	1.91			
151	71.2	2	1.27			
152	71.7	3	1.91			
153	72.2	3	1.91			
154	72.6	2	1.27			
155	73.1	3	1.91			
156	73.6	1	0.64			
157	74.1	3	1.91			
158	74.5	5	3.18			
159	75	4	2.55			
160	75.5	5	3.18			
161	76	2	1.27			
162	76.4	2	1.27			
163	76.9	3	1.91			
164	77.4	3	1.91			
165	77.8	6	3.82			
166	78.3	3	1.91			
167	78.8	4	2.55			
168	79.2	3	1.91			
169	79.7	3	1.91			
170	80.2	1	0.64			
171	80.7	4	2.55			
172	81.1	3	1.91			
173	81.6	2	1.27			

174	82.1	4	2.55			
175	82.5	3	1.91			
176	83	2	1.27			
177	83.5	2	1.27			
178	84	2	1.27			
179	84.4	3	1.91			
180	84.9	2	1.27			
183	86.3	2	1.27			
184	86.8	2	1.27			
185	87.3	2	1.27			
186	87.7	2	1.27			
187	88.2	1	0.64			
188	88.7	1	0.64			
189	89.2	1	0.64			
190	89.6	1	0.64			
191	90.1	1	0.64			
193	91	1	0.64			
194	91.5	1	0.64			
196	92.5	1	0.64			

APPENDIX 4.4

Total score, frequency and percentage of questionnaire per hypothetical construct

APPENDIX 4.4

Total score, frequency and percentage of questionnaire per hypothetical construct

		Hypothetical constructs scores					
Total score	**Total percentage**	**Self Total=88**	**Motivate Total=88**	**Class Total=28**	**Study Total=8**	**Frequency of students**	**Percen-tage students**
81	38.2075471	36	33	10	2	1	0.64
114	53.7735849	45	55	12	2	1	0.64
118	55.6603773	47	57	10	4	1	0.64
121	57.0754717	45	62	8	6	1	0.64
123	58.0188679	48	57	14	4	1	0.64
126	59.4339622	48	55	21	2	1	0.64
128	60.3773584	49	54	19	6	1	0.64
128	60.3773589	50	58	16	4	1	0.64
129	60.8490566	44	62	20	3	1	0.64
129	60.8490566	52	53	16	8	1	0.64
130	61.3207547	57	57	10	6	1	0.64
132	62.2641509	53	58	17	4	1	0.64
132	62.2641509	59	59	10	4	1	0.64
134	63.2075477	62	55	15	2	1	0.64
135	63.6792452	52	57	19	7	1	0.64
136	64.1509434	49	61	18	8	1	0.64
136	64.1509434	50	66	13	7	1	0.64
136	64.1509434	53	61	17	5	1	0.64
136	64.1509434	56	60	15	5	1	0.64
137	64.6226415	51	72	10	4	1	0.64
137	64.6226415	54	61	15	7	1	0.64
138	65.0943396	61	60	14	3	1	0.64
139	65.5660377	49	65	20	5	1	0.64
139	65.5660377	54	68	12	5	1	0.64
140	66.0377358	50	65	20	5	1	0.64
140	66.0377358	53	67	15	5	1	0.64
140	66.0377358	56	62	14	8	1	0.64
140	66.0377358	57	67	10	6	1	0.64
140	66.0377358	58	59	20	3	1	0.64
141	66.5094339	56	73	10	2	1	0.64

142	66.9811320	55	62	17	8	1	0.64
143	67.4528301	56	61	20	6	1	0.64
143	67.4528301	60	66	12	5	1	0.64
144	67.9245283	51	69	21	3	1	0.64
144	67.9245283	58	64	16	6	1	0.64
144	67.9245283	61	61	19	3	1	0.64
145	68.3962264	54	64	20	7	1	0.64
145	68.3962264	62	65	12	6	1	0.64
145	68.3962264	64	59	15	7	1	0.64
146	68.8679245	59	62	19	6	1	0.64
146	68.8679245	60	63	18	5	1	0.64
148	69.8113207	48	74	21	5	1	0.64
148	69.8113207	53	70	17	8	1	0.64
148	69.8113207	55	68	18	7	1	0.64
148	69.8113207	57	66	19	6	1	0.64
148	69.8113207	62	64	18	4	1	0.64
149	70.2830188	57	70	15	7	1	0.64
149	70.2830188	58	68	16	7	1	0.64
149	70.2830188	64	65	18	2	1	0.64
149	70.2830188	66	64	13	6	1	0.64
150	70.7547169	59	62	22	7	1	0.64
150	70.7547169	61	61	21	7	1	0.64
150	70.7547169	67	62	17	4	1	0.64
151	71.2264150	62	65	16	8	1	0.64
151	71.2264150	63	64	22	2	1	0.64
152	71.6981132	53	73	19	7	1	0.64
152	71.6981132	63	68	15	6	1	0.64
152	71.6981132	64	68	14	6	1	0.64
153	72.1698113	62	68	18	5	1	0.64
153	72.1698113	64	66	20	3	1	0.64
153	72.1698113	69	61	15	8	1	0.64
154	72.6415094	59	73	15	7	1	0.64
154	72.6415094	60	70	16	8	1	0.64
155	73.1132075	60	68	21	6	1	0.64
155	73.1132075	63	70	14	8	1	0.64
155	73.1132075	66	63	21	5	1	0.64

156	73.5849056	62	68	18	8	1	0.64
157	74.0566037	61	70	18	8	1	0.64
157	74.0566037	62	74	15	6	1	0.64
157	74.0566037	65	67	23	2	1	0.64
158	74.5283018	59	74	17	8	1	0.64
158	74.5283019	64	71	16	7	1	0.64
158	74.5283018	65	69	16	8	1	0.64
158	74.5283018	66	68	17	7	1	0.64
158	74.5283018	67	67	18	6	1	0.64
159	75	62	64	25	8	1	0.64
159	75	65	66	20	8	1	0.64
159	75	67	69	17	6	1	0.64
159	75	69	67	16	7	1	0.64
160	75.4716981	61	74	18	7	1	0.64
160	75.4716981	62	70	21	7	1	0.64
160	75.4716981	68	68	21	3	1	0.64
160	75.4716981	68	69	16	7	1	0.64
160	75.4716981	69	66	21	4	1	0.64
161	75.9433962	64	71	19	7	1	0.64
161	75.9433962	66	68	19	8	1	0.64
162	76.4150943	61	76	18	7	1	0.64
162	76.4150943	67	69	22	4	1	0.64
163	76.8867924	64	74	17	8	1	0.64
163	76.8867924	69	69	19	6	1	0.64
163	76.8867924	69	70	17	7	1	0.64
164	77.3584905	65	73	18	8	1	0.64
164	77.3584905	69	69	20	6	1	0.64
164	77.3584905	69	73	16	6	1	0.64
165	77.8301886	65	71	22	7	1	0.64
165	77.8301886	67	73	17	8	1	0.64
165	77.8301886	68	73	17	7	1	0.64
165	77.8301886	69	70	20	6	1	0.64
165	77.8301886	70	70	18	7	1	0.64
165	77.8301886	75	72	12	6	1	0.64
166	78.3018867	62	77	20	7	1	0.64
166	78.3018867	70	73	19	4	1	0.64

166	78.3018867	72	72	19	3	1	0.64
167	78.7735849	63	75	21	8	1	0.64
167	78.7735849	66	72	22	7	1	0.64
167	78.7735849	68	72	24	3	1	0.64
167	78.7735849	73	66	20	8	1	0.64
168	79.2452830	63	74	24	7	1	0.64
168	79.2452830	67	74	19	8	1	0.64
168	79.2452830	70	69	21	8	1	0.64
169	79.7169811	67	71	24	7	1	0.64
169	79.7169811	71	71	23	4	1	0.64
169	79.7169811	73	75	13	8	1	0.64
170	80.1886792	67	77	20	6	1	0.64
171	80.6603773	68	72	23	8	1	0.64
171	80.6603773	71	75	17	8	1	0.64
171	80.6603773	71	75	18	7	1	0.64
171	80.6603773	80	67	21	3	1	0.64
172	81.1320754	66	76	22	8	1	0.64
172	81.1320754	67	76	22	7	1	0.64
172	81.1320754	70	72	22	8	1	0.64
173	81.6037735	72	69	25	7	1	0.64
173	81.6037735	75	75	16	7	1	0.64
174	82.0754717	66	75	25	8	1	0.64
174	82.0754717	73	79	14	8	1	0.64
174	82.0754717	76	72	20	6	1	0.64
174	82.0754717	77	77	14	6	1	0.64
175	82.5471698	69	74	26	6	1	0.64
175	82.5471698	75	75	17	8	1	0.64
175	82.5471698	76	73	19	7	1	0.64
176	83.0188679	72	78	18	8	1	0.64
176	83.0188679	81	70	21	4	1	0.64
177	83.4905660	74	76	19	8	1	0.64
177	83.4905660	75	75	23	4	1	0.64
178	83.9622641	74	76	22	6	1	0.64
178	83.9622641	78	75	21	4	1	0.64
179	84.4339622	75	78	18	8	1	0.64
179	84.4339622	77	72	23	7	1	0.64

179	84.4339622	78	73	25	3	1	0.64
180	84.9056603	80	73	20	7	1	0.64
180	84.9056603	86	74	14	6	1	0.64
183	86.3207547	77	79	23	4	1	0.64
183	86.3207547	82	74	19	8	1	0.64
184	86.7924528	74	79	23	8	1	0.64
184	86.7924528	78	77	21	8	1	0.64
185	87.2641509	75	77	26	7	1	0.64
185	87.2641509	77	79	23	6	1	0.64
186	87.7358490	76	79	23	8	1	0.64
186	87.7358490	77	78	24	7	1	0.64
187	88.2075471	73	82	24	8	1	0.64
188	88.6792452	81	76	27	4	1	0.64
189	89.1509434	84	77	21	7	1	0.64
190	89.6226415	82	74	26	8	1	0.64
191	90.0943396	79	83	22	7	1	0.64
193	91.0377358	79	79	28	7	1	0.64
194	91.5094339	80	82	24	8	1	0.64
196	92.4528301	81	83	24	8	1	0.64

APPENDIX 4.5

Frequencies combined (1 and 2 grouped together; 3 and 4 grouped together) and categorised (1 as <75%; 2 as ≥75%) for hypothetical constructs (n=157 students)

APPENDIX 4.5

Frequencies combined (1 and 2 grouped together; 3 and 4 grouped together) and categorised (1 as <75%; 2 as ≥75%) for hypothetical constructs (n=157 students)

Hypothetical construct Percentage category						
Self	**Motivate**	**Class**	**Study**	**Frequency of combination**	**Percent**	**Self-efficacy**
.	**.**	**.**	**.**	25	13.7	
1	**1**	**1**	**1**	19	10.4	Low
1	**1**	**1**	**2**	16	8.8	Combination of low and high within constructs
1	**1**	**2**	**1**	2	1.1	
1	**1**	**2**	**2**	2	1.1	
1	**1**	**2**	**2**	1	0.6	
1	**2**	**1**	**1**	7	3.9	
1	**2**	**1**	**2**	19	10.4	
1	**2**	**1**	**2**	7	3.9	
1	**2**	**2**	**1**	3	1.6	
1	**2**	**2**	**2**	1	0.6	
1	**2**	**2**	**2**	4	2.2	
2	**1**	**1**	**1**	1	0.6	
2	**1**	**1**	**2**	2	1.1	
2	**1**	**2**	**1**	1	0.6	
2	**2**	**1**	**1**	2	1.1	
2	**2**	**1**	**2**	2	1.1	
2	**2**	**1**	**2**	31	17	
2	**2**	**2**	**1**	12	6.6	
2	**2**	**2**	**2**	25	13.7	High

APPENDIX 4.6

Frequencies and percentages of responses per question (q) of the questionnaire according to the Likert scale (individual options)

APPENDIX 4.6

Frequencies and percentages of responses per question (q) of the questionnaire according to the Likert scale (individual options)

Lowest (*) and highest (**) frequencies of questions are indicated for Likert scale

LIKERT SCALE	1	2	3	4
q1: You can clarify a paragraph you have just read and don't understand, by carefully rereading it.				
Frequency	1*	6	65	85
Percentage	0.6	3.8	41.4	54.1
q2: You can find a way to remember key facts in a reading assignment when you have trouble recalling it two weeks later.				
Frequency	7	30	80	40
Percentage	4.5	19.1	51	25.5
q3: You can redefine complex definitions from a textbook and recall it when you have trouble remembering it.				
Frequency	11	32	86	27
Percentage	7.1	20.5	55.1	17.3
q4: You can set and attain an important study goal during your remaining time when you have tried unsuccessfully to study for an hour.				
Frequency	11	25	85	33
Percentage	7.1	16.2	55.2	21.4
q5: You can ask the right question to clarify matters when you don't understand your lecturer.				
Frequency	12	38	59	47
Percentage	7.7	24.4	37.8	30.1
q6: You can reorganise and rewrite your notes before the next class meeting when your lecturer gives a rambling disorganised lecture.				
Frequency	31	49	52	25
Percentage	19.8	31.2	33.1	15.9
q7: You can catch up on the work within a week when you have missed several classes.				
Frequency	14	23	56	64
Percentage	9	14.7	63.7	40.8
q8: You can interpret an assignment you are reading that doesn't make sense, by using text clues such as headings or italics.				
Frequency	12	23	61	60
Percentage	7.7	14.7	39.1	38.5
q9: You can find a way to motivate yourself to learn it fully when the assigned reading is boring.				
Frequency	11	18	77	51
Percentage	7	11.5	49.1	32.5
q10: You can make it into an exciting challenge when a homework assignment is repetitive and uninteresting.				
Frequency	13	48	75	19
Percentage	8.4	31	48.4	12.3
q11: You can find a way to get the information clarified before the next class meeting when a lecturer's class is over your head.				
Frequency	15	33	83	25
Percentage	9.6	21.2	53.2	16

q12:	You can associate new concepts with old ones sufficiently well to remember them when you are trying to understand a new topic.				
	Frequency	6	18	74	57
	Percentage	3.9	11.6	47.7	36.8
q13:	You can motivate yourself to keep good notes when a lecture is especially boring.				
	Frequency	13	29	57	58
	Percentage	8.3	18.5	36.3	37
q14:	You can create self-questions to help you review the material successfully when you suddenly realise that you can't.				
	Frequency	19	42	68	28
	Percentage	12.1	26.8	43.3	17.8
q15:	You can think of good examples that will help you remember it in a test when you have trouble recalling an abstract concept.				
	Frequency	4	19	67	66
	Percentage	2.6	12.2	43	42.3
q16:	You can condense your notes down to just the essential facts when you are taking a module covering a huge amount of material.				
	Frequency	8	29	71	48
	Percentage	5.1	18.6	45.5	30.8
q17:	You can find a way to associate the technical detail of a concept for a test that will ensure recall, when you are struggling to remember.				
	Frequency	4	34	78	40
	Percentage	2.6	21.8	50	25.6
q18:	You can record all the important points in your notes when your lecturer's class is so rapid that you are unable to write everything down.				
	Frequency	22	31	64	39
	Percentage	14.1	19.9	41	25
q19:	You can refocus sufficiently when your concentration wanders while listening in class.				
	Frequency	20	23	75	37
	Percentage	12.9	14.8	48.4	23.9
q20:	You can create your own analogy that a reader will understand when describing a complex principle in a written paper.				
	Frequency	10	30	85	32
	Percentage	6.8	19.1	54.1	20.4
q21:	You can go back to your notes and locate all the information you had forgotten when you think you did poorly in a test you just finished.				
	Frequency	9	15	44	89
	Percentage	5.7	9.6	28	56.7
q22:	You can diagram a body of information, or chart it for a test in order to remember it all two weeks later when you are struggling to understand it.				
	Frequency	15	34	67	41
	Percentage	9.6	21.7	42.7	26.1
q23:	You prefer class work that is challenging in order to learn new things.	2	17	81	56
	Frequency	1.3	10.9	51.9	35.9

	Percentage				
q24:	It is important for you to learn what is being taught in this class. Frequency Percentage	 1* 0.6	 1* 0.6	 21* 13.4	 134** 85.4
q25:	You like what you are learning in this class. Frequency Percentage	 2 1.3	 6 3.8	 37 23.6	 112 71.3
q26:	You are certain you can understand the ideas taught in this course. Frequency Percentage	 1* 0.6	 7 4.5	 107** 68.2	 42 26.8
q27:	You think that you will be able to use what you learn in this class in other classes. Frequency Percentage	 1* 0.6	 12 7.6	 63 40.1	 81 51.6
q28:	You think that what you are learning in this class is useful for you to know. Frequency Percentage	 4 2.7	 8 5.1	 31 19.9	 113 72.4
q29:	Your study skills are excellent compared to other students in this class. Frequency Percentage	 12 7.7	 70** 44.9	 55 35.3	 19 12.2
q30:	You know that you will be able to learn the material for this class. Frequency Percentage	 1* 0.6	 9 5.7	 82 52.2	 65 41.4
q31:	When you study for a test you try to combine the information from the lecture and from the book. Frequency Percentage	 4 2.6	 10 6.4	 52 33.3	 90 57.7
q32:	When you do homework, you try to remember what the teacher said in class in order to answer the questions correctly. Frequency Percentage	 2 1.3	 18 11.5	 57 36.3	 80 50.9
q33:	You ask yourself questions to make sure you know the material you have been studying. Frequency Percentage	 6 3.8	 34 21.7	 75 47.8	 42 26.8
q34:	It is hard for you to decide what the main ideas are in what you read. Frequency Percentage	 37 23.7	 59 37.8	 48 30.8	 12 7.7
q35:	When the work is difficult for you, you either give up or study only the easy parts. Frequency Percentage	 58 36.9	 38 24.2	 38 24.2	 23 14.7
q36:	When you study, you put the important ideas into your own words. Frequency Percentage	 11 7	 25 15.9	 63 40.1	 58 36.9
q37:	You work on practice exercises and answer end of chapter questions even when you don’t have to. Frequency Percentage	 33 21.3	 38 24.5	 54 34.8	 30 19.4

q38:	Before you begin studying you think about things you will need to do to learn. Frequency Percentage	15 9.6	30 19.1	54 34.4	58 36.9
q39:	You use what you have learned from old homework assignments as well as the textbook to do new assignments. Frequency Percentage	15 9.6	35 22.3	56 35.7	51 32.5
q40:	You often find that you have been reading for class but don't know what it is all about. Frequency Percentage	32 20.5	64 41	45 28.9	15 9.6
q41:	You find that when the lecturer is talking you think of other things and don't really listen to what is being said. Frequency Percentage	29 18.5	45 28.7	46 29.3	37 23.6
q42:	You work hard to get good marks even when you don't like the subject. Frequency Percentage	7 4.5	14 8.9	54 34.4	82 52.2
q43:	You work hard to get good marks even when you don't like the lecturer. Frequency Percentage	11 7	12 7.6	41 26.1	93 59.2
q44:	When reading, you try to connect the things you are reading with what you already know. Frequency Percentage	3 1.9	9 5.7	51 32.5	94 59.9
q45:	You ask questions in class or contribute to class discussions. Frequency Percentage	53 33.8	40 25.5	46 29.3	18 11.5
q46:	You never come to class without completing readings or assignments. Frequency Percentage	23 14.7	32 20.4	51 32.5	51 51.5
q47:	You work with classmates outside of class to prepare class assignments. Frequency Percentage	23 14.7	25 15.9	53 33.8	56 35.7
q48:	You put together ideas or concepts from different courses when completing assignments or during class discussions. Frequency Percentage	23 14.7	26 16.6	59 37.6	49 31.2
q49:	You use e-mail to communicate with the lecturer. Frequency Percentage	40 25.5	33 21	26 16.6	58 36.9
q50:	You discuss grades or assignments with the lecturer. Frequency Percentage	80** 50.9	35 22.3	23 14.7	19 12.1
q51:	You discuss ideas from your readings or classes with others outside class (students, family members, co-workers etc.) Frequency Percentage	8 5.1	20 12.7	60 38.2	69 43.9

q52:	You put a lot of effort into this subject.				
	Frequency	4	12	51	90
	Percentage	2.6	7.6	32.5	57.3
q53:	You make sure to study on a regular basis.				
	Frequency	7	18	64	45
	Percentage	5.2	13.5	47.8	33.6

APPENDIX 5.1

PHASE 2: Transcribed data: Lecturers

APPENDIX 5.1

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 1

Questions and answers **Demographic data** **Lecturer 1 (L1); Interviewer (I)** **26min 37sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L1: 11 years	11 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L1: No	
I: Which subject(s) / module(s) do you teach? L1: I give Microbiology. When I started, I gave a service course for nurses, 2nd years, and at this stage I give it to major-subject students for the 2nd semester.	
Self-efficacy questions: *I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.*	
I: Have you heard about the term self-efficacy? L 1: Yes. I: What is your understanding of the term student self-efficacy? L1: As I understand it, they must basically take responsibility and not just wait until I must say something to them, but they must go and learn effectively. They **must take responsibility for their process.**	**Self-efficacy questions:** Take responsibility for their process.
I: **How do you experience self-efficacy in Natural Sciences students whom you teach**? L1: **I must say I think in general, it is poor.** There is always a group that stands out and participates and that at least does what you asked them to do beforehand. There is after all **one outstanding person in a year**, I would say, who will do more than you expect. Most of them, today in class I saw that **actually the stuff they did in Biology in the first year and it is as if they never heard of it.** So I don't know whether this answers your question, but **this makes it difficult.** I told them that I cannot go back to Biology, they must just go this afternoon and swot it or something so that they at least know what I'm talking about in class, because otherwise they sit there and look at me as if I've lost the thread. I: Where do you think does this come in? Do they realise that the sciences are connected with each other? L1: You see, this is the big thing, **they go and learn something, say in Biology, a chapter of Biology, and then they do not even connect it to the second chapter of Biology, what about now two years later in Microbiology**. For example, today I did the work we did in the last two lectures, it's actually two sections of a larger thing, but I pertinently told them that they must not learn this stuff separately, separately, separately, because it is all part of a broader concept, and some of them have now understood this. To me, this year, there are slightly more students who take part and will answer when I ask questions. I am always concerned about a group at the back of the class. I: Do you experience a difference in **dynamics between the Afrikaans and the English class**?	I must say I think in general, it is poor. One outstanding person in a year. do not even connect it to the second chapter of Biology, what about now two years later in Microbiology. The English class has always been more vocal. When you ask them, they answer or say that they do not know. The Afrikaans class says nothing and it is difficult to estimate whether they understand or not. This is actually **strange** to me because it is a smaller group with a more intimate way of lecturing. Not a cultural thing.

L 1: O yes, a big difference. I think it's half safety in numbers. The **English class has always been more vocal.** When you ask them, they answer or say that they do not know. The **Afrikaans class says nothing and it is difficult to estimate whether they understand or not.** Unless you ask someone specifically. This is actually **strange to me because it is a smaller group with a more intimate way of lecturing**, but because it is sometimes as if you talk to a wall, it sometimes falls flat. **Even the Afrikaans children in the English class participate more**, so I **cannot say it is a cultural thing**. I think really that, just because there is a **larger group, they are counter intuitive**. You would think that in a larger group they would remain more quietly, but it is still whether there is whether there is I: More energy? L1: Yes, that is a good word for this.	
I: How do you see the **role of a lecturer**? Can the lecturer impact on students' academic performance? L1: I definitely think so. I do not want to say the greatest impact, but you must … if I know think back to how I began and went through the work and gave a lecture basically, humph, because this is how we learned. In the old days, people stood in front of you and talked for an hour and that was that and you had to write. Today, **you can realise that some stuff works better**, especially now this year when we start **attending curriculum transformation workshops about student engagement** and so on, you have better insights and **there are other ways to do things**, and for me, **besides all the knowledge** they must have, **it is a passion for me that they must develop for the subject.** If they do not develop this or if they are not interested in the subject, they fall half out. **But the few that you can now motivate and inspire to see how amazing it is, are those that continue and ultimate do postgraduate. I think that if you yourself are excited about the subject, it is the only way to do it**. You cannot expect people to think that this is fine, if you do not think that it is fine. I now think back to when I was at school. The reason why I am here is the Biology teacher I had in Standard 8. **I still think that they see that you go out of your way**. Shame, one year I met a student here outside, I don't think she went to third year, but she just accosted me and said many many thanks, because she saw that I had passion for my subject and she did not and then she went to swot drama or something. So, even if they not go on, you must get them into a direction in which they want to go.	Impact of lecturer: Attending curriculum transformation workshops. Besides all the knowledge they must have, it is a passion for me that they must develop for the subject. I think that if you yourself are excited about the subject, it is the only way to do it.
I: **Please explain / elaborate on your teaching strategies?** L 1: I very much tend to **follow the traditional way** and as I say have **learned a lot from the workshops** and try to do exciting things, such as for example, I have **redone the practical so that it links more with what is done in theory so that they can physically see the connection.** Here we do something and this is where it fits in. Umph, then I also **changed the assessment.** This year, they have not yet written a test, but I will see to it that there is a **pre-lecture quiz of maximum 10 questions on Blackboard** so that they at least go through the work once which is meant to serve as preparation. I have not yet looked to see how many of them have done it. They **get the slides beforehand** and know which part of the work we will be doing and then they have to do the **quiz** thing. I: Do they get marks for this? L1: They do not get marks for that section, but if they do it, **Blackboard basically makes available a summary of the chapter.** So they get something for it. Although many people say that one should not actually **reward them** for this, but anyhow, they will not do it if you do not give them something. Then it is the lecture and I have tutors who have their work of a **compulsory tutorial** built into the timetable, and **afterwards they must do a crossword puzzle** of the lecture for which they get marks, but they can do this until they get it right. So it is actually just a mark for did you do it or not. This also counts towards part of their semester mark. Then, the **semester tests** themselves, I told them this year that they can bring their **classnotes, not the book nor the slides, but any notes they have taken, into the test.** So obviously I will now **assess them on another level**; I will now not **necessarily ask a definition, but rather an application**, because they now have the information in front of them, and I will rather test, so they understand. I do not know how I will exactly do the exam. There may be the same type of questions as in the test. I do not want	**Teaching strategies:** Traditional way Changed the assessment. Pre-lecture quiz of maximum 10 Questions on Blackboard and Blackboard basically makes available a summary of the chapter (reward). Compulsory tutorial Crossword puzzle Semester test They can bring their classnotes, not the book nor the slides, but any notes they have taken, into the test. Assess them then on another level; I will now not necessarily ask a definition, but rather an application. "Extra credit assignment" and for this they must be creative.

them to write an open-book exam, but will still consider how I will do it. Then I also have a "**extra credit assignment**" and for this they must be **creative** and they must portray one or other concept we did in front of an audience. So they can write a poem, an app, a rap I do not know what I will get, but any way in which they can convey something to someone. I do this in collaboration with the **Department of Art.** So, their first- and second year students were already here and they must also paint one or other biological concept or I am not sure what. To them, it is about the painting technique and I will not judge the technique now. If there are no unrests and uprisings, the plan is to hold an exhibition at the end of the year and to make a function of it or something. I: Is this also actually something of a reward? L1: Yes, it is. I **want them to feel a little important and also think a little "out of the box**" so that they see that it is not simply Microbiology and here I am learning it. A few have mentioned that they are interested in doing this. I will now see whether they manage to do this, but I hope so. I: For interest's sake, the use of technology then? I hear you mention that Blackboard is now increasingly used. L1: I think that t**echnology makes some things easier, but I think that one should not get too involved in this.** Look, I know, what do they call it? The "**millennials"**, I know they are **so stuck to their telephone** that it is unpleasant. I think you can **use it as an aid**, humph, and then. I mean **I use the internet daily**, I am more on the internet than on anything else. I think that one's way of learning changes; I think one does not have to remember as many things as when we swotted. **Knowledge is immediately available and more rapidly than you can think.** But I think that there is so much information and you must rather go and learn to judge the quality of the information. Anyone can pur something on Wikipedia. So, you must know enough to see that someone has now written a lot of nonsense, and I think **it's something that fails to come, judging the mass of available information**. I: Would you say that, as you call them the millennials, children born 20 years earlier and the age changes rapidly, **must one keep up to date to reach them or must they also know the older principles**? L1: Now you stumped me. I think that some of the older principles will remain the same, but in the sciences information changes so rapidly and in addition to technology or how you learn it, I mean thousands of new species are described daily. So, the information and what people can do in terms of technology causes you to remain up to date, you can't just learn old principles. Umpf especially when you think that one day they will have to function and say they become microbiologists one day, understand they can, I say not all the old stuff, because you must still do some of the basic stuff even if it is 100 or 200 years old, but you must still be aware of the new stuff that has become available or at least of what is important. Stuff changes so rapidly that manuals are sometimes already outdated (laugh). I: Do you think that it also plays a role that they feel perhaps overwhelmed by the amount of additional stuff at undergraduate level? L1: Umpf, no. I think that we filter it a lot at undergraduate level. **They are definitely not on the forefront of technology in terms of what is learned.** One tries to **teach them the basics** with what was established "technology" 10 years ago, and so on. That is why I often say to them get a BSc, because they always **ask me how much money they will earn**. I say: "not so much, sister, if you leave here with a BSc, even with an Honours, you will only be half taught (low salary).	Technology -technology makes some things easier, but I think that one should not get too involved in this. "emails", I know they are so stuck to their telephone that it is unpleasant. Use it as an aid. Internet - it's something that fails to come, judging the mass of available information. They are definitely not on the forefront of technology in terms of what is learned. Teach them the basics. Want them to feel a little important and also think a little "out of the box".
I: **What is your opinion of interactive classes?** L1: Look**, I like asking questions about that connection**, that they realise that there is that connection. I would give them a piece to read and then ask them "Why do you think this is so?" Then they myst try to reconnect to something we did in the previous lecture. Umph, they try, but I think they are still in, I think it is certainly something that comes. Look, it is one thing to teach lecturers to do this, but they are not used to this. **They are used to sitting in class and to learn Chapters 1 to 5 and that's it**. To get them **to half come out of this mode, is not so easy**. So, **you must exert some pressure on them so that they realise that you will not necessarily ask the fact, but ask the connections, and they must see the point.** I: So I hear that, in order to half teach and lead them, it is asked in this way and so?	

L1: Yes. I: Their reaction thereto? Are they willing to participate? L1: I think they are. Look, early in the semester, but whatever we have to because the semester is not young. It's as if they are starting to realise. The only problem is that, because they get lectures from **different lecturers**, each one with his **own way of approach, I** do not think that all of them place so much emphasis on this. So, I think that, to a large extent, they are taught in that traditional, you know, learn the fact in chapter 2 and this has nothing to do with chapter 5 kind of methods.	
I: Elaborate on **students' engagement** and communication with you in class and in your office. L1: I think that they must also thaw a little. I think that in the beginning they look at you with such big eyes. I: Feel intimidated? L1: Yes, perhaps. I do not know precisely what it is. I think that they are **slightly afraid to be put on the spot, but one has to sometimes.** If you ask a question and you get no reaction, then you simply pinpoint someone. This is a **little difficult with the large classes**. I must acknowledge that **I tend to work in the first half of the class and those backbenchers can sometimes disappear slightly in the mass.** I: Their communication at the office? L1: **Not now, but as soon as the first semester test comes out, yes.** What I will do this year, because legislation no longer allows us to place tests in pigeonholes. In the past, I always **kept back the tests of those who obtained 45 and they had to come and fetch them from me to hear what the problem is.** Just to know that I see you and you must work slightly harder. Sometimes there is a crisis or something, then I can help. So, this year, **I will keep all the tests and they can come and fetch them from me and hear from them how they experienced the test** and usually you know from then on that you do not see so much of those who do well, but to those who struggle, I say come let me help you and I explain again and then it is as if they realise that they must now make a plan. There is always a **small group that comes, not everyone**. I: And **after a lecture, will they come and ask?** L1: **There are usually 2 or 3 or a few that come and ask.** They did not come this morning. I think they suffered from bomb shock (laugh), but there are usually a few who come and ask. Out of a class of about 150, only 5 would come, it is not a terrible percentage. I: Do they send **e-mails** to make appointments? L1: Look, they must if they want to come and see me because I am many times busy on the floor below or in the labs. I do not have specific hours. **Up to now, they have not really**. I think there was one who came, but it is still early in the semester. It starts to become more frequent usually after the semester test.	**Student's engagement and communication:** Slightly afraid to be put on the spot, but one has to sometimes. Difficult with the large classes. A few ask questions after class small percentage. Backbenchers can sometimes disappear slightly in the mass. Not now at office, but as soon as the first semester test comes out, yes. Kept back the tests of those who obtained 45 and they had to come and fetch them from me to hear what the problem is. Legislation- I will keep all the tests and they can come and fetch them from me and hear from them how they experienced the test. After a lecture – 2-3 come and ask usually. Email – not up till now. Do not make appointments.
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L1: The second year's first semester is still introductory microbiology. This is now more in depth, but **still basic principles**. So, in the **second year, we do not focus on stuff which they must apply**, **this is more for the third year**. So, here they must know basic metabolic paths and that kind of **stuff which they may one day use when they must manage a process or something in industrial microbiology**. I do not think that it is totally clear to them at this stage. In microbiology and in many of the **biological stuff, there are about two approaches, where you first learn the basic stuff which we do and then the application**. With the other approach, you take it from the other side and first show them what fabulous things you can make and then you figure why he does it and then from the other side. So, **we are more from the basic side to the applied side**. Umph, I do try certain stuff. This week we talked about photosynthesis, bacteria that photosynthise and so on, and they must be able to perceive that this plays a very important ecological role. Then **I try to link it** to stuff such as you must breathe, and if it was not up to them, you cannot breathe. I also think as they now beginning, that they have built such an ecosystem where bacteria will start to grow over the entire	**Relevance and usefulness of the module:** Second year, we do not focus on stuff which they must apply, this is more for the third year. Try to link the work with every day life. We are more from the basic side to the applied side.

semester. So, they must **observe it** weekly and take notes, then some of the bacteria we discussed will emerge and they will see it. **They enjoy this as this is not something that is only in a book.** They get slightly excited about the matter. I: Compare your perceptions with those students may possibly have regarding the module and its relevance. L1: At this stage, they do not actually think that it is an application, I think because they must still learn the basics. I: How do you think they will experience this at the end of the semester? L1: No, then I think that it will be more of a concrete thing for them, but at this stage it is still theory. I: I just want to hear about the **students' motivation**. You mentioned earlier that if it does not come from within, how do you experience them? L1: There is just a spectrum. Those who want to, will and those who do not want to, will not. Today I asked them how it goes in the second semester. Quite a few of them said it is better than the first semester and enjoy it, more and more enthusiastic about it. Another group did not enjoy anything. **You can lead a horse to water, but you can't make it drink.**	Obseravtions – they like not only see it in books. Motivation - Those who want to, will and those who do not want to, will not.
I: Is there **anything** you wish to add that always stands out with BSc students or something that must be addressed? L1: One matter over which there is much talk and I think one can say it is so throughout the campus. Uch has been said about **UFS 101 and as it is, it is a total waste of time, in my opinion.** I can understand why they wanted to do it, but you can put other things in that course that will be of more value to students. The so-called "**soft skills" such as time planning, how do you learn, study methods**. Much of this stuff they do on the South campus. We have **experienced that South campus students do far much better than these who only just made it.** I: The bridging course? L1: Yes, **after the bridging course**, because they learned such kind of stuff. It is those student who were just too good not to go to the South campus who struggle. So, they must actually place that type of stuff in that 101 and the time they spend on students must be something they can actually use. This is my modest opinion on the matter. I: I want to hear another thing: look, I lecture in, for example, Physiology. Do you, for example, know what we do in our syllabus or is there coordination? L1: **No, even within a subject group. We think we know what the person next door lectured on, but we are not quite certain about it.** You can check the yearbook, but what we will do now, for example, **as department is that we want to take all the programmes and make like a "mind map" so that they can see, look here we are and this fits in as such**. Just to slightly orientate ourselves and the students as to why I muat do Chemistry 1 if I want to do Physiology. This is a gap and if this happens on one subject group, I don't know about the others. No, I don't know what goes on in the others. **This is also a problem, because one would ideally like them to be able to make those connections with other subjects.** I know that some of my students take genetics. I did Genetics and I have thus an idea of what they do. So, if I know that there is a concept in Genetics which they should have, I refer to it. I have no idea what they, for example, teach in Physiology or Biochemistry. I: Thank you very much.	Experienced that South campus students (after the bridging course) far much better than these who only just made it. Add: UFS 101 and as it is, it is a total waste of time, in my opinion. Liaison: No, even within a subject group. We think we know what the person next door lectured on, but we are not quite certain about it. This is also a problem, because one would ideally like them to be able to make those connections with other subjects.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 2

Questions and answers **Demographic data** **Lecturer 2(L2); Interviewer (I)** **22min 15sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L2:8 years	8 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. 2:No	
I: Which subject(s) / module(s) do you teach? L2: Behavioral genetics third year (Program Director)	Program Director
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term self-efficacy? L2: Yes hmm. I: Your understanding of it? L2: My understanding is that a **student must work at his own speed and motivate themselves** and keep themselves motivated throughout the semester. From my perspective as lecturer I expect them to keep their motivation and **be dedicated to their studies and that they must be effective**. Although **my experience is that students aren't always effective**. Hmm I think many of the problems stems from credit bearing. The first year they are very busy and their time is being taken up by their studies and then suddenly in their **second year there is a drastic decrease in the amount of classes and they have a lot of free time and somewhere in that process they lose that drive.** It is like when they are busy they keep busy and suddenly when they are not that busy anymore they. I: **The more you have to do, the more you can do.** L2: There you go, exactly that…..	**Self-efficacy:** My experience is that students aren't always effective. Second year there is a drastic decrease in the amount of classes and they have a lot of free time and somewhere in that process they lose that drive.
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L2: Hmm in the class setup there are always those **small groups of students whom are absolutely fantastic**, brilliant students; **they work a lot on their own**. The **majority of students are off course like the "bell shaped curve" you must constantly keep them going and engaged and then unfortunately a large group who does not attend classes, they are just not "present".** They come to class but do not pay attention. I: Almost like a "non-care" attitude? L2: Yes most of the time **students that repeat or have some other modules outstanding.** Yes I know the faces (laughing).	Majority of students are off course like the "bell shaped curve" you must constantly keep them going and engaged and then unfortunately a large group who does not attend classes- small groups of students whom are absolutely fantastic.
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L2: I must speak from my own view. I often say if I must think back to be undergraduate, I can count on my one hand how many times I went to a lecturer's office and then in the same breath **I can say how many students come to my office on**	**Lecturer's impact:**

a daily basis with stuff. **Then it is not only about the module I present, but about everything. And not only that, also very arrogant**. It really **makes me angry**. I always said that "back in the days" 'a lecturer is there to say to you, this is the standard. I must strive to achieve that. I must do everything in my ability. A lecturer is sort off, you can't touch them, you respect them. That is how I feel it must be, **but it feels as if those roles have changed totally.** If I must now think, the first year that I was lecturing, I almost did the minimum. In today's time, I give them the **voice recordings,** I have a **Facebook group** to keep them involved. I must present **extra classes** just to get those striders in my class involved. I: Where do you think that comes in that things changed so much over the years? L2: I think it is, one of the things that the **classes are so big** hmmm, many students just get lost in class. If I think back to when I was undergraduate, third year Genetics, I think we were maximum 30, 40 in the class whereas this year I had **150 in class**. That is ridiculous. **The moment something gets a bit more exclusive, and then you see students start working harder**. With genetics, we **try to accommodate as many students possible**, and then unfortunately **students are there without any enthusiasm.** I: Do you think it is a good or a bad thing, what about standards if you only try to accommodate? L2: **Not accommodating to pass them, but accommodating the class size**. We just always take more and more, and the class bigger, because the throughput decreases. But we must get the students in somewhere. **We are being told that we have to take so many students in for first year and so many goes to the second year.** What do we do with them in the third year? We cannot keep on limiting classes. **Other disciplines do limit because they don't have big enough laboratories**, or whatever reason and then those guys get pushed into us. Then we sit **with enormous classes and students that do not necessarily want to be in class. They just sit there to finish their degree and that causes the students to lose their enthusiasm for the qualification.** 'Another big problem is in **our department specifically, there are many young lecturers**. I: Unexperienced? L2: Not necessarily, **but the students do not respect them**. The small difference in age- I now think back to when I started, I was 23 and if I must reverse it I will also think " oh really what can you teach me?" But the students should not see it like that. I would not have been appointed if I couldn't do it but we all go through that process of how to lecture and and and. They must rather see it as this young lecturer will remember how it was to be a student. They can give you more perspective and they are **more adaptable to technology.** I: If you say you are being told there should be so many in class, who tells you so? L2: Dean's office. I: And maybe that comes from the government? L2:Mmm. Unfortunately we are being told so many first years are taken in. So we start in the beginning of the year as from registration to fill those numbers if that means late applications or decreasing entry requirements or to make a gap to get students in. We must try to fill that class. It is not really a good thing.	I can say how many students come to my office on a daily basis with stuff –about everything and arrogant. Makes me angry -roles have changed – students. Today - I give them the voice recordings, I have a Facebook group to keep them involved. I must present extra classes just to get those striders in my class involved. Reason? Classes are big (150) – problem. Try to accommodate as many students possible. Students are there without any enthusiasm. We are being told we take so many students first year and so many goes to the second year – Dean's office. Another problem - many young lecturers- but the students do not respect them.
I: **Please explain / elaborate on your teaching strategies?** L2: I am a big advocate **to not always continue lecturing**. I: Not to talk? L2: Yes I try to prepare my **lecture for 20minutes and then I include interesting stuff in-between.** So when I discuss a specific genetic mechanism, then **I try to discuss it in a more relatable way as well.** So I search for an example which I think students may know of and work that into the lecture **or tell them a story so that they laugh or are shocked**. I find that if I do it like that, they connect it to something different. Then I also have my "**voice recordings**" which I post on	Teaching strategies: 20min lecture Facebook Tag Top 10 Tell them a story Voice recordings Ted talks Pot cast

Blackboard. I am not a big fan thereof. Then my last strategy which works well is "**Facebook"**. I have Facebook group for the third years and use it to post interesting stuff. I: Over and above Blackboard? L2: Over and above Blackboard. I am not a big fan of Blackboard because when you need it most, it doesn't work (laughing) so I communicate on Facebook. When I saw an interesting "**pot cast" or "TED talks",** even if it does not concern Genetics, but science or "imaging" or whatever and I think this made me think then I **share** it on the group. Hmmm something else that I do. I: Sorry to interrupt but do you find that they make use of it? L2: Yes many times I have seen that they link a conversation to it and discuss ethical issues, or if any controversy is linked to it especially if it is something that we are not used to like twins, one with a white skin color and one with a black skin color, and immediately they discuss but how is this possible? It starts with a political issue, but then becomes science of how something like does that happen and what is the genetics mechanism involved? So if they **write semester test and I have marked it I will post the top 10 and tag** them. So I find with the science students who usually were the top achievers at school, to be very "**competitive**" and they like the acknowledgement. So I find to list the top 10 and to say this was the **class average and the standard deviation** above the average that motivates the students. I: I hear you talk about technology. Would you say it is important to stay updated with times and technology? L2: It keeps them involved. Students like for example to go to an "**app" "class jojo"** or something alike which you can download on a phone and the entire class can be involved immediately. I like to get students involved like that, because many times students find they need something extra and then they have such a platform which they can use. Rather than sitting in a class without such a platform.	Use possible app
I: **What is your opinion of interactive classes?** L2: Hmm like getting them involved? Group work type classes? I: Group work, asking questions, triggering discussions through TED for example. L2: Absolutely. I also tell students in the beginning of the year, if you have a question, stop me right there and then. I promise you there is 10 other students with the same question, there no such thing as a stupid question. I would also often in class if I feel it is a question which needed more discussion, I would instead of just asking the question, I would ask and what do you think about that? And then I would **ask someone** else and what do you think about that? Just to get that **discussion,** because many times they ask a pertinent question and we as lecturers often miss those small things which they pick up. I: Feedback from them. L2:Yes	**Interactive classes:** Ask questions Discussions
I: Elaborate on students' engagement and communication with you in class and in your office. L2: It is actually very interesting. **Afrikaans students are quiet. It is very difficult to trigger them to ask questions.** I think it has to do much more with culture than with participation in class. **English class asks many questions** and one wonders if it is because they don't understand or just to say something. I don't mind anyway, they can ask questions. I: At least it starts something. L2: Yes it interrupts the lecturing a bit and just gets them engaged again. I: And would they come after class to you in front or come to your office with questions? L2: Our classes are usually here in the same building. Like I've said I usually present for 20 minutes, then I include small class things. I usually try to finish at about 10 or 5 to. So a **5-10 minute gap for questions if they want to ask there in class.** I know many students don't want to come to your office, so I create that opportunity for them. Although because I am program director, I find students are much more willing to come to my office and **I try to keep the door open to them,** that whenever	**Students' engagement and communication:** Afrikaans students are quiet. English students ask many questions. 5-10minute gap for questions if they want to ask there in class.

there is a real problem, they can come to me. I often say to students if you don't understand your work, don't ask your friend in class, because they will most probably help you wrongly. So I try to keep that door open, and also if any more serious problems arise. **Many students come to me with psychological or emotional problems**. So I like it if there is at least one lecturer in the department with accessibility.	Many students come to me with psychological or emotional problems (support).
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L2 :(Laugh) I spoke this morning with my boss about this. I was at a congress last week. A human genetics congress. In general I am very worried that Genetics, hmmm we train students, Human genetics and **then they won't find a job one day because we are not a first world country and medical illnesses, it receives attention, but not necessarily the genetic tests of those illnesses**. It is being **viewed as cosmetic and medical aids don't fund that**, for the testing, but I have seen that more companies are busy with research in South African populations because we are totally under presented. Last week for example they spoke about colon cancer and breast cancer and the panels they used to screen for it because there is so little research done. If a Sotho person wants to go for a colon screening for example, then they must screen for polymorphisms, because they don't know which panels are population specific. For breast cancer they now have a Sotho one, Indian Lady, but for instance they don't have one for Zulu or Xhosa. So there is a **lot of research on that development nowadays, so I see it is something that is increasing**. I: Do you look at those things in the module? L2: Yes so that is the one side, and the next thing that we look at is for example pharmacokinetics, specialized medication. We at the department is busy looking at the efficiency of medication for psychological disorders for example schizophrenia and bipolar. So there **are definitely job opportunities**. Paraxel also look at **pharmacokinetics** and many of our students go and work there and the last aspect that we look at is "Genetic counseling" which we know is very much under presented and actually very needed, because we don't have the support needed to interpret the results from the screening and to understand it. Hmm so that is also an aspect that we look at and which is increasing in our country. I: Compare your perceptions with those students may possible have regarding the module and its relevance. L2: **Many students see my module as very difficult because it is an integration of many different modules, there** is not only genetics in there, but a bit of Psychology, a bit of Physiology, there are many different aspects to be integrated which are necessary for research. Hmm **I think one of the main things I teach them is to think**. It is not only about checklists A B C D E. You don't only need to memorize it. You must be able to see point A connects with 3 and that is what it possibly can give us, but what happens if point 3 changes to point 4? So what does that gives us then? So I try to teach them to reason and think. I: The natural sciences students with the many modules. Do you know what they do in Physiology or in Biochemistry so that one can bring it all together and more focused for the modules to support each other***? (Liaison)*** L2:Hmm **I specifically go and look at different modules** and what it entails apart from what I self did during undergraduate and **I try to see where it can connect** and I go back to the program director side, because I have to be able to explain to students where genetics and Microbiology gets together. How does it work? So I make a point of it, but I can't say all my colleagues or the other departments, but I try as far as possible. I: So you do a lot of effort with that. There is **no communication platform** available? L2:No I: Do you feel that short? L2: Yes. If I think back we are now already 7 years busy with the programmes and we said in the **beginning we have a programme director meeting four times a year** and **then we talked and every program director knew exactly**	**Relevance and usefulness of the module:** I am very worried that Genetics, Human genetics and then they won't find a job one day…but A lot of research on that development nowadays, so I see it is something that is increasing. I think one of the main things I teach them is to think. A need for better communication platform. Too much administration to do.

what was going on in each programme and hmmm how the programmes slot into each other. So I knew how Plant sciences slot into Genetics and where Genetics connects with Biochemistry. Why can't Plant sciences and Physiology not be taken with Genetics? Hmmm that combination does not make sense, why. Hmm **I think we last had a program meeting, 3 years ago where we spoke about programmes and what it entails. There is just no time**. **With all the administration we need to do, there is just not time.** We are now through recirculation, we are through codes that changed, codes changed again and again. Now they change People Soft for registration and it is just these long lists of administration which we must do, so there is just not time. Hmm which is a **disservice for students**. I:Thank you very much	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 3

Questions and answers **Demographic data** **Lecturer 3 (L3); Interviewer (I)** **15min 37sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L3: Since 2007, so 10 years.	10 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L3: Yes I: At other universities? L3: Not in this formal context, previously just helping with tutorials. I: While you were here? L3: No I was at the University of Pretoria. I: Just after you postgraduate studies? L3: Then I came here. I: So you were helping students like an assistant? L3: Yes. He first formal teaching was here.	
I: Which subject(s) / module(s) do you teach? L3: Genetics initially 3rd year, then 2nd year and now I am back at 3rd year.	Genetics
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student self-efficacy? L3: No I: What is your understanding of the term student self-efficacy? L3: Hmm I would **think it is students managing the things they are supposed to do** at the times they are supposed to do it and overall **become efficient in terms of doing that**. That is my thinking of the term.	Self-efficacy: think it is students managing the things they are supposed to do
I: How do you experience ***self-efficacy*** in Natural Sciences students whom you teach**?** L3: Should I go on with the definition that I think it is? I: Yes do you think they are efficient and use whatever is available in class to learn? How do they use their time? L3: Hmm **not as efficient as they could** I guess because you will always hear students complaining it is a lot of work, very little time. So I guess there is always room for improvement. If I may put it down to a number I would say **their efficiency is 70%.** So in terms of participating in my modules their efficiency in terms of **dedicating their study time I would estimate it to be 60-70%.** Yes I: Do you experience some of the students to be very efficient and just totally not? L3: But if you just imagine a **binomial distribution those that will be very efficient will be the top 5% of the class and on the other hand may be 10% the low end that are not so efficient.**	Not as efficient as they could. Efficiency =70% Binomial distribution those that will be very efficient will be the top 5% of the class and on the other hand may be 10% the low end that are not so efficient.

I: How do you see the role of a lecturer? Can the ***lecturer impact*** on students' academic performance? L3: I think I have an impact on the students' academic performance otherwise I wouldn't be here. **I try to apply as much relevance to the practical world when I present my modules** and some in fact the majority of them show some interest because that is pretty much where they hope to see themselves in the future and I always **encourage them** one of the formulas I came across when I attended some of the conferences and is the so called **PASE equation or formula** which simply says through **performance** is determined by the **effort t**hey put in the **support they get from me and** their **attitude.** So I always tell them the support is in the middle, you must put in the effort and get your attitude right and you will pass. I: But you have to guide them there. L3: **I have to guide them there but the support is in different ways.** Lecture notes that is the beginning of the support, helping them with whatever questions they might have not only during class but even beyond lecture times and all sorts of things	**Impact of lecturer:** PASE formula: Performance, attitude, support, effort. Try to apply as much relevance. I have to guide them there but the support is in different ways.
I: Please explain / elaborate on your teaching strategies? L3: Hmm one of the **most effective ways** I have started from a few years back is **after a few slides I throw in a question in the form of multiple choice and normally using a voting system**. I know there is now fancier ways of voting electronically but I don't have that. So it will be just by **show of hands** and then we discuss why the right answer is the right answer. Alternatively it will be calculation of some sort and give them some time to solve it and then I **demonstrate on the board**. So that is pretty much how I do it and to make sure that they are still awake and listening. I: Do you use some technology? L3: Yes **Blackboard.** I: **Tests or study material**? L3: Both of that, the module I am teaching now it's a computer based in terms of the practical work that we do and they spend a lot of time hmm yeah. I: Do you see a difference between the computer based and the more formal lecture? L3: Hmm I think so yeah. I: Are they more involved? L3: Yeah the **current generation is more IT savvy** than we use to be back in the days so they prefer something in front of them where they type. I: Do you think you have to keep up with the technology? L3: Definitely I think with the class tests is where we can do it effectively now. The class tests are all on Blackboard and they write pretty much one every month and the semester test and every second or third week they have something to be assessed as well.	Teaching strategies: Most effective - after a few slides I throw in a question in the form of multiple choice and normally using a voting system. demonstrate on the board. current generation is more IT savvy. Blackboard - Tests or study material.
I: What is your opinion of interactive classes? L3: We do that in my lectures but maybe we can improve I would say **during the lecture there will be three or four interactions.** **I: Like what?** L3: Like the **scenarios** I have mentioned. **Questions** where we discuss answers and stuff like that.	Interactive classes: One lecture = 3-4 interactions. Questions where we discuss answers
I: Elaborate on ***students' engagement*** and communication with you in class and in your office. L: I always encourage to ask questions and be open. Again if you go back to the 5% of the 5% that will be interested and that will ask but at the same time you have to consider the fact that students are individuals and they differ. **So some of them may not have the courage to ask me during class but immediately after class they do come**. I always have someone come to me and ask a question or clarify a concept that we just did. I: How do you handle the Afrikaans students? You just teach in English.	students' engagement: some -not have the courage to ask me during class but immediately after class they do come. 250 in a class and only 20% were in the Afrikaans class and then the remaining in the English class. Open door policy -they do come

L3: In the past the department would appoint someone to give the Afrikaans classes. I will still draft the notes in English and give to the person assisting me and the person will translate it into Afrikaans and present the classes. I: So you just have experience of the English classes? L3: Then when the current module started in 2015 we then apply to the faculty to get permission to have it in an English only module. I: How do you experience the Afrikaans and the English? Do they have the same way of communication? L3: I don't notice hmm from my colleagues who helped me with the classes before. They **would tell me that students in the Afrikaans class are usually quieter than the ones in the English classes**. But it is in my view down to numbers because the third year modules that I presented was one of those general modules which was not attended by only Genetics but by Microbiology and Biochemistry and whatever even Physiology. So he classes were big, **250 in a class and only 20% were in the Afrikaans class and then the remaining in the English class so just purely based on numbers you have more people asking questions in the English class than in the Afrikaans class.** I: The communication in your office? Do they often come here and ask questions. L3: **Open door policy**. As long as I am in the office they are more than welcome to come and **they do come.**	
I: Give your perception regarding the relevance and usefulness of the module content that you teach. Lecturer 3: Hmm in the **world of Genetics, the contents is pretty much the future** in the sense that people are sequencing genomes left right and center and once you sequence a genome you should be able to analyze the data. That's what my module is about. I am giving them the sort of introduction to analyze human data once the sequencing is determined. **It is very much the future**. I: Compare your perceptions with those students may possible have regarding the module and its relevance. L3: Hmm I am hoping so but I cannot really say so but hoping so. I mean the book that we are using tends to stick that point a lot of sequencing genomes and obvious when you sequence genomes you should be able to analyze the data. So I mean that's why I am saying that. I am hoping and if we think about if I may use an example. There is a field called Pharmacokinetics where the idea is to when someone go the hospital of an illness, nurses and doctors will draw blood and do a DNA profiling and sort of study or exercise and dispense medication based on the patients DNA profile. So that's the way to go. I: How do you experience the ***students' motivation*** for their studies? L3: Again it's different for different students. You do have **some that you can see is really motivated and some that are not motivated.** In my experience it's really easy to spot already after the second class test and first semester test you can already start seeing who are serious and who are not. I: What do you think contribute to that motivation? L3: Hmm it depends. So those who are motivated what motivates them? **I am not sure but I guess the desire to achieve and complete what they came here to do.** That's only what I can think of. I: And those that are not motivated? L3: **Personal problems** and some that are **not really interested** in this study may be they wanted to do something else and are here to settle for second best and not enjoying second best. I mean for me it's just the drive to go through this whole process and for the most students as presented last week on the faculty board meeting you do **get 70% or so students are first generation students.** So they are the first ones in their family to study and things like that. It's a lot of possibilities. I: Thank you	Relevance and usefulness: world of Genetics, the contents is pretty much the future Motivation: some that you can see is really motivated and some that are not motivated. I am not sure but I guess the desire to achieve and complete what they came here to do. not motivated? - Personal problems and some that are not really interested 70% or so students are first generation students

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 4

Questions and answers **Demographic data** **Lecturer 4 (L4); Interviewer (I)** **33min 43sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L4: 9 years	9 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L4: Not lectured, but as postgraduate student I was a demi or tutor for 3 years at the University of Pretoria.	Plus tutor 3 years
I: Which subject(s) / module(s) do you teach? L4: Physiology 2nd and 3rd year BSc students. My areas which I am responsible for is cardiovascular physiology (3rd years) nervous physiology and endocrinology (2nd years), hematology, immunology and protein metabolism (3rd years) and the adjustment of the human body to its environment.	Physiology
Self-efficacy questions: I:I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** What is your understanding of the term student self-efficacy? L4: I haven't heard of the specific term, but the **concept as I understand it is that students should at some stage determine and measure their own level of efficacy and follow up** hmmm **basically themselves evaluate with regards to their goals if** they can reach it or strive towards it and **if they use the right methods and techniques for the module** which they are busy with.	Self-efficacy: concept as I understand it is that students should at some stage determine and measure their own level of efficacy and follow up
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L4:Yes unfortunately only a **limited number.** I: Percentage wise? L4: Hmm the **percentage gets more from the 2nd year to the 3rd year**. Especially in the 2nd year where there were more than 100 students in the first semester and with basic concepts they do not get it, and there are under the larger group of them, few that realise I do not understand this basic concept and must ask a question on it in class to understand better or I must speak to the lecturer about this, even after I have invited them. So in terms of a **percentage of self-efficacy which I refer to very very low.** I: In the second year specifically? L4: Hmm I would say about **30% which really know and do it accurately**. It is from class interactions where many questions are asked or where they contact me outside of class per email or to make an appointment and then she wants to discuss specific themes or ask they do not understand how to approach Physiology and how to prepare for class tests or semester tests, but then again in the 2nd year it is a much smaller group. I: And in the 3rd year?	limited I think figures of self-efficacy if 2nd years and 3rd years compare well and that the motivated students are self-efficient and unfortunately the reverse is also true. percentage of self-efficacy which I refer to very very low 2nd years -30% which really know and do it accurately 3rd year the self-efficacy is much greater -even say more than 60%.

L4: In the **3rd year the self-efficacy is much greater.** I don't know what to account it for, but it is more than 50% and I would **even say more than 60%.** I: Is the class size bigger or smaller than the 2nd years? L4: The 2nd years is on average smaller and for the last 3-4 years **the 3rd years are just more than 30 students, which is significantly less as the 2nd years, but percentage wise their self-efficacy is greater**. There are much more interaction in lectures, more questions are being asked. Hmmm I don't know what to account it for, if the students maybe became more comfortable with me as lecturer and the way of transfer from my side which they understand more, everything easier understand, but definitely the **awareness and efficacy number grows,** even though it is a smaller group, the percentage grows.	
I: How do you see the role of a lecturer? Can the ***lecturer impact*** on students' academic performance? L4: Hmm definitely, I think without students it would be much more difficult for most of the students to get the basic stuff and I will again use the example which I use earlier about the **basic terminology** and so. A prerequisite for our students is that they must complete the Biology on first year level before they can 'take the Physiology in their 2rd year with us. And simple definitions like "what is a neuron" or "synaptic transfer" or "neurotransmitter" lack. Hmm and for myself **as lecturer I find that it is really a principle of lay a foundation, teach the students how to approach Physiology** and look at what are the principles oppose to only coming up with answers**. Go look for a solution**, I think that is something that happened a lot this year. Many of the students study only to put an answer on paper, and my experience **as lecturer is to rather teach them to solve a problem.** I don't know what is happening here, so I must find a solution/plan/theory on how I will do this part of the work which I don't understand or get the principle so that I can make it understandable for myself. I think it is **important for a student to transfer those discipline knowledge (knowledge about your subject), so that a student understands.** I: You speak of basic knowledge that lacks. Would you say it is with everyone or the percentage which you said efficacy or do better? L4: Hmm my perception has to do with **many students which I perceive self-efficient do not have any problems. It is however the larger group who are not self-efficient and struggle with the problem.** L4: I would often ask students when I have just discussed a concept with them, e.g. In the 2nd year group we do learning and memory, then I will **test the concept of how a short-term thought can become a long-term thought** and I use the principle of pain. **Then it is as if the students are unable to put themselves in the position to think** "what will happen if I put my finger on a thumb tack", why will I remember that? So **they can't or those that are not self-efficient, they can't make that everyday simple connotation with an example**, even though I give the example and try to discuss the example with them of what they experienced for example when they pushed on a thumb tack, or their hand on a hot plate, there are not good feedback from the group without self-efficacy. And I don't know if it **maybe is due to personality differences that I may intimidate them, and if it maybe only an intellectual thing.** So I cannot see or identify it accurately. It is only my perception. I: Even though you cannot identify it, would you say it lies on a level of lack of reasoning ability or exposure? L4: I rather think **lack of exposure,** even though the examples I use are very simple like the hand on the hot plate. Anyone has had that experience. So I think it is more with specific examples, (I just want to use my words right) hmm the little experience maybe, but like I've said because I use simple examples , I think it **has to do more with reasoning**, I think it is more a **reasoning problem**. I think many students only study to put a fact on paper, just to memorize something and not to come up with a solution.	Impact of lecturer: as lecturer is to rather teach them to solve a problem. important for a student to transfer knowledge about your subject - that a student understands many students which I perceive self-efficient do not have any problems Large group – not self-efficient, struggle. Difficult to think and make connotations with everyday experiences. (Theory to practice is difficult). Maybe is due to personality differences that I may intimidate them, and if it maybe only an intellectual thing. Lack of exposure/ has to do more with reasoning.

I**:** Please explain / elaborate on your ***teaching strategies?*** L4: Good simply it is the **textbook sketches** which we use. I make a very short summary of the information in the textbook and put in on **powerpoint slides** which are on a screen. I: Very visual? L4: Yes it is not only the diagram. I make **provision for left and right brain orientated.** Hmmm so on a slide there is a diagram and a summarize text, except if the diagram is too detailed, then I will alternate the 2 slides. Something that I started using this year is the **links to YouTube videos**, another visual or insight on the information and off course I go through this information before I add it. Others **with students that come to see me I use a paper where I make illustrations on my desk** and that **works well** with the students I have interaction with. There are no animations on my slide, because I don't want to try and impress the students and my time is relatively limited, because if things move and I am busy talking then some students' attention can't handle it well. So I **prefer to rather have a calm focused learning environment** where the **attention is unfortunately on me and depending on how I talk to them and how I visualize the information to connect with the information and to transfer it in such a way to them.** I: What do you think of the use of technology and the current time? L4: I am very much for **technology i**f students want to use it as **additional study resource hmm it is necessary** like I've said earlier, **many of the students don't even know the basic concepts and then to make use of advanced technology for me is risky**. I do however think that the technology for students that want to become more self-efficient, outside of lecturing time should have access and that it must be in line with what the lecturer is doing. We were just last year at a focus group at the department of education where we spoke about something like this that technology has its place, but the **human interaction has a big component in education.**	Teaching strategies: Textbook sketches, Powerpoint slides, Links to YouTube videos, students that come to see me I use a paper where I make illustrations on my desk. Prefer to rather have a calm focused learning environment. Attention is on me. Technology if students want to use it as additional study resource hmm it is necessary. Human interaction has a big component in education.
I: What is your opinion of ***interactive classes?*** L4: I like the idea of interactive classes. I am myself a very interactive person and the value thereof, despite that I as lecturer am very visual, so the value of an interactive class I can see. That's why I try when I lecture that students don't give me an answer, but **I ask which examples are applicable to their own lives**. So I **try without technology to have interaction through asking questions and creating scenarios** "have someone ever put their hand on a hot plate" "have someone ever scratched their knee on a cricket field?" So I try to get students from the academic to their everyday lives with leading questions and examples and scenarios which I create myself. I think the visuals make it easier for the students that are left brain orientated. Those who are right brain orientated can associate easier with my style where the left brain orientated students may use another electronic source.	Interactive classes: I ask which examples are applicable to their own lives. Try without technology to have interaction through asking questions and creating scenarios.
I: Elaborate on ***students' engagement*** and communication with you in class and in your office. L4:In me, as new lecturer want to make sure that the **first semester it seems as if there are much more questions**, in general with the 2nd and 3rd years. They are very curious and have not had previous access to me as lecturer. It is as if that **curiosity totally vanishes in the second semester.** I: What do you think is the reason? L4: I can't give a specific reason. I: Motivation maybe? L4: I am currently busy with the 3rd years and not even halfway through the 2nd semester. I think they might already be focused on what will happen if I get my degree? In their case **I think future stress or what is the next step hmmm something future or planning wise may work in with them.** I get the 2nd years only the 4-5 last weeks of the semester before the exam and I expect their attention will already be 'I am already preparing for exams' and	Student's engagement: First semester it seems as if there are more questions. Curiosity totally vanishes in the second semester. Reason -I think future stress or what is the next step, future or planning wise may work in with them (for motivation).. 3-4 individuals in each year group who ask questions frequently throughout the year. The rest would share an experience on the internet or something that happened with a friend. Make email appointments/ limited amount who come to ask about the work.

there is so little time that I need to share this information. They actually only want the class to finish to get to other study work. That is my suspicions; I can't say it 100%. I: In the class they will put up their hands and ask or do they rather come afterwards and ask? L4: The majority with questions would ask it at the end of class although there are usually **3-4 individuals in each year group who ask questions frequently throughout the year** and from the **rest would share an experience on the internet or something that happened with a friend** and their experience thereof. Most of the academic questions come from the lecturing orientation. I: And communication in the office or do they send an email? L4: When I started working here, I had an open door policy that they can come and speak to me anytime, but that unfortunately affected my work efficiency and with experience **I've learned to rather have scheduled times for students** and to teach them professionalism. When I see them in the beginning of the year I say here is my email address. **Send me an email with your question or if you want to come and speak to me** then I can schedule a time with you. I try to teach them in that way how to function when they are finished with university; there must be a professional approach. The last few years the amount of students that just come through your door has decreased, but I still have a lot of interaction and students that **email me for appointments** and questions about venues and I refer them back to the study guide, but it is a **limited amount who come to ask about the work.** With self-efficiency there is a small group that knows where they are supposed to be, what is expected of them, who have worked though the information in the study guide, what the majority is "sir what do I need to do now?' 'Sir the figure that we did, will it be in the test?" **So it not really academic more on the surface.**	
I: Give your perception regarding the ***relevance and usefulness of the module*** content that you teach. L4: Hmm why it is important the first semester for the 3rd years specifically, the cardio vascular physiology, I try to connect with blood pressure en blood pressure regulation and why it is important for a person to be healthy. **To work and think preventative with hypertension for their own lives** and also to share the information with their families. The neuro and endocrine with 2nd years sort of bring them into contact with how they work. In the 2nd year I don't try to expose them to research fields. Like there is a reason why they are hungry and must sleep at night and a reason why it is not good to study until 2am 3am in the mornings. It is things like melatonin, so I try to **bring the knowledge in contact with their worlds.** In the 3rd year second semester I try to teach them to reason what makes sense and what not. The academic information I still want to bring across, but I am **strongly focused that they must be able to test things against the truth** and not just take it for granted and there is a variety of scenarios which we use en things that are relevant like when Lance Armstrong was caught, how do they feel about it, etcetera. Does it make sense and it is ethical that he was caught out and also Prof Noakes' diet, do they know what it is all about? I: So except for their own health, do you think there is relevance for their own career one day? L4: Discipline wise, **depend on who goes further into a physiology direction**, definitely academic wise, but I know a **majority of our students does not have physiology as primary focus.** Most students here focus are on Genetics and Biochemistry and I think Forensic science and all 3 are explorative directions. **My hope is that the thinking which I teach them, they don't only use in the module, but also in the daily world.** I: How do your experience their motivation to study? L4: In general I get the feeling the majority wants to study and sometimes I ask them honestly 'who wants to study?". Then a **majority of the heads are nodding saying they don't want to study and prepare** and one can see it, I have previously often every 2 weeks, actually every week, I gave a very small class test, and although the class's	Relevance and usefulness: Valuable for their own health/ Academic - depend on who goes further into a physiology direction, a majority of our students does not have physiology as primary focus. Motivation: majority of the heads are nodding saying they don't want to study and prepare. Bad motivation – due to majority of students study because their parents couldn't study, and the pressure from the parents. Stress from outside from family or bursaries. I think figures of self-efficacy if 2nd years and 3rd years compare well and that the motivated students are self-efficient and unfortunately the reverse is also true. Liaison with Natural Sciences faculty? I am very positive about something like that, not only from an academic point of view, but also from a logistical point.

pass rate was good, the classes personality as tired. They only work for that and mark and I have started rather to transform the small class tests into tutorials with the same efficacy. I: To what do you think one can ascribe the **bad motivation** to? L4: I don't want to generalize, but I think the **majority of students study because their parents couldn't study, and the pressure from the parents "**I couldn't but you are so fortunate". Most students that contact me experience **stress from outside from family or bursaries**, they have received a bursary and that bursary... I think the **figures of self-efficacy if 2nd years and 3rd years compare well and that the motivated students are self-efficient and unfortunately the reverse is also true**. Those with low self-efficacy have little drive to study. Funny enough those who aren't self-motivated I can gather with class interactions, they sit there because they must, or someone told them to come. I: You now sit in the Faculty Health Sciences, but they are actually registered with Natural Science, and you give Physiology, but they have modules like Genetics and all the rest, do you know what they do in those modules? L4: I have a limited knowledge because I studied BSc myself. I ask the students as we go on, like the protein metabolism which we will do this year, while giving the lecture I will ask do you know of this. Have you done this in Biochemistry?" When I do muscle fibres with the 2nd years I ask how can Hussein Bolt or most people of Jamaica do good races or the Kenyans good long distances? Then I try at the end to link it with genetics and try to ask the students what they can explain to me? So I get my knowledge from what they are busy with in such a way. I: How is your feeling about a possible greater **liaison with Natural Sciences faculty?** L4: I am very **positive a**bout something like that, **not only from an academic point of view, but also from a logistical point,** our schedules for when they write tests, and the amount of students registered with them for other modules and the class clashes in our lecturing times. I would really want more liaisons with Natural Sciences especially with regards to the academic program. I: Anything that you maybe still want to add? L4: I don't know how relevant it is, **but I must mention that in the years that I've been working here in the last year there has been a great increase in the decrease** of the students' self-efficacy since the protests from last year's "fees must fall". I have received much more requests that the information must be available by now and why can't I give their papers now already? I: Greater demands? L4: Yes they are **much more established on their rights** and **"I want something now"** which weren't there in other years and students are aware there is a process and these are the steps to follow and the students that demands marks after an exam. Then it is the **exams they have failed and then they demand higher marks** and that haven't happened before. So that is the one thing that I noticed this year. I:Thank you very much	I must mention that in the years that I've been working here in the last year there has been a great increase in the decrease of the students' self-efficacy since the protests from last year's "fees must fall". Much more established on their rights and "I want something now" / Then it is the exams they have failed and then they demand higher marks.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 5

Questions and answers **Demographic data** **Lecturer 5 (L5); Interviewer (I)** **17min 24sec**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L5: It is 24 years now.
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L5: At first I was at the University of Limpopo, and now I am here since 2006, so it **is 11 years.**
I: Which subject(s) / module(s) do you teach? L5: I do 3rd years and Genetics Honours
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.
I: Have you heard about the term student ***self-efficacy?*** L5: Not really. No. I: What is your understanding of the term student self-efficacy? L5: I guess in terms of… this will sound funny but I am going to say **to take some work from my workload**, I would say the degree to which they do their own background and own reading work. If you think the **thought of moving away from the old situation where we only stand and lecture, to a situation where students are prepared.** I can't really say asking questions, but a higher level of discussion on the grounds of regained knowledge.
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L5: I must **say at this stage I am a bit frustrated.** Hmm if I look now, with us the situation is a bit more typical, where preparation is important where we have theoretical and practical classes and the thought is that you create the background in the theory and apply in the practical, and the class **attendance is actually very poor** this year and then students come to practical very **badly prepared.** I: Do you take register for attendance? L5: I take a random study throughout the year, but not every day, the numbers are too big.
I: How do you see the role of a lecturer? Can the lecturer ***impact*** on students' academic performance? 5: Sorry before we continue, do we speak of my pre-graduate or postgraduate students? I: Only pre-graduate L5: Because if we look at honours it looks a bit different. Just say again? I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L5: I would really want to think so yes. Hmm yes it is important for me that they must love the field, it is not always practical, but it is surely your starting point. I think you must do **more than your part in terms of professional performance in class**. I would say professional, you must really **come across as the expert in the field**. I always say if new lecturers start here, if you walk into class fiddling with your little notes, then you have already lost. You must be able to walk with empty hands and grab people's attention, but now it's a bit of topic. I do think you can have a big influence in terms of in my case, the **examples you use to really make it as applicable as possible for them.**
I: Please explain / elaborate on your ***teaching strategies?*** L5: This is again a good question, like everyone does ne? Good my module is very statistically orientated and one can **work through many problems, step by step and it is not just a lot of information which you present.**

I: The application?
L5: Application and you can make them feel good that they work with you through something and yes make the **application very clear.**
I: Do you then look at slides on the screen or the computer or how?
L5: Yes I use **powerpoint slides** for all my lectures and then every now and then **I will put in a blank slide** for them to work out something themselves and then go back to the **blank slide** en do it with them. It is surely something that we must do more often, but there is **not always enough time** to interrupt **that thought of the lecture and do a mini-tutorial and have them to work on their own.**
I: And the practicals?
L5: We still have the **practical reports**, so practicals start with a presentation where we "recap" the theory which we did in the previous 2 lectures and they get a problem which they work through in their own time and they must stay there until they are done.
I: And come to the conclusion themselves and submit the report?
L5:Yes
I: What do you think of the use of technology and these times with apps and this and that?
L5: Yes I coincidently showed them **an app last week which they can download** for some of the genetic problems and then we make use (maybe not enough) of **software.** 3 practicals for the 3rd years in the second semester, I book lab E and up to that stage they did the stats by hand and then for those 2 sessions I make them use the software.
I: Does it seem to resonate? Do they like it?
L5: Yes.

I: What is your opinion of ***interactive classes?***
L5: I like it a lot and it is very interesting I became the lecturer whom I didn't like when I was a student. We all sit in classes and do not like lecturers that ask questions and students are not always spontaneous to participate. I would actually, I won't say challenge them, **but I will for those that don't put up their hands, give them the opportunity to say something without feeling intimidated.** But I must say **if you have a good bond with your students there are always a few in class whom want to talk** and who surprise you with the things they come up with.
I: I want to hear, it is still Afrikaans and English classes at this stage, is there a difference between these groups? Is the one group more than the other?
L5: The English group is much bigger.
I: How is the interaction, do the groups differ?
L5: If I must make a rough generalization, I have to say there is **more interaction in the English group.** Not that there is not interaction in the Afrikaans group. **Maybe because the English group is larger and potentially more people who can speak. More spontaneous and open.**
I: What could one do to motivate more interaction? Is there a scope to elaborate on for interaction?
L5: I think it helps if you keep it as **close as possible to their frame of reference, because people do not speak if they don't know anything about it,** but if you speak of a Free State problem it is already closer to them.

I: Elaborate on ***students' engagement*** and communication with you in class and in your office.
L5: If you say communication, do you mean…
I: It links to the previous question are they willing to ask questions, are they open to questions. Do they do it in class or afterwards at the podium?
L5: Yes there always that **one or two that comes afterwards to the podium**. I would say they **ask few questions during class** which I don't evoke. So you can get something reasonably going if you lead, but cases who just stop you and say explain again, they are scarce. And in the office, that is quite noticeable, today's **students aren't scared to come to your office.**
I: And email communication?
L5: Yes the **closer to the exam the more emails.**

I: Give your perception regarding the **relevance and usefulness** of the module content that you teach.
L5: Yes I give Population genetics which I think is the center of genetics knowledge.

So I don't think you can have a qualification in Genetics without a good understanding of Population genetics. In terms **of application it purely depends on where they will end and for a group of them it will be applicable and for a group that will go into the practical setup, practical skills will be more important** than what they get from my module.
I: Compare your perceptions with those students may possible has regarding the module and its relevance.
L5: I think again it depends from their plans. So those sitting there with the thought of going into a professional career, I think they have it. I do think however that most of them have it.
I: And then I only want to hear your feeling about your experience of liaison with Faculty of Natural Sciences. Do you know what is going on there or is there an effort from the faculty that those that lecture Genetics know what is happening in Biochemistry and Physiology so that those things can be brought together to collaborate with those that lecture the modules.
L5: **I don't think there is enough of it.** I think where most of **that liaison happens is on the level of programme directors.** So at least they are a relatively small group to be focused and to be aware of what is going on. I think I am relatively aware of what is going on in other modules to the extent that it is things that my students also take.
I: Because of programme directors now, is there now some sort of communication so that one can know what is happening in other modules or should you find out yourself?
L5: In other departments? **You must find out yourself.**
I: So it is not standard that everyone know what everyone is doing and to work together?
L5:No
I: How do your feel about it? Do you experience it as a gap or not?
L5: I think it is something **people work on and then forget as things continue** – **every now and then there is a new focus direction which bring new combination of modules** and then I think people will do effort to put together a programme once and to be relatively sure of where they will get what exposure but I think **with time it was not maintained.**
I: How do you experience the students' **motivation** to study?
L5: Sometimes they **worry me in the beginning of the semester** and things really start slowly and you wonder in the beginning of the semester and then towards the **end of the semester there is actually a lot of seriousness shining through** and then the performance in the module is not that bad at the end of the day.
I: Do you think it is intrinsic motivation of really want to or are there external factors that drive them to study?
L5: One must be dead honest, it is **final year students that want to get their degree and I think that is a great motivator.** I would like to say they jumpstart because I inspired them and I think it may be true for a small group but one would not be able to say why.
I: ***Anything else*** from your side of something that can be addressed?
L5:Something that I discussed yesterday with someone and think about a lot for the last passed weeks, I think we are much **too old school** in terms of it has always been on the timetable, you have **a theory period and a practical period and I think that is obsolete. I would really like to see a situation whereby there is no distinction and I see students for long times and we would totally give the interpretation of now I lecture and now I stand back and now you work for half an hour and now we continue with class which we maybe not do it in the current model.**
I:Thank you very much

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 6

Questions and answers **Demographic data** **Lecturer 6 (L6); Interviewer (I)** **33min 58sek**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L6: I have been teaching them since 2015 January, 2 and a half years.	2½ years plus 11 years clinical teaching
I: Have you taught at other universities as well not only BSc but I know you come from a medical background. Please list these, as well as the duration at each institution. L6: Well I was in die clinical field since 2004 so we have been teaching students on a clinical basis, bedside teaching since 2004.	
I: Which subject(s) / module(s) do you teach? L6: Neuroscience for the BSc, third years.	Neuroscience
Self-efficacy questions: *I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.*	
I: Have you heard about the term student ***self-efficacy?*** L6: Hmm actually I can say it is the first time I am making contact with the term but I am sure it is described and spoken about but not term self-efficacy. I: What is your understanding of the term student self-efficacy? L6: I think it's got **to do with the students' initiative hmm to take responsibility for their studies on their own** and to have that drive and ambition to go and sit down or do something to **improve their learning by themselves**.	Self-efficacy: to do with the students' initiative hmm to take responsibility for their studies on their own
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L6: They were third years. I must say my expectations were a little bit higher hmm the **students have a very full programme**, I realize a very **few of them take time to prepare themselves for their classes** which **I feel is one component of self-efficacy, preparation ahead of time.** So the **participation in class is usually generally more about every life things** where they bring in their family members may be or problems with neuroscience they have come across. Less so the content of the work that they need to focus on, that should be assessed on. Because I could then see that they have not prepared themselves for the lecture. I: If you have to give a percentage for self-efficacy, are all of them the same or some high and some low self-efficacy? L6: Hmm when it **comes to the preparation part, very few it might be 2%** of the class that went and look at the text book to see the topic that they are busy with for the day. The **post lecture prep, I would say there is about 40% that go and prep themselves well in advance for the test.** You will see **they will come back to the next lecture with questions and then there are those who cram even on the same day of their test and that reflects clearly** in the way they answer the questions. **It reflects in how they answer their papers, not necessarily in how much they get for the paper**. Hmm sometimes you can see the student give an	Student self-efficacy: my expectations were a little bit higher. Students -very full programme. few of them take time to prepare themselves for their classes 2%. one component of self-efficacy- preparation ahead of time. Participation in class is usually generally more about every life things. Self-efficacy -Post lecture prep, I would say there is about 40% that go and prep themselves well in advance for the test- will come back to the next lecture with questions those who cram even on the same day of their test and that reflects clearly.

understanding of the work that is covered even though they don't give the specific answer of the question on the paper of which we don't really take that content into consideration. It takes a lot of time on the lecturer's side on marking a paper that has a set memorandum. **We don't ask so many long questions anymore because the time is quite limited. A longer question gives more a reflection of the insight and the preparation that has been done.** I: Do you think the students make a connection between cramming and getting 40% or 30%. Will they do it the next time again or do they learn from it? L6: I think (laughing) sometimes they see their marks and they will just tell themselves "I haven't prepared myself so that's why I didn't". **It's not necessarily that they learn from that**. Hmm and on our side it still takes some stimulation to tell them "**listen please go and have a look of what you didn't understand in the question hmm and revise that**. I mean the habit of if there is an important piece of work and they evaluate them on it and I see that they have not performed well in that section, I will repeat the opportunity for them to give me what they understand in a next test and I will make them aware of their mistake and even as we usually do discuss the memorandum of the test and if see the deficits go and recap on that work. The unfortunate thing is that there are some still students, **a large percentage of them that will not go back to that test that they did not do well hmm I am not sure if it is a type of avoidance on the students' side or not having time or just not caring.** It's as if when they write off a test, it's final. Once they get their mark it's final. **It's not seen as a learning opportunity.** I: I hear that you say you give them some opportunities to facilitate. L6: To facilitate their learning of the work.	Don't make a connection between cramming and getting 40% -don't learn from it. Lecturer still have to tell - listen please go and have a look of what you didn't understand in the question hmm and revise that. Large percentage -not go back to that test that they did not do well - not sure if it is a type of avoidance on the students' side or not having time or just not caring. Not seen as a learning opportunity.
I: How do you see the role of a lecturer? Can the ***lecturer impact*** on students' academic performance? L6: It takes a lot of **individualized attention** I must say and that is a big part and that is where I see that **there is an improvement**. Hmm it's almost as if, if you tell a student well "you late again today, you late again today, you late again today" it will be repetitive behavior. But as soon as you call that student in and say "you are late again today and you missing out on first section of the work every day and these are your marks and I can see it has an impact on that. So they **need to be made aware specifically of their wrong doings** or their behavior that is taking them of the track. Sometimes we don't know what the problem is but **some of the students need individualized attention and that is where I see the most impact.** As in call that student and we usually give **opportunity for the students to come and make appointments with us**. There are still a **very few students who will take that opportunity** and come and see me. I: Why do you think so? L6: I don't know what, there is a gap somewhere. **I don't know if it's some kind of a guilt students have because they didn't perform well in the test, a type of avoidant behavior** and there is something there I think we need to, t**here is a *gap* that we need to bridge. They need to reach the understanding that they are not here to write tests, they are not here to get a mark but they are here to learn what is needed for them to be a successful professional at the end of the day** and **to be able to use that knowledge in their duties one day when they are employed.** That is something where I see there is a gap. So when I lecture what I realize **they enjoy most is when we bring the work into context for them,** It's when you see a patient and you are the patient's first contact and you are the one that can make the change. You have an impact there, you have a chance to make an impact and diagnose something and refer the patient appropriately. They want to know here their eventual role will be. **They need to be linked to that responsibility.** I think them being students alone takes them a bit away from the broader picture that eventually this is who I am going to be working with. This is **my expectation in society** if I say I am so and so.	Lecturer's impact: Individualized attention –most impact. Need to be made aware specifically of their wrong doings. Few students use the opportunity if making appointment with lecturer. Gap that need to be bridged. Should understand- there not to get good marks but learn to be a successful professional – need to reach this understanding. Students enjoy when bring work into context for them. They need to be linked to that responsibility.

I: Please explain / elaborate on your ***teaching strategies?*** L6: I try to **keep it quite modern** because we are working with the dynamic youth. They want to be able to use their technology and I actually make room for that. So when I teach I usually bring in the latest, **to make contact with reality whatever is happening in the news and incorporate that**. Look I don't have time for that when I do my slides because things happen on a daily and weekly basis. So **when I start off I try to incorporate whatever daily changes there are in society.** As soon as **a student asks me a question and there isn't knowledge or I cannot provide an answer at that time, I immediately reflect it back to them and give it to them as homework** so they can go and use their technology or even at that point of time go and open up their internet and look for us what that prefix means. It's Latin. If you can understand what that part of the word means we can have a better understanding of where it fits into our whole subject at that point in time. So I try and stay current and that's what the students are looking for and like say they want somebody with experience. **They want to know how does it work for you how were you be able to apply this.** How will I be able to apply this? So I tr**y to keep their feet grounded in that way they want to know that parts.** Like I say I see there is a bigger interest besides the work they have to simulate at that specific point in time, there is a **bigger interest in the social working** and how is this important later? There is a bigger interest in that part and not the specific detail of the work. **So to keep their interest you have to keep in current** and in their level. So in the first couple of lectures you get the feeling of what is expected from your students, you kind of get an idea of your class overall. Some of your classes are most difficult, the students are more introverted and you struggle to get a response from them but eventually you will see as the lectures go along you learn to know the students and they learn to know us and their specific learning preferences and their learning styles and that is how you get to adapt. I: With learning styles some students are more visually and some more auditive. Do you adapt to that? L6: I do. I have been starting to use **Prezi,** I like my slides but started to use Prezi and the **students seem to be more interested and more focused on the lectures when I do that**. It's the same information and same content. I: Is it may be because it's a little bit more modern? L6: It is more **modern, I put in visual-audio and I can put in newer pictures and can also incorporate daily social in there. So they enjoy it very much**. It is working.	Teaching strategies: Keep it (**contact with reality)** to keep interest. **Want to know how does it work for you how were you be able to apply this.** Tr**y to keep their feet grounded in that way they want to know that parts.** Prezi – put in newer pictures, daily social, more modern, put in visual-audio and they enjoy it- students seem to be more interested and more focused on the lectures when I do that. Student asks a question –no knowledge or I cannot provide an answer at that time- reflect it back to them and give it to them as homework.
I: What is your opinion of ***interactive classes?*** L6: I like it. It works also. It's very difficult, you get a type of student that just comes there and comes to class as part of the furniture and ja. But you need to devise it to make it more interactive and it helps them also. It's almost as if they got an **anxiety hmm and going to be judged by their peers.** I also realized that they learn better from each other, from their peers and that's how it also helps for them who don't understand certain concepts. **It's sometimes better to let the class explain it to each other somehow let them hear it from each other.** I: Asking questions in class or? L6: Asking questions, they would ask me questions and will reflect it back to them if there is anyone in the audience who has knowledge on them and always for them to go and check on it afterwards and at the beginning of the next lecture, just retrieving "what was your homework?" Just to keep them active. Sometimes you **have to put the responsibility in their hands** hmm and have to guide them but I realized that **homework still works on this level.** Assignments hmm… I: Do they do the homework if it's not for marks or are the marks the motivation? L6: Hmm I **haven't so far given any marks for homework but it is a little less formal and somehow I got a better outcome** out of that homework. They actually do go and sometimes we have to enforce by giving an	Interactive classes: As if they got an anxiety hmm and going to be judged by their peers. Better to let the class explain it to each other. have to put the responsibility in their hands. Haven't so far given any marks for homework but it is a little less formal and somehow I got a better outcome. If they have an interest in it and I link it to something that is real time then I see that they will go and read up.

assignment as **homework for a mark but I see there isn't a real connection that they do it because they need the mark**. If I test that work in a class test situation, the understanding is somehow just not the same. They **are forced to do it then but if they have an interest in it and I link it to something that is real time then I see that they will go and read up** about it and I can see by the manner that they answer that z So, it works for me.	
I: Elaborate on ***students' engagement*** and communication with you in class and in your office. L6: You get groups, you g**et the extremes like I said there is a student just comes and are part of the furniture and you have the more open students and feel free to stop me during the lecture and ask the question.** One has to find ways to stimulate the other student who is the furniture and a little bit more withdrawn and I think that takes place during the first couple of lectures when they feel more comfortable in the situation and you can, like I say I always reflect questions back to them and that helps a lot. When somebody asks you something there are a **100 others with the similar type of question** and **always help to ask "what do you guys think about this?" "Have you read up about it recently, have you seen something about it recently?" So it is important for them just to incorporate the current and to reflect.** We need to give responsibility. I am a firm believer of **when you want responsibility you need to give responsibility. I think that is a big part of self-efficacy.** I: And at the office? Do they often come here or not? L6: They do, I realized that they **prefer a walk in service** hmm the formality somehow put the whole thing back. The formality of just merely dropping me an email holds them back. I know some of my other colleagues have a chat group. I unfortunately draw a line there where it comes to my cell phone, is my personal belonging. I do get a **few emails for appointments and problems but the students more often come door knocking**. They **like the idea that they can come, open door type of thing.**	Students' engagement: When you want responsibility you need to give responsibility. I think that is a big part of self-efficacy. They prefer a walk in service-office. Always help to ask "what do you guys think about this?" "Have you read up about it recently, have you seen something about it recently?" So it is important for them just to incorporate the current and to reflect. (strategy) A few emails for appointments and problems but the students more often come door knocking. Like the idea that they can come, open door type of thing.
I: Give your perception regarding the relevance and ***usefulness*** of the module content that you teach. L6: Very relevant and I think it is **important for us to be able to help them to make that connection and once they have the connection, they take more of an interest.** They will go and read up a little bit wider. **We need to stimulate them**. They want to be something, they want to do something (Interviewer: scientists). At some point some of them come and say "I don't really know how am I going to use my studies", "where am I going to go with my studies?" "where am I going to get a job?" "what are my possibilities with what I am studying?" So **career guidance** is quite a big part that I think **we haven't quite succeeded in yet.** The preparation for a student for tertiary. I know there are more effort been made but there is a **gap somewhere** for the students at the end of the day. For me I find my field quite relevant for what I am teaching at the moment hmm and I **try and link it for the students to see where it will fit in one day and where they are going to use it. I try and use real cases so they can make sense and put the puzzle together.** I: Compare your perceptions with those students may possible have regarding the module and its relevance. L6: Students will be students and like I said at the very beginning when they **come initially into the class, they just think I need to study this to get a mark** so that I can pass the subject and move on and as they sit in class they actually become really more interested in just passing the subject. I think if we as evaluators eventually see what they write and **you can see how the student develops and matures in your subject. I think that is what we are all looking for.** We want students that will take initiative and read broader because they initially come and with that further that they want to know more but **they get swept up by "I need only 45% so I only have to study this little bit**". The more they will read, the more they will understand, the more they will remember of the basics and I think that is what we need to install in them that **there marks depend on their interest in a subject and not in**	Relevance and usefulness of the module: help them to make that connection and once they have the connection, they take more of an interest. **Career guidance** is quite a big part that I think **we haven't quite succeeded in yet.** I try and use **real cases** so they can make sense and put the puzzle together. They get swept up by "I need only 45% so I only have to study this little bit. **There marks depend on their interest in a subject and not in how much we give them.**

how much we give them. We give them text books, work books, we try to stimulate them with assignments, we set the platform. I: How so you experience their motivation? What I've heard is that you give them opportunities and expose them to practice and give examples and they get more interested, you've used the word interested and helps to motivate them. How do you experience their **motivation?** L6: Initially in the first lectures, you find that they come to class and don't make much eye contact. It's this big subject and it's difficult hmm but **I think the positive attitude of the lecturer is a big factor.** I think in their initial years we still play a big role to stimulate them to be motivated. We do play a big role and it smears off**. Our passion for the subject rubs off on the students**. You'll see that on the way the students answer and questions coming in more and more at each lecture. One must acknowledge it and I say to them I enjoy the interactive part. We have a long lecture today and you can see when they become tired and restless and when they can ask questions and get answers, when probing questions, they stay in contact with you during that time. **So motivation there must be but I think we can by what we give them just ignite a little bit of passion.** I: You are now here in the Faculty of Health Sciences and they are from the Natural Sciences Faculty, are there any communication between the faculties that you can know they do in Biochemistry of Microbiology this and how to adapt your course so that all can teach them Science as a whole? L6: At this point in time I think some work needs to be done. I can see from the **student's reaction that they feel there is a lack in the link between the subjects that they do** and I must say there is a bit of a void there. So usually when I am teaching, I am like "have you heard about this before or do you do it in any of your other subjects?" We still need to inquire what they are doing. **I haven't had contact with their specific faculties and don't know what their other subjects are. So I think there is a gap.** I: Do you think that will have an impact on their performance that at the same time Genetics do congenital disorders e.g. you do the neurological development? L6: **Definitely you can see the students see each subject as a separate thing but they need to realize all of these are one**. But there is a gap yes when it comes to the Natural sciences side. I: Thank you very much.	Motivation: I think the positive attitude of the lecturer is a big factor. Our passion for the subject rubs off on the students. So motivation there must be but I think we can by what we give them just ignite a little bit of passion. See from student's reaction that they feel there is a lack in the link between the subjects that they do. Liaison: haven't had contact with their specific faculties and know what their other subjects are. So I think there is a gap. Definitely you can see the students see each subject as a separate thing but they need to realize all of these are one.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 7

Questions and answers **Demographic data** **Lecturer 7 (L7); Interviewer (I)** **35min 02sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L7: 8 years	8 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L7: No no I was still a postgraduate student when I got the post as junior lecturer here and then I stayed on so I have and is still busy here.	
I: Which subject(s) / module(s) do you teach? L7: For the second year students, zoology and then honors modules as well.	Zoology
Self-efficacy questions: *I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.*	
I: Have you heard about the term student self-efficacy? L7: Yes I've heard of it. . I: What is your understanding of the term student self-efficacy? L7: That they basically already, ok my interpretation of it, that they **already have the basic background knowledge** when you present the chapter, **know how to make a summary** from it hmm. To be able to study and answer long and short questions from it. Basically **self-functioning at university** like my year group when I was undergraduate, long long ago. It's my understanding, I may be wrong. **Yes self-effective without being spoon-fed, like we are doing with them now.**	**self-functioning at university** Self-efficacy without spoon feeding students.
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L7: I will say the past 8 years, especially the past 3-4 years a **dramatic decrease in terms of being able to stand on their own feet at a university**. **We often get the message that we must change, adjust to them, but it feels as if our standards lower because of that. It is as if many of them didn't develop the capacity earlier in life to function on their own**. I: Where do you think that comes in if they didn't develop their capacity or the decrease? L7: One tends to **blame the education, the school system,** hmmm that is my.. I don't know it is difficult to say. I haven't asked the students personally, the ones that do okay and what is expected, were they in private schools? But I see it every year, it increases and it is interesting, I just did the **first semester test and only 30% passed.** I: What are the numbers here? L7: Hmm I have 71 this year so 30% of 71 failed and according to me it was a standard test (laugh) and easier than previous years. **There were 1 insight question of 3 marks and I think we must have 25% insight questions in our question papers on this NQF** level and I can just think what the fail rate would have been if it was done correctly on Bloom's taxonomy. But what is interesting, we now have a lecturer from Wits, and he says it is shocking in the context of South Africa, **our students are way weaker than his previous experience at Wits.**	Self-efficacy: Past 3-4 years a dramatic decrease Get the message we must change /adjust to them, but it feels as if our standards are lower. Adjust the school marks/ wrong and then they say she must mark it right. Something that never happened in the past. 10% high self-efficacy 20-25% low self-efficacy Sit and stare at me. Most take Zoology for the credits.

I: Might it be because from the top we hear that we must have greater passing rates? L 7: Yes I: Despite this the M score was raised. L7: But they **adjust the school marks**. I know for a fact, we had a master student here and his passion has always been to go teach, and he did it. They tried to keep him for a PhD but he went into teaching. He survived 2 years and did something else he just couldn't take it anymore. Then the **inspector** comes from the Free State and joins the marking. Then he **corrects things that are wrong and they have banned him,** he may never teach again. I: Black or white school? L7: It was a private Black school in Bloemfontein. So I know they do it and one can gather that, [HOD] also said that students come to her and then she gives the right answer and what they write is **wrong and then they say she must mark it right. Something that never happened in the past.** I: Is that a sense of arrogance or what would you say? L7: I think it is what they are used to it from school. If they just mark it wrong and say it is wrong and this would be right. I: Lacking insight in a sense? L 7: Hmm it's difficult for me. I'm not on par with the school system. I don't want to point a finger to the all the time. There might be more external factors, but only my perception, my own perception. I: If you look at the class situation and you must indicate a percentage who are really good functioning and self-efficient. How much would that be? L 7: 10% I: And the rest poor or somewhat average? L7: Hmm no I would say the majority is average and then like, that's difficult now, the first test is usually a slaughtering each year. There are about **20-25% who really struggles and you think how did you make it into the BSc programme?** I: How do you observe students? If you do certain things in class, do they realize they must utilize that and apply? L7: No I: Or to underline or at least ask. Or do they only sit there? L7: **Most of them only sit there.** I have learned by now if it's something **new which I add, an article with something new or that is not in the textbook, something interesting then I work it into the lecture.** Then I tell them this is not in the textbook, **write it down**. Then they only **sit and stare at me** and then I say previous years I have asked this in a test and then they still only sit and don't write down. Some of them 1 or 2, I think the rest depend on them and get it from them. Many without interest, but it can also be the first day, as part of an icebreaker I ask why everyone is here. Then I identify my Zoology students. So this year there are **10 from 71 Zoology students,** who are interested in Zoology. The other 60 say they **take it for the credits** and they haven't had better other options. Usually they think Zoology is a bit more interesting than Botany. Yes but many also think Zoology is the easier option, but it is not only "National Geographic" episodes (laugh) not just all the nice stuff.	
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L7: Yes I've seen with students, especially last year, I had two that really struggled. It was education students and I, in my own capacity, tutored them whenever had an open period, and physically sat with them and said "take this paragraph, and summarize it and how will you do your summary?" then I saw what they did, they write every word, e**very sentence just like it is. Just copied it**. Then I said it is impossible they will never be able to memorize the textbook like that. Then I showed them how I do it and then the light went on. It was shocking to think, the one was a final year education student, **and how did she managed through this entire system without knowing how to summarize and how to approach a long question**. And she is	Impact of lecturer: Tutor whom struggle -summary- they write every word, every sentence just like it is just copied it. Try my best to give them some interest in the module.

on her way to teach children. So they were very grateful and said it helped them. So **don't just write them off and say they are lacking interest**, I **try my best to give them some interest in the module**, because if **you find something interesting you will find it easier to study.** So I've realized it is not only them, **they must also have input and one can have a big influence.** I have also had some that now didn't want to study education full time anymore, but Zoology, but that is very seldom. I: So things that I hear you saying is you pick certain students up that needs more attention and then give more attention, remediating in a way? L7: **Yes one often sees with the additional help there are so many that need**s it and there second semester test is Monday already, literally two weeks apart. It is very little time to address some of the problems I saw in the first test. **So I offered that if some of them struggle with the work then in group format, I won't give individual attention in this short period of time, come to me and nobody has come.** I know their programmes are full with tests and so.	I offered that if some of them struggle with the work then in group format, come to me and nobody has come.
I: Please explain / elaborate on your teaching strategies? L7: I try, maybe unsuccessful, **to force them to read through the chapter before class**, before we start the class on Amphibia, because with the **repetition,** they don't have to study it, then some of those terms if they hear it in class, will ring a bell. **The more something is emphasized, the easier you are supposed to study it.** So I try to force them with a **pre-lab quiz** which is done in the **practicums** before each chapter and everything is nicely coordinated with where we are in the lecture. I: Do they do that on a computer? L7: It is a written thing in the practicums and they also do it **on Blackboard quizzes** on the chapter which they must have done for me, which I hoped the knowledge is there from the first year. Hmm so I do that, then I have the lecture in class, and gives a lot of time for discussion and questions and so on. I like my **PowerPoints** to be visual and to explain things visually. So for everything that I say/ every adjustment of an animal, I **show a picture** and explains it from there. So if you see and hear a thing, then hopefully you understand better and then they do the quiz on Blackboard on the chapter. So it is repetition repetition repetition and continues assessment and they don't study for it. I: Practical in the laboratories? L7: Yes we have **practicums.** I: And how do they function there? L7: **They struggle a lot,** they struggle a lot. I: Is it something they need to observe with animals and then write it down? L7: Yes some of it what I basically do because my **classes became so big** I could always have taken them out and do practicums outside. **Now with 70 students and transport costs, you know we don't have the finances.** We can't go to the Botanical gardens, because it costs me a fortune to get everyone there and safely back. **So I had to change my practicums and we now do a lot of educational documentaries,** because they don't have any background with that. To ensure they don't sit with Facebook and WhatsApp during the documentary, I have compiled a **questionnaire** and it is answers given as they watch. So I give the opportunity to look at it and then observe and record and they can't do that. T**he first one we did, an hour after the documentary was finished, and they still sat there and tried and tried.** The majority has also failed the second one now. I: Do they know they get a mark for that? L7: Yes they know it is important and also the pre-lab quizzes count a lot per practical, but it is shocking that they **can't observe and write down in 'real time'**. So yes I don't really know how to approach that. Yesterday without books I gave them a real frog, and a real frog skeleton and 3 preserved "specimens" then they must do differences and similarities and so on. We already	Teaching strategies: Force them to read through the chapter before class for Repitition -but unsuccessful. Emphasis - easier you are supposed to study it. Practicums - pre-lab quiz on Blackboard. Struggle with practicms- can't observe. PowerPoints explain things visually (pctures). Classes huge and finances struggle – cannot afford excursions anymore – now educational documentaries- can't observe and write down in 'real time'. Struggle a lot with application of knowledge.

did that in class, and then they must only observe what they see and write down, **and they struggle a lot with application of knowledge which they already have and observe and interpret**. I: Tell me do you also have Afrikaans and English classes? L7: Yes I: Are there any dynamic differences between the English and the Afrikaans classes? L7: Hmm not **that prominent anymore like in the past** hmmm the **Afrikaans kids are more reserved and quiet, and the English class I sometimes have to silence**. There is a repeater who sits right in front and listens to every word I am saying and she now silence them for me because she is here to study this year. So yes usually you saw much more of a backlog in the English class and the dynamic changed a lot over the last years. Not that much anymore, some of my best students are Black students which I am very happy about, but I don't know them that well individually. Now after the first test I could identify some of them.	
I: What is your opinion of interactive classes? L7: In the beginning and it is better now, **nobody wants to ask questions, but now that the ice is broken, they will try and it is always the same individuals.** But I was also a big introvert and I never answered anything in class, and could not say it out loud, so I have a lot of sympathy with that, and won't drag it out of anyone, because I was the same. **The questions they ask are usually things I must repeat, which I just said.** It is not very often that someone, there is this one education student a male student who, every will now and then, ask a good question, simple but yes. It tells me he thinks a bit about it, but the rest of them, **there isn't that academic discussion which one would expect with a lecturer and university students on this level.** I: How do you encourage interactive classes? Asking questions or other methods? L7: I only ask and do not identify specific students, not at all, and sometimes I say, **just guess,** and then usually I get it from 1 or 2 students, but if they answer wrong then I try to, in a nice way, say 'no, now you are wrong". One always try to motivate them when in interaction with you.	Interactive classes: The questions they ask are usually things I must repeat, which I just said.
I: Elaborate on students' engagement and communication with you in class and in your office. L7: The **Afrikaans class ask questions easier**, I think they are more at ease with me. It is maybe because they are **the smaller class and in a small venue**. I think the setup is more intimate, or more comfortable. The English class, I don't think they are uncomfortable, I just think they don't have anything to ask. **I think they expect from me in a way, I am there and I will get the knowledge into their heads. I get the idea they put in the minimal effort and think it is my responsibility.** Up to a point it is and that I do to the best I can, but it is not as if the realize they must do the other 50% to get to the finish line. I: And then at your office, do they often just pitch without appointment or email? L7: I get many emails with the access control (in the building), there are some that comes to see me and they do not mind consultation hours, but many don't have access to come here. There is only 1 or 2 that saw the phone. They usually corner me after class, when **I'm done with class they come to the front and ask many questions about the work and things I've already said but must repeat**.	Students' engagement: Afrikaans class ask questions easier, more at ease with me- the smaller class and in a small venue. Gthe idea they put in the minimal effort and think it is my responsibility. Questions after class – to repeat what I have said.
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L7: Something that really is close to my heart, is conservation, so that in a way my angle with them. So every time we use an example, like with Amphibia it is always agh that group that is being missed, and there is also many superstitions about them in our country. So I spend a lot of time on the **conservation aspect. So the assignment** I gave this year is the Sixth mass obliteration, I don't know if you know, but we are currently in it and people causes it. So instead of scaring them and giving the stats and then half of them don't get it. I give it as an assignment to go and read about it, and to come and explain to me and	Relevance and usefulness: Relevant (apllicable on ecology) assignments. applicable to them and their children- how I try to keep their interest Liaison:

convince me of what is going on. So that is my angle because they won't survive without the environment, and without natural resources. So everything in my class stresses that. Even if they are not Zoology students, it is also **applicable to them and their children**. So that's **how I try to keep their interest**. I: In the Natural sciences faculty, I am now in the Health Sciences, and gives Physiology, but all the natural sciences, do you know what they do in the other modules? In other words to adjust the modules and to bring them together. L7: Hmm to be honest, **I don't know except for those when I'm was still doing them undergraduate,** but it changed a lot in the meantime, I know. So with genetics because it is very relevant and everything is substantiated with molecular proof. So I do the basic with them, because there are many who doesn't have Genetics. So I do it in that way so that it can be a repetition for the Genetics students, but introductory **for those with no background.** I combine those aspects, it is important to understand evaluation, that genetic basis of heredity, etc. but what happens in Physiology and Biochemistry I have no clue. **We do have in our department, we present speeches so that we can see that we do not repeat each other's work and try to build on what was already lectured.** But I don't have a clue, to be honest, what happens in other departments' modules. I: What do you think would be the impact if Natural Sciences **get everyone together** and say on second year level this is what the modules entails so that everyone can know what the rest do and be coordinated. L7: Yes that would **be of value**, but I doubt because that would be extensive coordination. Some people will have to adjust their content, and some people "are very set in their ways" and you must not give comments on their modules. I am however very comfortable with that. I change my module every year, I can't say the same thing each year and I am always willing to react to gaps. But I have realized that these intra-departmental presentations we did, that our gaps are more as a course in totality. Because the students also tell me, the third year is much easier than the second year, and there are many gaps, which I also picked up, like extensive anatomy and physiology of animals, we don't have it, but people now present **their field of interest in Zoology** and the whole point was **to identify gaps** and to offer a more comprehensive degree in Zoology. At the end everyone just patted each other on the back and said I am impress with your work, and that was the end. So **I will definitely support something like that, but I don't know if you will get it from the ground, and with everyone's collaboration.** I: Would it have an impact on the faculty and the students as clients, advantage or disadvantage? L7: I think it **will benefit them**, because many of them **struggle from first to second semester, and to see the flow.** How the knowledge you have now flow to what you study next year, because they put it into individual boxes and just want to pass and then the "poegh" is out. I also struggled with that and when I got my degree here I also felt now I must walk into a job, I and I think many of the students feel the same. They **struggle to see where they are going** and some have mentioned that to me. We had one student last year, but she in anyway went to study "Vet nurse" and she wanted to do her Honors with us, she doubted, very good student, she was open and comfortable with me, **with Botany she knew what she was studying and how it fits with the next,** and she sad with us she didn't experience that. That is one of the reasons why we did those presentations for each other. I: Then a last thing I want to hear, how do you experience the ***motivation*** of the students? L7: **Low, very low** and I realize in general, **especially now the last 2-3 years.** There was a point that some came to ask me with big eyes whether I know of any **potential strikes**. **I get the impression, especially the last 3 years, it is a punishment to be here**. **It seems as if they don't want to be here and nobody forces them to be here**. With many I get the impression it was easier for me in the previous years to motivate them, but I think many students' morale is low and the worry about whether they will finish the year. There are those that want to strike and those that worry about their degrees. I: Other possible reasons? Maybe worried about finding a job?	Don't know what is done in other modules. do have in our department, we present speeches so that we can see that we do not repeat each other's work and try to build on what was already lectured Students struggle from first to second semester, and to see the flow/ struggle to see where they are going. Motivation: Low, very low. Motivation: **very low** -get the impression, especially the last 3 years, it is a punishment

L7: I wonder if they even think so far. I think they are only here and think everyone must get a degree, and that is your "golden ticket" out of your circumstances, but is not to say. **I think they are still very naive about life after university and you can realize they expect more of you to spoon-feed them…** A stupid example now, we dissect a fish, and they had to write a report about the dissection and about **half the class came to ask me what the point of the practicums is**? They had to write down the "research questions" in the report and they **could not determine that themselves** and it was to study and the internal and external anatomy and adaptations of a fish. So I don't think they think so far. **Only think about today, as little effort as possible, and moan about everything all the time,** and think their situation is unique and don't realize the generations before them has gone through the same. University is not supposed to be easy. If you walk over that stage one day, you must feel as if you deserved to be there. I don't think they feel that. **They give the impression that they think you register and get the degree. What happens in-between is not their problem, but yours**. Yes. I: Any other comment you want to make? L7: the last comment I want to make, I think the students we have today, look I am a Zoologist, **not a pedagogue**, all of us. **You are a specialist and nobody teaches you how to transfer the information, so many of the current challenges, I only teach them the technique that works for me, and also in terms of their study techniques,** I have no formal training in that. So I often go to **Teaching and Learning's "workshops"** to learn more about that and to better yourself in that regard. **At some stage, we now get a lot of pressure from the top, to adapt to the students we now have, should the students not also adapt to how a university is supposed to work,** and teach and the quality of teaching which you are supposed to give them. Somewhere we must meet each other in the middle, but we get the message from the top you must change and adapt to them. So somewhere we must also address that aspect of students, in my opinion. There is somewhere a presentation on the education, ok there are different faculties on the success of UFS101, but if I look at my second years, it doesn't look as if they did UFS 101. They still **don't know how to use "google scholar**", how to summarize, and basic stuff. I wonder if it shouldn't be a continuous thing, I don't think one year is enough to address t**heir gaps of 12 years and obtain a degree in the same time. I think it places them and us under tremendous pressure.** I: Someone at a different department told me that at your faculty Board meeting someone from CTL presented on "first generation" students that it is the first one from a family that came to university and the big percentages of them. What are your opinions on the role that may play? L7: **I was also the first generation and I functioned.** So it's difficult for me to get that. For many of us, in my parents' days it wasn't common for a woman to go and study. You worked at a bank or even men, they did practical things. It wasn't as common as today where they think everyone must get a degree. I am the only one from my school friends that came to university. **It's difficult to get that because I could do it and I am first generation.** Even **in school, there were the 90% who did so well, and they were in the same schools as these one not making it. It is difficult to identify a "common denominator" for everyone, they are all individuals.** That responsibility they can't take, most of them. I: Thank you very much.	to be here. think they are still very naive about life after university and you can realize they expect more of you to spoon-feed them. Only think about today, as little effort as possible, and moan about everything all the time. Should the students not also adapt to how a university is supposed to work? First generation students?

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 8

Questions and answers **Demographic data** **Lecturer 8 (L8); Interviewer (I)** **23min 18sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L8: 6 years	6 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L8: No. Before that I did an internship in Medical sciences and after that I was teaching overseas.	
I: Which subject(s) / module(s) do you teach? L8: I lecture second year Genetics and Human genetics.	Genetics
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy***? L8: I have a bit of an idea. I: What is your understanding of the term student self-efficacy? L8: Is it that **they have some confidence to study and carry on and self-study and carry on their own**. Such a vague idea, something like that.	self-efficacy: they have some confidence to study and carry on and self-study and carry on their own
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L8: Do you mean while I teach and not when they leave my class? I: While you lecture. L8: I must say in the beginning not at all until we write our first class test, in the beginning of the semester and afterwards, I make a point of it to tell them because I somehow has a promotion module. So I make a point to, after the first test, tell them if you don't attend and ask frequent questions, you will not make it. **So in the beginning not at all, until we've written that first test.** I: If you say not at all, what do you mean? L8: **They won't ask questions, they don't come to your office if they don't understand something**. We **have many tutorials and they want to get out of there as soon as possible. They don't put in the time to see that they really understand.** I: What are their efforts? L8: Not much. I think it is an **overwhelming thing for students.** They walk into the **second year and they've had the first year, but maybe they are a bit overwhelmed** with what is happening. I: If you must give a percentage from your experience of students' self-efficacy? L8: Sjoe I think the majority have. I think many have and can go on, on their own, motivate themselves and go on. I think it is a **small group which I know doesn't have it,** especially those that come to me. My **class is quite big.** I: How many are there in your class?	Self-efficacy: In the beginning not at all, until we've written that first test -they won't ask questions, they don't come to your office if they don't understand something. Overwhelming for students.. Small group which I know doesn't have it –big class. About 40% who can go on by themselves and 20% who struggle –personal problems –at home, school. Self-confidence is very low and there are students in my class whom I think should not be there.

L8: about 250. **So I can see those that are motivated to ask questions, but there is a small group, I would say from those that I know of, there is about 40% who can go on by themselves and 20% who struggles.** I: If you say **struggle,** what do you mean? L8: I had that question often, it's a big question. I think everything **starts at home**. Our students have many **personal problems** which they carry and I think it comes from home. It also comes from **school if you are taught how to study.** How to use your time and how to plan and that bit of self-confidence. I: Sort of exposure during the years? L8: Yes and **self-confidence is very low and there are students in my class whom I think should not be there**. And the reason I think they go into the second year **because our classes are so big and they have 'multiple choice' questions** and then they enter my class and it is long questions. **We have multiple choice but brings in more long questions to prepare them for what is ahead and that's where they struggle.** I think our first year level of difficulty should be lifted to prepare them for the second year.	
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L8: Yes I definitely think so. When I started lecturing here, it was like here is your textbook and it wasn't my book. You go to class and lecture and come back, but over the years I've seen you need to be **available to your students, especially for those with difficulty to understand because if you aren't there for them, they won't make it.** I also have many tutors that can help if they don't want to come to me and we make use of multimedia. If I **hand out tests, I do it myself**, even if it takes me the whole period but to ensure that for those that did well I say very good, and **those that did poorly I say come to me let's see what we can do**. **I think because the class is so big, they only become faces, you don't know their names and then they get lost, if they start doing bad, then they don't come to class and then they totally fall out.** I: You refer to tutors, is it sort of remedial or just extra attention or? L8: No it's only, **my practicums are not practicums because they are so many and it's changing into tutorials**, and there I have 10 demi's who helps students to solve problems, but afterwards they can go to them with questions. I do have a thing of helping, but you can't come before a test and say I don't understand. You must have studies with a list of questions and then we work through that.	Lecturer impact: Need to be available to your students, especially for those with difficulty to understand because if you aren't there for them, they won't make it. Because class is so big, they only become faces, you don't know their names and then they get lost, if they start doing bad, then they don't come to class and then they totally fall out.
I: Please explain / elaborate on your teaching strategies? L8: Something I've learned, actually from school is to **repeat stuff.** Many lecturers don't want to repeat and think everybody has heard the first time. **I have had to repeat a problem 5 times and if I don't do it, I lose them.** Those who are a bit cleverer and got it the first time, look a bit bored, but I pull them in and **say 'now you tell me…"** I don't mind repeating something and I try to do **it around South Africa,** because our textbooks are form overseas. So every time I have a short story in the beginning of the textbook of an illness and genes and the patient is also in there. Then I try to bring it to South Africa. Then I try to **bring it closer to home**. Then I try to show **videos of more difficult molecular concepts** and the videos actually works. Then last year I had **clickers** which worked well. Just in class with a difficult concept, ten I ask a question, a, b, c, d and they must push on their clicker what they think the answer is. If I see too few know, then we go back and I explain again. I: Don't you have **clickers** anymore? L8: **No it was send to the south campus and they didn't had money to buy for my big class.** I: So you had it last year and now they must put up their hands? L8: Yes but they don't want to. Clickers are no name (anonymous) and you don't have to put up your hand. I: How do you use technology?	Teaching strategies: Repetition, SA examples – familiar/ bring it closer to home, Videos, Clickers (but taken to south campus due to finances), PowerPoint, Lab without equipment due to funding/no microscopes anymore.

L8: I use **PowerPoint, videos**, I liked the clickers and wanted to go with that, because students enjoy it. **Yes it's basically all I use. We always had wet practical's where they used microscopes but we don't have it anymore. There is no funding for that.** I: Not for the microscopes or the amount of students? L8: The amount of microscopes for all the students will cost some money and for the chemicals for everything we need. So we don't have practicums anymore. I: You have a big **laboratory?** L8: Yes **but it is only a building – there is nothing inside.**	
I: What is your opinion of interactive classes? L8: I like interactive. I must say my English class is much more active than Afrikaans. I: Percentage wise? 8: There are 200 students in the English class, and **30-50 in the Afrikaans,** so it is much less. Like I've said we start with a story with a patient and a case and then they automatically start asking questions and if they don't I'll ask so what do you think about this? I like debate and if one say I think this, then I say but I think so and what about this and this. Then the class split sort of in two and we **debate a bit, but there is not always time for that.**	Interactive classes: debates
I: Elaborate on students' engagement and communication with you in class and in your office. You said they ask more questions in English and what about emails? L8: Yes they usually send an email. I know the university say we must have consultation hours, but I am also busy with my PhD so I can't always have my hours so I say send me an email, then we make an appointment. So it's difficult for me to do that. **This year much more students were willing to come to my office with their problems, but it feels as if those that really struggles, they don't come.** I: Why do you think that is like that? Reasons for that? L8: I don't know. I: Maybe they are shy? L8: I don't think they are shy I think it's more **not caring.** I don't have a clue. I: The communication in class, - would they ask more questions during class or will they come afterwards and ask you? L8: During a lecture, no, afterwards there is always 1 or 2 that wants to know something but only for interest sake not really about the difficult concepts. But I think it is because they know if we go to the tutorial we will practice and I must say in the beginning of the semester they aren't willing but towards the end they will say if they don't understand and I explain. I: And your office? Will they come to your office? L8: They **often come to my office especially before a test and we have revision times before the test and they come to that. If we haven't had enough time in class, then I say rather come and see me, but what I realize which actually bother me they come with old test papers and say I must work it out which I don't do.** It feels as if they then just study the questions and not how to answer. **They also come with question papers from before I lectured it and it's not relevant anymore, and then they study that.**	Students' engagement: Send me an email, then we make an appointment. Come to office but it feels as if those that really struggles, they don't come. Not shy I think it's more **not caring.** Attend revision classes before test.
I: Give your perception regarding the ***relevance and usefulness*** of the module content that you teach. L8: We got a new textbook last year which is more relevant in the genetics field. So what we **study in the second year is sort of the basis of genetics**. So it is all the human genetics and you are interested in plants or animals, the concept is the same. And because I come from a diagnostic laboratory I can see the textbook is relevant. So in the tutor we first have a lecture beforehand and I **try to show it practically, and say if you work in this industry, you will have to use these techniques and this is how it works. So I try to keep up.**	Relevance and usefulness of the module: study in the second year is sort of the basis of genetics. show it practically, and say if you work in this industry, you will have to use these techniques Liaison:

I: In the natural sciences there is some ***liaison*** between the modules, so that you know what Physiology do and in Biochemistry so that you can adapt your content to that. L8: **Not that I know of. Interesting you asking. I have many times asked lecturers from other places 'just give me your content' but I didn't get feedback.** Especially because I, there were no human genetics module, I started it. Then I didn't want to overlap with Human Molecular biology, because our students also take that. **I asked for information, but they didn't want to give it.** I: Did they pertinently say no? L8: Yes or they ignore emails and it's as if they don't want us to know what they lecture. I: Do you think if there was regular liaison and someone at Zoology does the snake's respiration and the same time I do human respiration and you the genes which cause the illness for whatever that it will help to integrate the science? L8: That is an excellent idea, a very good idea, because I know in one of the Physiology modules they touch on genetics with embryology and then I know Biochemistry do a lot of genetics, but I don't know what. So sometimes students say they've heard of this and **I also don't want things to overlap too much.** I: How do you generally experience the students' intrinsic ***motivation?*** L8: I always have a **group of students driven by marks,** it's those students that if they get 98% they want 99% and they are never satisfied. For them it's all about achievement and to get good marks give them… I think from home and from family, it shows. Then you also get the **ones that don't do that well, who struggle.** And if they don't do well and they don't come and talk, everything goes backwards and they get a **low self-esteem.** I don't pass, what will happen and the funding? So it's a struggle. I: So do you think those that are motivated, is it more percentage that drives them? L8: Yes I think achievement drives them. I get students that don't do that well and if they only pass, it's an achievement for them, but that's the minority. I think it is an academic environment and marks are everything, not everything, but marks are the reward and the university links it because if you pass so many modules we give you money. So it all and all about your marks. I: In a previous interview someone said there are many first generation students in natural Science. Do you think it will or which role does it play in students' motivation, because their families weren't expose to that and now they come? L8: One can reason both ways with this one. **From experience I had a student who did honours which was first generation and it was very important to do well,** he was driven, because the whole family backs him and everyone gives money to keep him at university. He doesn't want to disappoint. So its sort off his driving force, he doesn't do that well, but he passes everything and works hard. But I think **for other students it's a big shock to come to university,** there was nobody to talk to beforehand and the family at home doesn't understand what it's all about, then I think it is a **huge shock and the pressure, especially if they don't make it.** I: Do you maybe have another comment on your experiences? L8: **Students changed a lot in the 6 years I've been working here.** It's my opinion and I may be wrong, but I feel because we give the PowerPoints and must give out the test memo's and we give revision classes, and we do multimedia and we bring in all these things – **where does that student learn to stand on his own feet?** I can walk into class and half have **cell phones on because they record the class and I've had one that brought one of those small cameras to class.** Why do you come to class? Then you can study online. **They don't take notes but want the notes or take pictures.** This year I said 'you may not take pictures or record anything and it didn't help a thing, they still did it and it bothers me to give these things. Now they want old tests. I think it creates problems. I spoke to [..] the other day **I feel a lecturers pass**	Not cooperation from other lecturers about their module content. *Motivation:* group of students driven by marks other students it's a big shock to come to university- the pressure, especially if they don't make it. Anything: Students changed a lot in the 6 years I've been working here. They don't take notes but want the notes or take pictures. feel a lecturers pass rate with and without technology should be the same. Technology is not where it lies. It must come from the students' side.

rate with and without technology should be the same. Technology is not where it lies. It must come from the students' side. Interviewer: Thank you very much	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 9

Questions and answers **Demographic data** **Lecturer 1 (L9); Interviewer (I)** **20min**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L9: 2 Years	2 years plus 7 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L9: Before Kovsies I worked at the university of the Western Cape. I stayed in 2008 with them after I finished my Honours and I worked as a Scientific Officer. We did the practicums and presented the lectures through ??? and I was there till 2015. I worked with first year and third year students.	
I: Which subject(s) / module(s) do you teach? L9: First year Optometry students and then third year BSc and the module in Exercise physiology.	Physiology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L9: No I: What is your understanding of the term student self-efficacy? L9: Hmm student self-efficacy, I don't know, I think it's more like a **form of peer studying** whereby students work with **ideas together and share** as a way of studying and in that way see if it can be an effective tool. I: You refer to your group? L9: Yes I: And what about individual self-efficacy? L9: Sjoe. Hmm for a **student to be self-efficient it must have a lot of self-study where he focus on his own work**. At his own pace and finding his own specific ways to understand the topic better. That's maybe self-efficacy?	self-efficacy: student to be self-efficient it must have a lot of self-study where he focus on his own work
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L9: **Academically they do well, and are very responsive in class**. I think **my way of lecturing is not one of standing in front and just tell them something**. There is **a lot of interaction with the students** and many times in many cases with shy students who do not answer, they are much more interactive. They ask questions and we talk during the lecture.	Student self-efficacy: Academically they do well, and are very responsive in class. a lot of interaction with the students
I: How do you see the role of a lecturer? Can the ***lecturer impact*** on students' academic performance? L9: Yes I think so, I think it is all about the approach, students are here to learn. I think with their undergraduate studies there are many skills to develop. So **for me it is always the student must have the willingness to ask when they don't understand if they want to know more and ask me to explain better**. **So my role as lecturer is for them to get the core of the specific theme I'm explaining.**	Lecturer impact: my role as lecturer is for them to get the core of the specific theme I'm explaining.
I: Please explain / elaborate on your ***teaching strategies?*** L9: Currently because I'm only involved with the third year students, my style is, it also depends on what level the student is, I will usually if I present a module**, ask questions in between, ask questions and then at the end of the lecture, 10 minutes before, we will have an overview, we will recap and then I'll open the floor for questions**. It also gives me an idea of exactly where they are. I do it with every session, I think it's important rather than doing it at the end. I: PowerPoint, technology?	Teaching strategies: ask questions in between, ask questions and then at the end of the lecture,10 minutes before we will have an overview, we will recap and then I'll open the floor for questions, PowerPoint, part is theory

L9: Yes all my lectures are **PowerPoint.** With this specific module it's a bit different because the **biggest part is theory and there is no practical component, but I try to show them videos and a documentary** a few weeks ago. I also use the **lab tutor system** just to give it a practical component and then I have. You know theory is theory, but as a student, that's how I studied, **to see something physically, then it makes more sense**, I have a better understanding thereof. Then I try to **get them involved with Sport science department** so that they can see hoe certain things which we discuss in the theory, work.	and there is no practical component, show them videos and a documentary, lab tutor system get them involved with Sport science department
I: What is your opinion of interactive classes? L9: Agh I think it comes from my style, it **feels like tutorial based**, where you **work in smaller groups. So that's the approach I bring in the larger group**. I encourage it and it's a tool to gage their progress to see exactly on which level they are.	Interactive classes: work in smaller groups. So that's the approach I bring in the larger group
I: Elaborate on students' engagement and communication with you in class and in your office. L9: Agh I think with these senior students, some have that willingness to come and ask after class or hmm or if they have questions they will ask during the session. **I think it's more so if they don't have to know, they won't ask, but when they're in crunch time most will come to find out.** I: Would they ask in class or rather come to your office L9: They would **rather come to the office or send an email.** I: Is it everyone or a few? L9: A few but they usually work like **if a larger group have the same question then they will work through the class rep.** I: How do you experience it, is there a difference between the English and the Afrikaans group? L9: Yes there is a big difference. The **Afrikaans class is smaller** so that interaction, it's different as with the larger group and I've seen with the **Afrikaans group, everybody asks questions**. There isn't one that just sit and don't ask questions. I think they are very comfortable with me and I think it's because they are a **smaller group**. They know each other and spend a lot of time together and study together. I: And the English group? L9: Hmm the English group is bigger. Hmmm I will half identify some of the students and **it's usually the same students who ask questions** and the rest will ask here and there if they're uncertain. I: What do you think is the reason? Maybe just shy or net keeping up with the work to ask? L9: I would hope they are with me and understand. I: Or is it maybe a personality thing? L9: I think is **a personality thing**. Some are a bit reserved, but yes if I ask the same students questions and think they are reserved but I would hope that they understand what I do (laugh).	Students' engagement: but when they're in crunch time most will come to find out. smaller group – ask easier questions
I: Give your perception regarding the ***relevance and usefulness*** of the module content that you teach. L9: This module is an 8 credit module. I don't know how it works here, but it's usually **an elective**. So it's **one of those modules you do to get credits** and then you can see it because **they focus on a lot on their major modules**. So much so that last week there was a group, the second group I tried to accommodate because there was a clash with another Biochemistry module and last week we had a session and no student came, the English class. They focus a lot on what they think is the more important modules and because they are Biochemistry BSc students, these are not really students that will take it on postgraduate level. So they are not Biokinetics, Physiotherapy or Sports physiology. I: Do you think **they view the module as inferior**? L9: I think they do. I: Only on the credit basis? L9: I think they do, I think they think it's something they must do to pass this module, and get their degree and I think their interest only stretches to here, I don't think there is postgraduate interest, because I talk a lot about research and I can see their interest is not huge. I: You know, you know for example they do Biochemistry and we are here in Health Sciences faculty, but they are actually with Natural Sciences. Do you know what they do in Biochemistry or Genetics or their main modules, so that what you do here can sort have blend? L9: I have actually **had this discussion yesterday, that's with the Afrikaans group** and I realize they talk in between about Biochemistry and tests en experiments they do. So they do many hands on type of essays which they do and I think they are very focused on that. I think it has to do with the **practical components which this module doesn't have**. So something they can do to trigger there interest to see what they can do with this thing. I: Through the **practicums the relevance come?**	Relevance and usefulness: one of those modules you do to get credits they focus on a lot on their major modules. they view the module as inferior practicums the relevance come - Exactly Liaison: Integration of the modules are important

L9: Exactly so they do it in Biochemistry specifically I've seen and it's more in the field they want to be in and it's **something we can work on especially in the module I give.** I: What is your opinion of Natural Sciences letting us know of in the second year this is the Biochemistry outline of what they do and genetics this and we then give Physiology the time when Genetics do respiratory illnesses, you respiration of exercise so that they can bring the sciences together. Would such lesson be meaningful? L9: I think, I totally think so. **Integration of the modules are important and you don't really get a module that is separate and only address certain things**, because there are so many other factors playing a role and many of their questions, I can see that do not come from our work but from somewhere else. So it usually come from modules. And then they ask what is the impact of that what we do on that specific thing. **So I think the integration of the modules is very important and I can see they already think so.** So they don't only think on one module level, but think how can this play a role? I: How do you experience the students' ***motivation?*** L9: There is a big difference between the students I work with who only wants this undergraduate module to be done, hmm I think they only work to get it done. **I don't think there is many who is motivated to do well. They want 50% and that's that.** It's very evident, because usually you can see it with students who asks questions, **and they are the ones who really pushes hard to do well, who puts in effort.** And I've also seen with a specific group if I ask "what are your plans?", " what comes after this?", "what do you do next year?" "are you going to do honours?". **There are many that say they only want to go and work.** So they want to finish and see what they can do with this BSc degree. So there **isn't really the motivation to do postgraduate studies or that interest.** I: Any other comment from your side? L9: With the **Afrikaans group**, I know I focus a lot on them now, but I think I have better interaction with them. I see **they ask questions and think outside of the classroom**. They would for example ask questions like you know, how certain things affects if you do a certain job. **So they think outside of the scope of this module and it's a good thing.** It's something that you want to see them think further. **I hope I can see it more in the next year.** I: And the English group? L9: **The English group is, they are interactive, but not as interactive as the Afrikaans group.** There will be like one question which shows they are thinking outside of the scope, but otherwise it is only based on what we are doing. I: Thank you very much	Motivation: don't think there is many who is motivated to do well - want 50% and that's that. they are the ones who really pushes hard to do well, who puts in effort. Afrikaans group, -they ask questions and think outside of the classroom- think outside of the scope of this module and it's a good thing. There are many that say they only want to go and work. isn't really the motivation to do postgraduate studies or that interest.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 10

Questions and answers **Demographic data** **Lecturer 10 (L10); Interviewer (I)** **28min 32sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L10: It's coming to exactly a year now.	1 year plus 3 plus 4 (8 years)
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L10: I've taught at the University of the Witwatersrand for 3 years but I also taught as a visiting professor at the University of Duke in America (North Carolina). I: Was it part time, 6 months or so? L10: Visiting so I would teach a module once a year. (during PhD)	
I: Which subject(s) / module(s) do you teach? L10: I teach Ecology, I would like to call it Conservation Ecology and I also teach on Etiology and then also on skills is basically your science writing skills as well as your fundamental statistics.	Ecology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student self-efficacy? L10: Hmm are you talking about efficacy in terms of students engaging and going on? I: What is your understanding of the term student self-efficacy? L10: I think it varies based on different exposures I've had with students. I've **see different engagements in terms of how much effort they put in**. I don't know what they say, artifactive background but clearly there is a **clear distinction between different groups.** I: How do you think should someone with a high efficacy go about in the class? L10: I think someone **has basically to be engaging**. I truly believe **teaching should not be a one way straight**. So as in a structured lecture I don't have to stand in front and one who issues all the knowledge but I believe strongly in students having a **discussion and challenging any form of wisdom,** should I say knowledge that come across to them and basically, because that's **how I believe things change and how people learn more**. So I always try to encourage that kind of thinking. I have this in my class "you are free to bring your computer and can even be on google while I teach, I don't mind". **You are free to interject at any point, free to engage. I like that serious type of engagement because it takes me to another level as a lecturer.**	Student self-efficacy: has basically to be engaging. teaching should not be a one way straight. You are free to interject at any point, free to engage. I like that serious type of engagement because it takes me to another level as a lecturer.
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L10: You mean currently? I: Yes L10: **Very low.** I: What do you mean with very low?	Student self-efficacy: Very low. I have 6 hours that appear on my door for consultancy, available for students every week. Guess how many have been used? Zero. You've got students, third years, final year with zero engagement.

L10: It is worrying comparing to other institutions I've been to. **I have 6 hours that appear on my door for consultancy, available for students every week. Guess how many have been used? Zero.** I: For the whole semester? L10: For the whole semester. I: You invite them and they don't come? L10: They know they can come. I put it on Blackboard. I: What do you think is the reason? L10: I don't know, it's quite mind boggling. I thought they would have taken advantage of that opportunity. I've tried to make as much of my teaching engaging as possible. From structured lectures with the apartments to lectures where you try to build a whole lecture, you know it's all in a ? (5:15). **You've got students, third years, final year with zero engagement.** I: And then to get to the reason why they don't realize. L10: I have never understood, I am beginning to speculate and what I find at UFS that I find different at other universities is there seem to be a very drawn line or marginary but somehow I think it's been enforced students and lecturers set out a distinction where people all **are required to be called by titles. So you look at your lecturer differently and not as a peer and somebody is high up there and may be that also creates that fear which should not exist I think.** I grew up in a system at UCT being a student where I never for a day ever refer for my professor by his title. Those were people at the age of my father. They insisted to be called by first names. I: You think that makes a difference? L10: I think it makes a difference in terms of how students will engage with you. Trying to create that barrier and hiding under the title. I don't think it's useful.	are required to be called by titles. So you look at your lecturer differently and not as a peer and somebody is high up there and may be that also creates that fear which should not exist I think.
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L10: I do believe that, I truely do. **You know it's not a matter of departing knowledge but me guiding towards how they acquire the knowledge that they need, how they put together this skills into something tangible that's usable ultimately.** It's more of application, trying to show them exactly how to apply this thing. **So you give them the blocks but you need to put them in that stage to put the blocks together, to make it useful. So it's a two way stream. I can only take you to second level if you show that willingness to go with me to a certain level** because if I'm not getting feedback, I am not sure am I giving less or teaching at a level you do not understand. You know it's always a guess work. I: If you can allocate a percentage for those who are willing to be taken to the next level, is there a percentage that show that willingness? L10: In written assessments you do see a very small fraction. I mean my third year class is made up of **13 students. I can say about 3 students in my class are clearly on a high level** above the rest. You can see they do their reading, they do revision, they do their research and then unfortunately more than half the class is actually doing not up to the standards expected for a third year and there is some that are ?(9:24) not because of the way they engage the material but **some of them are actually semi-literate.**	Lecturer impact: not a matter of departing knowledge but me guiding towards how they acquire the knowledge that they need, how they put together this skills into something tangible that's usable ultimately. So it's a two way stream. I can only take you to second level if you show that willingness to go with me to a certain level. 13 students. I can say about 3 students in my class are clearly on a high level. some of them are actually semi-literate**.**
I: Please explain / elaborate on your teaching strategies? L10: So I've got a very interesting teaching philosophy. As much as I present students with a lot of material to look at and **I never prescribe a text book**. That's not useful at all. **I am a researchable kind of person and bring a lot of material and I help students gather all that material and I make that material available on one way or the other**. If you would like to photocopy, you are more than welcome and I give that beforehand. My	Teaching strategies: I never prescribe a text book I am a researchable kind of person and bring a lot of material and I help students

lectures are there beforehand so that when we are going into the lecture room, we are all engaging on the same level. There is no surprise. I don't treat it as a History novel and I give them at the end of that lecture, readings that people can go on and proceed to it. But as I've said I am very open to interjection. If you feel you want to interject at any point, raise your hand and let's get that done, even in the way of my assessments. **My assessments is not about regurgitating what you have been taught, there are more about it to use for application.** It's never right or wrong but have you been able to use that material and give us a convincing argument why your way of thinking make sense. Most cases might absolutely be wrong at the time but I reward for that because it shows to me a certain way of thinking that students are engaging in which who knows might later be the norm that we don't regard as the norm. And in cases where students don't do any assessments, I give opportunities for people to try to re-engage in these assessments. But **also taking into consideration there is a limit of the amount of opportunities you give.**	gather all that material and I make that material available on one way or the other. My assessments is not about regurgitating what you have been taught, there are more about it to use for application.
I: What is your opinion of interactive classes? L10: I enjoy interactive classes hmm in most cases I would prefer in Ecology outdoor classes whenever I can where it's not only theory but students can engage with their material practically. Because I believe seeing, feeling and experiencing is probably the best teacher than you being told something. **So if resources permitting I would like to have more interactive and engaging classes being outdoors with more relevant practicums.** That sticks more than anything. I: Are you able to do that? L10: Hmm **resources are quite limited**. You know Ecology is an outdoor discipline and with the current resources I'm allocated with it's nearly impossible. I: What do you do then for practicums? L10: So at the moment, lucky enough I use some of my protocol funds I have as a scientist and has the option to put it to some of my classes so that they can engage and have field trips. Because the allocation being allocated is basically R15 000 for teaching or modules. I think it's not enough. So for me it's not about allocating money to resources but for things that are required, we have the places supposed to go for field occasions making the vehicle viable so that they basically can engage with the materials. Because ultimately they not only competing against their peers but competing with other students from all the universities and there is 20 of them and the obviously the world abroad and it's not **how peers are come about to be competitive because other students are way out of their level because of their practical level of engagement.**	Interactive classes: if resources permitting I would like to have more interactive and engaging classes being outdoors with more relevant practicums. how peers are come about to be competitive because other students are way out of their level because of their practical level of engagement.
I: Elaborate on students' engagement and communication with you in class and in your office. L10: So if ever students that ask questions I can pretty much pick out their names and **2 or 3 students will ask something in class.** Always the same students and the **rest just sit and don't ask.** You know **whether understand or don't, they never ask anything.** So they are really not engaging and at the end of it all as I said they've got this consultation hours available and nobody actually get to it. I: So you teach just in English? L10: Yes just in English. I: So the Afrikaans students do they the English class? L10: Yes. What I did was, my first lecture I got ? (16:00) from 2 mediums and I asked them what they prefer because I was only able to teach in English and assess in English, were they comfortable with that or do they need a parallel medium and all of them agreed that they want to do it in English. That was it. The only thing they requested was it	Students' engagement: 2 or 3 students will ask something in class.The rest - whether understand or don't, they never ask anything. Afrikaans students are doing far much better than the English students. never got an email from a student 2 communications from students that I got and it is why they've missed an assessment

they could write their final exam in Afrikaans which I said Yes. I will make a marking guide available for somebody I can ask to mark that. I: Do you experience a difference between the Afrikaans and English students engagement? L10: Hmm not really, no precisely. I don't think that will put a distinction to it. I have actually to look at the marks, how they are spread out, not precisely. Hmm interesting when you teach in English you think the Afrikaans students will be suffering in it but you find to compare the 2 to split together, the **Afrikaans students are doing far much better than the English students** may be because of the English students they few more most of the ? (17:23) within the English class students. I: You've said they don't come to the consulting hours but do they send emails? L10: No I **never got an email from a student**. There is **2 communications from students that I got and it is why they've missed an assessment** and bring a sick note (2 students).	
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L10: **A lot needs to be changed** hmm as I've said I've the advantage of having engaged in several material being taught at the University of Cape Town, being a visitor at the University of Duke, being at WITS and now I am here. **One of the things I realized is a lot of things need to be changed with the material given to students** e.g. this is the **prescribed book for the course and this book is an old book**, a very old book and I can at least relate to 10 other books being used (19:13) to be honest. So I feel teach whatever there is and **slowly but surely start to change material** for the entire course because that needs to be send for approval. But I've **realized of how much of the material been taught is been outdated. People have to be up to date using your current journals and read.** It's easy and comfortable to use and design one thing on a course and continuously teach it over for years. But unfortunately **industry is continuously changing and continuously engaging industry and if you are not changing then you are not doing your students any favor.** It's a get out there. I: They have to apply their knowledge someday. L10: When you get there it is absolutely gone. I: How do you experience the motivation of the students? You have mentioned the 3 students asking questions and what about the rest? L10: The rest are quiet I don't know whether they are timid to ask and engage with me or is it they don't understand which is not allowed to engage and their assessment**....I am not really sure they don't realize that they don't understand** but the comforting things I have seen, talking from colleagues, people actually think I'm getting a good turnout in terms of how many students come to class because on average at least 80% turn up. So it sounds like turn up is good in terms of students coming for lectures but I'm not sure if they are turning up because they don't to be absent so that can be allowed to take exams or they are turning up because they actually enjoying the lectures. It's difficult to guess. That's why I'm thinking at the **end of the course, my last lecture is pretty much going to be one of those one-on-one talks to students to understand what they enjoyed of the course, to understand from their point of view what things need to be changed** or what they think. I am actually looking forward to that engagement at the end of the course. I: Are you aware, you are here in the Natural Sciences faculty and me in the Health Sciences teaching Physiology, do you have an idea of what we teach, Biochemistry and Genetics that we can sort of combine and support each other's subjects and bring the things together for the students as science. L10: I am glad you mention that hmm one of the things I actually mentioned and they opened their eyes and were like, we are the last strong holds, us it was UP, it was Free State and Rhodes. We are now only the last free standing	Relevance and usefulness of the module: relevance and usefulness of the module with the material given to students the material been taught is been outdated. Liaison: all the universities around the world have moved away from those very narrow splits. Everything collided into one thing, called Biological Sciences. clearly there is still a resistance and people want to maintain their speciality. most of us engage with university at the first year without actually knowing what we want to do and what our strengths are but now you are locked into this narrow stream and there is not much you can do and in terms with engaging with other faculties been trained, interdisciplinary in the way I engage in things hope that we can have more of that kind of engagements where courses a module is not structured by one person but several players coming into it, from all perspectives. we need to start looking at our content with a fresh perspective-is it translated to the performance of our students out in the industry don't know what the alumni are doing because I have never seen what their outputs are. to learn from institutions that said they got the recipe right because we actually have the infrastructure and then we need to revamp somehow to be highly competitive.

strong holds that got separate Zoology and Entomology and Botany because **all the universities around the world have moved away from those very narrow splits. Everything that falls in Genetics, Botany, Zoology, Entomology is all collided into one thing, called Biological Sciences** and that make sense because you want to bring scientifically trained individuals and they are more competitive out in the field. **But clearly there is still a resistance and people want to maintain their speciality** traits which I think is unnecessary at undergraduate level and very necessary after Hons, below that I think it's seriously unnecessary. Because if a student realize in the 2nd or 3rd year he is not good in Zoology there still an opportunity to do any other biological science he is been good at. Because **most of us engage with university at the first year without actually knowing what we want to do and what our strengths are but now you are locked into this narrow stream and there is not much you can do and in terms with engaging with other faculties,** I am collaborating with Virology and Microbiology. We've got a project going together and I am actually using their lab. We've got a fund for interdisciplinary together because that's how am **been trained, interdisciplinary in the way I engage in things.** My PhD was on influenza. It was more than me just looking in to the Virology, I had to engage in the Ecology of the animals. So I **strongly believe in interdisciplinary,** you know the only way I look at research and deduce and make any conclusions out of it is if I give statistics. So it's for me very clear that we need that interdisciplinary and bring the experts to teach. I was in a system when we taught as you say Physiology, we actually at WITS did a service. Physiology was offered by Health Sciences to medical students. There was a component where I went and teach Physiology of animals. Even it was just 4 lectures but that made a difference because then they get that part of Physiology from the point of view from an ecologist. **So I strongly hope that we can have more of that kind of engagements where courses a module is not structured by one person but several players coming into it, from all perspectives.** I***: Anything*** else you want to mention? L10: I **believe we have quite a lot of resources** having the institutions, we do. I think the **biggest thing is we need to start looking at our content with a fresh perspective where people need to start saying "what is it we are doing?" and exactly is it translated to the performance of our students out in the industry**. **I think that is lacking**. **I don't know what the alumni are doing because I have never seen what their outputs are.** They don't really know where they are. I would really like to know where do our students end up and how employable they are and competitive they are and that should be a very interesting dip stick so to say to see how we are doing and having seen what that translates **to learn from institutions that said they got the recipe right because we actually have the infrastructure and then we need to revamp somehow to be highly competitive.** So that we can become a leader in the space. There is no reason why we should not. I: Thank you	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 11

Questions and answers **Demographic data** **Lecturer 11(L11); Interviewer (I)** **25min 41 sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L11: Since 1988.	29 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L11: No I finished my doctoral degree at RAU, now UJ and for three years I was instrumental scientist and then I was offered the position here.	
I: Which subject(s) / module(s) do you teach? L11: Zoology undergraduate and Honors modules which I lecture. Currently it is third years.	Zoology
Self-efficacy questions: *I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.*	
I: Have you heard about the term student ***self-efficacy?*** L11: No as scientist we deliver scientific knowledge, so no. I: What is your understanding of the term student self-efficacy? L11: Those **students must be able to a certain extent, to prepare**. If they come to class and **ask questions, to know in which way to approach** it and if they need to submit assignments, they also **must follow the instructions in other words to sort of help themselves**.	*self-efficacy:* sort of help themselves
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L11: Well **nowadays not really that good,** so hmmm we have certain things that students must be able to do, so must learn how to write scientific reports, because many of our students leaving with a BSc degree or Honors end up in a situation where they must write research reports. So we do it as from the first year in a 'light' way and the second year I emphasize that they must be able to do it with **examples and nowadays we found with examples and feedback that they literally can't do it.** So it causes a very big problem. I: If you were to give percentages for students with high self-efficacy and with low self-efficacy, what would it be? L11: In the past we would with self-efficacy and with outcomes of marks we would find a normal distribution curve, whereby a few were very poor, and a few very good, and the biggest part of the class in the middle, they were average. **Nowadays we have two curves, the first curve below the pass rate, a small percentage with 50-65% and then a curve of 70% and above and even people who get 90%** which we never had back then. The distribution shifted, **but the biggest part in in the lower section.**	Student self-efficacy: nowadays not really that good. found with examples and feedback that they literally can't do it. two curves, the first curve below the pass rate, a small percentage with 50-65%. then a curve of 70% and above and even people who get 90%. but the biggest part in in the lower section.
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L11: Oh definitely. I must say because I am now lecturing for years I might have an outdated look, but my idea and when I was a student, and I also see it now with students who come back afterwards and thank me. I think you first **need to deliver the love for the discipline,** not just facts it's not just about the facts. So if you **stand in front**	Lecturer impact: need to deliver the love for the discipline. stand in front with enthusiasm and lecture and your door is open when

with enthusiasm and lecture and your door is open when they struggle with something, then I think you are a successful lecturer. The problem is that nowadays they struggle. **They don't have good reading abilities**, and not much of a reading background, so their **general knowledge is very poor** and there is **no general retention of knowledge**, so in the first year we built on what they did at school. **I build in the second year on that what they did in the first year and the third year lecturers build on that and the students just have no knowledge of the previous year and that becomes a problem**. We try to **address it with additional assignments** which we give, but that can also overburden the student to address these gaps but I think the **role of a lecturer is very complex lately. Multiple.** They **also come with their personal problems** which you must help address and I can't say no to a student.	they struggle with something, then I think you are a successful lecturer. don't have good reading abilities, general knowledge is very poor. no general retention of knowledge. role of a lecturer is very complex lately/Multiple. Help with personal problems.
I: Please explain / elaborate on your teaching strategies? L11: I have formal lectures which I give hmmm then because t**hey don't buy the books anymore**, I have extensive notes. I: Do you have prescribed books? L11: Yes. I: Is it finances or why don't they buy the books? L11: I don't know, because there are many students in class who can afford them, but **they say they don't buy a book just for one year. So I refused and resisted to give my notes**, because the book wasn't so expensive and to make it even cheaper, one of the books we prescribed, we use less than half of the book. So we discussed with the **publishers** and they helped with an **e-book just with those chapters so that is it much cheaper and still they don't buy it**. So that is a problem. So my classes is a **formal lecture,** formal in the sense that I stand in front and talk, but I like to **do it in an interactive way** and the students **must stop me and ask questions**. In the past it worked well and lately students don't want to ask questions. They come afterwards. **After my class there are about 30, 40 who come to ask questions,** but they **don't want to ask in class format.** And we also **have a practical component.** So in the practicals we can do it more, **unstructured, they still have a task, an assignment** which they must do and submit at the end of the practical or a few days later. To allow time to go and read, because they don't buy the books, and come with no books. But then we also use the practical class to have the willingness to come and ask questions and to speak up if they don't understand something that happened in class. I: If the 30, 40 students come to you at the end of the class, do they ask relevant questions or is it like "I could not submit my tutorial"? L11: Some of the questions are relevant and I see that it develops during the course. **In the beginning it is like "how do one spell this word?" and "I didn't know I had to do this" and "are you going to ask these things in a test?" but later it's more like they will come and say they differ from you and say they've read this and then it becomes more relevant as they gain confidence.** I: Does it show more understanding of the content? L11: I don't know it's always the same people. So I think it's a case of someone being interested in the field and want to know more or read something. **It's the same group of people who always comes to the front.** I: And the rest, do they remain voiceless? L11: They come late for class and leave early, before the class finishes, yes they walk out.	Teaching strategies: they say they don't buy a book just for one year. So I refused and resisted to give my notes. Publishers helped with e-book just with those chapters so that is it much cheaper and still they don't buy it. a formal lecture. do it in an interactive way must stop me and ask questions. After class there are about 30, 40 who come to ask questions-Some of the questions are relevant and I see that it develops during the course- same group of people. don't want to ask in class format. have a practical component. unstructured, they still have a task, an assignment.
I: What is your opinion of interactive classes?	Interactive classes: in the practical component

L11: We do that **in the practical component**. The class is a bit big and limited for the second years. We **always had 30 students in the second year, and the last few years we have 120 to 130 and our material didn't change. So we have the same material as for a 35 pax class. In class they expect everything to be given in different formats so that they can use technology. All my things are on Blackboard.** We sometimes have **interactive tests and class tests on Blackboard** which they must complete. They must submit a s**eminar to study the technique, write an overview article, manage literature** and look for their own literature and make an appointment at the library to show them, but **not everyone goes, because I can't force them to go.** So a very small percentage of the class go and do that, and then they must not hand in the overview article in hard copy, but **submit it on Blackboard to be evaluated for plagiarism** so that they can go through that exercise as well. And then in the practical component they must, we received some **IPads from CTL so that they can do virtual dissections**. The **limitations are the class is still too big.** So **10 students need to sit with one Ipad.** With me in class in the second semester it is a bit smaller, round about 80 students, because they drop out, but with me with 135 students it doesn't work well. So we try to do it, but it doesn't count for a formal mark, because then some students will be disadvantaged. I: You said the students come late and leave early, what would be the problem? Lack of interest? Or motivation? L11: Look in the **past it mostly were people that were interested in the subject and the field.** Nowadays you **still find a percentage that is in class out of interest,** but we are also a **service module for education students** and they are the ones **least interested** and they also have the least success and this year 5**5% of my class was education students** and that a big part of the class. **What they expect of us is to teach what they must teach on school level** and that is not the university's course. So they come at the end of the module and say they have learned nothing which they can use at school level. **Because they don't see the techniques we taught as a learning process.** Then there is a group pure BSc students whom I ask and ask, because in the practicals we can talk a lot more, why did you take Zoology? Why did you take this module? And then you are **astonished if someone say I need easy credits, you easily pass Zoology, and then they don't pass, because no module is easy** and if you don't sit down and work, and don't come to class, but if you repeat the module, you can do very well, because it's not a difficult module, but it's a lot of work and you must sit every day and work. **So we find a large group of students only taking it for the credits and not because of interest.**	always had 30 students in the second year -last few years we have 120 to 130 and our material didn't change. So we have the same material as for a 35 pax class. they expect everything to be given in different formats so that they can use technology. All my things are on Blackboard still find a percentage that is in class out of interest service module for education students - least interested - 55% of class- they expect of us is to teach what they must teach on school level they don't see the techniques we taught as a learning process. astonished if someone say I need easy credits, you easily pass Zoology, and then they don't pass, because no module is easy large group of students only taking it for the credits and not because of interest. Astonished if someone say I need easy credits, you easily pass Zoology, and then they don't pass, because no module is easy.
I: Elaborate on students' engagement and communication with you in class and in your office. It sounds as if they easily come after class with questions, and at the office? Do they make appointment? L11: No we all **have consultation hours** which we post on Blackbioard, **not that they care about that**, but it doesn't matter. If I am not busy with something, then **the student comes in and it happens quite often.** I: Do they send emails? L11: They **send many emails**, but their emails are not asking questions. It more like "I couldn't attend class", "I can't write test". Those type of emails.	Students' engagement: send many emails. have consultation hours- not that they care about that. the student comes in (office) and it happens quite often**.**
I: Give your perception regarding the ***relevance and usefulness*** of the module content that you teach. L11: In our department the modules are structured in such a way that the first year is a broad overview of Zoology. We are a double department, Zoology and Entomology. Entomology being only insects, insects are animals, but because of the relevance in agriculture it's a module on its own. So in the first year we have a single not even a full semester course where we only underpin them in the principles of Zoology and Entomology. Then in the second year we start with invertebrates, that now my module, and then they see the development of animals is from less complex	Relevance and usefulness of the module: that sense I think it was a successful programme which we will adapt now. Liaison: have on a regular basis, not every year, but every 3-4 years; we look at the content

to more complex and what the adjustments are and not all the detail they have to know, because the invertebrates in their book is thick, 800 pages to deliver certain principles which they can use afterwards. Then I concentrate because it was in demand, on poisonous animals and parasites I South African context. So we look at spiders, snakes, scorpions, and everything poisonous and it helped many students when they go into nature conservation and many of our students go and do that. **Our students go into education, nature conservation, and many of our students went to veterinary after BSc** and then they get credit for some modules because they did the programme here. In **that sense I think it was a successful programme which we will adapt now.** I: Is it natural sciences faculty and I am with health sciences faculty and lectures Human physiology. The students now have Biochemistry and genetics and everything. Do you know what these modules do? Is there some form of liaison in the natural sciences faculty? L11: Hmmm yes we are a few Biology departments, we get together regularly, and a **few years ago I was the program director for Biology. So we looked at the content of the Biology departments and modules together**. **Because the numbers became so big, and the workload of programme directors so much, there now is a program director in each section, genetics even have 2, the program directors still need to get together so that there is no duplication**, with us a certain lecturer resigned and she looked into forensic entomology and genetics captured that as one of their compulsory modules because they have forensic genetics. So there is a close look at the different modules, between the different Biologies. Regarding the other modules which our students take, first year they must take Math's, and Physics. And there **we have on a regular basis, not every year, but every 3-4 years; we look at the content** of that, because it won't help Physics for the Biology students which they will never use if they don't continue with their second and third year. So they have a **Biology input in their Chemistry and Physics which they do in the first year. It's looked at regularly.** I: How do you experience the students' motivation to study in general? L11: In **general much worse than in the past**, but there **always are students that's very much motivated** and who really wants to be here and often comes into your office and ask questions and who attend the practicals. Hmmm sometimes I get a bit depressed if I stand in front of a class and I love my field and enjoy telling them about it and **if you stand there and have all that energy and you don't get any reaction and most of them look like they are sleeping and playing on their cell phones. That makes you feel very negative, but there is always a certain percentage in class who is interested.** Hmmm I think it is a given and I don't know how to motivate them, we try, but **if you go into something just for the credits, it is very difficult to turn that person around**, but it has happened that someone took this module, without being interested and then ….18:26 they come back and do their third year, they come and do their Honors and M. I know have a student with me who is doing his M who told me he didn't really had interest in the field until he did modules with us and it changed him. So there are still people interested from day 1 and then some you can convince to be interested and then **the group who doesn't want to be there**. **I don't know how to address it and we often attend workshops at CTL**, but it feels as if there is nothing you can do about it, **but you shouldn't stop trying to work on their interest.** I: Do you think it has to do with the **school system**? L11: Definitely, because interesting we have **students from Zimbabwe, Lesotho, Namibia, where they still use the old school system, the Cambridge system.** If those people come into your class, you immediately know they didn't attend school in South Africa, because they have a total different approach, their work ethic is different, **they work harder**. They sit there because they have decided. It's as if the young people; and I don't blame them if they sit in front of me and is not interested. **I blame the system who didn't taught them nor empowered**	Biology input in their Chemistry and Physics which they do in the first year. It's looked at regularly. Motivation: general much worse than in the past. always are students that's very much motivated. more immature now when they enter university.. there is always a certain percentage in class who is interested. if you go into something just for the credits, it is very difficult to turn that person around. but it feels as if there is nothing you can do about it, but you shouldn't stop trying to work on their interest. . I blame the system who didn't taught them nor empowered them to know what they want to do. students from Zimbabwe, Lesotho, Namibia, where they still use the old school system, the Cambridge system. If, they work harder . I blame the system who didn't taught them nor empowered them to know what they want to do. but the solution would be that we improve the school system. we do -successful, we considered to stop it because it's so expensive, we have excursions. a long-term apparatus plan, but finances are a problem worldwide The budget stays the same each year and the costs increase (excursions).

them to know what they want to do, because sometimes they do it up to their third year and then they say they don't know what they want to do. Now they want to study BA, but don't know whether they want to. **They don't find direction in the system and then only try one or other qualification and you can't if that's not your passion.** So I think somewhere earlier it's not being addressed. They are way **more immature now when they enter university.** I: You said it became worse over the years. Any other comment which we can address to improve the students? L11: Look it's very difficult, **but the solution would be that we improve the school system, because hmmmm then it will immediately improve our work here.** So what we try to do and we shouldn't stop, there are r**egular workshops so that we can see how we can address it. What we do and is extremely successful, we considered to stop it because it's so expensive, we have excursions.** The first and second years have a group. The second group we had a day excursion to the Botanical Gardens, but to take 128 students to the Botanical Gardens became a nightmare, so we cancelled it now, but we had not cancelled our third year excursion, we still take the students because it was so much of a success on Honors level and there we **win so much lost field on an excursion,** that I wish we can do it from the first year, with these big classes. They come back from the excursion and say **now they know why they should write the report like this and that. They then understand things within context.** I: It is only about limited finances? L11: Hmmm yes because we use to take our third year to De Hoop nature reserve in Bredasdorp. It was a marine excursion and was part of the Fresh Water and Marine Ecology module in the third year and then they do the fresh water here where they go to the rivers and the , **it is short only for one afternoon and then we do it in the recess**, a full 10 days to De Hoop, but to take a class of 30, we at a point to share costs combined it with Plant Sciences, then we did Plant Sciences and Zoology and the Plant sciences students even though they don't have Zoology, spend two days with the Zoology students. There are very few students who take Zoology and Plant sciences, but only to see how the other side work, and for the rest we do everything apart and it was **phenomenal.** We did it for 24 years and it became ridiculously expensive. **It became so expensive that we can't do it anymore.** So now we still take the third years on an excursion, we take them to Willem Pretorius for 5 days (its closer). First we hired busses, because everyone in class could drive, and everyone had experience of a few years of driving. Nowadays we sit with third year students and no one has a license or if they have one it's for only 6 months. We can't give them the responsibility to drive a mini bus. We drive together, but still we can't take that responsibility. We then started to hire a big Sky bus, but it becomes so expensive and we can't afford it anymore. **The budget stays the same each year and the costs more** and we are just being forced. We still go to De Hoop, we just came back from there, but now we take the Honors class ho is 8 students and that we can still afford. We go to De Hoop because for those working on Invertebrates, there is a wide spectrum, mammals, birds for a wide spectrum of research, because each student already has a research project. We then choose an additional project which they must do in that week, which should link to their year project which they must do in the department, but it's very sad that we can't do it with the third years anymore. We attracted many honors students with the third year excursions. I: So it's actually the student numbers that limits everything? L11: Yes look the **student numbers increased tremendously**, but our **infrastructure did not**. We have second year labs which can accommodate 35 students and I have **55 microscopes here and now we sit with 128 students.** So I moved into the first year lab with 120 seats with no aircon. So if you sit there in the summer months with the practicums and not every seat has a microscope. So the dean, they have also been cut, has about 2 years	

to buy me material, but the material I buy is minimal. So its small numbers which they must share, so one desk for 12 students gets one set of material to share. So it becomes impossible to do, because they take chances. "You watched so I will just copy your sketch." And we **cannot address it in the near future. We have a long-term apparatus plan, but finances are a problem worldwide and when I speak to colleagues at other universities they have the same problem, c**lasses with 3, 4, and 5 times more but without the infrastructure. I: Thank you very much.	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 12

Questions and answers **Demographic data** **Lecturer 12 (L12); Interviewer (I)** **23min 44sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L12: I'm from 2000 involved, 8 years at this university.(17 years)	17 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L12: No then I was still a student. Completed my studies and started.	
I: Which subject(s) / module(s) do you teach? L12: I give Human Molecular Biology from the Genetics program on campus. I: Second or third year? L12: **Third year.**	Human Molecular Biology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L12: No (laugh) I: What is your understanding of the term student self-efficacy? L12: Self- efficacy if I must interpret it myself I will say **it's how they understand the work themselves without it being explained and how they can function within their own** framework.	self-efficacy: it's how they understand the work themselves without it being explained and how they can function within their own
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L12: In class they are for me, this year it's a **smaller class.** **I**: How many are there? L12: This year there is **7 students and they are much more independent as the bigger classes from the past**. I get much **more interaction from them and they prepare more and I suspect it's because they are put on the spot**. **In bigger classes you can get lost, but with the smaller class you get more involvement, prepare and come to class prepared.**	Student self-efficacy: 3rd year - 7 students and they are much more independent as the bigger classes from the past. more interaction from them prepare more I suspect it's because they are put on the spot Smaller class
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L12: I try to as lecturer to **make it interesting to trigger their interest and I think if your own interest is higher, your academic achievement will be better**, because you will read more, you will want to know more, and ask more questions. And I try to **give the data** not only like it is in the textbook, but in a way **to make them think**, ask questions themselves and trigger their interest in that way. In the past my students joked with their presentations at the end of the year said "yes {..} always know someone that is sick. I **like using examples from people I know**, to say its everyday things which occur, to **make it alive.**	Lecturer impact: your own interest is higher, your academic achievement will be better give the data to make them think like using examples from people I know make it alive
I: Please explain / elaborate on your teaching strategies?	Teaching strategies:

L12: Hmm basically I've got my **slides** from which I work and then I **try to work from their own experience**: have you heard of an uncle or aunt who complains of these specific complications?" I: From their world? L 12: From their world for example with an iron deficiency I'll ask who of you feel tired all the time. And try to get it to it can be because of your "how does your diet look? And try to make it a bit **more personal**, then that what I've learn I can apply to my family or on myself and when I see someone on the street "is this why the person act that way"" or "is this why this person looks like this?" Just those questions help them to think a bit further than what you read in the book.	Slides. try to work from their own experience try to make it a bit more personal experience. using examples from people I know.
I: What is your opinion of interactive classes? L12: I love it. The **more feedback, the more interaction, the more students speak to each other, the better for me**. I've talked to one of the lecturers form Medical school the other day, **hmmm the students get better over the years and especially the English groups do better with the interactive classes** which the Afrikaans groups have. Now I don't know is it the educational differences with the old fashioned Afrikaans students being taught you sit still and listen. You get much more interaction with the English class, but **nowadays the Afrikaans classes also pick up,** you get more interaction. I: If you say 7 students, is everybody English or Afrikaans? L12: I have, they are still split, there are 3 Afrikaans and 4 English students. I: Within that few students, are there still interaction? How do you promote interaction? You've said you ask question? L12: Yes it is like in a way, that's how I try to **ask questions** about it and promote it by **saying if you have a question about this section which is applicable to you, feel free to ask** and I get relatively many feedback from students saying the other day I felt like this, is it maybe that? I: Oh ok just to go and think a bit? L12: Yes I: Technology and so, Blackboard, do you use it? L12: I use **Blackboard for class tests** and all my slides are on Blackboard and in the beginning of the semester hmm I don't use it as often as I should. It's got much more applications which I can use but. I**: Sometimes it doesn't work and the internet is off.** L12: Yes I've also last year **with the fees must fall put many interactive stuff on Blackboard and many more have failed last year than before.** Last year 30 students were in class and it feels like placing stuff on Blackboard, the weak student, where in the past you could identify it and know where to give more attention that got lost during that time. So a student that is not motivated won't do it. I: Do you think it's important to keep up with times for example to use apps to be interactive or not? L12: With **postgraduate students I have this thing of WhatsApp groups**, yes a newer approach of communication with them hmmm undergraduate I have not applied it at all, yes and I think it may contribute in the future , but also in this specific module it **makes them lazy hmm if you with Human Molecular Biology gives them specific applications to use in the laboratory**, if they only want to feed that into an app and not have the guidelines as basis then if you get into a situation without technology or the technology fails you then you are in a situation you can't solve. So I try with the undergraduate students to **first get the principles in place, the ground principles**, and postgraduate we move to online programmes and apps and stuff.	Interactive classes: more feedback, the more interaction, the more students speak to each other, the better for me with the fees must fall put many interactive stuff on Blackboard and many more have failed last year than before makes them lazy hmm - gives them specific applications (apps) to use in the laboratory
I: Elaborate on students' engagement and communication with you in class and in your office. Do they ask questions themselves, or are they with you or not at all to ask questions?	Students' engagement:

L12: I especially get **from this small class a lot of questions if they don't understand they immediately stop me and ask** if I can explain that term again or explain from a different angle which ones again got lost with the bigger classes. I also get students that are **shy to ask and then they will come afterwards.** I: In class afterwards or here in the office? L12: They will come **afterwards to my office** and then they say there is a thing which they don't understand and if I can just go through it. I: And emails? L12: **I encourage emails**, because I tell them if they write it down, and from your questions on paper, it also helps them to understand what the problem is and I've communicated it like that to a student who asked me to phone her. Then I said I am not going to phone you, I don't feel comfortable to share over the phone. Send me an email, put all your questions in an email and I will respond to that email, and I ty to do it within a day or the same day. I: The email they send, is it about the content, where they write test, the venue and such technical things? L12: The technical stuff, the specific student asking me to phone me said she needed help and I said put it in an email and she rather preferred to physically come and discuss it. Hmm I also get the idea that with the **physical discussion students also try to fish what will be in the paper**. So that's one of the reasons why I prefer to keep it more formal in written format. Hmm so that a student can't come back and say you said this and it's potentially not what you said. I: They twist the words. L12: Yes (laugh).	from this small class a lot of questions if they don't understand they immediately stop me and ask. shy to ask and then they will come afterwards. physical discussion students also try to fish what will be in the paper
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L12: If they continue here in our department with postgraduate studies it is **directly applicable to their postgraduate studies.** Many of the modules they take postgraduate, is an extension of the modules they have now. So I specifically **recurriculated this module in 2010 to make it more applicable for postgraduate** because we saw out students come from undergraduate and have no clue what is expected postgraduate. So then I recurriculated the module with [,,,] to be an introduction to postgraduate. So if they continue with postgraduate, they will use it. **If they go away and do it elsewhere I don't know if it can be used in their future.** I: And their work? L12: If they **only go and work especially with the third year students they come here with no medical terms, if they haven't had Physiology, Anatomy or Histology** or one of those modules I first try to learn them that for if they go to place like Quintiles and Parexel and they sit with a document in front of them to analyse so that they know what it means or how to analyse it to know what it means even if I've never heard of it before but I can go and look of what word the term is made of. I: Ok so it's adapted for them in that way. L12: Yes I: Then I want to know we sit here in Health Sciences faculty but they actually come to Natural Sciences. Is there any liaison between you and Natural Sciences to in a way so that you can know what is happening in the students' modules? L12: We **get together at the end of each year with the program director of Genetics BSc and speak to them about their modules content and what they expect from us and to avoid overlap.** I: With that Genetics and this Genetics.	Relevance and usefulness of the module: directly applicable to their postgraduate studies. If they go away and do it elsewhere I don't know if it can be used in their future only go and work especially with the third year students they come here with no medical terms, if they haven't had Physiology, Anatomy or Histology. Liaison: get together at the end of each year with the program director of Genetics BSc and speak to them about their modules content and what they expect from us and to avoid overlap

L12: Yes with Human Molecular Biology because there is overlap, but let's try and restrict that. So we sit with them and they say what they expect and its being done once a year. I: This initiative comes from you or from Natural Sciences? L12: It came from [HOD from Health Sciences] side, because **he is program director of Human Molecular Biology and he is driving force** behind it. We have the advantage of **one of our colleagues who in our department also lecture one of the modules**, moved to genetics so we have that reference point. So we have [..] there and I know what is happening in her module and she knows what is happening in my module, so we have that reference point. I: How do you experience the students' ***motivation i***n general, the third years? L12: It depends on what they want to do the next year. A student saying I want to do **honours in this module, they are very motivated.** They come and look at the laboratories, read, ask questions about other things they have read. Students that want **to go and work, they want credits, want to get their degree done with some fun. I see it with repeaters**. Repeaters I would have thought, I never was in that situation, but it feels if I must have been in that situation, I would have worked so much harder to pass that module. Hmm the **repeaters from the year come specifically, they ask must they really attend the practicals, can't they get the marks of last year's projects?** Then I'll say you got 50 or 52% for your project, don't you want to do better? **No I just want to pass.** No I don't give them that opportunity. **I tell them they must again attend practicals and do their projects,** because I want them to at the end have a better product, hmmm yes but the motivation is they want to go and work. They want the degree, want the paper, and want to go and work. I: Any comment from your side of a trend amongst students or something that you pick up or a difference between Afrikaans or English or anything I haven't touched on? L12: Students in general over the last few years it feels for me they are being taught to ask questions to be independent but they **still expect to be spoon-fed.** Hmm we see it with our postgraduate students also. You can't just leave a student to carry on with their projects you must sit with your student on a weekly basis and it's not only the BSc students but also with the Medical students which I work with. **They sit back more and expect more of you and it's a problem especially with the White Afrikaans students.** It feels as if nowadays they sit back more and expect you to do something for them. I: What will you ascribe it to? L12: Well the students I spoke to say **it doesn't help in anyway.** I: To get a job? L12: I would in any way **struggle to get a job,** I will in anyway be disadvantaged which for me is the wrong approach. It feels like if you are in a situation where you as **Afrikaans male will struggle to get a job**, **more than in the past, you must work so much harder and I see the opposite with the students**. **They sit back because I will in anyway struggle**, so what? It's a problem because some Black students from poor circumstances, in the mornings take 3 taxis to be here on time, then I get a student 1 kilometre from campus or in a hostel on campus who comes half an hour late for class and it feels that cannot be addressed, that is **self-motivation.** I: The **school system**, can that also have an effect? L12: It's definitely a problem. We see with students, our postgraduate students we let them write a basic test in the beginning of the year, so an **entry test to see where they are at that moment and each year it gets worse and it is across all domains**. We had an average of 80% for that 100 mark test 10 years ago and now it's less than	Motivation: Those that want to go and work, they want credits, want to get their degree done with some fun- repeaters- no I just want to pass still expect to be spoon-fed. sit back more and expect more of you and it's a problem especially with the White Afrikaans students it doesn't help in anyway -struggle to get a job. Afrikaans male will struggle to get a job, more than in the past, you must work so much harder and I see the opposite with the students. They sit back because I will in anyway struggle school system? entry test to see where they are at that moment and each year it gets worse and it is across all domains. try with our Honours after the test, to identify gaps. it feels as if it's already too late.

60%. You know it's the top students we take from BSc and its basics we felt they've learned at school. Their Mathematics abilities, their Physics and Chemistry skills which we sometimes use, are much worse. I: How do you address that? L12: We **try with our Honours after the test, to identify gaps**, but it feels as **if it's already too late. It** must have been done by then. I: Thank you very much	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 13

Questions and answers **Demographic data** **Lecturer 13 (L13) Interviewer (I)** **28min 35sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L13: For about 5 years. I: What have you done before the 5 years? L13: I have been in administration, research development. I: Here at the UFS? L13: Yes I: When did you get your PhD? L13: 2008 I: Did you start teaching after that? L13: No I went into research administration.	5 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L13: No.	
I: Which subject(s) / module(s) do you teach? L13: At the beginning I taught Nursing students because they have Microbiology as a subject and I changed over to teach the Microbiology students of the Natural Sciences Faculty and I do it for the past 3 years. I: 2nd or 3rd year students? L13**: 2nd year** I: Our conversation is just going to be on undergraduate students. L13: Yes	Microbiology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L13: Not yet. I: What is your understanding of the term student self-efficacy? L13: Efficacy? I: **Yes how effective they are in the class.** **L13: They are not.** I: Are they not? L13: They are not. I: Do you teach only in English? L13: English and Afrikaans.	Student self-efficacy: They are not effective in class. Afrikaans classes –small- get some interaction from the Afrikaans class but is it really difficult to get it from the English class - diverse backgrounds unless you force them to do something see them come alive in practicums Perhaps in the practical they know they have to get a result -Exactly.

I: Do you experience a difference between the English and Afrikaans students in their efficacy? L13: To some degree hmm the English classes are mainly large and the **Afrikaans classes are quite small**. So you **get some interaction from the Afrikaans class but is it really difficult to get it from the English class.** I: Why do you think? L13: I think it's a **large setting for them.** I: What's the number? L13: **200.** It's large. So obviously they may be afraid to ask questions and obviously they come from **diverse backgrounds**, public schools. Private schools. Where as the **Afrikaans are small groups and possibly they may have been gone to the same schools and closer** so they are comfortable with one another. So it's easy for them to interact in class and not feel like being stupid in front of their own groups. As with the English class it may be a bit different. I: You gave now the ***indication that the self-efficacy*** in class is not good at all, what made you say that according to your experience with them? L13: Well as I said **they don't really open up a lot in class unless you force them to do something** so then taking initiative and asking questions and want them to ask questions. You don't see that often. I: So they are just quiet? L13: **They are just quiet**. But I must say it's **different when you get to the practicums** because there you **give them sort of practical meaning** of what you teach in class and that is when **they starting to put 2 and 2 together** and also the setting is that you force them to do something and they don't want to make mistakes so then **ask you questions and you see them come alive in practicums** but not so much in class. I: **Perhaps in the practical they know they have to get a result.** **L13: Exactly.**	
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L13: Hmm obviously what I said about the students the **subject for them is quite difficult. They don't understand a lot about the subject.** You **teach them about things they cannot even see,** they cannot perceive with their eyes. **Some of them came to university because they want to do Medicine** and because of the admission criteria they could not be admitted and they end up in my class. So in that sense they **might have built a negative attitude towards the course**. So the first thing you have to do is to make sure they have a better understanding of what the subject is about and how they can **relate to the subject** and **I think once you get them into that space to get into the bigger context where they can relate to the world of micro-organisms that's when you can see the attitude is changing.** I: It comes a bit closer to them in their own world sort of. L13: Yes make more sense of it how it impacts their lives you know, either beneficially of detrimentally and **give examples to them that they can relate to** for them to pursuit the world of Microbiology to guide them and I think that's a critical part that I have to play in this whole thing. **I at least get them to buy into this courses** and I think once we've overcome that ?? 7:17 it becomes easier to them to even take initiative and try to read up especially when they go to practicums because some of the things **I want them to do is to bring materials you know from their home environment and bring that into the lab.** So I think is in so doing I am able to bring them into my world of Microbiology. I: To make it more familiar to them? L13: Yeah otherwise it's just a foreign concept and if it's foreign and they are going to do bad in their grades.	subject for them is quite difficult. attitude towards the course – want Medicine selection. once you get them into that space to get into the bigger context where they can relate to the world of micro-organisms that's when you can see the attitude is changing. give examples to them that they can relate to

I: **Please explain / elaborate on your teaching strategies?** L13: Well it's been evolving over time because **initially when I started** off it was **just me giving class** and then they were not responding the way I wanted them to respond and one thing I am gonna to do **next year (**laughs) is to **build up their own outcomes for the module.** I: For what they want to achieve? L13: For what they want to achieve. So I'm gonna present in a way with each lesson they are gonna **try out their own outcomes** and it **will be a part of my assessment** you know for next year hmm in a way try them to be more pro-active more involved. So it's something that I haven't done up till now but it's something I gonna do going forward. I mean **we do traditional way of classes, power points but there are also videos** that I use, especially where I want to demonstrate certain techniques which I can do in class but also physically in practicums. So there is that sort of **technology that plays a role** but as I've said it's just basically them absorbing the information especially in a class room set up and hopefully with me encouraging them to come up with their own outcomes before should go out in community in a group and **do something community based** what they've learned in class and that way they can at the end of a semester say that you know we were able to do what we **wanted to and we feel we took part of our module**. I: Yes having something to give back. L13: Yeah I: While teaching in the class how do you experience their effort and initiative? Do they show some initiative, do 1 of 200 students show some initiative to sort of be more involved? L13: Once in a while. It's not something that you get daily. I **present about 5 chapters and at the end of each chapter we have 1 revision session** for that particular part. So that's when you see them **starting to ask questions but during the course of presenting that particular chapter there is no interaction whatsoever.** So it's only when you get to do the revision and they get the second go of going through the material and they just want to put 2 and 2 together that's when they get to ask questions. That's not on a daily basis.	Teaching strategies: build up their own outcomes for the module. try out their own outcomes and it will be a part of my assessment. we do traditional way of classes. power points. also videos -technology that plays a role. present about 5 chapters and at the end of each chapter we have 1 revision session-. start to ask questions but during the course of presenting that particular chapter there is no interaction whatsoever.
I: **What is your opinion of interactive classes?** L13: I think **it's good** because that now it says that taking ownership of what are being taught and it also **pushes me a back a bit to stay on my toes** and that's something good about it but if **I'm just sitting there and give the material and is no push back** you know **I also fall into a comfort zone of thinking what I am doing is good** when I could be responding to a question in a particular way looking at certain examples to make it you know easier for them to understand the material but **if you are not push back, you think the examples you are giving are adequate and that could not be the case.** So it's good you know to get a push back from the students for them to interact but to give the class the **dynamic it's a bit difficult to hmm to get them into small groups and get them to interact more with you.** Something I can do with the Afrikaans group but something I cannot do with the English class. I: You said the English class is about 200. L13: 200 and Afrikaans is about 20, 30, 40. It depends on enrollments in that particular year. But with the practicums you know obviously I have to move around and the structure improves and is easier to move from one group to the next. So in that setting it's sort of easier to have that interaction and they are more afraid to even ask questions because it's a small group and they **group themselves as friends** sometimes and there is a bit of you know, an element of **comfort for them been the safety net,** they won't be charged if they ask questions. So in **practicums you see them come out more lively and more interactive but in the lecture as I said it's a bit difficult.**	Interactive classes: pushes me a back a bit to stay on my toes. If I'm just sitting there and give the material and is no push back you know I also fall into a comfort zone of thinking what I am doing is good. practicums you see them come out more lively and more interactive but in the lecture as I said it's a bit difficult.

I: How do you encourage interaction? By asking questions or group work or what? L13: It depends, sometime we do group work but sometimes I then have to force it at the beginning of the lecture. Just to re-emphasize some of the principles that we may come across the previous day so I have to have to answer questions but it's really **difficult to get a response for the entire length without having to point to someone** (laugh) yeah but…	
I: Elaborate on students' engagement and communication with you in class and in your office. You have mentioned that they are not that open to ask questions but do they come after class to you? L13: Yes you see them coming after class so I don't know whether it's also a question of language of a good command of the language. It's **better to speak to me in private because they do stay behind** while I get ready to go out and **even walk with me some of them and ask questions.** I: Do they ask about the lecture or about technical things? L13: No **it's about content** and sometimes they do **visit me in the office but usually closer to the test and exams** (laughing). I: I want to ask more about the office. Do they send you email or come here? L13: No **they just rock up** because I do give them my **consultation hours so it's during those hours they mainly come** in but sometimes they do **send me emails of wanting to see me** especially during exam time because some of them may not be on campus but closer to the date of writing they want to see me before they going to the exam.	Students' engagement: better to speak to me in private because they do stay behind . even walk with me some of them and ask questions. it's about content and sometimes they do visit me in the office but usually closer to the test and exams they just rock up . consultation hours so it's during those hours they mainly come . send me emails of wanting to see me
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L13: It **depends on what they want to do in the future** you know for **nursing students it's definitely important** because they have to deal with sick patients . With me and my currents students, it depends on, **some of them are just doing this to get into Medicine** but obviously there are **some elements that they could take forward with them but for some they might want to go into business**, **some into law** and become ?? 17:15 attorneys. **So must have some understanding of the science** you know the science. So I think it depends on what they want to do and Microbiology is so diverse. It has **relevance to the food industry, pharmaceutical industry, in law, business** depending on whether they want to set up their own company, so depends on what they want to do. Some even make up 180 10, nothing to do with Microbiology going forward. But what I teach is basically introduction to Microbiology, based on the fundamentals and wherever they go doing something Microbiology related, those **basis will always be there and which is why my module is so important going forward** you know if they don't know those concepts is will be difficult for them going forward. So it's really a critical module in terms of what we present in this department. I: As part of the BSc degree? L13: Yeah I: How do you experience the **motivation** of the students? You've said now many want to get selected for Medicine, now they come here. How are their motivation to complete the degree and go forward? L13: Well you know each year, first day I give them a test by answering questions on their motivation and what it means to them if they pass the module, graduate to them personally, to their families and if they don't make it how will their families feel and you can see from their answers they are quite motivated. **They want to make their families proud.** So **that's what they get into my course with,** those levels of motivation but obviously life happens in between when they come in and go out. So some of them still going on motivated but some of them, thing happens in their lives and get affected. So they do effected but they do write test and I can see from there…	Relevance and usefulness of the module: depends on what they want to do in the future. relevance to the food industry, pharmaceutical industry, in law, business. Motivation: They want to make their families proud. really motivated-15%. they end up here for something they not even passionate about so there is no motivation. when I get to

I: How they are motivated or the reason being here? L13: Yes I: And if you have to give a general percentage for those really motivated? L13: Yes you see at the end those guys get a distinctions and ask about doing Mi**crobiology** in the third year and possibly Honours level, **so those guys it's about 15%.** I: In that test that you give them do you ask them why they took Microbiology but some of them might just take it for the credits. L13: Yeah I: Just to carry on with the third year? L13: They do say that so there is no motivation. It's just **about getting through the programme and getting a qualification**. They have been told go to varsity and study and **they end up here for something they not even passionate about so there is no motivation.** So you do see it in how they respond to my questions. I: What do you do about it if you get the test and read it and see there is low motivation? L13: So I do call them in and speak to them and try to understand what's going on. Usually with bad test grades I can look at their mark and look what they wrote in the beginning and make sense of what I am seeing. So those that I can read flat at that point and say what is going on here but it's really difficult with the first test because it could have been an once off event but it's actually **when I get to the second test when I see some patterns and at that point it's also a bit late to intervene.** I: Because it's just before the exams? L13: It's just before the exams. From the first test I can see it can sometimes be a once off. I: The last I want to ask you is I am from […] with the […] students and you are here in […] with the […] students. Do you sometimes as a faculty come together with the programme directors discussing what's been done in […], […] and […] to know what's going on in those modules to sort of redirect your modules to fit in with those principles? L13: At first year modules I know we have a common module represented and is basically and is usually **people from […] and us coming together and yeah but I think this is as far as it goes. But I do know from this year we have sessions as a faculty where we talk about teaching and learning and how we can all improve as lecturers to have a meaningful impact**. This is something going on **for I think a month now** which is **organized from the Dean's office.** So from that I think you get a sense of what other people is doing but in terms of what we present I think it's mainly principles that's been sent out of what we give for […] or […] and they will say what is relevant or important to them on the […] side. But when it comes to practical side obviously there is a lot of overlapping because most of our techniques is pretty similar so I think it also helps to grasps some of those concepts they are taught in […] they do them with us, they also do them with […]. So in a way it reinforces what they are learning. It could be good for them when they leave here they should be competent enough that they can go and work at some […] firm or even be competent to work in a […] laboratory. So in **terms of the techniques they acquire there is a lot of overlapping.** I: You said you are teaching for 5 years here now. During the 5 years have you experienced a decline in the standard of the students you teach? L13: No no **I think they are getting better**. **I am not sure is it me getting better and get more out of them** hmm but I would say they are getting better, the students. I was having a discussion with one of the guys here in the department and he also said that's what they pick up from the students that the **quality that is coming in is much better especially** those **guys that come through the extended programme** from the South campus. I also	the second test when I see some patterns and at that point it's also a bit late to intervene. Liaison: coming together but I think this is as far as it goes. from this year we have sessions as a faculty where we talk about teaching and learning and how we can all improve as lecturers to have a meaningful impact. I am not sure

remember the programme director saying to me that over time they get better through the extended programme do much better at varsity than guys that came straight from schools. I: How many come from the extended programme? L13: I wouldn't be able to tell and give you the numbers but obviously I would be able to tell if I get the student numbers because obviously they have to spend one more year there that those coming straight from schools. I: They **are older already and more mature.** L13: And they're **given the soft skills.** There is a bit of difference between the two, they seem to be more prepared for varsity than the guys that came straight from school. I: Anything else you want to mention about the students? L13: I think you know they just need people who care for their education. I think it's so much that they can do and they need direction and **that's where we come in** hmm and **I think if we are better skilled to become better lecturers we would actually get more out of our students**. I think most of them are at a point where they can be self-efficient to prepare and start reading up. **Not all of them come from backgrounds where they were given the soft skills to be self-starters** so I think we shouldn't be too critical of our students that come into the system that **we need to lean more on ourselves to look after them.** I: Thank you very much.	is it me getting better and get more out of them. quality that is coming in is much better especially those guys that come through the extended programme - are older already and more mature. Not all of them come from backgrounds where they were given the soft skills to be self-starters. we need to lean more on ourselves to look after them.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 14

Questions and answers **Demographic data** **Lecturer (L14); Interviewer (I)** **22min 42sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L14: I have started in 2010 as a junior lecturer and started lecturing up to now. I: So 7 years? L14: Yes seven years, this is my seventh year.	7 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L14: No started my studies here and started lecturing here. I: So after your studies you just continued here? L14: Just continued.	
I: Which subject(s) / module(s) do you teach? L14: I've started with the **second year module** […] with about 250 students and just lectured for the Afrikaans group. We had a lecturer who couldn't speak Afrikaans. Then I started the **third year module** in 2011 and just a third of the module and also a Honours module in 2011, full module, speaking of Honours numbers so 10 and third years were 140 and from there every year a third year module, full module by myself […] join me with the Honours module. Now I have a […] third year module. For the last 3 years I've also given a section of the second year module, but I'm done now. My **full responsibility is the third year module.** I: What are the numbers of the third year group? L14: Third year up until last year was about 150, it split last year and now I only give for Forensic Science students […]. We speak of about **46 students** so it's drastically less. Next year it will pick up because it has been combined again so that my module is also an option for the Genetics students. Sorry if I only need to elaborate in the […] department we have […] too. My focus is the […] and that's why we had the split-off.	Genetics 2nd 3rd year
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L14: No not really, I lie to you, I haven't even thought of it. I: What is your understanding of the term student self-efficacy? L14: It **feels to me how effective they are in the learning environment with their own independent studying and asking questions and understanding of the module**, I will say.	Self-efficacy: feels to me how effective they are in the learning environment with their own independent studying and asking questions and understanding of the module
I: Now with that understanding of self-efficacy how do you experience self-efficacy in Natural Sciences students whom you teach? L14: **Actually not good**, my students don't have a good understanding of the module and need a lot of guidance the third years. I must add the […] students are of our **top BSc students.** They are **being selected because we can take a**	Student self-efficacy: Actually not good. top BSc students being selected because we can take a limited amount. students with really high HAP-scores. I really struggle

limited amount of students. So you speak of **students with really high HAP-scores**, in my days it was the M score. They can study old test papers, I ask the same questions and rephrase it a bit and they are totally confused. **So I struggle, I really struggle currently, more than any other previous year.** I: If you think about them, is there a percentage that **function higher?** L14: Definitely, but this year it's a very small percentage, I'll say between **15-20%** If I must guess. I: And the rest very bad and poor? L14: Very bad, very bad, and like I've said for the actual group it is worrying. I: You expect more? L14: Much more.	currently, more than any other previous year. Higher self-efficacy- 15-20%
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L14: Definitely, I often think [subject] is also a understand thing and now I feel I can't just enter and present the material and say there you go. It feels that on **third year level** I must **ask an interpretation question in the test and exam, I can't just ask theory**. **It feels as if I have a responsibility to give them examples to work through and additional material to go though. I can't just say here is the theory and then ask for application**. I still feel that on third year level my role is still big to help them that bit. We have practical sessions, but is more molecular wise because it's more [subject] techniques. So in class I try to give additional examples and work through additional problems and say ok let's as group look at this problem, just to help them that bit. That what I offer currently. I: Giving guidance and guidelines? L14: Yes **providing guidelines and guidance and work through problems**. I: Do they get it; do they know that's what you are doing? L14: I'm not sure, I'm not sure if , I get many names from n huge percentage of my English group and much less from the Afrikaans group where as I do the example, they work with me, work together and say I'll quickly do the calculation and then I get 4 answers from the class. **So I think there is a group that realise and then there is a group that think she might ask this in a test and then they only study that. It's unfortunately my experience.**	Impact of lecturer: 3rd year - must ask an interpretation question in the test and exam. can't just say to them here is the theory and then ask for application. It feels as if I have a responsibility to give them examples. provide guidelines and guidance and work through problems. So I think there is a group that realise and then there is a group that think she might ask this in a test and then they only study that - unfortunately my experience.
I: Please explain / elaborate on your teaching strategies? L14: Ok ok it's very elementary. I won't lie to say I make **use of many techniques**, but something I offer and **I feel it helps a lot** is **not only a textbook.** There are a fantastic amount of textbooks available in [subject] which gives you all the information, but what we do is **we compile the study material from different textbooks which gives them additional stuff to understand** the module better because sometimes a textbook gives one person's perspective. So I feel we give additional information. Then we do the plain **PowerPoint presentation**, nothing huge. Like I've said my **practical sessions** also give them the opportunity to ask questions. On third year level they must do their work independently, so I don't offer more than the examples they must work through, but I also **give them ample opportunity to come and ask questions**. I have an open door policy, email me, but it's my teaching strategy for the third year. I: Blackboard? L14: We do **Blackboard, but limit its use on third year level.** I don't place my PowerPoint presentation on Blackboard. I have had many bad experiences there where students, because its **summaries, and students only going to study that, and then they have no clue of where it fits into the world** of [subject]. They can write down a term and the moment I ask describe the term, they have no cooking clue where it fits in. So I was against it, limit it on the third year level and only use it for notifications. I **don't make use of class tests** a lot. They however do have a **report to submit** and many of **the theory work together with the practicums just to give them more experience of how this theory fits into practice** and how do we do it in the laboratory and what report do we get from it. But other than that with	Teaching strategies: use of many techniques. not only a textbook. we compile the study material from different textbooks which gives them additional stuff to understand. PowerPoint. practical sessions. don't make use of class tests but has a report to submit.

Blackboard I'm a bit, we used it more on second year level, with class tests with the bigger classes. It feels to me the value, I struggle with that, then its multiple choice and on third year level you can't still, they have to able to reason and interpret stuff, so we use less of it.	
I: What is your opinion of interactive classes? L14: I like it, but.... I: Does it happen? L14. **No not from their side,** and with [subject] the students like watching CSI and have a misperception thereof. I open my classes, you put up your hand and ask me a question even I it's not relevant to what we do, but it's as from this year, it's like I want to get through the class and finish. There **isn't really interaction**, like 1 or 2 students will come afterwards and say, this was interesting. **I try, I bring things up that's in the media,** like the [name] case, it's very relevant in terms of genetic evidence and try to stimulate a discussion, sometime they **take part but on very elementary way**, very elementary. I: No insight, interest, motivation? L14: **Interest, motivation and insight, I think all 3 and unfortunately all 3 are not there**, all 3. It feels to me as if students went from real interest to I just want to get through this class to the next one to jump through this one to get to the finishing point. I: Have you thought of possible contributors? L14: We tend to blame the school, **they really just have a never mindedness**. I must say I'll have to share an experience I had and it may be because the [subject] science students and **many of them their interest is not at the [subject] laboratory**. I also experience that [subject] is not their field, because I've always had [subject] students and the Forensics **were super interesting to them, because it had application**. I think it might contribute to my problems this year. One pertinently put **up her hand and said she doesn't know why she should study this, why is it important for her**? That to me is short sighted, **they just look into a career and jobs in our BSc field are very scarce, they think they will walk into the perfect job**. They **don't realise they should qualify themselves as wide as possible** to have more options and I tried to explain it to her that the chance at ending at a crime scene is not 100%, so we try to prepare them for a wide spectrum, but they are very short sighted and I want to do it and I don't see all these other stuff, why is it important? So I think that is also why I don't get their cooperation a good day. I: They are not open? L14: They are not open to something else; I want to do this and nothing else. However I do get students that come to me at the end of the semester and say I wanted to do [subject] science and I see Genetics is my field. So I can't generalize. But with a **smaller group and more personal interaction**, with the group of 150, it was masses that came to speak to me and I've experienced it very positive. It also makes a difference this year.	Interactive classes: No not from their side. isn't really interaction. I try, I bring things up that's in the media. take part but on very elementary way. Interest, motivation and insight -unfortunately all 3 are not there. they really just have a never mindedness. many of them their interest is not at the [subject] laboratory. Forensics were super interesting to them, because it had application. don't realise they should qualify themselves as wide as possible. don't realise they should qualify themselves as wide as possible.
I: Elaborate on students' engagement and communication with you in class and in your office. L14: Actually quite good, **those that come and speak feel relatively comfortable with me,** they ask questions, the individuals that do. I: And afterwards? Do they come and ask? L14: They prefer it; especially the English class prefers it. The Afrikaans class we really speak of a small amount and they are a bit more, maybe can speak to me easier, but the **English class like to speak to me afterwards** because it's a bigger class even though they participate more with an example, but if it's about I've read this and want your opinion, then they rather come afterwards. I: The questions they ask afterwards, does it relate to the content or only when do we write test?	Students' engagement**:** those that come and speak feel relatively comfortable with me. English class like to speak to me afterwards more content bound, and something that popped up in the media and they want to know how this fit into this scenario. send me many emails. come in and ask but they prefer after class

L14: It's **more content bound, and something that popped up in the media and they want to know how this fit into this scenario**. So it's relatively relevant to the module and not only about semester tests and those things. I: And the communication at the office, do they come here, send an email? L14: They **send me many emails**, but this year I had less than previous years, every now and then one will **come in and ask, but they prefer after class**, it's just an easier option. I also think the buildings and entry to the buildings, put them off. I: Where are the lecturing venues? L14: There are the other venues, I walk there and lecture there. I: Far away? L14: We lecture there so I think it's too far from my office and I think if I was there it would have been easier to pop in and ask a question.	
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L14: Personally I think it's very important, **it's very important, because for you to work in a forensic environment, you work on the crime scene to gather DNA evidence for the analysis.** So if you have no clue of what is happening in this milieu, it has a great impact on what you do here and they don't always realize it, but we refer to DNA as the golden standard for forensic evidence. So it's really of your most important, most discriminating proof of evidence which you can gather at a crime scene. So **I feel the value is very important** and I mean I also bring in which proof of evidence you gather for DNA, what is the process through the laboratory. So **I think it's important for their future.** We have a great amount female students and I also want to give advice on scene analysis in South Africa which is dominated by men to a great degree, and for a good reason, because it's so dangerous. You go to a crime scene yourself, it's a tough world. We try to say, just know, you have an alternative option. You can always go and work in a laboratory setup and this is your other option. So I think it's really very relevant and can't be more important to them. I: We've now talked a bit about the motivation of the students, but overall if you must give a percentage of their motivation? L14: Do I now only refer to my third years? I: Yes for the ones you lecture for. L14: **High motivation I'll keep to 20%. Low motivation will be more if I just look at my pass rate with the semester test; it was 11 out of 40 students which by far didn't pass**. **Class attendance is at about 40%,** so I'll say yes, my colleagues experience the same. So I'll say **high motivation between 15-20% and really low motivation at about 30% and then you have the students in-between.** I must say it's a unique year, I can't lie about that. I: Do you think there is a reason? Are they scared of something? Are they demotivated about happened with the strikes? L14: I don't know whether they are demotivated. My head of department lecture to a group of my students and also another group and he experiences the same. He also struggles with class attendance and he has much more experience with lecturing than me, a fantastic lecturer. I: How do you experience it, the students are now very busy, tests, assignments and can't cope with everything. **If they write a test on the day, they don't attend classes.** **L14: That I experience.** My students in the contrary are very **upset if I tell them we write the test in a practical period and very upset if they have class with me before that**, but I don't feel I can give the class off. I have a module to pass with a specific amount of credit and there must be a specific number of contact time and they are third years, I can't just give them off. So I think they can't, it's as if **their time management isn't right.** They can't attend class and do all these things but it's a trend. I'll often ask where your colleagues are. **Then they say they write this and this test, so then they don't cope.** Then I also blame the school system. It **feels to me the school system doesn't prepare them**	Relevance and usefulness of the module: I think it's important for their future. Motivation: High motivation I'll keep to 20%. Low motivation will be more if I just look at my pass rate with the semester test, it was 11 out of 40 students which by far didn't pass. high motivation between 15-20% and really low motivation at about 30% and then you have the students in-between. Class attendance is at about 40%. feels to me the school system doesn't prepare them enough and then they come to varsity. can't cope at all and at third year level

enough and then they come to varsity and then, now what? They **can't cope at all and at third year level** we are more hands on because you must be able to do it. So I think it can be a good explanation, I agree with that. I: How do you experience the liaison with Natural Sciences faculty? Does the faculty organise a meeting for program directors to say everybody involved with BSc programmes, let's plan for next year to say in genetics we do this, in Biochemistry this to see how we can connect these things? L14: I must say, not really. We try with the [subject] because we also have students at [subject] and **try to get together more often.** Our entomologist, whom we now have in the department, was at Zoology so it's more an **in-house process and not something being organised by the dean or the faculty**. So During my times when I was still part of mainstream we haven't had it. I: So you don't really know what's happening in the other modules? L14: No. **I know the programme directors must know more of it if they discuss the programmes, but we that physically lecture, we don't know.** You do your part and that is honestly my experience. I: Do you think it can improve something? L14: I think it can be a good thing. That what **I've experienced with the [subject] what we do help tremendously,** because that way we identify areas where Anthropology can help us and we help them. I know one of my colleagues is using them now in one of her lectures. I know often we will compile an onsite crime scene and we will help each other there. **The closer we work together, the more we identify areas and gaps of the module** and joint problems with the module and the students together. It helps a lot. So I can just imagine if we do it broader. Genetics is also a module and fits into our orals so it will be of enormous value if we can do something like that. I: To give the students a better understanding of Science? L14: Yes and we all build on the same basis. I: It's as if students accept there is this module and this module. L14: Yes they also don't bring it by, they cannot. They even struggle in a module to bring it by so if we can do that more for them, it will be of great value. I: Any comment from your experience which can contribute to a better self-efficient student? L14: I think at this stage **I am so hopeless that I can't even think of something to add.** I think **a different attitude with students**. It's difficult and I don't know how you change that. I and my colleagues try very hard to create collaboration. I think **if we make class attendance compulsory, then we reach that student at home** who doesn't cope and who doesn't realize if I sit in class it will help. I: If you say when you don't have a certain percentage attendance, don't you write exam? L14: It will help because it's usually those cases who come to your door on predicate day and then what now what now and then I can't help them and **I can see the ones not attending my class, do badly,** because I have a smaller group now and I can see if I hand out the semester tests because of the new legislation, I've never seen them in class, and I see it reflects in their marks and it reflects in their understanding and I think if class attendance is compulsory then we at least have the students in our classes and then we can alternatively, I think we also need to get out of the negative mode of I just do this and only use these sources, but if we can only get them there then we can get through to a student, because I feel then we can make more effort, but that where my advice stops. Please write this thesis and let me know what we can do (laugh).	Liaison: try to get together more often. in-house process and not something being organised by the dean or the faculty. The closer we work together, the more we identify areas and gaps of the module. Anything: we make class attendance compulsory I can see the ones not attending my class, do badly

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 15

Questions and answers **Demographic data** **Lecturer 15 (L15); Interviewer (I)** **49min 19 sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L15: Hmm the Free State not very long. When I came here I was appointed as vice dean and then dean. From 2004 vice dean and September 2010 I was appointed as Dean till September 2015 so for that period I was not involved in teaching at all. My lecturing started in 2016 so in other words this is only my second year where I am involved in teaching and specifically Biology 166 Introduction to Zoology and Entomology but before that many years at other universities.	Lecturer 19 years Vice dean 4years dean 5years current lecturer 2 years =30 years experience
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L15: With the University I lectured for 13 and a half years and then from Feb 2008 (might be a mistake think it should be 1998) till end of 2004 at the QwaQwa campus which was initially part of the University of the North. So it was an additional 5/6 years which I lectured and thereafter basically these 2 years where I am lecturing here.	
I: Which subject(s) / module(s) do you teach? L15: Biology 1663 I: Mainly for the **first years**? L15: Yes I: What are the numbers? L15: Yes the classes are big because it is a service module. There is not only Zoology students but many students take it as a stop module. I: Is it a year module? L15: No it is a semester module, second semester specifically, and the student numbers are mostly around **520-530.** I: Sjoe it is a lot. L15: Yes because it is a **service module** I: It is a prerequisite module for our Physiology that starts in the second year. More or less, what is the content? Plants, Animals, Worms? L15: No look it is introduction to Zoology and Entomology. Maybe just mention Zoology is the study of the animal kingdom in totality of which Entomology is also part, but the insects are the most part of the animals of the animal kingdom You can take all the other animals groups and put them together and it will still not be half of the insects with all their diversity. Here round about 80% of the animal kingdom consists of insects and that is why we stress the study of insects, Entomology. So introductory we cover an evolution theory from ….4:10-8:52. In a million years from now it will totally look different. That is the module.	Biology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	

I: Have you heard about the term student ***self-efficacy?*** L15: Well I think one has a basic understanding of what it basically mean. I: What is your understanding of the term student self-efficacy? L15: Hmm when a student comes to University the student is **not under the care of a teacher** and the lecturers walk into the classes, they lecture and they walk out. One tries as a matter of fact to ensure that students come to your lectures. Class attendance is important; it depends on how you present your lectures. But **in terms of self-efficacy** for me, it's **mainly about discipline because if a student wants to be effective at university**, **understanding that the attendance of a lectures are important, keeping up with the regular work, the consultation, making use of the resources to insure you understand the work and if you put all of those factors together and you do well, you don't even have to do it excellent**, **then you are successful at university**, according to me. Adding that in terms of **your foundation, your school situation must be righ**t because a **student that's not right can try hard but the chances are good that total success won't be there.**	*self-efficacy:* not under the care of a teacher mainly about discipline: attendance, keeping up with the work, consultation, use resources –just use it don't have to be excellent, then successful Your foundation must be right
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L15: Hmm I: Is it 500 in one class or are they divided? L15: They are divided, this year in the Afrikaans class it's about 120 and the rest of the class is English. So the biggest part of the class is then English. Important challenge which one has in the current situation is to stay focused and to maintain discipline in that lecture and you must be strict. But a big part of that is if you enter and you stand in front, and you talk to the student and you don't read the stuff, you talk to them. The fact that you constantly make eye contact and you have strategies and you say things like if I catch anyone of you with your cellphones, here are the slides you will then come to the front and I will introduce you as professor X and you will continue with the class f and I will sit at your place and I will ask you questions. I don't know if it is my white hair and if the uncle looks a bit strict, I have good discipline among the students and the students enjoy what you say and you just mix it with interesting things, things that keep their attention. One of the things that's a **sign that the students are comfortable with me, is when the lecture is done I am usually circled by a rugby team** because then they know we have seen it on TV you know there is always someone that wants to come and ask and that for me is a sign that there **is a relationship with the students and that trust is built with the students.** I: If you think about the students and how they sit, making notes and looking as if they are effective, asking questions, the percentage one can say, maybe more difficult with a large group as with a smaller group, the percentage more or less for those with a high self-efficacy and those not, what would that be? L15: Yes look one of those **indicators that maybe speaks or indirect speaks is how they perform in tests.** I think **tests give you a good idea of a multiple of factors**. It's not about the class; **I don't put my lectures on Blackboard** but what I allow them to do because nowadays each student has a camera and quite a big camera. My slides that I use I don't overload with information. I make the fond of the slides very big so that guys that sit far back in the class can also see what to do and **allow them to take photos which I find many of them take photos and listen to me and there are others that work in teams and make additional notes** and one also sees, but I think the majority of the students sit and listen and take photos. The cellphone is also something which one should manage because they send messages to each other and you figure it out when there is a joke and there was a case where the students almost were helped out of class and I think it gave the group a huge fright and then everything was fine and we were able to continue. **So it is all about discipline**. I think the new lecturers that come in and are young have more challenges as what I had when I start lecturing because that thing can become a problem in class when it is not being managed. I: Definitely if it is used correctly it is a different matter if one says go and look on google what do you see there?	Student self-efficacy: indicators that maybe speaks or indirect speaks is how they perform in tests. tests give you a good idea of a multiple of factors I don't put my lectures on Blackboard - you will find a large amount of students which won't attend class that's my biggest reason allow them to take photos which I find many of them take photos and listen to me and there are others that work in teams and make additional notes. English class is at least 60-65% class attendance. sign that the students are comfortable with me, is when the lecture is done I am usually circled by a rugby team (engagement)

L15: Yes I can show you afterwards some lectures like I've said I try to make it big and easy readable. I: Is there a reason why you **don't place it on Blackboard?** L15: Hmm I think y**ou will find a large amount of students which won't attend class that's my biggest reason** and I tell them I want you in my class. I: And how is the attendance? L15: Look **I don't do roll call,** but if I look at the amount of students in my class I would say the **English class is at least 60-65%** of my students are there. It can even be higher at times because the Stabilis is full. With the Afrikaans group it is easier because it is smaller and you can immediately see if the group has decreased but you still have **the trend of writing tests then the class attendance decrease** because they sit and study and make havoc.	
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L15: Hmm we are suppose to have it and for me it is a given, that is why we come here, why we are appointed as lectures to develop the student technical, module technical and as well as a person - for me that is primary. **If you go into a class and no learning takes place then we waste each other's time**. You are on your own, and money and the time of the student but also the parents who pay a lot of money. **But how does one measure that? You measure it against questions. Students with interaction, students' interaction with you, students who come to your office and speak and you realize this student is on track with the content that I discussed, there is only here and there an uncertainty that I must sort out**. So you pick it up quite easily. I must say students don't come in their thousands but I never close that door. I have consulting hours but if you come to my door and I don't have anything urgent I will close the door and we can speak. So here have been many students and some came to say my slides didn't work out well then I will say come to me, to my office. Then they sit here and took their slides and they have everything they need. So last year with the strikes I've put all my outstanding lectures on Blackboard and I created a platform through which they could ask questions but that everybody could see. So if someone ask a question and I respond, its emails and then everybody that is regurlarly with their emails can see how the discussion goes, but is wasn't much. **There wasn't a lot and of course your biggest measurement is how they perform in their semester tests.**	Impact of lecturer: If you go into a class and no learning takes place then we waste each other's time. But how does one measure that? You measure it against questions. Of course your biggest measurement is how they perform in their semester tests. students' interaction with you, students who come to your office and speak and you realize this student is on track with the content that I discussed, there is only here and there an uncertainty that I must sort out (engagement)
I: Please explain / elaborate on your teaching strategies? I: I hear lot of PowerPoint and big font and that them taking photos, many times in the conversation… L15: Yes I **throw in a few questions** which is important for me, hmm and I think it is part of academics and **senior academics' emotional intelligence, we don't know everything and for me students get more respect for me if I say wait I am not sure what the answer is lets go and look,** and the most important is that you look who hasn't and if nobody then what you say is what actually happened. Now with the discussion about reservation, we also spoke about sustainable use, sustainable utilization and then there are so many interesting examples which one can speak about, examples about things you know. Our actual population of shellfish which you found in the sea and a nice thing to talk about is like red tide hmm I am sure you know about red tide and the fact is it is caused through a microscopical single-celled organism which sometimes only because of good conditions procreate in their millions and the impact on that and the effect of that on lobster. The lobster which actually comes out of the water and people want to eat it, but you can't eat it because you have a buildup of neurotoxins which has been in the lobster and has affected the lobster. So you can talk about all of those things and then you can immediately see they come with all of these questions how is this and why is the water red and you know that is actually a good thing - people say you must look out for plagiarism and what is it again the copyright they must lock me up but there are so many pretty visual stuff from the internet which you can download. In my days a Professor has made a sketch which I think he also later on didn't understand. I: Yes on the board	Teaching strategies: throw in a few questions. senior academics' emotional intelligence, we don't know everything and for me students get more respect for me if I say wait I am not sure what the answer is lets go and look. give practical examples -enriched by the internet.

L15: Then he must delete it to make a new ugly sketch. Here you can show them. In my days he talked about the red tide en then you were thinking yes the see is red but if you look closely the see at some places is purple and at places it is brown and in my days I thought it was blood red. **You bring across more of a reality and in my case it is used to educate children and young people and to improve their understanding of biology**. I: Yes and the exposure with the practical examples which they can identify with. L15: And in the natural sciences it is so ideal. Agriculture, architecture you can nowadays go to the buildings and see the techniques. It is been **enriched by the internet**. I: So technology is being used? L15: Yes	
I: What is your opinion of interactive classes? L15: Hmm I come from the old school and the **only interactive phenomenon which I am used to be students that within the class context talked to me and I don't know if you speak about group work and that type of thing.** I: Only the interaction in-between…. L15: It's for me important, it gives me an indication where it was poor lecturing and you can see those faces we don't know what this man is trying to say. I mean **the learning process is a two way process, it is not a monologue,** it's a two way street. Something which I often also say is, now I speak totally of point. In my days I didn't knock on a professor's door, I was too scared. You were not welcome in the offices. But know it is different. Our student's attitudes changed towards lectures and I think it is also part of the community evolvement, in fact the social evolvement. Many people will interpret it as disrespectful. I greet the students and they greet me. In my days it wasn't like that. At UWK if a lecturer passed, even if that person gave poor classes you would first greet and that is something that changed a lot. **Students became very comfortable with us. The way they greet you.** You sometimes feel like the guy on the street corner selling the newspaper. And something that is very **important to me is the element of respect. I think why many things, and it starts with the students not respecting their parents. Our households are the functional units of the community.** If the households function well then the community function well. It is there where many things go wrong. If you think of the Cape Flats and gansterism and stuff, it's a complex situation and you can't just say it's a lack of discussion. It's a difficult dynamic to understand, for parents it is something, a survival in their own homes. But hmm, for me it's something that changed among students. I: More comfortable? L15: Yes but one must also accept it, like I said it is like a **social evolution** which originated hmm because these things also change. I: It must just be managed correctly? L15: Yes students must know who you are and the same you must know who they are, the common mutual respect. I: The Afrikaans and English classes, how do they differ regarding interaction and willingness? Is there a difference? L15: Hmm the **English class for me, relaxed quicker and ask questions.** The **Afrikaans took some time. They first check me out (laugh) and then there were always 2 or 3 who come afterwards talk to me** about this and that, about the work, my dad has something on the farm and so on. And the last few lectures, no there is good interaction between me and the Afrikaans group. But amongst the English guys it is as if they first started to relax and hands went up and they say but we don't quite understand what you say but why does that happen, why is it 5 instead of 10, you know those things. **But at this stage, no I don't see any difference.** I: So they take some time to get use to and bond and then…	Interactive classes: only interactive phenomenon which I am used to be students that within the class context talked to me. Students became very comfortable with us. The way they greet you- social evolution. English class for me, relaxed quicker and ask questions.

L15: Yes I think the students check you out, I think **students first make a value judgment**, I don't know if that is the right word for value judgment. Hmm, if students realize this person know what he or she talks about, secondly it becomes interesting and thirdly the guy has a bit of he wants to hear my opinion, he asks questions, he doesn't stare at us and every now and then we see something that makes us laugh, he loves talking about his experiences as a student and all those things, that makes the students to become comfortable and finally starts to ask questions and starts to differ from you and I think that's a good sign that students are now comfortable to say we don't think that thing that you just explained, is right. I come from a family of teachers my mom, dad, uncles, aunts, the whole works. So it's in me and I enjoy the interaction with the students.	
I: Elaborate on students' engagement and communication with you in class and in your office. L15: Many of them I would say the majority of them, who have interaction with me come afterwards to come and talk to me and that is in both classes, the Afrikaans class as well as the English class, but I sometimes challenge them and that's a nice way of getting them quiet. I don't just stand in front, I walk between them and say what do you think has happened in this situation and then that guy realizes he didn't listen. And if this uncle looks at him like this, he should rather focus again. So it's **a game you are playing with them. Later on they say I don't want to talk anymore because then I will be ask questions, let me be quiet and know what's going on.** I: And at the office you also said they come here readily and the door is wide open and being accommodated. L15: I have reached the stage where they would stop me outside and some would just greet and that greet is another greet it is more like I know this guy and I am comfortable with this person and many would come afterwards and ask questions. **I don't want to give the impression that they can come in their thousands but I think I have relatively good interaction**. I: If they question, is it more content or more technical questions? L15: Many of the **things are technical, it is administrative questions**, and many of them would ask me something about the content especially where you must get your ducks in a row to understand it, but I've also had before the holiday some asking is Prof going away for the holiday? Where is Prof going? And then I ask where are you going, and then we have a social discussion not about the work, but I think it is an indication that they are comfortable with me.	Students' engagement: a game you are playing with them. Later on they say I don't want to talk anymore because then I will be ask questions, let me be quiet and know what's going on. things are technical, it is administrative questions.
I: Give your perception regarding the **relevance and usefulness** of the module content that you teach. L15: Yes look I've think one of the aspects which is key for me of what one **wants for them is to understand the theory of evolution** because that's the foundation of how we interpret the world around us and it is important for me because as they continue and finally in post-graduate study then it is a good foundation of exactly how the whole process work in terms of genetic variation, in terms of selection, different processes of genetic variation influences, genetic drift hmm gene flow and all those type of things but finally it also gives the foundation of how a research question of their own project will be formulated. How they will determine the goals and from those goals they will ask specific questions and also the hypothesis, but all of that actually has an evolutionary foundation. The larger systems teach them and you've got greater complexity as you continue and we try to bring that across in the department throughout the years. **It is the golden thread that runs from, pre-graduates, your honors, your masters, your PhD and finally if you are a lecturer it's your foundation of your research which you are doing.** And I think for me that's the key. You sometimes get we do a big oral with the honors group where the whole department sits around the table and the students come in one by one and each lecturer who manage different aspects of the work, asks a question but the foundation of that is the evolution theory and then if they get to honors you expect that it is being foundated because now it is already their fourth year and it is the building blocks of what we present. I: The students' **motivation** in general, is it high or low? How do you experience it?	Relevance and usefulness of the module: theory of evolution -it is the golden thread that runs from, pre-graduates, your honors, your masters, your PhD and finally if you are a lecturer it's your foundation of your research which you are doing.

L15: Hmm yes I think in class context there are different indicators that you can look at. An **important basic thing is class attendance**. **A student that comes here with the aim to study and to be successful will attend all the academic activities**. The management within the lecture, some students feel free to ask questions, other students just sit and listen and you can see on those faces the lights are on but no one is home. And that all give you an indication that the students are here and they are here with seriousness. What is a **very big factor in our education system is finances.** So that the fact that we came to the fees must fall wasn't a surprise for me because the education became so expensive. Many of them are here with the NSFAS scheme. I: NSFAS what is that? L15: National student academic funding system…I don't know the whole NSFAS abbreviation but look whatever it is the money that the government give to the students according to me, but there are certain requirements and students must at least perform on a certain level annually to be able to continue. The students know that we have huge unemployment in our country and the unemployment amongst young people between 18 and 25 is people that didn't study and they are not involved in the working force so it is like a time bomb on which our students sit, and they know that **if they don't perform they will be part of that statistic**. And I think for many of them **that is quite a motivation and now I speak especially about our black students because the biggest need is amongst them**. Yesterday I had a student here and he became ill, but very ill and he is been supported by NSFAS and I hate to tell him the story because universities function well if the rules are consistent and strictly applied with empathy but there are times you need to go beyond a certain point and then you can't anymore and I had to tell the student that the year is unfortunately finished for you because you just missed too many academic activities and I could immediately see on his face the worry when I asked are you a NSFAS student and he said yes and then of course that feeling that now I am on thin ice because I have been allowed to redo certain modules and I am basically on the border. You try to give them hope and say go to the NSFAS office and take all you medical things, they also must have empathy with situations outside of your control. **But to come back to the seriousness of study I think for me it is factors like attending, the attitude of the students and then of course how they perform in the informal evaluations.** Because that determines if you can go from level 1 to 2 and there are many of them that try but they don't have the foundation. We know that school is the foundation in terms of those … but you must take that with a pinch of salt. Here at university those things also transpire and they realize that they are on unsafe ground. I: Then only a last question. Are you aware of, because I am from the […faculty] of any ***liaison*** somewhere between the Natural sciences faculty, a certain BSc programme, the programme directors organize lecturers of the BSc programme to come together and discuss a module, or in this module we do this and in this module we do that and get together and adjust and support or does everyone do their own thing on his own island? L15: Yes look we've got a good common parts in the first year, because we have about 5 or 6, but I've lost track now but in that direction, biology first year modules and they have been presented by us and some of them by […] and some of them by […] and some of them by [ ], [ ] and [ ]. And the textbook. This is the textbook and we've decided as team which textbook we are going to use. So that brings us together and then we must basically discuss because we also want a book with your module as like my module and that module manage, but at the end of the day **each department knows what is fundamentally important for those students which have their module as the main module and finally wants to study post-gradually so that decision is basic but within a department**, **but you also get overlap** there will be overlap between Plant Science and Zoology for example the basic principles of genetics, the principles of evolution. Hmm I don't see that as a problem. The [department] which manages the [module] he says that all our students must have the basic foundation of the genetic theories and concepts. There will always be overlap, but with us as a matter of fact the focus is on	Motivation: A student that comes here with the aim to study and to be successful will attend all the academic activities. very big factor in our education system – finances. if they don't perform they will be part of that statistic -that is quite a motivation and now I speak especially about our black students because the biggest need is amongst them. think for me it is factors like attending, attitude of the students and how they perform in the informal evaluations. each department knows what is fundamentally important for those students which have their module as the main module and finally wants to study post-gradually so that decision is basic but within a department- but you also get overlap. students say he lectured nicely and the students feel they are successful in the module. It's a big motivator. the students that comes from the South Campus are well prepared and they come here and can manage themselves very well, more mature – UPP. the school situation remains worrying – finances. in our department, we see they pass their first year and in the second year they come crashing.

the animal and Plant Sciences on the plant. So where there is a little bit of overlap it is actually good because then it is that additional foundation because they hear it from me and they hear it from you. I: Any other comment that we haven't touched on that can also be useful? L15: Hmm yes look one of the big discussions since I've been at the UFS is attendance and the **importance of class attendance**. I think you can bring in all of these technologies but finally **we can't bring in the technology, it is too expensive but things change and I believe this computer of us will in future play a prominent role within class context and in terms of class attendance**, but for me it is a big thing**. And that's how I went through my student years, like the students say he lectured nicely and the students feel they are successful in the module. It's a big motivator.** So how you do your work is important. The other part especially with students where the foundation is not totally fine I think our South Campus program is a good program and there are talks of shouldn't we send a bigger part of our students to the South Campus program before they come here with the argument of extending the program to 5 years, but the average student take 5 anyway and we know that **the students that comes from the South Campus are well prepared and they come here and can manage themselves very well.** I: Also a bit **more mature.** L: 15 Absolutely, that is some of the discussions we've had to implement all of these things but it comes down to rand and cent. I think that is why you must drive your boat to **stay financially sustainable but the school situation remains worrying**. If I look at my first, I had this morning while waiting for you, thought let me look at my first and second test. The first test had an 80% pass rate and the second one just below 70% and it decreased a bit because the work was a bit more challenging than the first semester test. 50-59% got 26%; 60-69% got 28%; 70-79% got 18% and 80% plus got 7% that is for test 1. For test 2, those that used is 30%, 50-59% got 39%, something 6%, oh that went up 26%, 60-69% was 20%; down 8%, 70-79% decreased heavily to 6% and the amount that got 80% plus decreased to 2½%, but the work in the second test were more challenging. You had to understand what you were doing. But in general I am satisfied. I: It is still high pass rates, 70%, 80%, there are a few second year modules with a pass rate of 30% and I don't ask it pertinently. L15**: We also have it in our department, we see they pass their first year and in the second year they come crashing.** I: Thank you very much	

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 16

Questions and answers **Demographic data** **Lecturer (L16); Interviewer (I)** **56min 51min**	**Comments** **Words often used:** **Gap/problem/in reality**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L16: Since 1998. I: Almost 20 years	20 years plus 1 year
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L16: University of Kwazulu Natal. It was a short period, just over a year. At UKZN I was originally in the Biology department and when I came to UFS I was originally in the genetics which was then integrated in the bigger Plant Sciences with Natural Sciences and moved over to Human Molecular Biology.	
I: Which subject(s) / module(s) do you teach? I: Do you currently lecture for undergraduate students? L16: Yes but minimally. Its only cameo lectures, third years as well as second year students.	3rd , 2nd years Human Molecular Biology
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student self-efficacy? L16: Yes I have I: What is your understanding of the term student ***self-efficacy?*** L16: My understanding is mostly very broad, but **my interpretation thereof** is **students' abilities** to **manage that what they learn** with regards to a module. So it **starts with the information they must manage to prepare for a class, how they manage that class, how they react towards a lecturer, what they do after a class, they ability to assimilate information that has been lectured, to study and to then give it back in a responsible way in tests and exam assessments.** So my understanding thereof is in a broad context and off course to work in groups, including class format, in group format.	Self-efficacy: students' abilities to manage that what they learn
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L16: It's not a simple yes or no answer. I will try to elaborate. **My experience is that students have the ability if they are told to do a specific task and the task is well defined and set out then they usually have the ability**. Off course you will get the students that put in more effort in any task more than other students. **A gap I've experienced is that students struggle to think and function outside of the given context and framework.** And that is a very big problem and I assign it to the beginning of the **primary and secondary school system where students are not taught to think independently and function without a framework** and that is a big problem for me. So the students' abilities are good when I summarise what I've said, the students' abilities are good within a certain framework which is given to them and that's one problem, **so the school system is the major problem**, but I'll be a bit controversial to say when we went from the semester modules to the module system which we have now, we almost made everything too easy for the students, in the sense of **when I was a student there were no learning outcomes** and when we **moved to outcome based education learning** plan the **students started to only focus on the outcomes** without	Student self-efficacy: students have the ability if they are told to do a specific task and the task is well defined and set out then they usually have the ability. A gap I've experienced is that students struggle to think and function outside of the given context and framework. primary and secondary school system where students are not taught to think independently and function without a framework

understanding that there is underlying information which they must also have and the problem now is we sit with a student who, because of that, in my personal opinion, is emotionally not matured in comparison with how they used to be. **Oh yes they can function within a limited system but once they don't have the limited guideline, they struggle to function and I see it as a challenge.**

I: You say everyone function within a framework, do some function much better or poorer within that?

L16: Yes I experience something from everything I experience and I don't think it has to do with the system, **it's linked to the individual, and some of the students are motivated, they realize the opportunity given and succeed**. **Others are simply just lazy, but I also experience other students who cannot even function within the framework and I'm not sure if its laziness, I think it's merely the inability to function**. I ask myself the question are all our students on campus, do they belong here and I think the biggest problem for me is **they come into the system without really knowing where they are going** and what is their aim and without clear goals they tend to be less motivated and they go through the system without knowing where they will end up.

I: Would it have an impact even if you do a BSc degree or general degree if selection is involved and the degree more specific with certain modules that when being selected then you know what you are working towards?

L16: Good question and my answer will again be a bit controversial. **I think there should be selection,** but I think one of our current problems, **we start to early on undergraduate level with specialisation**. I will even say and I'll put on the naughty shoes it's not only a problem in BSc fields but in all degrees. If I take USA for example, if you want to be a medical professional. You cannot in year 1 study in the degree, but you do a programme relevant for you and your specialised medical training start at postgraduate level.

Now I think the big problem is when we brought in **the module system**, we spoke about the intentional outcomes and what such a person will focused as so much and now **we train people in natural Sciences with a very focused direction but the problem is they must choose that focused direction without knowing what they really want to do**, because **their exposure at school to the different fields are very limited.** So they come here and think they want to do something in Physiology or Anatomy.

I: Based on something they see on TV?

L16: Exactly, based on their exposure which unfortunately is not real or realistic in terms of what it entails. If I can give an example, most students doing BSc and are interested in our programme, have the concept of science as typical CSI and they have no background with regards to the mere fact there is much more entailed or needed than what they think and **the problem is the foundation undergraduate is too specialised, because the students get a minimum foundation in the modules which is not essential and the problem in my opinion is then on postgraduate level should they continue.**

The problem is they are being asked too soon, sorry I just need to complete this within BSc fields. There is room. Even if you do a BSc in genetics you can still do it with Zoology or whatever. **The problem is I don't know if students really in their first year have enough exposure to make that decisions** and I think in the professional fields there is **much more exposure on school level necessary where they integrate the broad scientific fields and don't realize the different nuances in the different fields.**

I: Like I've been doing these interviews, ***some people told me they are being pushed for more numbers and that has an incredible snowball with the practicums***. Bigger numbers, they only have certain facilities, laboratories, are too small and can't be lectured ***practically, but now becomes tutorial. They don't have enough equipment for hands on work so it actually down grades, they try but can't do the practicums, so snowball effect.*** Is it the same here?

L16: **We see the same problem in undergraduate hmmm our approach is a bit different**. I want to start with yes the problem is **the programme is funded based on numbers** and **therefor the programmes are marketed in an unrealistic way. So students is being sold on something which they don't really know what it is.** So the lecturer involved sell the programme because the want the numbers for funding. **Now the problem is excess students and exactly what you said now I agree**

so the school system is the major problem

Others are simply just lazy, but I also experience other students who cannot even function within the framework and I'm not sure if its laziness, I think it's merely the inability to function

they come into the system without really knowing where they are going

BSc selection? -think there should be selection

we start to early on undergraduate level with specialisation. we train people with a very focused direction but problem is they must choose that focused direction without knowing what they really want to do

their exposure at school to the different fields are very limited

problem is the foundation undergraduate is too specialised, because the students get a minimum foundation in the modules which is not essential and the problem in my opinion is then on postgraduate level should they continue.

problem is I don't know if students really in their first year have enough exposure to make that decisions

more exposure on school level necessary where they integrate the broad scientific fields and don't realize the different nuances in the different fields.

Finances:

We see the same problem in undergraduate- our approach is different.

practicums presented is less than what is was and in many cases its replaced with tutorials or other assignments or a

totally with. Today the second and third year BSc programmes is the amount of **practicums presented is less than what is was and in many cases its replaced with tutorials or other assignments or a situation because it became so expensive so students are exposed in group format** where they don't really practice the skills and it's a big **problem the numbers** because if you look at the **ratio of lecturer to students it absolutely in the last 10 years increased to such an extent and we were very unrealistic and you could that type of or the gap in the relationship, the enlarged relationship or ratio you can address it with electronic media.** The problem is just you **don't have any guarantee with regard to the real skill** which students learn and that's a problem for me and will become a bigger problem if I listen to **my colleagues think distance learning should be done through electronic media.** I think in Science it's not the case and I think it's a real problem and I experience it on Honours level. **Students are not matured to do the things students did 20 years ago.** I: That is a problem. Now I understand and not always logical, because when more students, more funding, now everywhere I hear finances that laboratories which is suited for 35 students, there now are 105, now even up to 20 students sit around 1 microscope of equipment. How is that? The funding must then increase? L16: **If the funding remained on the rules of 20 years ago, we would have been able to address the problem of lack of staff with the larger numbers, but in real life a rule has come from department of education which in real terms in the last 5-10 years, the subsidy didn't increase in real terms. What it means is we fight for a bigger part of the cake which is the same size and actually in real terms the cake is getting smaller**. What now happens we are in a very dangerous cycle of you need more numbers for more subsidy but it doesn't mean the subsidy gets more in real terms. **You must do more with less**, but if you say good I will limit myself and select only these students in the second or the third year, your funding will decrease so that you can't do what you used to with the same amount. **So everybody is basically forced to increase the numbers and it's something which I think the management of the university doesn't really look at. The problem is shifted to the level of the departments,** and to modules without really saying in real terms we don't give more money even though there is an increase in students yes there is an increase in money but if you take it proportionally 20-30 years ago a third year class consisted of 10-15 students in comparison with this year's 120-130, and the **question is is the funding still on the equivalent level? And the answer is significantly no** and that's the problem, **so we are in a vicious circle**. **We are tumbling down, very negative spiral and a dangerous one and we don't have the ability to fix the poor primary and secondary system, because your relationship lecturer to student gets bigger.** Sorry that sound very negative. I: That is reality.	situation because it became so expensive so students are exposed in group format ratio of lecturer to students it absolutely in the last 10 years increased - can address it with electronic media. Students are not matured to do the things students did 20 years ago. department of education -last 5-10 years, the subsidy didn't increase in real terms. What it means is we fight for a bigger part of the cake which is the same size and actually in real terms the cake is getting smaller management of the university doesn't really look at - The problem is shifted to the level of the departments so we are in a vicious circle- very negative spiral and a dangerous one
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L16: Definitely. The **approach of a lecturer has a significant impact on students** with regards to how a lecturer, let's begin with the **lecturers interaction with the student,** how they should in **general approach the student will play a significant role in how the student will react towards the lecturer.** Obvious there will be, **it's like that with most things, student who don't make use of the opportunity that lecturers offer**. So that's always a problem, but **where students really reach out and show interest in a certain module, a lecturer can play a big role to stimulate the student further**. Also a lecturer can play a big role in the students experience of a module should the student have an inherent interest or is willing to explore possible interest, because **there are students I have experienced, they get motivated merely based on the way the class is managed**, **but there are students that irrespective of what you do, don't get motivated on the grounds of how the lecturer manages the student is important. How students experience a class and how the lecturer lectures is also key.** It's much easier for a lecturer to take an easy way out, you enter the class and you don't use the opportunity to let the students challenge you with regards to how you lecture. Unfortunately I must also say, **I don't think there is a single format which is ideal for a lecturer**, **because each lecturer is unique and the way they communicate with the students, their interaction will be different and I don't think its necessarily a problem,** but I think there are problems where lecturers lecture only because there is no other lecturer and	Lecturer's impact: approach of a lecturer has a significant impact on students

they are not necessarily educated to the content and the didactic material, now I don't think I'm a good teacher, but I think I'm a good lecturer and **I think the whole aspect on students stimulate me and to get their interest which can be a motivating factor.** I: And thinking outside of the framework. L16: **And to start thinking outside of the framework.**	
I: Please explain / elaborate on your teaching strategies that work from your experience? L16: It's a very important question and I think there is different things and the **one thing is to at the first day of a module start <u>building a relationship</u> with students where <u>mutual respect</u> becomes the norm.** So usually I start with that and especially with the undergraduate modules and I do it with all the modules, **I start telling the students there are two parties**, them and the lecturer, and the lecturer play a specific role in what they must do and what is the student's fair **expectation of me as lecturer, but what are my fair expectations of them as students,** so to on that level give a very clear setup of my expectations from them as a class and what their expectation of me can be and **within that orientation session to show them they must realize they are in need of the lecturer's knowledge and while the lecturer is helping them gaining knowledge.** It's the **lecturer's task to ensure they pass the tests and exams. They must realize they are in class to learn**. The **lecturer must create the right environment,** but the lecturer can do it alone. So that the one side, the other side is **too also warn the students and then to apply it if they had to prepare for a class, to enforce it by writing a class test, before the class start and to apply it and continuously**. The other aspect **I also apply, is to ensure class is not just a one way flow of information is to force them into participation** because in the beginning they are very uncomfortable if you pinpoint a specific problem. I usually **divide the class, depending on the venue, in quadrants and then I'll say I want students from this block, what the answer on the following question?** I: That it is not directed to only one student? L16: So that's it's not directed at one **and to give them time to get back to me and what I experience them is they become more comfortable to come with answers when being asked**. It also make the more comfortable to come and ask questions afterwards. The other thing is to **give them certain questions without the answers** to say **next week you will write a class test and the <u>question is what is the conclusion from this class</u> and I expect them to do a bit of self-study**, so to get them out of their **comfort zone**, so that they don't just passively sit in class en walk out and then the class test is to **take the knowledge from the previous class and then to ask a short class test to ensure they keep up with the module,** because **otherwise they see the class as a single unit**, and that **creates a <u>big problem</u> because they don't integrate information** and then of course **with tests and exams to ask questions which are more integrated and to create scenarios and then different aspects from those scenarios, to take that out for questions.** I: What I also heard with others with ***large numbers in the class, up to 200 in the class, it forces the lecturer to go to a MCQ system with computer cards just for marking time and those integrated questions, but those essay type questions gets lost.*** L16: Yes it's a **<u>big problem</u>** and sorry I didn't speak about that and one of the things I think is important is that students **must practice their writing skills** and pertinently **ask them in a tutorial or test** to give information to **practice their reasoning ability and synthesis of information.** For example information they've learned in one context to apply it in another context and to **make conclusions even if it's not in the context in which they've learned it is also very important. So for examples the tutorials** to get them so far where they with more than one sentence, two sentence answers, **but they actually must provide a very logical outlay of the specific answer, but it <u>remains a problem</u>**. For example I have MCQ undergraduate, for the Honours students and the undergraduate Medical students, **I design specific MCQ which demand the integration of information and I must say it's a bit of a challenge and that's <u>another problem</u>.** In many of the modules I'm involved in, **for me it's very**	Teaching strategies: one thing is to at the first day of a module start building a relationship with students where mutual respect becomes the norm. They must realize they are in class to learn I also apply, is to ensure class is not just a one way flow of information is to force them into participation divide the class, depending on the venue, in quadrats and then I'll say I want students from this block, what the answer on the following question? and to give them time to get back to me and what I experience them is they become more comfortable to come with answers when being asked give them certain questions without the answers expect them to do a bit of self-study - short class test with tests and exams to ask questions which are more integrated and to create scenarios and then different aspects from those scenarios, to take that out for questions. *(my words: step-by step approach)* must practice their writing skills -ask them in a tutorial or test -practice their reasoning ability and synthesis of information question is how the students are being taught with regards to module information

worrying, I expect them to think, the other lecturers don't expect them to think they only demand them to give back the information. I hear that quite often. So the **question is how the students are being taught with regards to module information**. Are they only taught to give it back or really to ask the question which indicates the next level? I: To take the reasoning ability further. L16: Yes	
I: What is your opinion of interactive classes? L16: Yes interaction in classes is a **bit of a double sided sword**. Hmm I'll **start with the potential problems**. **If classes is divided into groups, you sit with a typical problem of you'll find students in a specific group who participates and would be interactive and you'll find students who will sit back and allow the others to do the work.** Also you'll find **overeager students who takes over**, in such a case from the other students will stand back, but in general **it's very important to get participation in class.** I think **I try as far as possible** to what I **expect from students is to prepare for classes**, then I try to in general **get their interaction by saying, Good you've prepared if I discuss this certain topic, what is the specific answer to the question? Who can tell me?** And to as far as possible get them to participate and to for example if we study something where they can reason or synthesis where they must work something out is to **say good lets work though an example and who is the first person to give me an answer and to then see who has the same answer and why did you struggle with the answer,** what is the problem? So to get that interaction going, but it means the lecturer can't just enter and work through 20 slides and then walk out again, and **the most wrong thing, in my opinion is to ask, do you understand?** To ask a student to give an answer from I don't understand. So I'll never ask a student do you understand, **I'll ask a question to test the understanding**. I: To get behind the thing. L16: Yes I think it is important and I ask nicely don't you understand, because I know I won't get an honest answer, because the **students are uncomfortable to indicate the gaps**. So I'll ask the question which I know they will indicate whether they understand.	Interactive classes: bit of a double sided sword potential problems-different groups important to get participation in class the most wrong thing, in my opinion is to ask, do you understand?- students are uncomfortable to indicate the gaps I'll ask a question to test the understanding
I: Elaborate on students' engagement and communication with you in class and in your office. L16: I think, before I answer the question, I've realized, **the students' experiences is a big factor with regards to how they communicate with the lecturers and their interaction with lecturers.** A big problem comes in with my first year classes where the **classes are big and the students do not realize that it's not school, you can't be passive towards a lecturer.** So at the time, **I usually see at second or third year most students haven't learned it's important to develop a relationship with a lecturer and to move away and to just be a number.** I: Almost hiding and a no name. L16: Yes I spend a lot of time to explain it to the students and on regular basis to ensure they can get away with it, because what I've experienced, especially in the beginning, is **students will write test and a few will come afterwards to hear where they can improve or earn more marks** and so forth. What I try to do is to **encourage them to at least just come after a test and I do it in a funny way. I will for example if I do the memorandum in class, I'll make a point of saying, you know usually I mark these tests late at night and I can make mistakes and you shouldn't just accept it if I gave you a mark but you short one.** So what I do is a shift, I make **a shift in focus from the students to myself** and then I say **you must actually come to me because there is actually a good chance that you can get marks and I try to in a subtle encourage them to come to me**. Now what then usually happens if they start to come with the hope of getting extra marks, which is not a problem to me, **because I want them to develop willingness to talk to the lecturers**. So I try to do it immediately after a class and it's not always possible depending on their class schedule, but for example with tests, if they write tests and we go through the memorandum and if the class ends before the time, I don't walk out, I hang a bit, I wait and usually at the beginning of a module if the students don't know me yet, about one or two come**, but the longer we continue and they get to know me more the more come** and off course **you can't help everyone during that time because they sometimes are shy**.	Students' engagement: the students' experiences is a big factor with regards to how they communicate with the lecturers and their interaction with lecturers. classes are big and the students do not realize that it's not school, you can't be passive towards a lecturer. I usually see at second or third year most students haven't learned it's important to develop a relationship with a lecturer and to move away and to just be a number. a shift in focus from the students to myself- subtle encourage them to come to me- I want them to develop willingness to talk to the lecturers I encourage them, come in groups encourage them towards developing personal interaction

There are students that are willing to go to a lecturer alone, but **I encourage them, come in groups, make appointments, my philosophy is they can come anytime, even outside of consultation hours.** If I can't help them immediately, then I say good lets arrange a time. There are **students that will email or sms,** but I try to **encourage them towards developing personal interaction** and even if it's not for marks but **to ask where can I improve, where is the problem with how I approach the question**, but **I try to use the idea of you must move away from only being a name, you must became an individual who gets to know the lecturer,** but I will for example if I mark **tests and exams, I mark them blindly**. I don't look at who's answering paper it is and I also tell students and then I add because I do it that way I **don't have a pre-expected idea** and because most marking is after hours just to come back to the first point, I may have made mistakes. So they shouldn't accept that if I marked something it's still possible for them to get a mark just to give them the willingness to come and talk, what I experience is, **many of the students will tell me if they ask a lecturer questions they sometimes get a negative reaction**, because if a student ask me a question and I don't know the answer, I can say I don't have the answer. I: The openness. L16: Yes **other lecturers try to hide and don't have the guts to say they don't know.** The other thing is students tell me that lecturers simply don't want to help them. Now I know there is two sides to each story. There is a certain student who took a module from one of my colleagues and later I had, then she try to see the lecturer when he's not in the office, then I ask were you in class? Then he says no the student is not in class regularly. **So the students are unfortunately not always honest.** So I tend to say there is a problem when the lecturer is not accessible, but there is also a problem if the **student use it as an excuse to say I was at the lecturer but he is not there, but it's actually not true.**	tests and exams, I mark them blindly many of the students will tell me if they ask a lecturer questions they sometimes get a negative reaction openness
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L16: Hmmm that's a good question. I think it's the first problem, I'll start another point if you don't mind. A **big problem is students tend to move from one module to another if they have completed the module, they regard it as done and they don't see the necessity of modules building on one another, the knowledge must be integrated**. The other day in the week I had a postgraduate student in my office and I ask the students to take the data they found into excel and do very simple calculations with it. The student then put the data in Excel but don't use the functions to make the calculations, they did it on a calculator and I then asked the student why they put it into Excel and not used the functions, because that's a way of making sure you don't make a mistake. The student then told me in their Honours year we send the students to courses in different software packages of how to calculate data in Excel. Then the student said but that was two years ago. Then I said go back to your first year you did a course in Excel, **then they said but it was long ago**. Then I said **I've learned long ago that I must breathe and that doesn't mean that I must now… there is information which I learned years ago and that doesn't mean that I can't go back to textbooks, but it's my responsibility.** I must know it, so I think I talk about the relevant content of modules there are two aspects, it's about relevant information the student must know, but the problem is if you tell a student, usually while lecturing, **if there is information I expect them to study, in other words I regard it as relevant, then I tell the students, the information I regard as relevant they must know and know it well. A problem I experience in many modules,** other modules **the lecturer said I must study everything, but then they realize at the end of the module the lecturer only asks certain parts of the information,** and I have a bit of a problem with that. **I think it's important to take note of larger applications, but if a student step away from a module I ask myself what is the essence of what they must keep and I think many times information is included which is not essential and then I would rather want to exclude that information.** On the other hand **information presented in modules in context of the bigger picture of assimilation of information should be addressed**, because the modules are usually very focused and no greater context is, the information in a module being explained and students should realize I can now assimilate this in a very narrow way, or I should try to see the bigger context and **that's the problem with the module system** and it's a problem with the students if they have written a module then to discard it and with that also the information they have	Relevance and usefulness of the module: completed the module, they regard it as done there is information which I learned years ago and that doesn't mean that I can't go back to textbooks, but it's my responsibility. if a student step away from a module I ask myself what is the essence of what they must keep and I think many times information is included which is not essential I see it with the postgrads. The student gained information undergraduate, and by the time they must apply it on postgraduate level, they have forgot because they only studied to pass the module.

learned and **I see it with the postgrads. The student gained information undergraduate, and by the time they must apply it on postgraduate level, they have forgot because they only studied to pass the module.** I: The last thing what are your thoughts about we are now here in [faculty], not with program directors but lecturers of the modules that **gets together** because it doesn't really happen, getting together and saying I do this in [subject] you do that in [subject] in the second year so that we can support the concepts to bring across to the students, you don't study a module, you study a science. L16: **Yes that total picture. I think it's absolutely necessary**. My experience is the last 20 years was that in certain disciplines there were recurriculation, then all the involved disciplines interested in the module for their students, had their discussions about the content of the modules and more discussion on departmental level. Nowadays my experience is those things being managed on departmental level, where departments don't necessarily talk to each other, but they bring changes in their programme if they think its critically necessary they will talk, but **there aren't really between the disciplines sufficient discussions**, and often students say, **I ask have you has this aspect, then they say yes they had it in that module, but if we start talking about it, I realize what is being lectured is different from what I want to teach them**. Hmm I don't think there is sufficient discussion only because we now view the BSc programmes to specialise and moved away from the thought that students must learn retain skills within a certain module. **We are now on the module level and there are students with a mixed variety of modules from different disciplines and they have a bit but not enough to really be able to say there is enough foundation and building on that basis, and that's also <u>a gap.</u>** I: Thank you very much.	Collaboration: Yes that total picture. I think it's absolutely necessary there aren't really between the disciplines sufficient discussions, I ask have you has this aspect, then they say yes they had it in that module, but if we start talking about it, I realize what is being lectured is different from what I want to teach them. bit from a variety of disciplines but not enough to really be able to say there is enough foundation and building on that basis, and that's also a gap.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 17

Questions and answers **Demographic data** **Lecturer 17 (L17;) Interviewer (I)** **20min 02sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L17: From 2011	6 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L17: No I: Have you studied here and then just continued lecturing? L17: After my MSc, during my PhD.	
I: Which subject(s) / module(s) do you teach? L17:Genetics 3764 that is the **third year** module which they take in the second semester.	3rd years Genetics
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L17: Not really I: What is your understanding of the term student self-efficacy? L17: I understand it is **how effective students use their own time to study certain concepts**. I don't know if it is right, it is what I think it is. I: It's your understanding.	how effective students use their own time to study certain concepts
I: How do you experience self-efficacy in Natural Sciences students whom you teach with your understanding of the term? L17: It differs from year to year and off course you have the **full spectrum of students who do things differently** and it is difficult for me to say the percentages of whatever, but I must say it feels that the **students' self-efficacy while we are having class, is very low,** but this years' students or with their **assessments, I do continues assessments, so I don't write exams, I have 7 evaluations during the semester. During class, a formal class, it feels as if it is low, but when it comes to the evaluation of that class, they usually surprise me**. Then it must tell me that during class the interaction is low, but I don't think the self-efficacy and I know there are many students and I am also like that who learns more by sitting quietly on their own and observe as what I would participate. **I know there are personality differences and students that learn more from active participation**, but I almost **get the idea that students, especially BSc students this year, learn better and more not from active participation, because when it gets to assessment, they perform**, **even though they don't have engagement in class.**	Student self-efficacy: full spectrum of students who do things differently. students' self-efficacy while we are having class- very low. During formal class, it feels as if it is low, but when it comes to the evaluation of that class, they usually surprise me-get the idea that students, especially BSc students this year, learn better and more not from active participation, because when it gets to assessment, they perform.
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L17: I definitely think so. **I rather see myself as facilitator rather than just lecturer**. **I don't feel like the source of knowledge** and we must in anyway put everything on Blackboard, and I have **found in my years of lecturing students that didn't attend one**	Lecturer's impact: see myself as facilitator -era wherein students cope very well with only

class or one practicum but that get a predicate of 60% and 80% in the exam without me even knowing how they look. I do think we are in an **era wherein students cope very well with only electronic sources.** So I won't say I am the source of knowledge, everything that I give is already on Blackboard. That is also why I am not strict on class attendance, because **if the student feels he/she is capable to study only electronically, and they do well in the assessments, then I don't have a purpose there**, I am not the source of knowledge**. I give knowledge and only facilitate** that so that they understand.	electronic sources. give knowledge and only facilitate
I: Please explain / elaborate on your **teaching strategies?** You mentioned ***continues assessment and 7 evaluations***. What type of evaluations is that? L17: Different forms like I have a **practical assessment where they physically** ….. different volumes and afterwards I measure the volumes and according to that they get a mark for their ability so there are practical divisions. Then I do an **oral section where they as group must do a presentation** on something. I have 2 open book written tests where I give practical examples and they can bring anything with to work out those examples and then I have a **few online tests** which they can work out and monkey puzzles and then **2 traditional semester tests** you can say. I: And your teaching strategies in class? How do you go about? L17: What is teaching strategies? I: Do you use PowerPoint, do you stand in front, and do you invite interaction, that type of things. L17: Oh ok ok. I do different things, usually I have a **PowerPoint presentation**. I think they learn from their first year to study from a PowerPoint. So I make a summary on my PowerPoint presentation, even though I tell them it is only a summary and my PowerPoint usually doesn't have a lot of words on, it is usually pictures and I **attempt to create as many as possible scenarios** which they can use to think and to make it relevant. Hmm a big part of what **I also do** has to do with **good laboratory practice**. So what I do is I **hand out one medication pamphlet each**, and tell them to each read something from there and what the relevance of that is, why it is there, how it helps us etc. Just to get like a point of reference want to say, of what good laboratory practice really means, like if you don't do it then nobody will compile those pamphlets and if they get a headache they won't know why, because it is difficult to study something if you don't know where it fits is, but I must say I don't do flip-flops and put on clown noses and those funny stuff.	Teaching strategies: *continues assessment and 7 evaluations*- practical assessment, oral section where they as group must do a presentation, few online tests, traditional semester tests.*In class:* PowerPoint presentation, attempt to create as many as possible scenarios, I also do good laboratory practice ,hand out one medication pamphlet each.
I: What is your opinion of interactive classes? L17: What is an interactive class? I: Do you encourage questioning, you just said some do not like questioning, what type of interaction is there in class? L17: Hmm my experience is it differs from topic to topic, for example I have a section on ethics, and then I encourage discussion and that is quite interactive, because **once you give a difficult example in class, then many start to develop an opinion, and the interaction is relatively strong**, but when it **is merely a technique, a molecular technique, then there is little interaction,** because they can't have interaction on next generation sequencing, because their background thereof is zero. **So it is something new to learn, so the interaction is little.** I: So I hear that the ***topic determine the level of interaction***? L17: Yes. I: Let's say you explain something in class and there are the ones that do not understand, and it is foreign to them, would they just put up a hand and ask, or are they withdrawn? L17: Hmm there are groups like that; I must say **since I've started in 2011 there has been quite some evolution.** When I started, I also didn't really know how to read my audience, and and and, but much more interaction now, and the **shy ones will definitely make an appointment and come to my office.** I: Or afterwards?	Interactive classes: *topic determine the level of interaction.* say since I've started in 2011 there has been quite some evolution. shy ones will definitely make an appointment and come to my office. Or wait for me afterwards and ask. after the assessments there are a lot that makes an appointment. I give an assignment without too much detail. need many boundaries.

L17: **Or wait for me afterwards and ask** this or that. I believe, look the class is 150 students so obviously I lose many who won't do that, but I usually pick them up during the assessments, they identify themselves, then they realize since there are so many assessments I must now quickly make a plan, and then usually **after the assessments there are a lot that makes an appointment.** I: And would they send an email with questions or only what is the time of the tests etc.? L17: Yes they do it freely and they are also very quick to correct me. If I accidently made a typing error, and say it is October 2018 then there would be 10 emails telling me that your year is wrong. So they do have the willingness, for example if **I give an assignment without too much detail**, and actually I have decided to do it that way, **because if you give too much detail their thinking work is too littl**e, so I give as little as possible detail, and **give as many as possible rules** and if they ask may I do this or that then I ask does that suit your topic? If you can motivate that it fits your topic, then you can do it. Go and think if it fits. So they would send many emails about may we do this or that. I: It is as if they **need many boundaries**? L17: Yes they want it quite a lot.	
I: Elaborate on students' engagement and communication with you in class and in your office. I just first want to hear the difference in numbers between the English and the Afrikaans class. L17: Hmm I think they are 30 in Afrikaans and 120 English students. I: Is there a difference in dynamics and willingness to ask between the two language groups? L17: Hmm no I don't think so percentage wise obviously the number of students will differ between the Afrikaans and English class, but I won't say, I think all **my Afrikaans students have the willingness and the English students not.** I would say it is percentage wise distributed, there are **always 30-40% who asks many questions,** but I think the **majority, the 60% in both classes would rather not ask and wait for someone else to ask.**	Students' engagement: always 30-40% who asks many questions. majority, the 60% in both classes would rather not ask and wait for someone else to ask.
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L17: Hmm ok I think in the past the modules I presented I was sort off the information source for example I presented Human molecular genetics we call it and that fit into a degree Human Molecular Genetics. So it was literally illnesses, molecular disorders and those illnesses, what causes it? Monogenic illnesses, polygenic illnesses, concepts on what is monogenic, polygenic what is multifactorial. So that was the previous module I presented. We have this **specific module in practice we call it [subject], So that is totally practice orientated.** That is why it is a big part of good laboratory practice, I manage a big part of for example, clinical practice. I do prospecting and what are the rules on genetic resources and a big Ethics part as well. With that we also felt like our students needed something which is relevant with wherever they are going, because it doesn't matter, remember we have […] students from Zoology, from Botany all over, so we can't only focus on one thing, but ethical standards remain the same, good laboratory practice remains the same. Ok good clinical practice is maybe something unique, but in our south African system we have so many **Quintiles, Paraxel where there is so much work, most of my postgraduate student go and work there**. So we thought that that is a good baseline, because many get appointed and then after a month they realize what contract research is and they hate it or some doesn't even know thereof but wish they could have been part. I: Then I just want to know the students motivation, how do you experience it? Are they low or high on motivation, how do you see it? L17: I must say if I compare it with my previous modules with two semester tests and an exam, what I know is **students get motivated through assessment, through marks**. **If you don't connect a mark to something, it won't happen.** I for example if I think of the last two classes I presented, **where no assessment or tests were connected, I had less than 20% class attendance**. So I must say, the assessment, not in all cases, **if there is a big test then class attendance is also low,** even though they will be assessed later in the year, so there are different scenarios, but I think the motivation and participation and questions are more because they know they will be assessed on today's lecture, not just a part of today's lecture. I: Sort off circumstance determines how they are?	Relevance and usefulness of the module: specific module in practice - totally practice orientated. Motivation: students get motivated through assessment, through marks Liaison:

L17: Yes I: Then a last question I want to hear, I sit in [faculty] and then give [subject] and you are in Natural sciences and give [subject]. Do you know what is being done in that module so that you can support each other, So if I do fetal development, you for example fetal genetics do and so on? L17: I think, I don't think there is total collaboration between you and {...} . I must say **I don't think there is total collaboration.** I think I know the least of what their syllables. I: How do you know that? Do they get together and discuss that? Is there a liaison? L17: There is a liaison between all the Natural Sciences. So if they compile a curricula for the second years, so that they is no transcription and translation, in [subject] and in [subject], even though it is relevant for both modules and for example, enzyme action within Biochemistry which is a first year module, and no overlap between enzyme action within Biochemistry and enzyme action by Plant Sciences or let's say in Biochemistry on how the mitochondria work so that it is not only specifically for Biochemistry and not restricted to only that. So there is an explanation over the years of work. I: Do they send an email or is there a meeting? L17: **Program directors who work out each curriculum, then they sit and it usually happens at the time they compile the yearbook**. Then come the yearbook, this module works with this one, and then we want them to have insight into that. I: Is there anything from your side that you experience as a ***gap*** for the students which can be done to improve their performance? L17: I think what I want to propose can't be done, I think the **gaps come from school** and it is **not an educational gap, it is a life attitude gap,** and **I don't know how to fix it**, I am too stupid for that. I know too little of human psychiatry. I really **get the idea my students think everybody owes them something**, and I don't know how to fix that. Furthermore **I feel we give way more tools than when I studied**. I mean I bought my standard textbook, no notes, slides nothing. **You had to figure it out.** So it feels they get many more tools, as what they would have had before and still it is not enough, **where will we draw the line**? If you step into a corporate business one day, they won't give you small study guides, translations, slides etc. you will basically work from the rulebook, and figure it out. So on the hand **I don't know if we are doing an injustice.** I: Let's say we stop that and only say here is your book go and study. How would the students handle it? L17: **No I think there will be more unrest and fires.** I think, understand they expect it now. It is like giving someone something, they think they must get it. So I think it is too late to close the door, because we already opened it. So I think they expect it and w**ill be very upset if they don't get it, you will have to start that at earlier in the year**, and I won't say what we did was the right way, because there was very little interaction. I was way too scared to get close to the lecturer never mind to consult and we didn't have internet, so we couldn't google, or could not YouTube, but we are in an era of information, so I can't say what is wrong and right, **I do like what everyone else is doing.** I: Thank you very much.	don't think there is total collaboration. liaison between all the Natural Sciences. Program directors who work out each curriculum, then they sit and it usually happens at the time they compile the yearbook. gaps come from school and it is not an educational gap, it is a life attitude gap. get the idea my students think everybody owes them something. I feel we give way more tools than when I studied. I do like everyone else is doing.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturer 18

Questions and answers **Demographic data** **Lecturer 18 (L18); Interviewer (I)** **35min 10sec**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? L18: I am 7 years with this University, but only 2 years with Genetics I: And before these 2 years? L18: I was at Plant pathology.	7 years
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. L18: I was at Tukkies, but didn't lecture. I did my post-graduate there and was a postdoc there for a while.	
I: Which subject(s) / module(s) do you teach? L18: Genetics 2626, so the **second year** molecular Genetics, only the second semester and now I have the honours with Sistimaticus Species. I: These questions are just about undergraduate students	2nd year Genetics
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: Have you heard about the term student ***self-efficacy?*** L18: Do you mean if they can help themselves and self-study? I: Yes I: What is your understanding of the term student self-efficacy? L18: Hmm you can give them **the work and explain and then they run with it themselves**, if they don't understand something then they can come to you and make appointments and chase marks to make sure that everything is fine and they **can figure out some concepts for themselves**.	self-efficacy: after explaining the work and then they run with it themselves. can figure out some concepts for themselves.
I: How do you experience self-efficacy in Natural Sciences students whom you teach? L18: There is **some of them that just have and some who solidly don't.** I: Percentage wise those that are high and low? L18: That is difficult, because I have **big classes, 262 this year. So, I don't interact with everyone,** but it is normally those that come to interact with me that is in this group, but there are some of them you can realise, I would say about 20% and then there is this large group who I don't really know where they are. One **usually has to do with the extremes**, but there are some of the **middle group who come to talk and say they don't understand and such things.**	Student self-efficacy: **some of them that just have and some who solidly don't.** usually has to do with the extremes but middle group who come to talk and say they don't understand and such things.
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? L18: Yes, well **I lean towards the, I do too much side**, and I know there are lecturers that just leave them and sorry that is the way it is, I won't help, I won't change and that's just it. I mean we all have had those lectures, **I bend back to help them,** because I feel if we have made the effort to chase them, then it would help them and for them it's a big thing. They spend money and need the module, why would you not help them? It is also a service to them.	Lecturer's impact: I lean towards the, I do too much side - bend back to help them. *the more interaction you have with the students, the more impact you have*. I have some

I: If you say you bend backwards, what do you do? L18: Yes except the explanation, this week one of the times I have **explained the concept 15 times a day**. Other lecturers would have said, go away. **They come here, don't even make an appointment, if they would have made appointment I could have consolidated them in.** I: Into a group? L18: Then enough of them come, and then you explain to them you remain friendly (laugh) because they actually come. Ok that day it was about 10% of the class which is outstanding but still it is only 10%, where is the rest? Some of them understand it I know but the other don't understand. I: Do I understand you correctly by saying ***the more interaction you have with the students, the more impact you have?*** L18: Hope so. I: Not just in the class but also what happens outside of class? L18: I hope so because I love people very much. I am an introvert, but especially with my postgraduate students I am **a firm believer of you make an impact on their lives,** never mind the subject even if it is just to **teach them that there are people who want to listen to them**. If you come, you will be helped, not always with other people. My husband is a teacher in Heidedal and **I have some insight where they are coming** from and **they don't know that they can come and ask or argue or that you can do extra things to help them understand**. There is this one guy that after all the explaining still didn't understand and I've really spend time with him and in all sorts of ways tried and he understood at the end. It was so cool. I: The lights went on. L18: Yes he got it and if he understands it, then he will understand the rest, if he doesn't understand it, then the rest will also be Greek.	insight where they are coming from and they don't know that they can come and ask or argue or that you can do extra things to help them understand.
I: Please explain / elaborate on your teaching strategies? L18: Well I am under development because it's a big class, even though only half of them come to class (laugh). Last year I did the module for the first time and then the strikes hit me. This year I did it a bit different, then the strikes hit me again. I: In the test or in the class? L18: The third test were disrupted and it is a promotional subject so it was chaos. I: Did you stop? L18: We've cancelled. So from last Thursday I'm putting out fires, we've decided we can promote and it is not the end and everyone is unhappy because they wanted to use the test to push up their marks and some of them needed it a lot and now they can't write and now they sit with what they have. Then me and [name] I was in hospital, another example of bending backwards, and I am one of the few lecturers who does it but it saves me time because otherwise I must sit here until 19:00 in the evening and I can just as well sort it out quickly, but anyway I am still developing, but obviously one lectures, all the notes are on Blackboard and I've also learned with time because my husband is a teacher, **I don't throw them with tons of information, for me it's pointless.** I would rather want them to understand the rest they can do for themselves if one day they must. So we **do a few chapters and then we have a revision period** where we go through everything. I plan one, but it ends up in 2. I: Do more attend if they know it is revision? L18: Less, those that matter are there. So then we do revision again because it is a difficult module and I don't see the point to give my thick textbook and say there you go, like I've been taught. For me its additional, **the notes must be worked on, so it's not always self-explanator**y so my issue is read the textbook if you really want to, because then you will understand it even better, than I can say it. So it's optional and most people use it, it's of course also costs mmh but we've bend back again, maybe a bit late but it is out of my control. We've got an eBook version for tutors which I don't think many people use, but next year they will be ready so that they can read through it because it helps them understand but it is technically difficult hmm then I realised some will still be	Teaching strategies: don't throw them with tons of information. do a few chapters and then we have a revision period. I design a study guide for them – definitions, concepts that can be short questions, concepts that can be long questions, concepts which they must understand. many experiments. the notes is part of the setup. outcomes write class tests, online *exposure in any way possible.* Practicums. Tutorials. practical hands on things practicums are also the exam videos some they have to watch themselves. tutorials four videos doing it in the computer labs. too expensive and too much effort to buy fancy lab equipment. practicums. I still get people who don't finish, it's disruptive because it

lost those that aren't such good students who can't help themselves. We go back to it every time, then I've decided let me do it and it sort of broke me this year, because I also did it last year and then I had to redo everything because the textbook's version changed, enough so to be different, but I take my lecture and then **I design a study guide for them**. Here are you definitions and you must know what these words mean and if you don't know, find out, and if you're not capable to find out, then come and ask me and if you don't come, tough. So all **the definitions which I think are definitions and I will obviously ask, concepts that can be short questions, concepts that can be long questions, concepts which they must understand** and not only know from heart and then because there are **many experiments**, I can and I've done it this year, this technique, what is his outcome, what was this experiment, what is the outcome and why have they decided it's like that and the textbook also has essential notes which I took out and gave to them and if they understand it, it's great. The textbook, agh the module's notes I di**dn't make the notes; its part of the setup.** So before each section there are **outcomes,** so I don't have to make outcomes myself I just used those. That I will use next because I've only run with it this year. There are actually some of them that come and ask they don't find the outcomes can I help them so hmm, then they must **write class tests**, **online** this year which also made me jumped because last year it was in class test format. So because I know they sit together and I try to randomize and I am developing a test back so there are more questions than they get, but it is still under development. My whole idea is if it forces them to work through the work then I am happy. I: The ***exposure in any way possible.*** L18: Yes so that they can realise I must give a bit more attention to this work, because this question I didn't really get. So if they make effort to work by themselves, fine, if they work together, fine and then the **practicums** I've changed from last year so that the theory can complement instead of other things, with other fancy stuff, because the textbook, it's American. It's not going to work here. I can't even give them the problems in the textbook because I don't even understand it. I: It doesn't fit the context? L18: It's too difficult it's too high so then I took the concepts which I know they will struggle with and which they must understand, I divided them and made **tutorials** from them and **practical hands on things** so that they can understand if we refer to it in the practicums and it doesn't always make sense in the beginning and realise with the **revisions in the class and the tutorials do you remember those,** do you remember this now, and does it make sense, and then a few more lights went on and the main **practicums are also the exam**, because I only ask from there. I: So their practicums and questions from there? L18: Yes and from the theory, especially the tutorials solidly **I take the tutorial questions just like that.** If they got it from a friend, tough and it's that guy where the lights went on who came to ask me, good for him because it's in the exam. So I try all those kind of things. I: The practicums with the large number of students, how is that going? L18: It's in two days and amongst others clashing with Physiology (laugh) so there is one on a Thursday afternoon because nobody want to come on a Friday those that really don't have a choice. It's a lot for us so you can't do everything well with them. I: And the equipment, is there enough or do they work in groups of 10 and 20? L18: We have a station with the things our overnight tractions it's **too expensive and too much effort to buy fancy lab equipment,** so I went to Mambo's and bought the plastic containers and told them you are going to do a kitchen gene extraction and they get DNA and then I've realised amongst the students they can go without the fancy measuring cylinders to do sequencing. I: To see how easy it actually can be? L18: Yes a plastic container here and a measuring cylinder there and there you go so we use the stations and demonstrations and I show them the **videos** which they don't watch **some they have to watch themselves,** but in the **tutorials there are four and they are doing it in the computer labs** and I must admit I also don't always like sitting there. I: Is it always computerized on their own time or do you book a lab?	is students that talk. next year I'll do it online.

L18: Yes last year and this year was on their own time. I showed them and there they go, but even if you say please stay behind because then it is done and I can help you because then it is done it doesn't work like that for them. **Then we realised last year's memo is circulating** and they write from there. That's funny because I made mistakes on the memo (laugh) and then I realised it (laugh). Then it was like I got you. It was a very blatant stupid mistake, but anyway then we changed it and I still must with the demi's because the demi's are also unhappy with things and then [other lecturer] who sees them in the first semester, said me and her works differently and we are different from each other and the modules are not exactly the same so quite frankly I don't see my way open to explain the same thing 1500 times from 2-5, when one realises they don't know what to do because they can't ask their friends. So I have blatant except the memo's there I know they have cripped and [other lecturer] is very good with detail management. I don't have time for that and I don't work like that so to say this one used that one's work, it is what it is and they are penalised because they will get it in the exam but due to the issue I've changed the third one and had to do it in the **practicums. I still get people who don't finish, it's disruptive because it is students that talk**. I mean you will find 15 different groups that will constantly ask you the same thing, but next year I will have the boxes outside with packs of tutorials which they must submit and they don't listen. Even if you say I have a list of things that you must submit and they still don't do it then it is chaotic to sort that out. So **next year I'll do it online**, then they will just have to do it and I won't sit with this mess and it also crippled my energy levels last week. I: I'll believe that.	
I: What is your opinion of interactive classes? L18: I love that. It **depends from year to year you must also know it.** This year I had actually an attractive class, ok it is usually the same guys. I: Do they ask questions themselves or do you need to ask? L18: **If you point they are quiet** so sometimes I point, but sometimes you don't get reaction so I am struggling with that still I leave it then and **make it rhetorical**, but **this year there were definitely people who asked interesting things in class** or if they didn't understand ask me to do it again. Last year nothing, but then there were guys who asked weird things afterwards. I: Afterwards ***at your office?*** L18: Both. So they are there but if you think **they are 260 and it is 2, 3, 4 class max from such a big class.** I: What is your opinion of what you've seen when you do it that way, do more lights go up? Is there something that stands out? L18: O that's difficult for me because it is **such a mix of people** I: Over the spectrum. L18: Yes I sit with **bright guys, I mean the one girl got 100% for her test,** last year there were also the clever, the top. I: That's wonderful. L18: Yes and now you sit with those who gets everything and even catch you out **and then those who not at all, not at all, you don't understand how because they just don't get it.** But we've **changed the things now, and now needs maths or stats** so that they can think because that's an issue for them. I: Analytical thinking? L18: Hmm but there is nothing wrong with them it is just not their module and then those where you can see this guy doesn't really study but he understands it. So I mark quite easy, but I won't say that there is 1 thing, I say that I must try different ways and **this year I've started with the tutoring thing** I am sure I am the only one in BSc or at least in Biology who does it and it is actually **shocking how few attend,** but then we've also realised **they don't understand that they can just come they thought they must pay** or something. I: So ***you do the tutoring or someone else?***	Interactive classes: depends from year to year you must also know it. If you point they are quiet and make it rhetorical. this year there were definitely people who asked interesting things in class. *at your office?* they are 260 and it is 2, 3, 4 class max from such a big class. such a mix of people. this year I've started with the tutoring thing- shocking how few attend - they don't understand that they can just come they thought they must pay. *tutoring*- idea was me- I don't have the energy to do that as well- I have 2 practicums per week and 6 lectures -tried for my demi's to do it but then I've realised it doesn't work well- more senior students -difficult to orchestrate

L18: The **idea was me, I don't have the energy to do that as well, I have 2 practicums per week and 6 lectures. I've tried for my demi's to do it but then I've realised it doesn't work that well.** I: They maybe teach them wrong? L18: **They like it**, there are some of them who are very keen to do it, but I've picked them at took **more senior students** and their job is the tutoring and the rest help with the practicums, but it is so **difficult to orchestrate**, because they are **not close to me and when they moan and say I haven't told them in time**, but for crying out loud when was I supposed to. I: Or you say it in class and their sits 10 from the 200 and you think you've said it. L18: Yes and then you must repeat it for the 15 guys that comes at different stages. Last week I almost blow a gasket, because really we had a crisis. I: Yes I understand.	
I: Elaborate on students' engagement and communication with you in class and in your office. L18: Sometimes they **sit blatantly and chat in class** regardless of it being a big class or not, **right in front of you**. One day I asked them what are you talking about no they have decided what to study for the test, then I said start by listening in class, those things. I've enjoyed it then the **one girl from the back shouted keep quiet some of us wants to listen** so yes it is really all over the show. I: Do you get many emails with relevant context questions or just when is the test, technical questions? L18: Yes it's more those type of things. If they want to come and **discuss something it is usually in person after class** and many also ask about where to find work.	Students' engagement: sit blatantly and chat in class discuss something it is usually in person after class
I: Give your perception regarding the relevance and usefulness of the module content that you teach. L18: O no **it is critical**, because we **talk about the techniques** amongst others and if you don't understand the molecular principles you don't understand the technique and then you ask the honours and the M students do you know how PCR work yes ma'am huh they don't realise as yet. I: They don't realise that they one day will have to do it, do you experience it like that? L18: Yes they don't realise it and because it is still promotional it is all about **being promoted then you don't even have to go and write.** I: Then how do you experience their ***motivation*** in general? L18: Huh again something of everything. You find the **absolute dedicated ones** that wants to go further, the ones that work very hard, t**hose that don't care, those that had a fright and try again, e**specially this year there was a big component of, o my we have failed now and we need to get going and then it is too late they missed the test but this module of mine, [lecturer] would have also told you, because it is half like a hotch potch, because **many people take the module to full their credits without taking it the first semester**. I: So there are **no prerequisites**? L18: No **next year they must have it in the first semester**, no I also sits with those who doesn't even knows the genetic principle. No what must I do? I can leave them, but I also want them to do well in my module, so now you must work on that foundation as well. I: But now it is in place for next year? L18: Yes it will be interesting to see what happens next year. I: Then I want to hear, I am with [faculty] and lecture Physiology and you give [modules] here, do you know what is ***happening in the other modules*** or is here liaison? L18**: No**, never. I: So you do what you think is important and I do what I think is important.	Relevance and usefulness of the module: it is critical -talk about the techniques. being promoted then you don't even have to go and write. Motivation: absolute dedicated ones/work hard. those that don't care. those that had a fright and try again. module has no prerequisites. Collaboration: Need for collaboration –we can definitely form a nice group and talk. what is a challenge for me is this diverse group of mine. I would actually do it much better if I can do it with you because there are many overlap. *really irritates me is the*

L18: Hmm at the moment I must admit because it is only my second year doing it but as you can serve the module better but I pick up because I sometimes ask because I know the Biochemistry guys but I don't really know what the Micro guys are doing, Plant science I know, Zoology **I've got an idea what they are doing,** Physiology **I know little of.** I've got no idea what is happening in Health but people like [lecturer] who comes from there helps a bit. So I kind off make it up what I think, but at the moment its literally what the module is and what I have to work with, but I do think because it is relatively elementary molecular. Any application which Physiology has and application which Molecular have is supposed to help, I think, you don't have molecular stuff. I: Not really I speak a bit about cell division and protein synthesis but it is like do you remember it from school it is not in the module. L18: But it could be good if you can see what I do. I: What do you think about the ***idea of getting together***? L18: **O love it.** I: From this perspective it is supported that they understand science are all these modules and you study the science not just Physiology or Biochemistry. L18: But you know I agree **because the other thing is also test clashes and practical clashes** because I already know of Friday morning 8 o'clock and last year the student came and talk to me and I have appreciated it, because the others don't do it, but **we can definitely form a nice group and talk.** I: Let the programme directors call us and see what we can do. L18: Yes because **what is a challenge for me is this diverse group of mine**, because it is Physiology, its Anatomy, the ones that wants to do Medicine then you have Zoo, Biochemistry, Micro, because I tried to get the points of reference so that they can understand. In my module there is Microbiology, there is Medicine because a lot is about the human disease of which I don't know much but physiological stuff that I know very little of, come to think about it**,** but the example there is how does haemoglobin works if it is a foetus or embryo, but there are different embryos, and how the genes work I have to learn myself, **I would actually do it much better if I can do it with you because there are many overlap**. So if you know what I am doing it can help you a lot and then you know, but I am always someone that does such things. I: Any comment from you side which you think from your experience this must get attention? L18: Hmm in my module? I: Yes with your experience with student? L18: Like technical stuff? I: Anything. L18: What **really irritates me is the student's attitudes**, but it's also **their problem if they don't want to work, it's not my job to make them work.** I: Hinder their attitude their performance? L18: Yes I don't know I give them the tools and what they do with it is their own choice, but then you also sit with, but it's a management thing of ooeee my marks aren't right, but its only one thing that I include to manage it better hmm yes do you know what. I: What frustrates you? L18: **Class attendance because it is so funny, they all come for practicums because they get a mark,** I didn't keep up with it this year, but they are all there and apologise if not, but it helps nothing. They all need to be in class, **why do I need to be reprimanded for all sorts of things which go wrong when my students don't care.** I: ***What about a system about 80% class attendance*** over the year as part of promotion? If it's not there they can't continue. L18: It's something I would really like to do because it irritates me, because it doesn't help you always talk to the ones that are there, because you know 2 thirds of the class is not there and it is them that come and say I don't understand, why is it like this, because	*student's attitudes, but it's also their problem if they don't want to work, it's not my job to make them work* *they all come for practicums because they get a mark. my students don't care. Should apply 80% class attendance* I was all in my previous department for consulting hours- they said I must sit the whole time and wait for students- this support thing. That attitude is crap. I can't give 100% of my time because it also gets to me.

I've explained it in class, 3 times and now I must say why and repeat it 15 times and some don't use Blackboard, some because they don't want to and others because they don't know they are supposed to. I: Or don't have access? L18: I think they have access it's just not on their radar. One picks that up with crises like with the strikes and then I say everything is on Blackboard I am not going to say it again hmm it' what they expect from us. Put this here and put this there and everything is hanky dory. They've actually asked me a week before the test, I haven't had time for anything I close the door but they still bothered me. **I was all in my previous department for consulting hours because there they said I must sit the whole time and wait for students.** I can't go to the bathroom because if they look for me and they don't find me I am in trouble. **That attitude is crap**. **I can't give 100% of my time because it also gets to me.** Luckily last year there were visiting hours but they don't follow it here and it makes it a bit more difficult, because the bell rings all the time and it angers the other department. So yes, if 200 people come one by one, close to 250, I'm not sure if this comes from [previous rector], **this support thing.** Yea sure, **we provide a service but they've got their part of the bargain as well.** I won't bend backwards if that student doesn't do his part and about that you won't be able to do something, I also have my rights. I am not that bad anymore, at my previous department I was so scared I was doing something wrong and even if you do something right, it's that one mistake that is terrible. You've actually sorted out the mistake long ago**, but you are reprimanded about the one time which you…** I: The ***50% pass rate.*** L18: Yes **it's not my problem** and like my husband who goes crazy about his learners who don't care, that's where it is coming from, but it's not only them, it's all over the show, but the **class attendance** that's their part of the bargain. **I over compensate like in 200% just because they are not there.** I: Thank you very much.	

PHASE 2: Transcribed data: Lecturers

Semi-structured interviews: Lecturer Pilot 1

Questions and answers **Demographic data** **Pilot 1 (P1); Interviewer (I)**	**Comments**
I: How long have you been teaching Natural Sciences students at the University of the Free State? P1: I speak under correction, but it's more or less 10 years. *(He got his 25 years award in 2017.)*	25 years experience
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. P1: No I haven't lectured at any other university before I started here, but I did at the same time lectured at CUT for a period of time.	
I: Which subject(s) / module(s) do you teach? P1: For the Science students currently Histology and in the previous years Histology and Embryology.	
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: What is your understanding of the term student self-efficacy? P1: Hmm that is **not a term I've heard before**, my understanding is to **what degree a student can manage his study** that he learns in the process and gain knowledge.	
I: How do you experience self-efficacy in Natural Sciences students whom you teach? P1: Yoh, it's one of those things which one never thinks of. Hmmm do you refer to self-efficacy specifically in the classroom and not generally in their studies? I: Yes you lecture and they sit there in the classroom to try and study effectively hmm to give an example, do they effectively make notes or do they only sit there or do they ask questions? Do they 'use' the environment? P1: My experience with the BSc students is in general smaller groups, usually 10 students or less and in most cases only 5 or less. They are in much **smaller groups which improves the contact**. A student can't get lost. I think it puts the student under pressure to participate and to engage and be involved. **I feel their efficacy improves and the more you get them engaged, the more effective they will be. My experience over the years with the BSc student is there usually are 2 groups.** The **one group wants credits and is not interested**. They have **no self-efficacy in class** and their marks showcase it, they aren't involved in the class. The opposite is then usually the student **who really is interested and is involved and they do very well and is usually not a middle group**. The student that focus and make notes, that's a student with a handout or electronic version of the slides that makes additional notes in class. I work from my slideshow which I make available beforehand. Hmm I try from my side **to ask questions where a student can choose to become involved or not and the student that is interested is more engaged and I think it improves their self-efficacy** and I experience an **openness to ask questions**. Not just purely on the topic, but also related and many times that student, you get the feeling there is a persona connotation to the topic, be it personally or someone they know or a situation they are aware of and that stimulates their interest and at the end their efficacy as student, but I must say if I divide the class in groups, **10%, 20% are really effective, then a few who is effective to a degree and then a few how are ineffective**. **The group that really is effective is a small portion of the class.**	**Self-efficacy:** Self-efficacy improves the more you get them engaged. 2 Groups: 1) want credits not interested 2) interested and do well. Ask questions - student choose to become involved or not. Those interested – more engaged -do better. Engagement improves self-efficacy. The group that really is effective is a small portion of the class.

I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? P1: I believe the lecturer has a great impact. The way in which you do it will differ, hmmm what I hope to reach, hmm especially because I lecture Histology and Anatomy which both are regarded as quite difficult science modules. **My role on the one hand is to explain difficult concepts** hmmm which on the one hand makes it more elaborative, but they understand what it is all about and the **second part is to trigger their interest** and that has to do by referring to everyday examples and applications, but I think one has a real impact. **Hmmm seen form the student's side, I think the impact of the lecturer is more on the level of what is being emphasized**. Looking for spot questions for the work he presented and I know I'm guilty, in the sense **I emphasize certain things more and that's the work I assess. So students pick it up**, they start to read on what is important and in that way it will influence their performance, but it's not necessarily a positive contribution to their knowledge of the module or general understanding of the module and then some start to read selectively, but yes that's not my goal. I: Was your idea, let's say you highlight the important sections of the work or give them a guideline, let's say they know how to go about, but maybe they understand it wrong, and they don't understand the link between all these things. P1: Yes I agree 100% with your statement. The intention is to highlight the important points and make it clear and that they can see the whole from those markers, but I get those students which isolate those concepts. I: Would you say the students see the work section for section and not the whole? P1: Absolutely. **They fragment everything and don't see it as a whole.** One tries to capture it with discussion type questions in the class, but again if it comes to assessment, you fall back on the fragmented questions and the students also realize it.	**Lecturer's impact:** form the student's side, I think the impact of the lecturer is more on the level of what is being emphasized. I emphasize certain things more and that's the work I assess. So students pick it up. They fragment everything and don't see it as a whole.
I: Please explain / elaborate on your teaching strategies? How do you lecture in class? In other words have you seen this thing or that thing works better. I've heard you said you ask questions in class and highlight certain things. Pilot 1: Yes I think **my strategy is mainly based on my strengths rather than the theory,** telling you what the correct strategies are. I am naturally more a **person that lectures in an unstructured way, supported by PowerPoint slides.** Primary that's what I do, that is my **primary method**. Hmm my **approach to a lecture is I try in general to show the bigger picture and to say where this fits in.** Then it becomes more specific, then you start, give a framework of how the work will be managed and in which order, on what attention will be focused and then I discuss each part with the focus on the difficult concepts. Then **at the end of the topic, it can be over two lectures, I try to simplify and summarize and say this is what it's all about.** That is my method. **I try to do it with a question I almost know they must have the answer for, get their involvement**. **I love to if the work asks for it, get opinions, no right or wrong answers, just opinions**. Hmmm Embryology asks for ethical or moral questions, and although not part of what is being assessed, but **suddenly the student start to think critically about the topic. If he thinks about the topic, he gives attention to the module,** and hopefully that doesn't distract him from factual information of the module which he must have. You try to get the student involved; there are those for which that don't work, and then others who you must just keep from distraction. **I minimally use other audio-visual help.** I nowadays use a bit, sorry for the mix language, the real **YouTube videos animation videos.** Those I use in Embryology are usually simple, very simple, but it gives an overview of the work within 3-4 minutes and afterwards I lecture, so that the students know what we are working towards. So I use that more and more. My module asks for that and then to show histology apparatus, but I do that through digital images, I don't work with the microscope or maybe in practicals with the microscopes, but it's not a lecture. Hmm in Embryology I use, but that's like two sessions in a semester where I use the **museum samples** with congenital defects which I use, but **that's some extra stimulation.** We visit the **Pathology lab, just for some change from the normal**	**Teaching strategies:** based on my strengths rather than the theory. Person that lectures in an unstructured way, supported by PowerPoint slides. Approach to a lecture is I try in general to show the bigger picture and to say where this fits in. At the end of the topic, it can be over two lectures, I try to simplify and summarize and say this is what it's all about. I try to do it with a question I almost know they must have the answer for, get their involvement. I love to if the work asks for it, get opinions, no right or wrong answers, just opinions. I love to if the work asks for it, get opinions, no right or wrong answers, just opinions. If he thinks about the topic, he gives attention to the module. I minimally use other audio-visual help. A bit of YouTube videos animation videos. Museum samples -that's some extra stimulation.

class setup because I know I need to change a bit from the plain lecture format. I don't use group work I don't use assignments anymore. I: Is the group maybe too small for group work? I hear you refer to museums and YouTube videos. Do you think it has an impact and facilitate? Please explain your answer. P1: I think it facilitates well. **My brain works in pictures.** Everything I've read and is written I must switch to a picture to master it myself hmmm and I lecture from these pictures hmmm that's why I tend to switch everything to pictures. I've also experienced a student making no sense form pictures or diagrams and I struggle to manage them, but you try to get pass that and to find something he understand better. I: Just out of interest – what do you think of technology? Do you think it's the zeitgeist and important to use? P1: I have a split opinion about it. **I don't think technology is important for effective training or effective teaching**. I do think technology can help and one **must be careful not to include too many frills** which can negatively influences the teaching. Simple example, even though I don't use it myself, even PowerPoint slides which you use every day, don't have ten little animations on the side and use it extensively, because **it distracts them** from the content. Because **I'm a visual learner myself,** I **believe the visual images are important and technology makes it easier to project** and animation and three dimensional images. So in that sense I believe in **technology helps us to create additional material for students to learn in various ways.** technology, but I believe you don't need the best, most funny and newest technology. I think For the more ouditive person, you can give a video with sound. You can have images and animations. I think like with **Blackboard** you can make things available and then the student has the choice.	Pathology lab, just for some change from the normal class setup because I know I need to change a bit from the plain lecture format. I don't use group work I don't use assignments anymore. My brain works in pictures. I don't think technology is important for effective training or effective teaching. Must be careful not to include too many frills – distracts them. Technology helps us to create additional material for students to learn in various ways. Blackboard.
I: What is your opinion of interactive classes? P1: I prefer **as much as possible interaction, but disciplined and structured**. A student mustn't shout or something, but I like if a student participate and ask questions. It's not only at the end that questions are asked; **they can interrupt me at any time and put up a hand.** So I **prefer** interaction, but it's basically **from student to lecturer interaction**. I read the student, the student asks something and I respond to him in the class. It's not really interaction of group work or something. It depends whether the group leans towards that, it depends of the group's attitude, especially with the **BSc type groups, they know each other so as one is asking they'll throw it back at the class**. **Then a discussion is triggered.** Hmm it works for me and it is important. **This way of interaction doesn't work with larger groups, that's now 50 + and you lose the student in the process.** Hmmm **interactions in other ways I'm not very effective with,** it is more things like MCQ on clickers in that way active and hmmm it doesn't always work as well as personal interactions.	**Interactive classes:** As much as possible interaction, but disciplined and structured.They can interrupt me at any time and put up a hand.Prefer interaction, but it's basically from student to lecturer interaction.BSc type groups, they know each other so as one is asking they'll throw it back at the class.Then a discussion is triggered.This way of interaction doesn't work with larger groups, that's now 50 + and you lose the student in the process. Interactions in other ways I'm not very effective with.
I: Elaborate on students' engagement and communication with you in class and in your office. P1: It differs, you'll get the student that will never say a word to you, and just ask the most necessary academic question. Hmm nowadays I experience that the **classes have a manager that is not really appointed**, but sort of develop from the class. A strong leader type of person, more extroverted that **talks and comes to your office**, **but you get the feeling it's a group question or someone else's question.** Hmm in general **I communicate quite easy with students and them with me**. Hmm I haven't experienced any uncomfort there hmm the class asks questions. There are the more shy students who won't ask if they feel it will reflect personally on them. Especially with the more moral type questions, they are scared it will reflect back on them, and even scared to give an opinion and scared to ask academic questions because others will think they are stupid or whatever, but those students tend to come one for one to my office. I work with an open door policy, if I'm available they can come and if they don't	**Student's engagement:** Class has a manager that is not really appointed. Talks and comes to your office, but you get the feeling it's a group question or someone else's question. I communicate quite easy with students and them with me.

ask in class they can come to my office. The admin type things are usually more the representative who manages that. Yes I haven't had discomfort where I feel there is no communication in the class or the office. I: Do you feel there is accessibility? P1: I think so yes. A **new trend** which I don't find with the BSc's but with the other groups is **communication via email.** I get it on a daily basis 3-5 emails from students and then it usually is academic related questions, it's a trend now but I haven't seen it with the BSc's. I think more with the smaller classes, especially the smaller classes, more than the big classes, with openness and comfort; you need to say something about yourself. They need to know something of you as a person, they don't have to know you're a doctor or so or the type of degree, they can know you've failed the subject at university or you had to do that one twice, just to get the image of you being human, with human components and I think that makes communication easier and open. Thus far I haven't seen myself on YouTube (laugh). I: An interesting thing, you say some students ask questions in class and others come to your office and some send emails. Do you think all three methods are sufficient to communicate or do you prefer another way? P1: I am comfortable with all of them, but what **I like least is email,** because it's typing and takes time, because I type quite slow. The **one I prefer the most is one on one consultation** it's not the case of a student asking a question and I give an answer. **The student asks a question and I ask five questions back**. Hmm I try to get it from what does the student know, what is the background and the knowledge and then **I try to lead the student through the thinking process to get to the answer**. Where it lacks factual knowledge, I will add it and it take time and doesn't only work one on one but also on two or one to three and more usually doesn't work. So I prefer it. The **time aspect is a problem**. The advantage of asking in class is that everyone has the questions, everyone wonder about it and gets the answer at once. One would not know to what degree you address that aspect. Is it only the one student that benefits or the others as well?	New trend which I don't find with the BSc's but with the other groups is communication via email. I try to lead the student through the thinking process to get to the answer.
I: Give your perception regarding the relevance and usefulness of the module content that you teach. P1: Honest opinion, it's one of the things I often wonder about and have many questions and I don't have a real scientific answer, but **my feeling is very limited application out there**. The reason why I say it is if one look at the type of modules in the type of degree they have, **I'm not sure which career they will follow,** because it will determine what they need with regards to Histology within BSc is minimal. I think it also goes for Embryology. Interviewer: Do you think it contributes to the bigger science? Pilot 1: I believe so; I do think hmmm my experience with my modules is, it's not a module in isolation. Histology links with Anatomy, links with Physiology, explain much pathology. On the level I am now one can see it, it contributes towards a larger science. I'm not sure whether a pregraduate student sees it. Maybe they will realize at a later stage that this what I am doing now, fits in here. But I don't think with what they study now, they realize it. I: Compare your perceptions with those students may possible has regarding the module and its relevance. *P1:* I see it contributes to their total degree, not just the factual content, but also skills and principles which they can apply in a wider context. So I believe it has value. I don't think the students see it like this; I think they see it in silos. Hmm I get the idea they read worse than in the past. I am not that much in touch with students' experiences than what I was previously. The feeling I get is that they learn and live differently from what I know, hmm they are at university and see things, like we've said earlier, in compartments, they nowadays see it in smaller parts. We study for the test and then it is completed and then the module is completed. I won't worry next semester about what I've	**Relevance and usefulness of the module content:**

already learned, it's over. I don't think they put in the effort to develop a long-term memory and a lack of long-term memory can, then you have nothing to apply or to integrate with other things. So the compartment of studying something, let it go and forget about it, is much bigger. Hmm I think about the tendency in **Science and everything develops so quickly and knowledge get renewed it creates the feeling amongst students, nothing is fixed, nothing is permanent and that includes knowledge**. So we won't put in too much effort to study in detail, because in a year's time it will be different. Hmm it looks like **they start to get an impression of everything, but not detail nor depth.**

I: Do you think this concept is related to the advancing technology that they realize it's so fast moving?

P1: Absolutely yes, I don't think it's the technology that advances so quickly, but the knowledge as well. In my days there was a new textbook every five years, nowadays it's every second year or even every year, because something new was added. Hmm I once had a discussion with someone who said, **is this attitude of the younger generation not a good thing, because they will live in a world where things changes fast. What is the value of in depth knowledge about old things, but I don't share that opinion.**

I: Do you have any idea to **make the content more applicable for the career**?

P1: I really would like to do that. It's a big goal for me. This first **weakness** why it doesn't happen, **lies with me and communication with the program director** or programme compiler hmm because **I am not in touch with the content of the other modules and before I'm not informed, I can't really integrate my own work.** I'm also involved in the medical programme and there I am relatively sure who gives what and which terms are used and which textbooks are used and somewhere read through them. But with **the BSc because it basically deliver a service for Natural Sciences and Agriculture faculty, the liaison is not that spontaneous**. I think it's possible if someone puts in some effort, but I'm guilty of that liaison and not knowing what the other modules do. **My knowledge of what is happening in students' studies is from asking them what do you do in this or that and I think it creates a lack of integration.** The other problem there is and this is a question I don't only ask the BSc's what do you need for this career? From which I can add from my field, be it knowledge, skills they don't have as yet and that's what is bothersome from the general directed degree. **There are such a diverse groups of careers in which they go**. **The one will walk into a job using my modules daily and the other one not at all.**

I: You say the focus is little?

P1: Other **bad thing of my modules is there are jobs that are much more technically orientated which is about Histology and Embryology**, but there are diplomas and **degrees at Universities of technologies which absolutely focused on training a technically** capable person. **So those doing the appointment who wants a technical person, don't look at degrees, because they don't have the technical skills,** hmm so to build in a technical component is a lot of money, intensive, time consuming. It's actually what one should do, to make it more career focused, but there is an alternative way of reaching that.

I: We now talk about the general focus of the BSc degree; they don't know what they will do afterwards. How do you think it influences their motivation to study to give their best and to utilize the class?

P1: I won't say I have the knowledge that students shared that with me, so more my feeling than anything else, hmm I lecture on second and third year level for the BSc students and I almost want to say that with my **second year students it's almost like they've never even thought of what they want to do. They don't work**

Science and everything develops so quickly and knowledge get renewed it creates the feeling amongst students, nothing is fixed, nothing is permanent and that includes knowledge.

Attitude of the younger generation a good thing, because they will live in a world where things changes fast.

What is the value of in depth knowledge about old things, but I don't share that opinion.

Weakness why it doesn't happen, lies with me and communication with the program director or programme compiler hmm because I am not in touch with the content of the other modules and before I'm not informed, I can't really integrate my own work.

My knowledge of what is happening in students' studies is from asking them what do you do in this or that and I think it creates a lack of integration.

career orientated. They work to get the next test done, to get into the third year, to get the degree hmm I want to say I don't know whether they are tuned into a study field. They initially chose it and now they just want to finish it. Its more on third year level, **more towards the middle of the year when the student will more, I almost want to say become panicky about where will we go next year** and many consider further studies. So still not career focused but think more about what is the next step and the process hmm so I really don't know how the students, I **doubt how many students enter an academic programme with a future vision for a career.** I now refer to general forming degrees. I'm not sure if they go in with that attitude, whether that will influence their studies. **What we now hear is that student groups think if you get the degree, you will find the job, and I don't think it's a realistic view. I would not have considered a general degree, because there is no motivation to work towards,** but how students feel about it, I don't know. I: Is there anything that came up which we didn't address what you maybe want to mention or in your opinion something that can improve in the class environment which can lead to better academic performance? P1: My BSc students are a nice group of students, there are no problems. I like the small group, the more personal interaction. **One sometimes wishes you could do more personal demonstrations or visits to places, because your module leans towards that, but it's not always practically possible, be it costs or infrastructure. S**o I think their academic timetable is sort of set up, tests are distributed. Maybe that's one thing, again about the **communication with program coordinators, which can improve is class timetables and test timetables.** How we manage it currently is I set my test dates without knowing how any of the other modules' look, I don't see it and then students come and say can we move here is a clash or here are two tests two days apart, can't we move? I am quite flexible with dates, to a degree. That's also a thing, better assessment schedules, which can contribute to better performance. I don't know how their exam timetables look. I know about two years back a student came to me saying she **writes all her modules in the first week of the exam. There is no block week and the exam** is four weeks long, but she writes everything in one week. You don't have control over that, but is a difficult thing to manage. Also around the academic calendar and there I don't have a solution. Because the **BSc students may redo modules. They fail a first year module and continue with the second year and redo the module, it creates big problems, with lecturing clashes** and it cause certain students not to take my module and I don't have a solution, because it will never all be accommodated within one institution. Unless one moves towards a more **online** type of course. I won't like that, I prefer the personal contact. I: Just a last thing, would you **expect more effort from the students** in your class? P1: **The short answer is yes. The long answer is, I'm too long here by now, I became negative with regard what I expect from students. I expect the minimum which is wrong**. **They say the more you expect, the more you get from students** and some of my colleagues can testify for that, **but my most enjoyable learning experience** was when I was a third year BSc student and had to work, we were a group of 11 students, to prepare. **The one student had to present and the others correctify, where it is wrong, and the lecturer only gives comments and** inputs here and there. That seminar, a discussion, was one of my best learning experiences. Not just the one you presented, but the one you had to listen to, because it was checked whether you pick up on the mistakes. So the moment you **get involved yourself** or put in the work yourself and **make it your own then learning is effective**. **I like a student who comes prepared where a certain basic knowledge is present**. **You can build on that, you can discuss it, the student can think about it. It's not all new terms,**	There are such a diverse groups of careers in which they go. The one will walk into a job using my modules daily and the other one not at all. Bad thing of my modules is there are jobs that are much more technically orientated which is about Histology and Embryology, So those doing the apointment who wants a technical person, don't look at degrees, because they don't have the technical skills. Second year students it's almost like they've never even thought of what they want to do. They don't work career orientated. Doubt how many students enter an academic programme with a future vision for a career. What we now hear is that student groups think if you get the degree, you will find the job, and I don't think it's a realistic view. I would not have considered a general degree, because there is no motivation to work towards. One sometimes wishes you could do more personal demonstrations or visits to places,

ideas and concepts, because then it becomes a very passive story. That is why I, with most of the themes I present, go over more than one lecture. Most is over a 3hour period to then at the end of the lecture do that summary and to bring everything together and to show the application. If this or that happens, then they can start to think about it. **A student that is prepared, has a basic concept even just through reading, would make it much easier**. Hmm I know some people believe students must go and present things to the class, but I think it works for the student presenting, but creates uncertainty with the rest of the students. They are not sure of the standard of the work. Is everything there, is it complete and correct? I know some people even ask them to work out an assignment and submit en then the assignment is photocopied and included in the exam, but again the topic is assessed and not the assignment. So how complete, how correct. I think it creates uncertainty. I think round about the third year BSc it goes better, but previous years' students were right or wrong, black and white. They want it to be perfect. I experience in some of my other modules I lecture, not BSc, where old question paper papers and memorandums circulate, where students come to me with two papers and memos with only a few words that are different, then they want to know which one is right. A few words that differ do not change the content, but its first year students. So they don't trust their fellow students. My experience is students **do not like group work, do not like group marks.** They feel someone else can disadvantage them. So at this stage I stay away from group activities, however some students say they enjoy it. I: Thank you very much.	because your module leans towards that, but it's not always practically possible, be it costs or infrastructure. Writes all her modules in the first week of the exam. There is no block week and the exam is four weeks long. BSc students may redo modules. They fail a first year module and continue with the second year and redo the module, it creates big problems, with lecturing clashes. The short answer is yes. The long answer is, I'm too long here by now, I became negative with regard what I expect from students. I expect the minimum which is wrong. My most enjoyable learning experience, the one student had to present and the others correctify, where it is wrong, and the lecturer only gives comments and inputs here and there. Involvement make own learning effective. Student should prepare before class –have basic concept. Students do not like group work, do not like group marks.

PHASE 2: Transcribed data: Lecturers

Semi-structured interview: Lecturers Pilot 2

Questions and answers **Demographic data** **Pilot 2 (P2); Interviewer (I)**	**Comments**
I : How long have you been teaching Natural Sciences students at the University of the Free State P2: This is my first year. I: Have you completed a year now? P2: Yes	2½ year experience
I: Have you taught at other universities as well? Please list these, as well as the duration at each institution. P2: Yes I have taught at (difficult name), it's the old MEDUNSA. I: For how long? P2: For one and 'n half years. I: Was it a permanent post? P2: It was a part time lecturing position, not full time.	
I: Which subject(s) / module(s) do you teach? P2: At the moment I teach Anatomy and Physical Anthropology. I: For the BSc students? P2: Yes	
Self-efficacy questions: I am going to ask you questions about your experience with the Natural Sciences students in your class. Please give your honest experience as a lecturer.	
I: What is **your understanding** of the term student self-efficacy? First of all have you heard about it? P2: I heard about it and I understand it as the s**tudents' ability to study by themselves** so that they can improve on their marks, so their self-efficacy as in their own input or effort in their study material or in their study methods.	students' ability to study by themselves
I: How do you experience self-efficacy in Natural Sciences students whom you teach? P2: Both in the lectures and in practicums? I: Yes all that is happening in the classroom. P2: In the **classroom I've realized that they just sit and listen** and when you ask them a question they will answer and **I feel that they prefer a lecturer to ask questions in order for them to grasp certain concepts and theoretical terms**. But then if you don't ask certain questions then they usually forget. In the **practical** settings they **prefer group work** compared to individual work because one of them actually told me that **in group work they learn how another individual will tackle a question on their level**. So if they ask me, I'll answer them but they still don't understand but if another student, a peer, gives them the same or different answer then they understand much better because then they understand from a different point of view. I: Do you think they make use of the strategies you teach them in class or they realize it's there to use? P2: Yeah not all of them. **Some will use different strategies** e.g. once I have taught them how to side a fibula. The right fibula, there is a fossa, if you can hold it with your right hand like a pin is from the right side and if you hold it with your left hand like a pin it	**Self-efficacy:** I feel that they prefer a lecturer to ask questions in order for them to grasp certain concepts and theoretical terms.

is from the left side. When you struggle to do that it's from the opposite side. Then they use this to explain it to me. Then they remember that. **If it is more practical, they remember it than more on the theoretical side.** I: So its things that they do. P2: Yes	
I: How do you see the role of a lecturer? Can the lecturer impact on students' academic performance? P2: I feel they do have an impact. Usually the lecturer is actually a **facilitator or a guide** to say this is important and this is what you need to know for this. Then if the student is not able to get to that level, the lecturer is able to suggest certain may be ways to learn the theoretical or practical work. So yes for me it is you that are **facilitating the learning of the students**. So it they don't succeed in a certain environment then you help them to change certain the environment. May be the way they learn, the way they study so in different ways. I: So I see the way you see yourself as like a facilitator. You just monitors what is going on and try to read them and facilitate it whatever the problem is. Do you think without that they will fail and with your help they will do better? P2: I think it depends on the student. **Some students do need the facilitation and other students can do it by themselves** and do not need the help from the lecturers. But there are **some students that need that intervention** so that the lecturer should say "ok you are not succeeding with this in the way you are studying I think you should change the way you study or how you study or how you write notes or what the problem may be. May be they do not study in a conducive environment. May be they don't attend lectures or are attending but do not understand. You just **need to know what is wrong or what the problem is with the student.** I: How would you be able to know what's wrong with the student? P2: You know some students will come to me saying, "you know I want to do well but I'm not grasping this". One student came to me after the semester test and want to do well in the exam because she didn't do well in the test and I said to her: "Well ok show me how you study?" Then she took out her lecture notes and said you know I can't remember this. So I told want I want you to do is to give me this in your own words. It's good to give it word for word but I want you to catch the concepts. So she read a definition about decomposition and the different stages and then I told her: "I want you to explain to me decomposition. Close your book and explain. I **don't want you to memorize but give the keywords**. The first one is that after 24 hours the temperature drops. There are more key words and if you can grasp the key words all the other words will just come in to explain. So you just need to catch the key words". So I think the first thing you need to do is to tell the students that **when you have a problem come and ask me**. I: So communication. P2: Yes I did tell them before the exam if they have a problem they must come and see me. I: So what I hear you are saying it that they focus too much on memorizing and that they must click it to give it in their own words. P2: Yes I: Do you think that lacks quite a lot? P2: Yes it does lack a lot because I see **they write word for word from the lecture slide**. That means they will forget it and will not remember it after a year from now. So ja that is a problem	**Lecturer's impact:** facilitator or a guide some students need intervention from lecturer So I think the first thing you need to do is to tell the students that when you have a problem come and ask me. Communicate with students.
I: Please explain / elaborate on your **teaching strategies**. I've heard you have mentioned the word intervention and there must be an intervention. P2: Hmm what I'll do is usually say something and starting interacting and asking them questions halfway through the class. I just ask questions. I: The format of your class? How do you go about to explain? P2: I use a lot of pictures and scenarios. In Anthropology we always say "Imagine you have a skeleton and you have to determine sex or you have to determine, how would you go about it? I: So certain scenarios.	**Teaching strategies:** to go visually, using pictures, you probe them with questions and give scenarios.

P2: Yes or if it is an Anatomy question I will say " Remember we've talked about a condyle, it what type of aspect or joint would you expect to find a condle?" Then they would say its ball and socket or something to determine or a hinge joint or whatever. I: So what I hear you are saying is **to go visually, using pictures, you probe them with questions and give scenarios**. Do you think it does what it is supposed to do with them? P2: Not all of them. I: Different learners? P2: Yes **different learners**. It does give a way to learn and prepare for the test and exam. Sometimes I ask similar questions in the test so it gives them a way to remember. I also give them tips, like this is an important slide and with aspect you have to be able to discuss what decomposition is, so this is important.	
I: What is your opinion of **interactive classes**? P2: Interactive classes are when there is a **two way communication between the lecturer and the students.** So when the lecturer asks questions, they must respond. I've been in a lecture where somebody have responded and that just changes the whole interaction between lecturer and students because am **I there to just facilitate or there to transfer my knowledge to them.** I: So they don't really it their own? P2: Yes I've been in that scenario where nobody wants to answer, the whole lecture was like that. You ask five questions and you come out with nothing. I: But do you think interaction is a good thing? P2: I think so even if they give you a wrong answer then you know, ok I have to emphasize on this because they don't know this. Then without interaction the lecturer does not know whether the students know it or not and the students don't know if they know I or not. I: Am I correct if I say that through interaction you get **feedback** of how to go about further? P2: Yes I: To know what to do with the students and how to help them. That feedback is important. P2: Even though is not direct feedback but **indirectly tell you where you should focus**, either in the lecture or practical. It does help.	**Interactive classes:** Two way communication between the lecturer and the students. Give feedback.
I: Elaborate on students' engagement and communication with you in class and in your office. P2: I have 11 students in the class. Before the lecture I will ask "Are you guys fine?" and then they will tell me they are struggling with this or we have too many assignments or how should we approach the assignment? So we ask each other and I always tell them "does anybody have a question?" So open questions. So I feel it should be open and I am an open person. I: So you feel you are open. Do you experience that they ask a lot of questions in class? P2: Yes they do. I: So you think your openness is helping for that? So and the engagement? Are there on their side more engagement than only asking questions? P2: No they just ask questions and **during practicums they ask questions.** I: Do they come to your office to ask questions and with problems? P2: No they **don't actually come to my office unless I ask them to**. But usually **if they have a problem they will ask during or after the lecture.** I: May be due to not many students in class they all get a change in class to ask.	**Student engagement in class:** Don't come to office only if asked to come. Will ask during lecture.
I: Give your perception regarding the **relevance and usefulness** of the module content that you teach. P2: I would say it's **relevant and important, especially if they want to pursue a career in Anthropology and work for the SAPS.** But the majority of the cases are not because the **software we use is different than they use in the field out there**.	**Relevance and usefulness of the module:**

Those are more expensive. Let me say this, the majority of the course content is important and useful, but 20% of the course is not because of the software that I doubt if they will use it again, only if they do postgraduate studies. I: Why is this software then in the content of the course? P2: Because they need to be introduced to it, because if they are not introduced to it they will struggle later not being on a certain level. When you go to **postgraduate level you have to be able to use those software**. I: Compare your perceptions with those students may possible have regarding the module and its relevance. P2: They are actually enjoying it and open to it because it's more case based or scenario based then they apply it. There are different methods, one without technology and one you use with technology, so dual use of it. So if they ask how important it is or how they will use it, I can reply with "if you are going to work for the SAPS, if you want to be a forensic analyst or officer, you are going to apply it in this content. I: So they see it's relevant. Then lastly how do you experience the students' motivation? What I mean is that the BSc is a general degree and there is no selection or going to become like say a doctor or a this or a that. Do you think this might or might not have an influence on the motivation of the students? P2: It's **not that motivating because they usually come to you and ask "am I employable**?" Then you ask yourself will they be employable? But I think the different courses they choose make them unique and will motivate them. Like with Anthropology it motivates them that they might have a job but with general degree, I don't really know if that is a motivator. I: Because they don't really know where they are going to end up. P2: Even with postgraduate, they are not sure whether they will get space to end up as postgraduate. It's just all those different aspects they need to deal with. I think there is **a lack of motivation**. I: How do you think will this lack of motivation has an impact on their academic performance? P2: For some of them it does but the majority of them just want to do well and obtaining the degree. I think that is the main goal for them. I: Is there anything you want to add from your experience? P2: **The students are open may be because I am open and they feel free to tell me if they have a problem and if there is something else,** like one of my students play hockey and will tell me they have a hockey match and have to go away. I: Do you accommodate them then? P2: Yes I'll tell them "ok you have missed the class test and have to write the next class test". I: So there is **openness between you and the students**? P2: Yes even if I have to go away I tell them what will happen and then they know. I: Thank you.	Relevant and important, especially if they want to pursue a career in Anthropology and work for the SAPS. Add: The students are open may be because I am open and they feel free to tell me if they have a problem and if there is something else.

APPENDIX 5.2

PHASE 2 Transcribed data: Students

APPENDIX 5.2

PHASE 2 Transcribed data: Students

Student 1 (low marks less than 50%)

Questions and answers **Demographic Data** **Student1 (S1); Interviewer (I)** **16 min 32sec**	**Comments**
I: Which degree are you currently registered for? S1: I am registered for BSc majoring in Biochemistry and Genetics.	
I: In which academic year of study are you? S1: I am in my second year.	2nd year
I: Is this your first degree? S1: Yes it is my first degree.	
I: How old are you? S1: I am 22 years.	22years
I: Name the module of Physiology that you are registered for. S1: PHBG2626	
I: Are you registered for the module for the first time or are you repeating it? S1: For the first time.	1st time
I: What is your home language? S1: Sesotho. I: But you attend classes in English? S1: English.	Sesotho
I: What is your understanding of this research project? S1: Hmm like in terms of any research? I: No this project. S1: Oh well just to find out what we do in class and how the lecturer called names and everything in class, yeah. That's how my understanding is about this.	
Self-efficacy questions: I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.	
I: Tell me about your ***approach to your studies.*** S1: Oh ok firstly **Physiology is like my elective,** it's **not one of my majors**. So my approach to it was, I think I **was very calm**, especially first semester regarding the way I see my marks, just like ok I took my time and**.** So this semester I feel like my approach is going to be different in terms of how I saw my marks last semester so **I just want to improve on that**. Even though it's my elective and might not do it next year. **I just want it, my credits and everything to look my results to look exceptionally perfect.** I: Good. OK. Describe the amount of ***effort*** you put into your studies.	*approach to your studies:* elective was very calm- I didn't take it that serious I just want it, my credits *Effort:*

S1: Hmm ok can I just talk about my experience of last year? I: Yes S1: Last year I **did not put so much effort** in and I felt my marks were very good. So now I feel like if **I put too much effort and too much pressure on myself things just seem to go, my marks just deteriorating**. So it just like you must just calm down and you know move slowly and must do things like last year and stop putting pressure on myself. Yeah I know my effort I sort of put in a little bit of effort I: And in Physiology? S1: On Physiology I am putting in a whole lot of effort in this semester, regarding what I've said putting in a whole lot of pressure regarding that module.	did not put so much effort too much pressure on myself things just seem to go, my marks just deteriorating.
I: Talk to me about your ***motivational levels*** with regards to your studies. S1: Hmm my motivational levels? I: Yes what motivates you? S1: Hmm the fact that I only have **my brother, it's just my brother and I**. He is older like 27 and working this year. He sort of had it rough regarding studies and everything so what motivates me is the **support that I get from my parents**. How they strive to give me everything that I really like, I really need to get in. **So the way they just carry themselves t**hat motivates me to do better in my studies. I really **don't want to disappoint them** for everything they have been doing so far, so they are my motivation. I: That's nice so you would say your **motivational levels** are high? S1: It's **very high yes**.	*motivational levels* : (external) support that I get from my parents don't want to disappoint them very high
I: Which specific skills or ***strategies*** do you use when you are in a lecture? / When you study? S1: I feel like I am sort of a person who's how I can put is, **audio like not visual like**. **I can just in class and listen** and when I get home I feel like this is want has been said then I **just go to my notes**. My skills are just like; **I normally sit in class and don't take notes.** It's just how I feel like things work better for me that way. I: Tell me about the skills or strategies when you ***learn.*** S1: When I learn ok I make sure that I **make my notes beforehand** that whenever the test date or exam date come I am well prepared, so in terms of the skills I usually **study well under pressure but sometimes it seems not to work out that well I don't know if it is a skill or what** but I honestly **feel pressure is one of the best things I can do.** I: What time do you prefer, when do you study? S1: Oh I study better at night. During the day especially Spring, Summer it's too hot. So at night I study better at night.	*Strategies:* audio like not visual like I normally sit in class and don't take notes. make my notes beforehand (at home) feel pressure is one of the best things I can do.
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S1: OK must I include the lecturer? I: Yes everything. S1: Ok Physiology my **first lecturer she is, you can understand her, she is open to anything, she is accommodative** and there is **another lecturer that is just like do you know what you are doing?** I feel like asking him that. Like honestly, jokes, can we just put the jokes aside. So sometimes for the first part of the module you get that good lecturer and then the second part of it it's just that the lecturer I don't know there is just something about him that yeah. I: Does it feel that when the lecturer is passionate about the session that it motivates you more to learn? S1: Yes it does it does especially the first lecturer let's just leave the second lecturer out. She **motivates the way she is just passionate** about this module just **brings you enlightenment;** yes I want to learn more about this. This is so interesting.	*class environment:* lecturer you can understand her, she is open to anything, she is accommodative. motivates the way she is just passionate another lecturer that is just like do you know what you are doing? Jokes motivates the way she is just passionate notes that we get help

I: And the ***material that you receive in class?*** Does it help? S1: Yes it **really helps**; the **notes that we get help** ok using them with the text book do help. I: How do you manage a rambling ***disorganised lecture***? How do you make sense of it? S1: I think I just **somehow try and block everything**, like if it's just too much going on to notice I mean it is rude to be disruptive **you just sit back** the lecture just means to end so maybe I can go and do my own thing now **and just self-study** this whole thing because everything was just being blown out of proportion, that's all. I: You rely then more on self-study? S1: Yes if the things in the lecture are like that you can't honestly hear what the lecturer is saying just goes back to what we were doing and **I will do it the way I understand it.** I: Do you have a group of friends that may be work together or are you on your own? S1: **I am on my own**. **Sometimes I do consult friends** if I do not understand this and the lecturer, like ok can I just get insight if this and that but normally I am ok. I: How do you feel about asking questions in class or to ***contribute*** to class discussions? Please explain why you feel like this. S1: It's so funny that I **am so talkative I am not shy but when it comes to ask questions in class I just get this fright** going on so I hardly ask questions **may be ask questions to the lecturer once the class is over.** I: Why would you say you are scared of talking in class? S1: I think because you know sometimes you think this question I don't think I think it's stupid again I do want to understand it but **I fear that people will think why is she asking such a question** no man it's just a stupid question. That is my fear of asking in front of the whole class. I So it's ***more about what your peers*** **think** and not really what the lecturer thinks about you or will that also be S1: No the **lecturer is just about open to everything** it's what my class mates will think yes. I: Are you quite a big class? S1: No we are not I think I will just open up with this question thing. I: So you think when it is a smaller class it will be easier to ask a question. S1: Yes I: **But in a big class it's difficult.** S1: Yes it is. I: Tell me about the **c*ommunication*** between you and your lecturer. You said that you might ask questions after class. Do you feel comfortable talking to your lecturer going to see him or her at their office? S1: I do feel **comfortable sending an email**, making an appointment and going to see the lecturer and just be **one on one** session tell her what I do and don't understand and it's much easier that way. I: Ok so you prefer to go see her in her office? S1: I prefer to see her in her office. I: What factors ***help / hinder your communication*** between you and you lecturer? Let's start with what hinders communication? S1: May be it's because on **her time schedule** I think that is the part that will hinder my communication. I: I first want to ask you are consultation hours at difficult times? S1: Yes it's sometimes difficult for me **at her consultation hours I can't make it there.** I: Is it mostly in the morning or afternoon that is difficult for you? S1: It's in the afternoon.	*disorganised lecture*: try and block everything you just sit back just self-study - do it the way I understand Contribute: talkative I am not shy but when it comes to ask questions in class- fright may be after class I fear that people will think *more about what your peers* think in a big class it's difficult Communication: comfortable sending an email, one on one at her consultation hours I can't make it there emails help

I: Difficult to get there in the afternoon? S1: Yes I: Ok and ***what helps*** communication between you and your lecturer? S1: Hmm emails once I've emailed her I feel it yeah she responds to the emails I can make can't make it yeah that helps us to communicate.	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S1: Appraisal of myself? I: How do you see your own capabilities helping your studies? S1: Ok hmm I think ok I don't think **I know that I am a hard worker**, me not just sitting back and thinking ok things are going to happen on their own time and all that. Me taking a step to making sure that everything is done and that I see myself passing and doing well in my studies, like it's a huge deal for me like some part of myself **throughout varsity life now I haven't even failed a module or re-assessed** or anything like that so in my own way that just I didn't even think that I am actually capable of doing things when I am going to put these things aside and going to focus here. So that's what I actually I feel a lot about myself. I: Do you feel your capabilities are sufficient enough to pass your subject? S1: I do feel that way, I do.	*Appraisal:* I know that I am a hard worker throughout varsity life now I haven't even failed a module or re-assessed (?? Did not pass first semester)
I: What do you think is meant by the term **student self-efficacy?** S1: Efficacy I understand it? I: Have you heard about the term before? S1: I haven't heard about self-efficacy term. So what does it mean? I: Self-efficacy is you're believed in your own capabilities, you are capable of doing or succeeding. S1: Ok. I: Are there any other questions you would like to ask me or? S1: Hm no. I: I want to ask you a last question, as I've explained self-efficacy how would you see your self-efficacy? S1: Isn't it like the previous question of my capabilities? I: Exactly. As you've said that your belief in your capabilities are quite high and able to succeed. S1: **I do believe I am able to succeed,** I feel like any challenges, obstacles those are minor things so I honestly feel that I am going to succeed, I do that I am going to succeed. I: Able to succeed. S1: Yes I am able to succeed. I: Thank you very much.	student self-efficacy: I do believe I am able to succeed

PHASE 2 Transcribed data: Students

Student 2 (middle marks 50-69%)

Questions and answers **Demographic data** **Student 2 (S2); Interviewer (I)** **11min 32sec**	**Comments**
I: Which degree are you currently registered for? S2: BSc Physiology and Genetics	
I: In which academic year of study are you? S2: Second year	2nd year
I: Is this your first degree? S2: Yes	
I: How old are you? S2: I'm turning 20 this year	20years
I: Name the module of Physiology that you are registered for. S2: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S2: Yes	
I: What is your home language? S2: Afrikaans I: And you do your classes in Afrikaans?? S2: Yes I do.	Afrikaans
I: What is your understanding of this reseach project? S2: Hmm I don't really know, I think the lecturer said she wants to explore study methods and the best way to study and so on. It is actually all that I know.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your **approach** to your studies. S2: Hmm like what do I want to do after this degree? I: No no like how do you approach your studies like how much effort do you put into your studies? S2: OK hmm I am actually **taking it serious especially with semester tests**. It is rather **difficult to study if I don't know I am studying for a specific thing**. **So I can't study 2 weeks ahead of time for a test**, usually a week or so or 3 days before the time is the best, but hmm it is **actually bad** because let's say our first semester test is only in a months' time then I don't get myself to study until the semester test and then it is so much work. So I **find it difficult if I don't have to study for something specific** to study to just sit and study. I: How do you feel about you answer? Do you think there is room for improvement or can you relax a bit more? What would you say?	Approach: taking it serious especially with semester tests difficult to study if I don't know I am studying for a specific thing think I need to motivate myself more

S2: I **think I need to motivate myself more** because it **piles up and then there is a lot of work** when I start to study so I need to motivate myself more and not just only for a test. I: Now let's talk about motivation.	
I: Talk to me about your ***motivational levels*** with regards to your studies. S2: Hmm I don't know I think it is to do well. I think **my parents motivate me a lot** and they are playing a huge part. Yes. I: And then to do well? S2: Yes, I actually just **want to get above 60, 70** preferably, but I don't worry about 90. Actually I prefer to always get above 70. I: Ok, are there specific goals you want to achieve? S2: Hmm not really, actually to get above 70 if I can, but yes, nothing else otherwise.	Motivation: my parents motivate me a lot want to get above 60, 70
I: Which specific skills or strategies do you use when you are in a lecture? S2: I **make a lot of notes** and if **she says extra stuff, I will always make notes of it** and that **really helps me especially if she explains something how to remember** it that is **not on the slides** or something like that I will always write it down. I: And your skills and strategies when you study for an exam or test? S2: Hmm, I **study out loud**; it is a big thing for me. I cannot just sit quietly and study in my head and read then I fall asleep. So definitely out loud especially Physiology because it is so much theory. It is not like doing calculations. It is a lot of theory and it helps me to study out loud and it **helps me a lot I am always busy to scrabble**. Like if I don't remember a word I will write it down. I: Whilst studying out loud, you will write it down? S2: Yes, normally it is… I: The more difficult parts? S2: Yes I: What time of the day do you normally study? S2: Hmm actually any time, but I don't like doing it late in the evenings, yes I get to tired. I would rather get up a bit earlier in the mornings, but actually I can do it any time during the day just not late in the evenings.	Strategies: make a lot of notes she says extra stuff, I will always make notes of it really helps helps me a lot I am always busy to scrabble
I: Let's discuss the ***class environment*** the dynamics and how that may contribute to your performance or motivation. Let's say, does the material you get in the class motivate you to study? S2: Yes it does actually. Like **our lecturer do a lot of effort with the slides**, it is very comprehensive I must say and it also helps a lot because I study in Afrikaans and I also have a textbook to explain it but she and **we receives definitions each week** which we must explain and that also helps a lot with preparation. I: With preparation? S2: Yes I: How do you manage a rambling ***disorganised lecture***? S2: I don't know I like things to be organized. So I think she **will easily lose my attention if starts to get unorganized.** I: Would you make notes in the class as well? S2: I will try but my attention will be distracted and I think I will forget. I: You actually space out? S2: Yes (laughing) I: How do you feel about ***asking questions*** in class or to contribute to class discussions?	*class environment:* lecturer do a lot of effort with the slides we receives definitions each week *disorganised lecture*? will easily lose my attention if starts to get unorganized.

S2: **I don't really like it**. I don't always have many questions in any case, but if I have I **prefer to go to her afterwards and ask** rather than in front of the whole class, **because many times I want to elaborate and she wants to continue with the topic** and then I also feel I don't know if I want to ask now and sometimes I also take long to think do I need to ask or not and once I've decided I want to ask she is already with a new topic and then I am too late. So then I would rather ask afterwards. I: Do you think the class size has an impact on why you don't want to ask a question? S2: No, because we are actually a small class so it doesn't really have an impact. I: Tell me about the ***communication*** between you and your lecturer(s). S2: Well like in class now? I: If you have a question or like you've said you will rather go after the lecture to ask her a question. Office ours and those stuff, do you prefer to make an appointment or to send an email or something alike? S2**: I usually send an email**, last year I did but I haven't this year yet, usually email works but last year **whenever I really did not understand something I made an appointment.** I: And then go and see her. Is it easier for you to rather make use of technology then you don't have to talk to someone face to face? S2: Hmm no I don't really have a problem **I prefer face to face**, but usually when I have big questions I will stay after class and ask her, but if I can and I know she is busy I don't mind using technology. I: That's maybe quicker? S2: Yes definitely. I: What factors ***help / hinder your communication*** with lecturers? S2: Hmm no I don't think there is really. I: Something that makes it difficult? S2: No I can't think of something. I: And what helps? S2: Hmm I don't know actually. I: Something like the lecturers approachability. S2: Yes I am **not scared to ask her at all**. She doesn't mind at all and she has always my answer. She always answers me and I have no problem at all.	Contribute: I don't really like it I prefer to go to her afterwards and ask Communication: I usually send an email, whenever I really did not understand something I made an appointment. prefer face to face *help / hinder your communication:* not scared to ask her at all (approachable)
I: Please elaborate on ***your appraisal*** of yourself regarding your capabilities, referring to your studies? S2: OK I: Your abilities would you say your abilities is good enough to pass you studies? Do you think you have enough abilities? S2: Yes I: You have faith in yourself that you can pass your studies with your abilities? S2: **I am sure I can achieve a lot**. I am **not always motivated** to go there, but I know if I sit and really study hard, I definitely have the abilities yes. I: And your abilities to pass Physiology? S2: **Yes no easy because I really like it because I know if I go sit and study I will definitely pass** I: OK S2: I don't find it impossible difficult, Physiology is actually a nice module. I: OK good to hear.	Appraisal: I am sure I can achieve a lot not always motivated
I: What do you think is meant by the term student ***self-efficacy***?	*self-efficacy:*

S2: Hmm (laughing) yes **I think it is to use the hours after class, to add extra time, to do extra work and to catch up.** I: Ok have you heard about this term before? S2: No, not really. I: So this is the first time you heard about this term? S2: Ok I: Do you have any other questions? S2: No, not really. I: Thank you very much.	to use the hours after class, to add extra time, to do extra work and to catch up.

PHASE 2 Transcribed data: Students

Student 3 (middle marks 50-69%)

Questions and answers **Demographic data** **Student 3 (S3); Interviewer (I)** **11min 04sec**	**Comments**
I: Which degree are you currently registered for? S3: I am second year BSc Behavioural genetics.	
I: In which academic year of study are you? S3 : Second year	2nd year
I: Is this your first degree? S3: Yes it is.	
I: How old are you? S3: I am almost 20.	20 years
I: Name the module of Physiology that you are registered for. S3: PHBG 2626 I: Are you attending your classes in Afrikaans or English? S3: Afrikaans	
I: What is your home language? S3: Afrikaans	Afrikaans
I: What is your understanding of this research project? S3: It is basically to look at how students are studying and to look at how it can be improved. I: Ok	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology. All answers will be anonymous.*	
I: Tell me about your ***approach*** to your studies. S3: I **summarize all my modules** and do it early so that it is **summarized before all my tests**. With Physiology I print all my **slides and work from them because there are so many sketches involved.** So I feel if I also summarize, then I get confused. So I rather just fill in on the summaries provided for us. I: And your preparation for class? S3: I **try to go through my work before I go to class, but unfortunately it is not always possible.** I try to pay attention in class and as much as possible and make all the notes of what she is saying. I: Describe the amount of ***effort*** you put into your studies. How would you sort of rate it? S3: **I think I put in a lot of effort with my studies**, but my plan is to do **Psychology postgraduate. So I put in a lot more effort with my Psychology** and now I focus on Physiology and Genetics which are only extra modules to me. I: Ok ok but would you say that you neglect the others because it is not your passion?	*Approach:* summarize all my modules before all my tests. work from slides because there are so many sketches involved. try to go through my work before I go to class, but unfortunately it is not always possible. *Effort:* put in a lot of effort Psychology postgraduate So I put in a lot more effort with my Psychology impossible to give 100% attention to all my modules.

S3: I won't say that I neglect them, but it is unfortunately **impossible to give 100% attention to all my modules.** So I know my mark is somewhat lower than my Psychology but I still put in a lot of effort.	
I: Talk to me about your ***motivational levels*** with regards to your studies. S3: I think I grew up in very good circumstances where **my parents were also very motivated to give their best in everything** they do. So since young I know you **do your best and then you know it is good enough.** So I think that positive environment in which I was raised prepared me very well for this and to know I want to achieve my best. I: Yes and any internal motivation? S3: I would **like to be the best I can be**, so I work hard for it and would like to do the best in what I am going to do one day. I: Yes okay, are there certain milestones you want to reach? S3: I **have my marks in mind which I work for, so I work for that and then I look at every semester test I know what I want to get**. It is a good measure so if I do a bit worse in this test then I know I have to work harder because I need to get that much for the next one. I: Ok	Motivation: my parents were also very motivated to give their best in everything (external) like to be the best I can be (internal)
I: Which specific skills or ***strategies*** do you use when you are in a lecture? / When you study? S3: I **try to keep my attention on the lecturer and cut out the other people around me**. My **phone is usually on silent** so that does not distract me and then I look at writing down as much as possible, because I feel I study better that way. I: Ok and tell me the skills or strategies which you use to study? S3: I think it is also writing down. I **study easiest by writing down**, especially long questions and such stuff I will write out until I know it and I **like my information step-by-step** so I try to put information that way like bullet points and such stuff. Hmm yes and I know I must focus a bit more on pictures especially in Physiology where the sketches are important. So that is **sort of my strength**. I look at my sketches and then I do my points well enough and take it back from there to my sketches. I: Ok and when do you prefer to study? S3: I study best at night. I: Shortly before a test or do you plan well or….. S3: I plan well at an early stage, but it is better for me to study at night, because I need absolute silence when I study. I: Ok	*Strategies:* try to keep my attention on the lecturer and cut out the other people around me. phone is usually on silent study easiest by writing down like my information step-by-step
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S3: **I think because we are the Afrikaans class we are less kids.** For me it is also somewhat better, because there are **less people to distract you** and **I feel the lecturer also knows us personally** sort of. **So she knows how to handle us with our personalities** which for me is also a **positive point.** So she knows this one like to ask questions and she **handles us with our personalities which also make it better for me.** I: And tell me the material you receive in class, would you say it is good? Does it help? S3: I think it definitely helps it is **very well presented and brings everything nicely together and it is better for me to study rather than the English textbook** and then I must also translate. So for me the slides are sufficient. I: **How do you manage a rambling disorganised lecture?**	*class environment:* less people to distract you I feel the lecturer also knows us personally she knows how to handle us with our personalities material- very well presented -brings everything nicely together – better for me to study rather than the English textbook disorganised lecture:

S3: I think **afterwards you must ask questions to the lecturer** before you go and then I look when I read through the work at home so that **I digest while still fresh in my memory.** I: How do you feel about asking questions in class or to ***contribute*** to class discussions? S3: I would rather **go and ask afterwards** I am n**ot really one for speaking in front of an audience.** I would rather ask afterwards. I: Why don't you like it? S3: I am **very introverted and shy** and it is not really my place. I: Is it maybe of what your peers will think or not really? S3: Not really we are a very relaxed class and those who have Physiology with me, also have the other modules with me. So we are the same group who are walking the same road, so no I won't say so. I: Tell me, you have just said you will go to the lecturer afterwards to ask your questions. How does ***communication*** with your lecturer work? S3: I think **we have good communication** like I have said earlier we know each other sort of so it is really, I **feel comfortable to ask her q**uestions and that **she really makes an effort to give the answer.** I: Would you also go and see her at her office during consulting hours? S3: I will if there are questions, yes. I: And emails or do you refer one specifically rather than see people face to face? S3: It doesn't really make a difference for me. **If face-to face is a possibility I will do it because it is easier, but let's say I am home then an email is easier.** I: What factors ***help / hinder your communication*** with lecturers? Let's first do hinder. What makes it difficult to communicate with your lecturer? S3: I **think I make it difficult for myself to wait with my questions.** So I know it is something I can work on to improve that. I: And what would you say help? S3: I think the **smaller class makes it easier for me with my personality**. I: Yes and then also the fact that you mentioned you can easily send an email from home.	afterwards you must ask questions to the lecturer digest while still fresh in my memory. Contribute: go and ask afterwards very introverted and shy not the peers *Communication:* we have good communication feel comfortable to ask her questions she really makes an effort to give the answer. face-to face - is easier but let's say I am home then an email is easier. help / hinder your communication: I make it difficult for myself to wait with my questions smaller class makes it easier
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S3: I must say **I know myself well** to know what my preferences are and the **environment in which I study the best.** So I think in that sense **I make it easier for myself because I know who I am.** I: Would you say you know your abilities you believe your abilities will help you to pass Physiology? S3: **You can say so yes.** I know if I study hard enough, I will bear the fruits. I: And also your other modules? S3: Yes I: Ok would you say you would rate your abilities at a high level? S3: I think so yes.	*Appraisal:* I make it easier for myself because I know who I am.
I: What do you think is meant by the term ***student self-efficacy?*** S3: I think it is **what you think you are capable of**. If you think you can't do this thing, then you won't be able to. So you must say to yourself I can pass this module and I can do well, then you will achieve it. I: Have you heard of the term before today? S3: I have not, no. I: Would you say you have **high self-efficacy**?	*student self-efficacy:* what you think you are capable of high self-efficacy - yes.

S3: I will say **yes.** I: Anything else you want to say or contribute?? S3: No nothing specific. I: Thank you very much.	

PHASE 2 Transcribed data: Students

Student 4 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 4 (S4); Interviewer (I)** **14min 52sec**	**Comments**
I: Which degree are you currently registered for? S4: BSc Genetics and Microbiology	
I: In which academic year of study are you? S4: Second year.	2nd year
I: Is this your first degree? S4: Yes	
I: How old are you? S4: I am 20.	20 years
I: Name the module of Physiology that you are registered for. S4: PHBG 2616	
I: Are you registered for the module for the first time or are you repeating it? S4: It is the first time.	
I: What is your home language? S4: Afrikaans I: Are you also attending the Afrikaans classes? S4: Yes	Afrikaans
I: What is your understanding of this research project? S4: Hmm I don't know a lot about it all I know is how I take my work in in class and how I focus in class. That is all I know.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S4: Hmm like what I want to do with it? I: Describe the amount of ***effort*** you put into your studies. S4: I **want to try and take notes in class and then rewrite it and prepare for class.** I don't know if it is the right answer. I: There are no right or wrong answers. You say you want to try. Do you do it currently? S4: I **don't do it currently**. Sometimes the time just get like with **res and all the activities it just gets too busy.** Then you must focus on all the others too, and then you feel you don't want to put in so much time into one, then there isn't enough yes. I: Would you say you put in a lot of time and effort into your studies currently? S4: Currently I do yes, I don't know if this is applicable, but I don't have Physiology this semester, now I have more time. **I realise that if you don't go through the work constantly, then it becomes difficult when the tests start.** I: OK and when you had Physiology would you say you made a reasonable effort?	*Approach:* want to try and take notes in class and then rewrite it and prepare for class don't do it currently res and all the activities it just gets too busy I realise that if you don't go through the work constantly, then it becomes difficult when the tests start.

S4: No first semester I've put in much less effort than this semester hmmm so yes.	
I: Talk to me about your ***motivational levels*** with regards to your studies. S4: Hmm I know you should not compare yourself to others, but if I look at the people, I am with the clever people in class. So it is half **like competition you want to be the best**, but I also know **in our country with the job opportunities, you won't be seen if you don't perform and get good marks**. So that is my motivation. I: Are there like specific goals you want to reach? S4: Like now? I: Yes with your studies and also your marks. You can explain both. S4: Ag I try, **I set a high standard for myself**, so I try. I don't know what else to say now (laugh). Yes **I have goals, I need to pass everything and hopefully get distinctions for my modules**, but it is not always possible for me, but yes. I: And your goals for your studies let's say with your degree, what do you plan? S4: Well currently I just want to get my marks up, whether it is to eventually apply for Honours or to get selected for it. So that's it. I: OK that sounds good.	Motivation: in our country with the job opportunities, you won't be seen if you don't perform and get good marks I have goals, I need to pass everything and hopefully get distinctions for my modules
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S4: Hmm I have tried if the slides appear to **write down most of the stuff**, **but I've realised then I don't listen to what she says** and don't take in what I write. So I know we **get the slides afterwards on Blackboard. So in class I will rather just listen** what she says if she says something that is not on the slides, then I will just take a note of it. So I focus more on just listening. I: In the class? S4: Yes I: And what skills and strategies do you use when you study? S4: I have realised , I **like to write down my work, but I don't necessarily summarize**, but I rewrite it, but I feel if I have written all of it, yes that's basically what I do. Because I've written or summarized it, I **will repeat it all the time to myself.** I: Out loud or do you read it like in your mind? S4: I read it in my mind, because in the res it is not really possible to read out loud, but if I'm alone **I actually prefer to say it out loud, because it is then easier to remember it.** I: And tell me more of what time of the day you study. S4: Well I've realised I mostly study in the evenings hmmm round about 8 o clock till 1 o clock. I think I function better at night, but also because the day is full of activities, there is not really time. I: Ok	*Strategies:* So in class I will rather just listen like to write down my work, but I don't necessarily summarize will repeat it all the time to myself. I actually prefer to say it out loud, because it is then easier to remember it.
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S4: Yes I would say it contributes. Do I need to refer to....? I: You can now refer to your lecturer a bit. S4: Ok like our lecturer I feel **she wants us to do very well**. She helps us a lot with notes and says focus on this. **So she wants us to do well, it helps a lot, it is motivation**. I would also say **my fellow students in class, everyone is goal directed** and there **isn't really someone sitting next to you who says I don't want to be here.** I would say it is pleasant and good circumstances. I: Ok and tell me about **the material you receive in class**. Do you think it helps a lot? Like the slides for example.	*class environment:* she wants us to do well, it helps a lot, it is motivation everyone is goal directed

S4: Oh **yes it definitely helps**, because it is not only sentences to read and then you don't understand a thing. It is short summaries hmmm work and **notes are added in different colours which stands out and indicate what is important and what not.** I: How do you manage a rambling ***disorganised lecture***? S4: Well if it is during class time, I **would rather just listen**, and not look at the slides and **afterwards I will try and see how does this fit and then write it myself.** I: How do you feel about asking questions in class or to ***contribute t***o class discussions? S4: Ok I'm **not really somebody that likes to talk in class**, but I **will definitely ask a question if I don't understand,** but I **won't just give an opinion or something like that.** I: Would you rather ask a question in class or afterwards? S4: I will in class but I feel I **will rather go after class** and talk to the lecturer. I: And the class discussions? S4: Hmm yes many times **she asks what do you think and what do you think. Then I feel like, I go blank and don't know what to say.** So I **don't really like these class or group discussions,** but yes. I: Is it about what the others will think if you say something? Are you many in class? S4: We aren't many in class, about 15 or so. So we aren't many, but **yes I do think what will they think now**, will I sound stupid or so. **So it's not the lecturer**, it's what the students will think of me. I: Tell me about the ***communication*** between you and your lecturer. S4: Hmm say I didn't understand something and want to go and talk to her now about what Physiology can do for me, I **will email and then I also go to her office and talk to her.** So that is how we have communicated. I: What do you prefer? S4: Hmm between email and…. I: Yes S4: I would **rather talk in person**. The email is only to schedule time and what. I: Oh I understand. What would you say ***help*** the communication between you and your lecturer? Help and hinder the communication between you two. S4: No it helps definitely (laugh) I don't know what else to say there. I: What we want to know is do the consulting hours help, what helps the communication between you and your lecturer? S4: Oh ok so just like explanation on something I didn't understand, only easier than what she has explained in class. I: And what would you say hinder communication with your lecturer? Like are you afraid to go and... S4: Hmm there were times that I've emailed her and then it was a Friday and then I wanted to know on the Friday what I should have done, but then she only knows on the Monday. So **over weekends and after hours I can't always get to her,** because then she isn't there or I have class. So that was **the obstacles.** Yes but furthermore I was **never scared to go to her**.	*disorganised lecture:* would rather just listen afterwards I will try and see how does this fit *contribute:* not really somebody that likes to talk in class will definitely ask a question if I don't understand won't just give an opinion or something like that don't really like these class or group discussions yes I do think what will they think now it's not the lecturer *communication:* will email and then I also go to her office and talk to her rather talk in person So over weekends and after hours I can't always get to her,
I: Please elaborate on your ***appraisal o***f yourself regarding your capabilities, referring to your studies? So do you think your abilities are good enough to pass your studies? S4: I surely think so hmmm I have from a young age, primary school, learned to do my best, to study when I should. I have a **study technique**, from primary I have **been summarising**. I do it as from primary school and it has brought me here and I don't want to brag or something, but I have **performed well at school** and I feel my technique contributes to that. I: And would you say you have the abilities to pass Physiology specifically? S4: Yes one feels the work is maybe too much or difficult now, but as soon as you go afterwards and sit and go through or like it is never impossible or go write down or put in effort.	*Appraisal:* study technique performed well at school 8 out of 10

I: So how would you rate your abilities? Would you rate it reasonably high? **S4: Yes I would say 8 out of 10 (laugh).**	
I: What do you think is meant by the term ***student self-efficacy***? S4: Students' self-efficacy. Sjoe if I must say hmmm I **think it is outside of class if you study on your own and sit**, I don't know.... I: Ok but have you heard of the term before today? S4: No or **how effective you are if you study after class when you are on your own** and the lecturer is not there to help you. I don't know it is ... (laugh). I: Ok is there anything else which you would like to add to the interview, anything else you can think of or would like to say? S4: Sjoe hmm not really, not something that can really help. I: That's 100%. S4: Are there more questions? I: No thank you very much we appreciate it.	*student self-efficacy*: how effective you are if you study after class when you are on your own

PHASE 2 Transcribed data: Students

Student 5 (Very high marks above 80%)

Questions and answers **Demographic data** **Student 5 (S5); Interviewer (I); 10min 55sec**	**Comments**
I: Which degree are you currently registered for? S5: BSc Genetics and Physiology.	
I: In which academic year of study are you? S5: Third year	3rd year
I: Is this your first degree? S5: Yes	
I: How old are you? S5: 21	21 years
I: Name the module of Physiology that you are registered for. S5: PHBG3726	
I: Are you registered for the module for the first time? S5: Yes I: So you are not repeating it? S5: No	
I: What is your home language? S5: Afrikaans I: Are you attending the classes in Afrikaans? S5: Yes	Afrikaans
I: What is your understanding of this research project? S5: She hasn't really elaborated a lot, said it is part of her PhD study and in the direction of helping students with their studies and so on and how they study.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S5: Hmmm (laugh) I have **always went for what I find interesting and it is easier to pertain information that is interesting and I have a way of making sense of it and that makes it easier to study.** Originally I was registered for Biochemistry and genetics, but then I changed it to physiology. It is just much more interesting. I: How would you say is your ***effort*** with Physiology? S5: **Not so much**. I **attend all the classes** and make notes in class and so on. If I must study for a test I **don't study that much, but mostly study in class.** I: How do you feel about your answer? Do you feel there is room for improvement or do you feel satisfied with the way it is now?	*Approach:* always went for what I find interesting and it is easier to pertain information that is interesting and I have a way of making sense of it effort: don't study that much, but mostly study in class. Definitely room for improvement.

S5: I am relatively happy, but there is definitely **room for improvement.**	
I: Talk to me about your ***motivational levels*** with regards to your studies S5: On third year I am **relatively exhausted**, but it is the last semester now so one has to push through. I: Are there specific goals you want to reach? S5: I want to get in there. I: Yes tell me more about your motivation, internal or external motivation. S5: **Most is internal motivation**. I am the **first child in my family to get a degree** if I get the degree. I want to go further in academia, maybe masters one day. That is what I want to do.	*motivational levels:* Most is internal motivation. first child in my family to get a degree
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S5: Hmm **in class I make notes** of what the lecturer says which is not on the slides. I keep **busy by writing and keep my focus to the lecture**. If I only sit and listen my attention is easily distracted. I: And strategies and skills when you study? S5: Hmmm I **make new summaries each time I study for a test and so on and then I go through it as many times as possible. I** don't really keep summaries of previous times that I've studied, because then you only read through it. **If you write it down, it is easier to retain**. I: And what time of the day would you say you study the best? S5: Hmm let's say between 17:00 and 00:00.	*Strategies:* in class I make notes. Keep busy by writing and keep my focus to the lecture. make new summaries each time. If you write it down, it is easier to retain
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S5: Yes definitely. The **lecturers also make it more interesting, they don't only read** from the slides. **Can easily see they have the knowledge and passion** for what they do and that contributes to us... I: And tell me the material that you receive in class for Physiology, would you say it also contributes? S5: Yes definitely the **power point slides are very thorough** and also have information which are being tested and not in the textbook. I: And the class environment? S5: Hmm it is very nice. In the Afrikaans class we are only **5 students so it is very personal, everyone knows everyone.** I: How do you manage a rambling ***disorganised lecture?*** S5: Hmm I will let you know if I get to one. I: Sjoe okay. S5: Yes [lecturer] is very to the point. I: How do you feel about asking questions in class or ***to contribute*** to class discussions? Please explain why you feel like this. S5: Hmmm **I don't like it a lot**, but it is my own, I will **rather go afterwards** if I don't understand something, but if I'm being asked a question, it is fine. I won't really ask questions during a lecture. I: Can you elaborate a bit on why you feel uncomfortable? S5: I don't know it has been forever, **shy.** I: Tell me about the ***communication*** between you and your lecturer. How do you approach communication with your lecturer? S5: **Outside of class I don't really have communication with my lecturer unless there is a problem** or something alike, but that almost never happens. So it is the **discussions during class.** I: Would you ask a question after class?	*class environment:* lecturers also make it more interesting, they don't only read. Can see they have the knowledge and passion. power point slides are very thorough. 5 students so it is very personal, everyone knows everyone. *contribute:* I don't like it a lot. rather go afterwards . shy. Outside of class I don't really have communication with my lecturer unless there is a problem. discussions during class.

S5: After class. I: So then you go to the lecturer after class and ask questions? S5: Yes I: But never afterwards you will for Physiology email or go to the lecturer to see her in her office? S5: No I: Can you reason why not? S5: Hmm it is **just how they explain in class and that I attend all the classes is there very little of the work I don't understand,** so I feel it is... I: Ok but you will feel comfortable to ask the lecturer? S5: If I don't understand yes. I: To email or to go and see her in the office? S5: Yes. I: You just say that currently it is not necessary? S5: Yes. I: What would you say can also help with the communication between you and the lecturer? S5: Hmm I don't really know. We have their email and telephone numbers. I: So **the information is there and you experience it as accessible**? S5: Yes.	
I: Please elaborate on your **appraisal** of yourself regarding your capabilities, referring to your studies? S5: Wow (laugh) I would say I am **relatively good with retaining information** after I have studied it and also to reproduce if I understand it and the nice thing of the Physiology module is **they don't only mark from a memo and what stands on there, so if your concept is right you will get the mark.** I: Ok I understand. Would you say your abilities are enough to pass Physiology? S5: Yes I: How would you rate your abilities? S5: On a scale from 1-10?? I: Yes S5: I would say **about 8.**	Appraisal: relatively good with retaining information about 8 out of 10
I: What do you think is meant by the term **student self-efficacy?** S5: Hmm I would say it is everything on the student like all the things they told us about so many credits multiply by ten that is the amount of time you are suppose to put into the module, to pass or to get a distinction. So the **self-study stuff** that is being asked that is not necessarily discussed in class, to be well prepared for tests, to be self-motivated and to study for tests. I: Is it the first time you hear of the term self-efficacy? S5: I believe so yes **I**: Ok would you say your self-efficacy is relatively **high?** S5: **Yes** I: Is there anything else you still want to contribute to what we have discussed. Anything else that we missed? S5: I can't really think of something. I: Great, thank you very much.	student self-efficacy: self-study stuff mine is high

PHASE 2 Transcribed data: Students

Student 6 (Low marks less than 50%)

Questions and answers **Demographic data** **Student 6 (S6); Interviewer (I); 20min 02sec**	**Comments**
I: Which degree are you currently registered for? S6: Human Molecular Biology, but now it is BSc Biochemistry and Physiology.	
I: In which academic year of study are you? S6: Third year	3rd year
I: Is this your first degree? S6: Yes	
I: How old are you? S6: I am 23.	23 years
I: Name the module of Physiology that you are registered for. S6: General Physiology we now do Metabolism and Exercise physiology and we will also do Environmental Physiology.	
I: Are you registered for the module for the first time or are you repeating it? S6: It is the first time.	
I: What is your home language? S6: Afrikaans. I: Are you attending the Afrikaans classes? S6: Yes	Afrikaans
I: What is your understanding of this research project? S6: I am not sure at this moment, as far as I know it is to use your time on campus to better yourself as student.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S6: Look, to study BSc was not the original plan, I wanted to do Medicine so Physiology was the module to take to improve my chances, I am not really planning to go further than my 3rd year, because in Honours the field gets smaller, but I want to, **my marks are currently not what I wanted them to be** and I want to pick them up. **I must say the lecturers help** and I just want better access to the field I want to enter. I: Describe the amount of ***effort*** you put into your studies. S6: **Four to six hours per day per module.** I: Would you say you will put in a lot of effort and with Physiology specifically? S6: I put in a little more because it is the module that is important and not because I feel I must do well, but because it is interesting. I like it. I: How do you feel about your answer? Do you think it is something that can improve or are you happy with… S6: No **I feel I can do better, but I honestly don't know how**. That is the only thing.	***Approach:*** **my marks are currently not what I wanted them to be** **I must say the lecturers help** ***effort*** : **Four to six hours per day per module.** **I feel I can do better, but I honestly don't know how**

I: Talk to me about your ***motivational levels*** with regards to your studies. S6: Well there is an approach in Biochemistry and Physiology are very nice and everything, but they have a tendency to mark very strict according to the memo and I feel in a field such as Physiology, I don't want to say there are grey areas, but feel there are more ways than one to answer a question and I feel one must be open, and if not they must at least be able to argue. I: And tell me what motivates you to study for Physiology? S6**: To get into medicine.** I: Is it only the degree or do you have **internal motivation or external motivation**? S6: **Well actually both, because it teaches me**, yes it actually goes deep, because Physiology teaches us how reality works, you can half show how to logically think about life, don't want to sound like a school life orientation subject, but it makes you understand where things go wrong and what is the norm where people would say there is no norm, Physiology teaches you why there actually is a norm. I: So at this stage it is the knowledge, the knowledge you gain from it? S6: It is not unnecessary knowledge, it is knowledge which I feel well personally I feel one must know it. I: Tell me anything about after your degree, is there something after? What are your goals? S6: To study Medicine and I will become a good doctor and hopefully specialise too. Look to qualify here in the medical programme would be ideal, because the programme is very good and the training is excellent. It is just a pity that it is so difficult to get in, but I am happy with where I am now. I am not always happy with how things are being managed, but there is nothing that I as individual can do about it.	Motivation: **To get into medicine** **internal motivation or external motivation?** - **Well actually both, because it teaches me**
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S6: I am one of those students that have used almost all the strategies. I am **visual, auditory, and I use a combination. I draw pictures, I summarize, I talk out loud, I talk to someone**. I will even discuss these things with my girlfriend even though she studies a whole different direction only to listen to myself and that I understand it. I: But when you are in class, let's say the lecturer is busy with the lecture. What do you do in class? Would you **make notes**? S6: I would mostly, but unfortunately I **can't make notes of everything so fast**. **I record the lectures if it goes too fast, otherwise I make notes and indicate important stuff**. I will go read up, not only in our textbook, but also in others to make sure I get the concept. I: Do you use your cell phone to record the classes? S6: Sometimes but I do have a recorder. I: And tell me the skills and strategies when you study? S6: It would be overall I **use the recordings, I will make sketches**, **anything that will help me to simplify it.** I: And what time of the day more or less do you study? S6: Usually as from 17H in the afternoon. If I wake up early in the mornings I will do it, but that rarely happens and between classes. My timetable is a good setup, but I live far from campus. So for me it is an issue to drive home and study there, and to find a place here that is quiet enough and with my study method is not easy. I: Then you would rather do it at home when you get home? S6: Yes or if I find an open lecture room I will rather go and sit there. I: So you use the library? I: Yes I do but the whole quiet thing you may not talk too loud and it contrasts the way I am studying. I: I understand.	***Strategies:*** **visual, auditory, and I use a combination. I draw pictures, I summarize, I talk out loud, I talk to someone** **can't make notes of everything so fast**. **I record the lectures if it goes too fast, otherwise I make notes and indicate important stuff** **I will make sketches**, **anything that will help me to simplify it.**

I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S6: Hmm only on that? I: Yes S6: It is very nice and everything and hmm I enjoy it at the moment like the classes I just feel it is a bit, how can I say, stupid of certain students to lay unnecessary complaints against certain lecturers which I feel really wasn't necessary and through that action some of us were negatively influenced and now **we may not make recordings in that lecturer's class anymore**, but **furthermore it is fine there is good order**. **I like the concept of not being a formality all the time, we must feel you should not be serious all the time and one must speak openly to your lecturers** and **they are always willing to help** and it is really not something that I had a lot of in my first year. I: And Physiology specifically? S6: Physiology especially it is what I base those marks on, because I hadn't had Physiology in my first year, but the beginning of my second year. I enjoyed the classes. Some of the things are you must know where to draw a line. One must not always make jokes and one must understand otherwise you will miss the tip of what they will discuss in the exams and so. I: Would you say the class environment with the students around you are maybe a bit informal at this stage? S6: It is really not what I meant, **it is professional, but I like the concept that you don't speak to them as an almighty but as lecturers in the** faculty. Doctor doctor doctor those things. One **can speak to them openly and is not scared to ask something**, and I appreciate the fact that they don't, I am use to asking clinical type of questions because it is my field of interest. **If they really don't know something, they will say it is something they don't know much of. They have even go and look up some of these things and it has really impressed me.** I appreciate it but I also feel they must be open in that aspect not only in class, but I know the varsity set requirements for them with tests and so, but I feel let's say there is a memo discussion I must be able to take a photo of the memo, since **I cannot write that fast**, and they continue with the slides and it is not something that they discuss on a board for longer time to write down, but then you are stopped and said you may not take a photo and they don't give you a memo, so I don't know which framework to work from. Then they say go look in the book, but I have studied from the book and that point was in so many words there hmmm is it really good. I: Tell me about the **communication** between you and your lecturer. S6: Lecturers, there are currently 4. I: Ok S6: It is very nice, **I like the fact that I can talk to them about my problems in the study environment.** They have offered to talk about personal aspects but I keep business to business and work to work. It is nice that they can talk to you about problems in the study environment and **I like that they are willing to help.** I just feel they must not be trapped by the requirements to be maintained, like I've said with the memo they must be willing to see the full stop and comma is maybe not there, but it also isn't necessary. I: Tell me how do you ***communicate*** with your lecturers? Would you ask them questions in or after class? S6: I **prefer to ask them a question after class**, because my questions are usually out of the textbook. It has to do with the work but not always on topic. I like to go after class because then they can have more of an open book discussion with me. I: So then also make an appointment and office hours... S6: It must be a flaw from my side, but I am **more of a in your face type of person**. So if I can't call you directly to make an appointment, **I will make a point to go to the office so that you know who I am so I would like to**	***class environment:*** **we may not make recordings in that lecturer's class anymore** **it is fine there is good order**. **I like the concept of not being a formality all the time, we must feel you should not be serious all the time and one must speak openly to your lecturers** **they are always willing to help** **not scared to ask something** **they will say it is something they don't know much of. They have even go and look up some of these things and it has really impressed me** **memo discussion you must also allow people that can't write that fast allow to take a photo** **Communication:** **I like the fact that I can talk to them about my problems in the study environment** **I like that they are willing to help** **prefer to ask them a question after class**

come and speak to you about this or that, doesn't matter when then we can arrange it, **but I don't want to via email** or something that takes time. I only have so many hours in a day and I am sure they feel exactly the same. I: So would you say at this time it is the time aspect that prevents you from sending emails? S6: Yes I had a problem with my varsity email and that was an issue and it is also not totally ok for me to give my personal email address for anyone like now I had to give my contact number for this and had everybody done so? 13:11 And if it was a requirement they would get it, but hmmm the email thing that can become a farce. Sometimes there are disruptions, I feel if there is an announcement then do it in class, and to make sure everybody has heard it, put it on email. Then it is fine or put it on Blackboard, because it is much more direct and fast, but furthermore it is fine, I feel confident to ask my lecturers to Physiology specifically to give my contact number, because if they feel there is something important they will contact me and vice versa. I: Is there anything else you would say ***complicate communication*** between you and your lecturers? S6: **The eyes that look over their shoulders**, one cannot, I am a type of person that wants to communicate on a social aspect. I understand the concept of them being my lecturers and higher and everything but it is just I have a tendency to befriend people. It makes me comfortable and also make them speak more openly to me. They don't have the formality of there is a set answer for this and that and they can talk to me as person and that opens doors to understand things and it is really how it is yes I don't think anyone can argue. I: Would you put up your hand in class and **contribute to the class discussion?** **S6: Yes a lot.** I: So you don't have a problem with that? S6: No not at all.	**I will make a point to go to the office so that you know who I am so I would like to come and speak to you about this or that** **but I don't want to via email**
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S6: (Laugh) My CV record is unfortunately not the best success, but I am always there and try to always be on time, and all my things are on time, my assignments and my tutorials and my tests. So I am registered for extra time, with exam and tests, and like I've said before I can't write fast and so, but it does not negatively influence my view of the module. My personal reaction, I think personally **I'll do better in an oral exam**, I talk faster than what I write and think. Like I've written yesterday and a few times I had to delete a big answer and start writing it again and that takes a big gap of my time, but unfortunately I am not blessed with fast writing and everything, it is fortunately a good one for a doctor because nobody can read their handwriting (laugh). I: Would you say you know your abilities? S6: Yes I just feel it is a, with the Physiology it is nice, it is a broad module and one can argue with the answers, and there are stuff that have these factual aspects I can add the part that we have just did with metabolism, factual and accurate and many of the things are however not factual and I have done metabolism for the past two and a half years in Biochemistry so I have a relative strong background on how things work and how it is executed. So now in a sense we do it in much less detail than before. **I struggle to see what type of detail to give**, because the book has more detail than the slides in class. I was caught off guard with certain tutorials and how to answer if someone ask me know, explain what will happen if someone eats sugar. There is a direct lane and then the overall effect. So it is literally the broadest and widest question what one can ask, I would appreciate if they can be more specific. Yes but furthermore it is relatively simple. I don't feel they are unfair, the question paper was decent, and what I have been waiting for from the start in Physiology. The previous stuff was half, I don't know how to put it, less specific. This semester is really enjoyable, I enjoy it.	***Appraisal:*** **I'll do better in an oral exam** **I struggle to see what type of detail to give**

I: What do you think is meant by the term ***student self-efficacy?*** S6**: I've got no clue what it is.** I: Ok so you have never heard of it? S6: **It is what you put in yourself outside of class**, and you must pitch for class to know what happened and if you are not there then it is it. You can do self-study, but certain things need to be taught, there is a reason for that. I: Is there anything else you would like to say or add? S6: Hmmm only about the whole memo story, I feel they must really be willing, they don't have to print it out and everything. If we are allowed to write down the answers during a **memo discussion you must also allow people that can't write that fast allow to take a photo** and if it really is an issue you must be able to go afterwards and they must discuss it with you and then they cannot just say I don't give memos and we have just discussed it in class, I mean the question has been asked and a memo has been drawn up, and they mark according to that and they blatantly refuse to deviate from the word for word answer, but I don't have any problems with anyone in the department. I am very happy there, furthermore it is fine. I: Thank you very much for your contribution.	***student self-efficacy:*** **It is what you put in yourself outside of class**

PHASE 2 Transcribed data: Students

Student 7 (Very high marks above 80%)

Questions and answers **Demographic data** **Student 7 (S7); Interviewer (I); 11min 05sec**	**Comments**
I: Which degree are you currently registered for? S7: BSc Behavioural genetics	
I: In which academic year of study are you? S7: Second	2nd year
I: Is this your first degree? S7: Yes	
I: How old are you? S7: 21	21 years
I: Name the module of Physiology that you are registered for. S7: PHBG2626	
I: Are you registered for the module for the first time or are you repeating it? S7: Yes	
I: What is your home language? S7: Afrikaans I: Are you attending the Afrikaans classes? S7: Yes	Afrikaans
I: What is your understanding of this research project? S7: The way I am understanding it is they want to see how I as student experience the university setting and how you use your experiences to study. That is what I think.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S7: Meaning like how I manage it? I: Yes S7: Hmm I am very **conscientious** so I like all my things to be **done beforehand**, it must be on time. Yes **I work very hard on it, I make my own summaries**, yes. I: Would you say you put in **a lot** of ***effort***? S7: Yes definitely. I: Are you happy with your answer, or do you feel you can do more or? S7: Hmmm I guess I can study harder to remember it better, but it is not as if I must do less, yes.	*Approach:* conscientious. Things to be done beforehand on time. work very hard on it. make my own summaries, yes. Put in a lot of *effort.*
I: Talk to me about your ***motivational levels*** with regards to your studies.	*motivational levels:*

S7: I would like to **before each semester I set a goal for myself** what **I would like to get and I would like distinctions for all my modules.** So then every time I would say ok and of course **every time you get above 75% there is a merit bursary** which you can get. So I would like to get that bursary and I like it to **show on the academic record because it shows there and I want it to look right** (laugh). I: Ok so are there any ***external motivational*** levels? S7: No except the bursary and I would **like to make my parents proud and myself.** I: And with Physiology, what is your motivational levels? S7: Hmmm yes ok a **previous student** who also had this module, but he is now already with **masters** and I know him very well and he **constantly asks how is it going** with this module specifically, because he does it in Physiology. So I **don't want to look bad against them**, so I like it to be high because obviously I want to look good and so. I: Would you say it ***motivated you more since he has asked you about it***? S7: **Yes and he does very well in it** and they constantly want to know how I am doing in it, I don't know if they track my marks. I: Has he given you any tips on how to approach it or to make it easier for you? S7: Hmm yes he **did tell me how the lecturers work** with where we are now [lecturer] you must have your terms correct. So I've really learnt that and I can see how she marks you must have your words right and the other lecturer is more lenient, you don't need to have that terms so right, but only your story right, whereby {..} is the terms. So I knew it. I: Do you have certain goals to reach? S7: With this module? I: With regards to your studies. S7: Yes it is **the 75% for all.** I: Good and then specifically for Physiology above 75%? S7: Definitely.	before each semester I set a goal for myself. would like to get would like distinctions for all my modules -get above 75% there is a merit bursary. like to make my parents proud and myself. Support from previous student-asks how is it going -gave me tips.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S7: Hmm the **slides for each lecture I print them** as she lectures, because they use the slides to lecture, I **make notes as she speaks.** I: OK, on the slides? And how would you describe your strategies and skills when you study? S7: Then when I study I have the slides and the textbook in front of me, so then I **first work from the textbook and make my own summaries and then when I miss something I go to the slides.** I: Ok and how do you work and study for this module? Do you do it mostly in the evenings? S7: No definitely during the day, me and evenings study don't work, so during the day or otherwise I get up early. Yes not in the evenings.	*Strategies:* print slides for each lecture. make notes as she speaks. first work from the textbook and make my own summaries when I miss something I go to the slides.
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S7: **Very nice, we there is this one girl in class, she does excellent. I like a competition setup**, but who won't know I compete with you, it is inside of me to think you are how much wait then I must do this amount more. You won't know I compete with you. Hmm there are a lot that do very well and more than half is Behavioural genetics so it is a bit tough in there, but yes **we support each other** and really help each other where we can so that everyone can do their best. I: Ok and would you say the ***lecturers are passionate***? S7: **Very** and especially [lecturer] she is **very well prepared and you can ask her anything, she has an answer.** I: And the material that you receive? S7: Excellent the **slides** especially her slides I don't even have to summarise from the book, it is **very comprehensive**.	*class environment:* Very nice. one girl in class, she does excellent - like a competition setup. we support each other . *lecturer are* Very *passionate*. well prepared and you can ask her anything. she has an answer. slides -very comprehensive. *disorganised lecture*:

I: How do you manage a rambling ***disorganised lecture***? How do you make sense? S7: I would say when a lecturer is not prepared at all, like they read from the slides as if it is their first time, it is not really disorganised, because you are supposed to be able to talk outside of the slides. I: And then what would happen if someone ***just reads the slides?*** S7: **Nobody concentrate, I don't even listen**, because it feels to me that I could have read it at home. **It certainly has a negative influence yes.** I: How do you feel about asking questions in class or to ***contribute*** to class discussions? S7: Yes **I would definitely ask in class** because I **have gone through the work beforehand and mark the things which I don't understand** and when she gets to them, I will put up my hand and say I don't understand this or that and then she explains. Or when she asks questions and I know the answer then I will gladly give the answer. I: Tell me about the communication between you and your lecturer. How do you approach ***communication*** with your lecturer? S7: Either I **go to her personally or I email** her. I: Is there anything that make the communication between you and your lecturer ***difficult*** at the moment? S7: No not at all. I: And anything that maybe ***makes it easier?*** S7: Hmm no **everything works as it is**. I: Is there one that you specifically prefer, you prefer to quickly ask after class, or prefer to go face to face to ask something? S7: Usually after class while we are still in the lecture and while we are still on that topic then I can quickly say yes and then we have just have **just there after class and everyone is still there**.	Nobody concentrate, don't even listen. certainly has a negative influence.Contribution: I would definitely ask in class- have gone through the work beforehand and mark the things which I don't understand. Communication: go to her personally. or email. **everything works as it is**. Prefer just there after class and everyone is still there. **everything works as it is**.
I: Please elaborate on your **appraisal** of yourself regarding your capabilities, referring to your studies? S7: I will definitely say the hardworking part helps me and my perseverance, I can when I struggle I realise sjoe now I struggle and then I just take a break and catch my breath and then I sit with that thing until I understand it correctly. So **I've got that perseverance to continue struggling** until I've got it right. I: Would you say you know your abilities and that you are ***capable*** to pass Physiology? S7: **Yes definitely** yes it is not impossible.	Appraisal: I've got that perseverance to continue struggling. Definitely capable.
I: What do you think is meant by the term student ***self-efficacy?*** S7: Oh what I think hmmm it means you now get this work from the lecturer so you must **go home and go through everything and make sense actually just like self-study.** So the lecturer is necessary, but you **need to be so well adjusted that the lecturer is almost not necessary.** That is what I think. I: Is it today the first time that you have heard of the term? S7: Yes I'm not really comfortable with it. I: Is there anything else that you would like to contribute or would like to say on your study patterns or your experience of class or anything? S7: **Hmm no not really I think the beforehand summaries and asking questions and the comprehensive slides I think you must just go and study.** I: Thank you very much.	*self-efficacy:* go home and go through everything and make sense actually just like self-study. need to be so well adjusted that the lecturer is almost not necessary. Beforehand summaries, asking questions and comprehensive slides -think you must just go and study.

PHASE 2 Transcribed data: Students

Student 8 (High marks 70-79%)

Questions and answers Demographic data Student 8 (S8); Interviewer (I); 16min 38sec	Comments
I: Which degree are you currently registered for? S8: BSc Behavioural Genetics	
I: In which academic year of study are you? S8: Technically I am second year, but I was at the South-Campus for an extra year. I: Did you attend the UPP programme? S8: Yes.	
I: Is this your first degree? S8: Yes it is.	
I: How old are you? S8: I am 21.	
I: Name the module of Physiology that you are registered for. S8: PHBG2626	
I: Are you registered for the module for the first time or are you repeating it? S8: Yes it is.	
I: What is your home language? S8: Afrikaans. I: Are you attending the Afrikaans classes? S8: Yes.	
I: What is your understanding of this research project? S8: As far as my understanding goes it is research for my lecturer's doctoral degree that is my understanding.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your approach to your studies. S8: Hmm my approach towards my studies. Let's say I am in the fortunate position to be able to study. My parents pay for it so I feel it is my duty to work hard and do my part and to do my studies well as far as possible. I: Are there any goals you want to reach? S8: I would like to do my masters in Behavioural genetics one day so it is something I work towards to achieve. I: And tell me, your approach to Physiology specifically? S8: Physiology really interests me especially the work that we are doing now with the food and the uptake of food and so forth and because my mom is also in the food industry so it fits in and give me insight on what she had to study and understand and all those things. I: Physiology is not only another module to pass it is about the knowledge you...	

S8: Yes definitely for me it is definitely about the knowledge I gain in the module and the knowledge about myself and others. I: Tell me your mother is in the food industry? S8: She studies food technology when she left school, so she works for a big company, an international company. I: Would you say that triggered your interest in the field? S8: I won't say it specifically, but because we now work with food, it interests me. I: Tell me your approach towards your studies, how much effort do you put in? S8: Hmm I'm actually a bit lazy. I study for tests but I am not the type that will sit in the afternoon and go through the work. I feel if I concentrate in class it is sufficient for me to remember what I must do and then before tests study all the work and go through it again. I usually try to start my studying about 3-4 days before my tests. I: Would you say your approach is the same with Physiology? S8: Yes. I: How do you feel about your answer, do you feel there is room for improvement or do you feel happy with how things are now? S8: I believe there is room for improvement, but the necessary motivations is not always there. I know I can do better, I know I can study harder and everything yes, but I would say I am satisfied yes.	
I: Talk to me about your motivational levels with regards to your studies. What motivates you actually? S8: One of my motivations to do well is I want to be **selected for Honours** and later masters and I know in many fields they look at your marks, so that is definitely one of my motivational and thus far I've done relatively well with my Physiology I am happy with how I am doing now. I would say my motivation is sufficient now.	Motivering is keuring vir nagraadse studie in ander rigting.
I: Which specific skills or strategies do you use when you are in a lecture? S8: In class I just try to concentrate as much as possible, and try as far as possible to stick with the lecturer as she speaks and attend and so. **That is it I have realised if I attend classes I do much better as opposed to let's say not attending classes so it feels I must be interactive with the lecturer.** I try to as far as possible ask questions and when I don't understand something, ask about t. I: Let's go back to being in class, do you only listen or do you make notes or do you only follow slides or what is your approach? S8: Hmm I mainly listen, but also try to follow in the textbook from which she works so then I will say that this is the highlight or important point which she makes and then I would, I don't really make notes , I only try to stay in the textbook where she is and with what she focuses on. I: Yes and tell me the strategies and skills you use when you study? S8: I have told her the other day when I st**udy because like I've said I** struggle with motivation and then I **buy myself a chocolate**, a nice slab and then after each chapter I've worked through I can give myself a piece of chocolate. That is how I try to **motivate myself** and it works for me. I am happy with that. I: Yes that is a good strategy. Tell me, then you only read there in the textbook where you underlined or do you write it again or how do you study? S8: I try to rewrite it because it feels as if I take in the work better when I write it and then it is not a rushed environment like in class where you only have certain amount of time to go through things so then it is easier to take in the work and then study it. I: And tell me what times do you prefer to study?	Bywoning van klasse help om beter te doen. Ook interaktief wees met dosent. Motivering- self deur belonings.

S8: I always try not to study too late in the evenings so from about 7pm to 22:00 and then also in the afternoons in the middle of the day because it feels to me my body has got this way I become a bit tired when the sun sets. (Laugh).	
I: Let's discuss the class environment (dynamics) and how that may contribute to your performance or motivation. S8: In my Physiology class specifically, most of the students that are there, you can sense they want to be there and try to do effort and all those things so it makes it easier for me to then engage and then also the lecturer is dedicated, she tries hard to get us interested, to keep us interested and those things. I: Tell me the material you receive, slides and so on. S8: Hmm I am actually not worried about that, because as I understand it you should actually study from the textbook, anything that you get extra is a privilege to get it so. I: So you actually prefer the textbook? S8: Yes I prefer to study from the textbook. I: How do you manage a rambling disorganised lecture? S8: Hmmm I won't say that I have experienced one of those in our class but I don't know I would also be a bit rambled if there is something like that in a lecture. I: Would you then also not pay attention or? S8: I won't say I would not pay attention it will only be very difficult to pay attention, because if you refer to disorganised I assume you jump between topics and so forth? I: Tell me about the communication between you and your lecturer. S8: In the beginning I was a bit anxious like everyone is, but I think as we got to know her and she got to know us, it became easier for me. So I speak much more freely with her and ask questions which makes it much easier for me. I: Which methods do you use to communicate with her? S8: I won't say I use a method, I would just address her. I: Sorry with method I actually mean do you go and see her after class, or would you make an appointment to see her in her office, or do you use emails or what do you do? S8: Most of the times I would only ask questions in class during class times. I haven't really emailed or went to hr after class or anything like that. I: Is there a reason why you have not used the other? S8: No not really it feels to me if I don't take that time in class I will in anyway not have time later to do it. I: Is there anything you can think of that can better the communication with your lecturer? S8: For me at this stage it feels sufficient. I: Is there anything that bothers you or that complicates communication? S8: No not at all. I: Like office hours or internet connection. S8: No not at all. I: Do you feel comfortable to ask questions in class and to participate In class discussions? S8: Yes I do it is difficult. Everybody is nervous, especially when you, say our lecturer puts you on the spot, but I also feel it is necessary to keep you engaged in class.	
I: Please elaborate on your appraisal of yourself regarding your capabilities, referring to your studies?	

S8: Hmm I want to, it sometimes is difficult to brag about yourself. I feel there is a reason why I came in. I know I did the extended programme, but it also helped me, it definitely taught me to hmmm how can I say to be consequent about what I want to do and to where I want to go and those things. It felt as if I would not have been here if I wasn't smart enough. I: So are you confident in your abilities to take you through your studies? S8: Yes definitely. I: And Physiology specifically? S8: Yes	
I: What do you think is meant by the term student self-efficacy? S8: Maybe like how hard you work, how a student work. Your motivation towards your studies and so on. I: Is today the first time that you hear of the term? S8: I have psychology as a module and we learn about self-efficacy we have touch on it here and there. So it is what I understand of the term. I would say it is how you use your own resilience or something alike or motivation and what it entails. I: Would you say your self-efficacy is relatively high? S8: I would say so yes. I: Is there anything else you can think of or want to add? S8: On Physiology specifically? I: Yes yes yes. . S8: Hmmm I think it is a challenge for everyone to compete on this level and I know some take it much more serious than others. Sometimes it feels as if there are people that takes it too serious, but then you also can't determine others' intentions and motivations and I take it as it comes. I: Ok and the ones that take is seriously is like your peers your class mates? S8: Yes and other class mates. So that is how I feel about it. I try to continue so that it doesn't affect me so I ignore them and keep to myself. I: Ok thank you very much. S8. It is a big pleasure.	

PHASE 2 Transcribed data: Students

Student 9 (Very high marks above 80%)

Questions and answers **Demographic data** **Student 9 (S9); Interviewer (I); 15min 21 sec**	**Comments**
I: Which degree are you currently registered for? S9: BSc Behavioral genetics	
I: In which academic year of study are you? S9: Second	2nd year
I: Is this your first degree? S9: I studied nursing for a year, just one year, and then I changed to BSc.	
I: How old are you? S9: I am almost 21	20 years
I: Name the module of Physiology that you are registered for. S9: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S9: Yes for the first time	
I: What is your home language? S9: Afrikaans	Afrikaans
I: What is your understanding of this reseach project? S9: It is about students' way of studying or class to integrate it to study easier en to make studying easier.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your *approach* to your studies. S9: Ok hmm I am quite serious about my academics and I try to get high marks, so I work hard and for my timing, obviously time management is important, because I also have a lot of sport, and I have sport every day of the week, and I am in a committed relationship which also take time. So I must plan wisely so that I can still manage my academics on the level I want to. I don't make summaries, I don't like it. I read through the work to **get an overview and then to pinpoint what is important**. So I first like to have an overview and then to zoom in. So even if the lecturer says the slides are sufficient, I'll go back to the textbook. I like it, I feel I don't know the work if I don't have an overview and then the detail. I: Describe the amount of *effort* you put into your studies. S9: I study easy which is a privilege, so I work hard, because I want good marks, but I do enough to get it. I: And your effort with Physiology? S9: As much effort as needed to get the mark I want. I: Are you happy with your answer? Do you feel there lack some effort or are you happy with how it is now? S9: Yes at this stage.	*Approach:* serious about my academics I try to get high marks. time management is important, must plan wisely. don't make summaries. read through the work to get an overview and then to pinpoint what is important *Effort:* study easy which is a privilege, I work hard, because I want good marks. do enough to get it. As much effort as needed to get the mark I want.
I: Talk to me about your *motivational levels* with regards to your studies	*motivational levels:*

S9: I think I would say it's always intrinsic motivation that's my main motivation is why I do something. It comes from within and not from pressure from other places, off course you want good marks, with your end goal in mind, but in terms of intrinsic motivation it is nice for me to do well, it's nice to know the work, it's nice to know I am expanding my knowledge, it's nice to apply my general knowledge and to say this fits here and this fits here. It motivates me to work. I: Are there any specific goals you want to reach? S9: Yes academic goals, Dux in the hostel and maybe Senate medal. I work hard for it, but is only secondary goals. Obviously firstly my degree Cum, that is my first goal, I must get that first, then the rest comes and if I see I can push higher for marks, then I will do it. I: Shoo that sounds good.	intrinsic motivation -main motivation comes from within and not from pressure from other places. goals -Dux in the hostel and maybe Senate medal, my degree Cum. if I see I can push higher for marks, then I will do it.
I: Which specific skills or *strategies* do you use when you are in a lecture? S9: Ok I have a black book in which make notes, my book goes everywhere with me, and I take my textbooks with if necessary, but mostly I take my **black book,** in which I make notes and other important notes and all those type of things. Yes the notes are the main thing and then **listening and asking questions if I don't understand.** I: You have mentioned earlier how you study, do you then also use that black book? S9: Usually it is like that. I sit with my textbook in front of me, and my black book so that I have all 3 sources and then I will look through the slides what is the most important, then I will read the corresponding sections in the textbook and back to the slides and then I will remember this she said we must concentrate on and so on. I: When do you usually study? S9: I usually study during the day because of sport in the evenings and after sport I want to go and sleep and don't want to sit up late and study. Most of the times if I have classes of or whatever I try to use it as my main study time. Preferably not, I don't have evenings to study, except if I want to start after 21:00 and I don't like it, 23:00 is bedtime (laugh).	*Strategies:* black book in which make notes. listening and asking questions if I don't understand. sit with my textbook in front of me, and my black book. look through the slides what is the most important, read the corresponding sections in the textbook and back to the slides.
I: Let's discuss the *class environment* (dynamics) and how that may contribute to your performance or motivation. S9: Yes definitely it's very nice to have an **interactive class, I must say it's also because of the demographics of the Afrikaans class, which is so small.** So it's nice in that sense, smaller, more personal, interactive type and more opportunity to say something, basically if it's a big class, because time wise if there is 50 students not everyone can say something as when it is 15 students. I will say it's nice and in Physiology specifically there is sp**ace what I specifically like is weekly definitions and then we discuss it.** So you **can make additional notes to see and to challenge us to give the answer instead of only reading.** Yes I would say interaction is important, it can get too much but there shouldn't be too much. I: Would you say the lecturer is passionate and contribute to your motivation to pass? S9 Yes definitely. I: The material you receive, do you get slides or something? S9: Yes we did get **slides.** I: Would you say it also helps? S9: Yes it is your **main study resource** and puts the emphasis on what is the important center of the information. I: Ok how would you say you make sense of a *disorganize*d lecture? S9: Sit by myself and check the textbook. I: In class or afterwards? S9: Depending on when I have time. If I sit in class with my textbook, and I see I don't know what's going on now, then I page in my textbook, and if I see afterwards I really don't know and especially if I don't like it like I've said I don't like summaries, not even my own, and someone else's are more confused and I don't like it. So it's nice to add on from the textbook to say this fits here and this fits here.	*class environment:* nice to have an interactive class,-Afrikaans class is small-smaller, more personal, interactive type if it's a big class, because time wise if there is 50 students not everyone can say something. what I specifically like is weekly definitions and then we discuss it -can make additional notes to see and to challenge us to give the answer instead of only reading. lecturer is passionate and contribute to motivation to pass. Slides -main study resource *Disorganize*d:

I: How do you feel about asking questions in class or to *contribute* to *class discussions*? S9: Hmmm obviously if there is a question its fine but there shouldn't be all sorts of, it **should not be too open, I don't know how to say it, stupid questions then that takes over.** I: Do you mean simple questions from other students? S: Yes it must still be focused and to the topic and then in terms of class discussions, I don't like it I don't want a full hour of class discussions except if it now really is an opportunity but Physiology is a scientific module. I won't say a class discussion ask for an hour of whatever, but a short class discussion like we've had a **scenario then it says ok this guy experience these symptoms** what would we conclude and then ok I conclude this it has to do with that. That is **very constructive**, but it should remain constructive I think that is the main thing. When it goes off topic, it wastes one's time. I: Tell me about the *communication* between you and your lecturer. How do you approach it at this stage? S9: If I have a question, I will ask there in class time or if I have an important question which I don't understand I will stay behind and ask in terms of, there are always emails so if it something you just want to make sure of you can also send an email. So there are enough communication platforms. I: And meetings in the office? Have you done that before? S9: No I haven't but it is totally an option, and preferably its sending an email, make an appointment and pitch up, but usually it is sufficient to quickly after class, stay for 5 minutes and ask the one question and get the answer. I: And which one do you prefer, you obviously prefer staying behind after class. Is there any reason why you not see the lecturer during consultation hours? S9: I think it's for when one really has a problem or a specific problem about a certain section of the work. Mostly it's one thing you are uncertain of, then it is inefficient to make an appointment of half an hour rather than just quickly get clarification. If I have a big problem with something or with regards to something that happened or let's say I wasn't there because something happened and one must explain something. I: You would be comfortable to make appointments? S9: Yes definitely. I: Is there something you can think of that will *improve communication* between you and your lecturer? S9: Because some lecturers are more closed, others more open and one knows and can feel it, but it can also be intimidating let's say a certain lecturer speak to another one and (?11:42) to go and talk and ask a question. It can also **be in terms of how the class is given where you realize that questions are welcome or not.** So I think you read the person and it can be intimidating with a certain lecturer and then you think no I won't ask now and think you won't get the answer you are looking for. Sort of 'you get those experiences'; I won't say Physiology specifically, but through the book yes.	Sit by myself and check the textbook. Contribution: should not be too open, I don't know how to say it, stupid questions then that takes over. -don't want a full hour of class discussions. short class discussion like we've had a scenario- very constructive. When it goes off topic, it wastes one's time. Communication: I will ask there in class time. If don't understand I will stay behind and ask . always emails. So there are enough communication platforms. how the class is given when you realize that questions are welcome or not. you read the person and it can be intimidating with a certain. be in terms of how the class is given where you realize that questions are welcome or not.
I: Please elaborate on your *appraisal* of yourself regarding your capabilities, referring to your studies? S9: Hmm I have background from lots of reading so it helps me a lot because I like reading. Hmmm I don't know as I've seen it, it is as if I take more in than other people, from reading it once, because I have been taught from young, I love reading from a young age I'll read to get information. Where I have realized with class mates it's not necessarily the reality. Some say they must read it 10 times. Then only I can take something from it, where I don't have that experience so it makes it much easier because I know I can only go through it once and I have a good idea of what's going on in the work. I don't have all the details but a good overview. I'm not sure if that answers the question. I: **So do you believe in your abilities you have at this stage?** **S9: I think so**. There are things and there are modules, I now have genetics, and that's a bit of a challenge, but I'm **not scared I am sure I will figure it out**, I will get by I'm sitting now, reading the textbook then I know I will understand it or not. I: But just Physiology do you feel your abilities are enough to pass?	*Appraisal:* background from lots of reading so it helps me a lot. I know I can only go through it once and I have a good idea. Ability good. not scared I am sure I will figure it out.

S9: Yes Physiology is a lot, I love Biology modules rather than Chemistry and Physics. Yes like Physiology all my Biology modules because it is a lot of information in written format, I like remembering facts.	
I: What do you think is meant by the term student self-efficacy? S9: I think it is about self-efficacy how you think you can reach your goals, **how effective you think you can be to reach your goals.** So if you **have self-efficacy, it says you can be successful to reach your goals. I**f you feel you have lots of low levels of self-efficacy then you struggle to reach your goals. I: Is it the first time you hear of the term? S9: No I: So you have heard of it before? S9: Yes I: So you say you have relatively high self-efficacy? S9: Well one can always improve on that, but I do believe so. I: Why do you say you can improve? S9: One can always improve oneself. I: Is there anything else you want to say about studying Physiology or anything else we didn't address? S9: No not really. I: Thank you very much.	self-efficacy: how effective you think you can be to reach your goals. have self-efficacy, it says you can be successful to reach your goals. I low levels of self-efficacy then you struggle to reach your goals. high self-efficacy

PHASE 2 Transcribed data: Students

Student 10 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 10 (S10); Interviewer (I); 10min 51 sec**	**Comments**
I: Which degree are you currently registered for? S10: BSc Behavioural Genetics	
I: In which academic year of study are you? S10: Second	2nd
I: Is this your first degree? S10: Yes	
I: How old are you? S10: 21	21 years
I: Name the module of Physiology that you are registered for. S10: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S10: I did PHBG 2616 in the last semester. I: It is not as if you redo all the modules? S10: No	
I: What is your home language? S10: Afrikaans I: Are you attending the Afrikaans classes? S10: Yes	Afrikaans
I: What is your understanding of this research project? S10: Hmm my understanding is that it is something about how students should study and how it can help in the class and something like that.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S10: Like how I study now? I: Like how much effort you put in let's start there. S10: I usually **go to class so that is already a bit of effort**. I **really study hard** for Physiology like at least I get a distinction for it so I put in a lot of time. I: Ok and tell me with your studies in general, do you also **put in so much *effort*** with your other studies? S10**: Yes with everything the same**. I: Ok but specifically with Physiology also? S10: Yes	*Approach:* go to class so that is already a bit of effort. really study hard. goal-all my modules but especially Physiology above 80%, it is my aim. only has so much time and I use the time.

I: Are there ***any goals*** you want to reach specifically? S10: I want to get in **all my modules but especially Physiology above 80%, it is my aim**. I: Ok and tell me back to the effort you put in, do you think you can do more or are you happy with the effort you make with Physiology at this stage? S10: I am happy with it because one only has so much time and **I use the time I have for i**t. I put in a lot if I have time for that module.	
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? S10: **I would like to study Medicine** so that is the aim so then I know, ok it is like something that gets me going and then I just carry on and focus and then I am motivated. I: And tell me the motivation to then pass Physiology? Is that what drives you? S10: Yes I **would like** to **pass everything**, I never don't want to pass something. I am too **scared of failures, I'll rather work hard.**	*motivational levels:* I would like to study Medicine. would like to pass everything-scared of failures, I'll rather work hard.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S10: I usually **print my slides beforehand** and if there are any **sketches that are not clear enough for me I will summarize it from another book** so that I understand it and if I study and it's unclear I **will go and read up on it until I exactly know** wat is going on even though it is much more information than what we need to have, but the at least I know I understand. I: Tell me which skills or strategies do you use when you study? S10: I'll study like **a concept, but I will study to understand it and then I remember** it. I will usually **summarize** it, but I won't summarize everything just the **things which I think is important.** I: Ok and how do you study, which time of the day? S10: Oh it doesn't really matter. Say I write on Monday then I would like sit on a Saturday the whole day and study except the evening like 18:00 I will stop, Sunday I will start again at 08:00 until the evening, but I will take breaks in-between. So I usually **study very hard just before a test**, then I remember it.	*Strategies:* print my slides beforehand -sketches that are not clear enough for me I will summarize it from another book. will go and read up on it until I exactly know a concept, but I will study to understand it and then I remember summarize -things which I think is important. study very hard just before a test
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S10: It does, the **lecturer is like very positive about the module and she tries very hard and help so then it motivates one much more,** as opposed to someone just standing there and reading and not caring. So **that effort results in you also want to make an effort.** I: And the material you receive in class of the slides? S10: It is very comprehensive and there isn't here and there something you won't understand and when it is not complete it is at least indicated so then you can make it more comprehensive. So I **won't say it is really necessary for the textbook, the stuff are very comprehensive**, but the textbook helps you to understand a bit more if you don't understand. I: So do you have a textbook? And the students in your class how big is your class? S10: We are like, I think about **18 in class and everyone works hard, yes the whole group is motivated and wants to do well, half like a competition so that pushes one a bit.** I: Yes that contributes to the motivation. How do you deal with a rambled ***disorganised lecture***? S10: No then I can't focus and my **attention is totally distracted** and then I would **rather try and do something on my own** even if it take the whole afternoon to make sense of it myself. I: How do you feel about asking questions in class or to **contribute** to class discussions? S10: Yes if I **don't understand something I will ask questions** and **if questions are being asked I will answer.**	*class environment:* lecturer is like very positive about the module. she tries very hard. then it motivates one much more-that effort results in you also want to make an effort. won't say it is really necessary for the textbook. the stuff are very comprehensive. 18 in class and everyone works hard. whole group is motivated. half like a competition so that pushes one a bit. *disorganised lecture*: attention is totally distracted. rather try and do something on my own Contribution: don't understand something I will ask questions. if questions are being asked I will answer. quickly ask after class.

I: And tell me communication so you don't have a problem talking and communication with your lecturer, how do you approach it when you have something you want to ask? S10: Usually when it is in the lecture, then I will ask immediately, but if it is something **from a previous lecture which I see I don't really understand, I'll quickly ask after class** and then usually if I ask then I understand what is going on and what I didn't know. I: Do you mean with after class like still in the venue when the lecturer is still there in front? S10: Yes I: Would you ever email or go and see her in the office? S10: Yes if **I feel something is really unclear then I will make an effort and go and see her**. I: Have you done so? S10: No I haven't yet. I: Was it just not necessary yet? S10: It hasn't been necessary. I: What factors ***help / hinder*** your communication with lecturers? Is there anything you can think of which could help communication between you and your lecturer? S10: No not really. I: And anything that makes it difficult at this stage? S10: No not at all. I: So you are comfortable to make an appointment? S10: Yes.	feel something is really unclear -I will make an effort and go and see.
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S10: Yes I think so because I am **very willing to study and I don't always like it**, I like the body a lot so it's a nice concept so it is better for me to study, it's sort of easier. I: Would you say your **abilities are sufficient** to pass Physiology? S10: **Yes** I: Would you say you've got relatively high abilities? S10: Yes I won't say I am stupid, but also not clever, **I put in effort** like my brain won't disappoint me if I lead him in the right direction (laugh). I: Ok	*Appraisal:* very willing to study and I don't always like it, abilities are sufficient. I put in effort.
I: What do you think is meant by the term **student self-efficacy?** S10: It is how effective you are as student, **your timing like how you would prioritize things** of importance like exercise, eat right and for example when you will study and how effective it will be for you not to make it worse, but better. I: Is today the first time you have heard of the term? S10: Yes actually. I: Would you say the students' self-efficacy is relatively **high?** S10: Yes I: Tell me is there anything that you would like to contribute to this interview, anything regarding your studies of Physiology or in class or anything that you can think of that we didn't speak about? S10: No nothing that I can think of now. I: Ok thank you very much.	self-efficacy: your timing like how you would prioritize things high

PHASE 2 Transcribed data: Students

Student 11 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 11 (S11); Interviewer (I); 9min 46sec**	**Comments**
I: Which degree are you currently registered for? S11: BSc Physiology and Genetics	
I: In which academic year of study are you? S11: Second	2nd year
I: Is this your first degree? S11: Yes	
I: How old are you? S11: I am 20.	20 years
I: Name the module of Physiology that you are registered for. S11: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S11: The first time.	
I: What is your home language? S11: Afrikaans. I: Are you attending the Afrikaans classes? S11: Yes	Afrikaans
I: What is your understanding of this research project? S11: Hmm I don't know she hasn't really elaborated on what she wants to do it is for her doctoral degree and do research on study methods and how physiological stuff students will influence (laughing)	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S11: That's how I study? I: Yes and how much effort you put in. Let's first talk about how much effort you make with your studies. S11: I don't know in my personal opinion I will say **I put in enough I must just sometimes plan better** so that I don't have to study late at night. **Like often make summaries** for each module, especially Physiology because Physiology is a lot (laugh) and for continuous assessment which you must do and so forth. I: Elaborate a bit more would you say it is sufficient or would you like to do more in a certain area? S11: I would only like to plan a bit better, but I **think what I currently do is sufficient, but I can strive for better.**	*Approach:* put in enough I must just sometimes plan better. Like often make summaries think what I currently do is sufficient, but I can strive for better.
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? S11: With Physiology it is a **module I am interested in and it is nice to study so it is good motivation and** then you want to do well and I **would really one day like to have a career in a Physiology area so.**	*motivational levels:* module I am interested in. nice to study -good motivation and would really one day like to have a

I: Perhaps any external motivation? S10: I have a very **good support system**. We have like **groups on WhatsApp** all the kids in the class, so then you motivate each other and then want to hear what to study for a test (laugh) or so yes mostly that. My **parents are also good support.** I: Are there any goals you want to reach? S11: I would really **like to get a distinction for Physiology** at the end of the year. I: Any reason for that? S11: I don't know I have always just got my distinctions. I just can't stop it (laugh). I: Very good very good.	career in a Physiology area so. good support system. groups on WhatsApp all the kids in the class.parents are also good support. like to get a distinction.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S11: **In class I will make notes of everything the lecturer says** and it also helps you **she gives work to prepare beforehand.** So then it helps if you have summarised it beforehand and you know what it is all about in class. I: And tell me the skills and strategies when you study? How do you study? S11: Hmm I would usually **summarise and lots of repetition. I** would usually walk around and say to myself what the swallowing process is. I: Out loud? S11: **Studying out loud while walking** so that I get all those studying methods all in one. I: Ok that is very interesting. So what time of the day would you say you study the most? S11: I would say between 16:00 and 21:00 in the evenings I would say yes. It is the time that you are done with class and prepare for the next day's stuff. I: Ok I understand.	*strategies* : In class I will make notes of everything the lecturer says. she gives work to prepare beforehand. Summarise. lots of repetition. Studying out loud while walking.
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S11: Hmm it's **nice in class** in the sense that **you must prepare for class and then there are many group discussions.** Like a statement is given and everyone' s opinion is highlighted and we get like a **weekly definition assignment** to do and submit on Friday, but then you say it in class and the guy that doesn't know, can then listen and so. **So it improves the class participation.** **I**: Would you say your lecturer is motivated and passionate? S11: **O very and it is nice when someone is passionate about that that you should do now.** I: Ok and the ***material*** you receive in class like notes and that stuff. Does it help? S11: It is very **helping and also sufficient**. I: How do you manage a rambling ***disorganised lecture***? How do you make sense if everything is disorganised? S11: Like only work wise or with the people in class chaos in the class? I: Both but let's start with the first one. S11: Ok with work I will say if **I don't understand something I'll go home and go look what it actually says because sometime you only have to make sense of it yourself** and when there is **chaos in class it will put me off a lot**, it is not nice because you **don't concentrate and your attention is distracted and so.** I: How do you feel about asking questions in class or to ***contribute*** to class discussions? S11: Yes that is **very comfortable**. I: So you don't have a problem with that? S11: No no. I: Ok that's good and communication with your lecture? How do you communicate with you lecture?	*class environment:* nice in class-you must prepare for class and then many group discussions. weekly definition assignment-it improves the class participation. nice when someone is passionate about that that you should do now. *material* -helping and also sufficient. *disorganised lecture*: don't understand something I'll go home and go look what it actually says- sometime you only have to make sense of it yourself. if chaos in class it will put me off a lot. don't concentrate and your attention is distracted and so. *contribute* : feel very comfortable -but the times that I do communicate are normally quickly after class.

S11: Hmm I haven't actually had the need to communicate with the lecture because the **information has always been given relatively well, but the times that I do communicate are normally quickly after class.** I: So you haven't used email or you don't see her in her office? S11: No it hasn't been necessary. I: But you don't see it as a problem? S11: No not at all I've had used email and stuff with other lecturers but our lecture is on it the whole time (laugh)	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S11: So does it mean I must mention good aspects of myself here? Hmm **if I need to work hard I will work hard.** Sometimes I am a bit lazy, but we will shift that aside but I will work if there is work to be done and I **will always do my part**. I will **not necessarily do it on time** (laugh). Sometime life just gets a bit busy and then you just need to breathe a bit before you do something else. I: Do you think your a**bilities** are sufficient to pass Physiology? S11: **Yes** I will say so, **I am sort off very disciplined in Physiology** I must say.	*Appraisal:* if I need to work hard I will work hard -always do my part. not necessarily do it on time. abilities are sufficient.. am sort off very disciplined
I: What do you think is meant by the term student ***self-efficacy?*** S11: Ok with students' self-efficacy I would say it is **how effective students work on their own** when they are on their own. It is about **how motivated you are and when there is no one telling you what to do.** I: Is today the first time you've heard of the term? S11: Yes actually it sounds familiar, but I think it is like the first time I had to define it (laugh). I: Thank you is there anything else you would like to add to your study methods or strategies that you use? S11: Hmmm no more than summaries and I **usually write things down that I must study otherwise I can't keep it in.** I: Anything else which you think can help you to study Physiology better or to take it in? S11: Hmm **it is nice if you can practically apply the things that you study in class** like we have visited the anatomy lab to see how the organs are displayed. So that makes it so much easier to study Physiology, because then you know how it looks in real life and it is much easier to apply to the theory. I: Thank you very much.	*self-efficacy:* how effective students work on their own. how motivated you are and when there is no one telling you what to do. usually write things down that I must study otherwise I can't keep it in. nice if you can practically apply the things that you study in class.

PHASE 2 Transcribed data: Students

Student 12 (Middle marks 50-69%)

Questions and answers Demographic data Student 12 (S12); Interviewer (I); 25min 31sec	Comments
I: Which degree are you currently registered for? S12: Genetics and Physiology	
I: In which academic year of study are you? S12: Second year	2nd year
I: Is this your first degree? S12: Yes its my first degree.	
I: How old are you? S12: 20	20 years
I: Name the module of Physiology that you are registered for. S12: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S12: Yes for the first time.	
I: What is your home language? S12: Sotho. South Sotho. I: And you are taking classes in English? S12: Yes.	South Sotho
I: What is your understanding of this reseach project? S12: My understanding hmm to be quite honest I haven't been filled quite yet. All I know is I was just chosen to help mrs Vorster de Wet with her PhD research. I also helped another lecture last semester with his studies. So I think they choose student who have participated previously. I: Ok that's interesting.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. How much ***effort*** you put into your studies. S12: I think with regard to Physiology I **put like too much effort as compared to other modules to be honest.** I put in too much effort because it **requires a lot of attention and requires a lot of understanding.** You must understand the whole concepts because if you don't like grab a certain mechanism you won't be able to understand another (?2:47) like learn again in the future. So I think I put in **may be four hours a day** and to be quite honest I **seriously don't neglect other modules.** I: OK you feel that you neglect you other modules because you focus so much on Physiology. S12: Ja but it's quite interesting I like it.	*Approach*: *Effort* : put like too much effort as compared to other modules. requires a lot of attention and requires a lot of understanding. may be four hours a day. seriously don't neglect other modules. quite a problem because I need to put also a lot of effort for other modules- are also demanding. sometimes I feel like I study just to pass

I: Ok. Tell me are you happy with your answer or do you think you can put in more effort with your Physiology or rather a bit less effort? S12: Hmm how should I say. If I say I should put in more effort I am still going to neglect some of my modules. It's **quite a problem because I need to put also a lot of effort for other modules because they are also demanding just like Physiology** but I think I just need to balance between modules just to balance because **sometimes I feel like I study just to pass the exams. I feel like I forget that I acquire knowledge that I have to use. I just study to pass the exams and it becomes quite skeptical when you have to reason and think on your feet**. You **forget some of the stuff just like when you study for a test** and forget and can't reason. I: Ok interesting.	the exams. feel like I forget that I acquire knowledge that I have to use. it becomes quite skeptical when you have to reason and think on your feet. forget some of the stuff
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? S12: Hmm I think what **motivates me is my mother**, yes my mother motivates me and the current situation at home that also motivates me like I want to be something because I am the first person from home to come to university. **I want to make a difference**. I think that's one of the thing that motivates me. I: And internally that was externally. Internally for yourself? S12**: Internally** for myself **I want to study Medicine so that's my motivation**. I always wanted to study Medicine it's like it really motivates me to see some of my friends studying Medicine because that's also what I want to do. So it also **motivates me like to work really hard to get into Medicine.** I: Yes and it that also why you want to put so much effort into Physiology? S12: Yes because it's quite related to what is Medicine. I: Yes to get good marks and not only pass. S12**: Not like to pass but to get knowledge background knowledge**. **You can't just pass it and not understand it.** I: It's an important point you are raising there.	*motivational levels:* my mother motivates me. (Intrinsic) I want to study Medicine. Not like to pass but to get background knowledge.
I: Which specific skills ***or strategies*** do you use when you are in a lecture? S12: I **don't usually use my text book** I **just listen** and try **to take as many notes** as I can because **me and my friends we take notes and afterwards we try to combine** like what did I get and what didn't I get and we combine. That's what we use yes. I: How many friends that form like a learning community that's more or less what you are doing. S12: For Physiology **it's 6 but for other modules it's like 10.** We even have a **whatsapp group.** I: No ways for Physiology? S12: I'm serious. Yes for Physiology. I: Wow that's great. S12**: We do past question papers** ask each other like if I don't understand a certain portion of the work I **ask like guys do you guys understand this and please explain.** I: So it's not always face to face bit more online? S12: **More online** but we are always together we are friends but sometimes when you study back at home just **send a voice note.** I: Ok I understand that is a good strategy and tell what skills or strategies do you use when you learn? S12: When I learn by myself? I: Yes yes.	*Strategies:* don't usually use my text book. just listen. to take as many notes. Me and my friends we take notes and afterwards we try to combine. whatsapp group 6-10 students. We do past question papers. More online - send a voice note. headings I turn into questions focus on what is been addressed on the slides. try to answer the questions. type all the learning objectives - which to focus make summaries. my roommate to ask me questions. becomes a matter of priority -it's management.

S12: This thing that I do is like **the headings I turn into questions** and **focus on what is been addressed on the slides** and **turn the heading into a question and start to try to answer the questions.** Sometimes I just like type the objectives say like for chapter 1 I **type all the learning objectives I know which part to focus on.** I: Do you make **summaries?** S12: Certainly. I: Do you say it up loud or? S12: No I don't say it up loud I just study. I: Do you read it and make notes? S12: Yes and I try to ask myself questions and **ask my roommate to ask me questions.** I: Then you answer out loud? S12: Yes and **he tell me if I got it all wrong.** I: Ok great and tell me which time of the day would you study the most. S12: I study the most from 5pm I can't study in the day because my days are quite hectic with practicals so I only have time from 5pm till late and I also late like around 00:00 I can't study I just have to sleep because last year I like studies until 3am. I: Then you write a test the next morning? S12: Yes and sometimes when I wrote the test I would feel blank. I: Yes that's a problem. S12: I've realized that it is not healthy at all. So I had to reset my schedule and come up with the best solution so that I can **study between 17:00 and 00:00 I can divide my modules** I can like if I study from 17:00 to 00:00 I can **put in like two hours into each module** it depends on how much I need to study. It **becomes a matter of priority let's say a write a test the next day certainly I have to put more into that module.** I: **So it's management.**	
I: Let's discuss the ***class environment*** the dynamics in class and how that may contribute to your performance or motivation. Do you think the class environment **motivates you to pass your subject**? S12: **Certainly.** I: Specifically Physiology? S12: Certainly. I am saying this because sometimes my lecturer specifically **she makes examples based on scenarios** that we go (?10:37) like every day then I realize this is basically Physiology and when you try to remember you just **going to remember the scenario** even like asking questions **I feel people asking questions is it's just the best thing** because sometimes you don't know that you don't know something and somebody asks and then like the question is already answered. **Sometimes you don't have the courage to ask like I don't like to ask questions I don't know why and then may be go after class and ask questions.** I: And group discussions in class why don't you like it? S12: No **I like group discussions** this it just asking questions in class. I just **feel like shy.** I: Are you shy to ask questions among your peers or are you shy to ask the lecturer of being scared it's a dumb question but obviously it's never a dumb question? S12: Sometimes I just **feel like it's a dumb question and feel like I am setting all the students back** and we have to proceed with the work and I am just delaying so I think it's **best to go to the lecturer after class and ask**. I: But you do ask? S12: Yes	*class environment:* motivates you to pass your subject. she makes examples based on scenarios - going to remember the scenario. I feel people asking questions is it's just the best thing. Sometimes you don't have the courage to ask. like I don't like to ask questions-don't know why-shy-feel like it's a dumb question. Go after class and ask questions. I like group discussions. use the notes. combine it I read in the text book try to make my own summary feel that the material we get is already a summary to the book. *Disorganised:*

I: And the material you get in class do you also think it helps you passing Physiology? S12: Certainly. Mostly I **use the notes** that [lecturer] provides and I **combine them with what I read in the text book** and what I've already made notes of and I **try to make my own summary** but like **I feel that the material we get is already a summary to the book** it's less work for me so I just combine it with what I have already and take notes in the class. I: How do you make sense of ***a rambling disorganised*** lecture? S12: Disorganised lecture? I: Yes if it's so much information and you don't know what's happening. S12: If there **is too much work I start by study bit by bit** like let's say a certain portion of the work is too long I just focus on smaller bits like cut them into pieces try to understand the work and move on to the next piece and try to combine the work. I: And when you are in class and the lecturer go through very difficult work and you don't understand what's going on? S12: I'll **ask my friends after class or the lecturer after class.** I: Do you space out sometimes where you just loose track and then afterwards you will somebody for help? S12: Yes it happens a lot of times but it's a question of are you able to focus because if you don't focus in class it will happen but if you try to focus on what is been said like keep track on what is been said because you can't focus on this portion and you don't focus on that you will just get lost. This is how I feel like I feel like you just have to keep focus throughout the lecture and if **you don't understand it's not your problem may be the work is too hard you have to ask** but if keep focus all ends well. I: Yes that's a good approach. Tell me about the ***communication*** between you and your lecturer. You say that sometimes you go and ask questions after class, do you have other approaches? S12: Not quite I **feel like emails delay and also appointments sometimes she is not available or sometimes I am in class when she is available so going to her after class is the best approach.** I: What did you say? Emails are? S12: Emails I think they delays. I: You mean delay in answering. S12: Yes because sometimes you want an urgent answer and the she is gonna look at the email like later. I: What do you think can help this? Say you feel these two systems are not working, the consultation hours going to her office and emails what can make it better? S12: I don't really think about it. I: Let's talk about the problems is you say the email delays. S12: Yes the email delays but I think the best approach is **going to her after class that's when she has time yes.** I: Have you found it necessary to talk to her about anything else except the work after class or don't you mind asking personal questions in that class environment? S12: Can you please repeat the question? I: No no sorry do you only ask work questions after class? S12: Yes based on let's say I've studied something I didn't understand like I've studies last night and didn't quite catch the mechanism so I **write the question down so I can remember to ask** and also let's say I **don't understand something in class I just go after class and ask her.** I: And let's say you see there is a problem with your marks and you need to go talk to the lecturer. Will you then make an appointment or will you also ask her after class?	If too much work I start by study bit by bit. ask my friends after class or the lecturer after class. *Communication:* feel like emails delay. in class when she is available so going to her after class is the best approach. Help: whatsapp group -get instant answers. it's on Blackboard

S12: The **problem with marks are they can be rectified in time and email** her for an appointment or just notify her because marks it's not that they are not important they are important but she can still look at the email and address you. I: So you will email? S12: Yes but for asking questions it's a dilemma. I: But you will email for other reasons. So how can we make it better or you are happy with emailing and going to her office during consultation hours? S12: Sorry. I: You don't have a problem going to her office or using emails it's just difficult asking questions using emails and consultation hours. S12: Hmm I think a **whatsapp group** because you **get instant answers** even the English class is not that much. I've see other lecturers do it **it's on Blackboard I** don't know how they do it. I: Oh like **discussion groups**? S12: Yes discussion groups. I: that's a very **good proposal for discussion groups on Blackboard**. Something interesting to think about, see we need this information.	
I: Please elaborate on your **appraisal** of yourself regarding your capabilities, referring to your studies? S12: Appreciate myself? I: Yes of your capabilities. S12: Hmm I feel like I am one **person who can study a lot of information in a short space of time that's quite a skill even some people call it cramming** I don't want to be labeled it's just how I am. I can read something now and catch the whole concept and like time management, I can manage my time well so my capabilities are good. I: Ok and applying afterwards what you have learned? S12: Applying what I have learned on Physiology? I: Yes S12: Hmm I don't quite apply it it just comes up like talking. Let's say I'm talking to a Law student it just pop up with the Physiological concept it's just like wow this is how it is. I: With applying I only mean do you remember the work afterwards? S12: Yes I do. I: Do you think your abilities are good enough to pass your studies? S12: Yes I do. I: And do you think your abilities are good enough to pass Physiology? S12: Yes I do think so. I: Ok good.	Appraisal: person who can study a lot of information in a short space of time that's quite a skill even some people call it cramming.
I: What do you think is meant by the term student **self-efficacy?** S12: What? I: (laugh) student self-efficacy, you can read the word over there. S12: Oh I think student self-efficiency is student being self-efficient, managing to be a student, yes **like coping.** I: With what? S12: The amount of pressure. I: Ok pressure from peers or studies or what?	self-efficacy: student being self-efficient - like coping with pressure **able to focus on your academics**. I enjoy Physiology - so fascinating.

S12: From studies. I: Pressure from studies so more focus on academic. S12: Like been **able to focus on your academics and been able to take the pressure**. I: Yes yes yes. S12: I'm not sure. I: Is it the first time that you hearing the word today? S12: No. I: You have heard about the word self-efficacy? S12: Ja. I: At university or was it at a module previously or? S12: No I've just come across it somewhere but I don't know where may be just tweeting already I didn't like took time to search the word up because sometimes when you reading you just say nah may be it means something. I: tell me is there anything else you want to ***add*** to the discussion we had regarding your studies , motivation regarding Physiology. S12: (Sighs) No but I really have to say **I enjoy Physiology**. The concepts of Physiology are **so fascinating**. Sometime you realize you are living Physiology even just doing things even just talking is Physiology. It's just a whole lot of concepts yes. This is what I just enjoy, learning about myself and Physiology. I: Wow that's a very interesting concept. Anything else? S12: No. I: Thank you.	

PHASE 2 Transcribed data: Students

Student 13 (Low marks <50%)

Questions and answers **Demographic data** **Student 13 (S13); Interviewer (I); 35min 39sec**	**Comments**
I: Which degree are you currently registered for? S13: BSc Genetics and Physiology	
I: In which academic year of study are you? S13: I am now in my fourth year, but technically third year. I have changed my field of study last year. So that's why I am actually in my fourth year. I: What was the previous degree you were registered for? S13: I did Human Molecular BSc and I wanted to register last year but when they said it doesn't exist anymore and then I changed.	3rd year
I: Is this your first degree? S13: Yes	
I: How old are you? S13: I am 22.	22 years
I: Name the module of Physiology that you are registered for. S13: PHBG 3726 and PHBE that's now exercise physiology so its two modules.	
I: Are you registered for the module for the first time or are you repeating it? S13: Yes for the first time.	
I: What is your home language? S13: Afrikaans. I: Are you attending the Afrikaans classes? S13: No, I registered for Afrikaans, but I am attending the English classes.	Afrikaans
I: What is your understanding of this research project? S13: Regarding the Lecturer? I: Yes S13: She told us it is how people study, applications on the modules how you study and approach studying. So I think she is going I don't know if it's that but I think she is going to do something with how your physiology works when you study and how you can improve and something like that. I really don't know.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S13: **I like studying** so I'll **take my books so I'll like read through the lectures and take my book and underline** and then I'll go study. I am a **bit of a nerd** so I like studying. This week I was a bit lazy so I haven't done anything yet (laugh). I: Would you say you put in a lot of ***effort*** regarding your studies? S13: Yes I make effort I **am a hard worker.**	*Approach:* I like studying -read through the lectures and take my book and underline-bit of a nerd.

I: And with physiology specifically? S13: Yes it's **my most enjoyable module**. I like it more than genetics. I will put in more effort and time than with all my other modules. I: Are you happy with your answer or do you feel you would want to do more or less effort? S13: One **can do more and then your marks will be better,** but usually one **makes stupid mistakes in tests** which costs you marks and the stress also influences negatively.	*effort*: am a hard worker. my most enjoyable module. One can do more and then your marks will be better, but usually one makes stupid mistakes in tests
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? S13: To do better yes I really don't know it's **from a young age in us you work hard for what you want in life.** It won't help to sit and wait you have to go and work. I think it's in me when **I have figured I must go work** then I go and sit and study (laugh). I: If you say it's in you, is it from influences from others or do you drive yourself? S13: I drive myself as well, but **my parents, both work very hard** for what they also want. I think it's **an example they show us** one can say and I am not a social person that goes out every weekend or so. I would rather watch music than to go out. I: Tell me your ***motivational levels*** regarding Physiology? S13: Hmmm I think one can certainly be more motivated, but sometimes you think this is now enough. You can't like have said just now I was a bit lazy and didn't want to work so then you take.... and then you think oh no, because we have an assignment to do and then **I think there is still time** I'll do it later and then I think I must really do it now and then I think there is still a bit of time. So **times like that you feel a bit lazier and you need motivation,** then you think I must do it and as time gets closer you think now I must get a grip and start working. So yes. I: What motivates you to pass Physiology? S13: Oh yes no I don't know. **Maybe that one should pass all your modules.** You only have one chance to redo then you must stop and start another field of study. You must pass. I: You also said Physiology is one of your favourite modules? S13: Yes one can also like for me it feels like you only have one chance. You can't mess with your one chance. So **you must give it your all**. There are **many other people that would have wanted to be on campus but that can't because they don't have the money or the opportunity.** I: That is true. Are there any specific goals you want to reach? S13: I actually wanted to study Medicine or Vet Science but I wasn't selected for it. I **push myself to get my marks up so that I can apply again for that**. So that's all the goals I can say to push myself so that I can reach that one day. I: Ok that's good.	*motivational levels:* from a young age- work hard for what you want in life. my parents-work very hard - an example they show us times like that you feel a bit lazier and you need motivation motivates? Maybe one should pass all your modules- **you must give it your all** –privilege to be here-application for Medicine/Vet **sees the ability, and motivate us to get there and if you have done well she sees it and say good,**
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S13: I usually have a **notebook with me** so when the lecturer say this is **important I'll write it in** and then I have my **textbook with me then I'll write at that figure *know this*** or know only the five steps or if they give a random question which they can ask or something then I'll write it down or **some things they explain or write extra stuff** or something which I don't understand I'll add a question mark. That's usually what I do. We **may not record the classes** which we were allowed to do in the past. I: Have you **recorded** that in the past? S13: In my **first year** I did, but it **takes so much time to listen to all of that again** that I never had time to even go back and usually if you have a notebook, and make notes then the **recordings then you think oh no I can only go back to and then you don't listen so well in class** because you can go back to the recording and then you don't. I: I hear that's very true. S13: So the **recording I am actually glad they took it away. Then one focuses more in class.** I: That's very true. Tell me the skills and strategies when you study?	*Strategies:* notebook with me- lecturer say important I'll write it in textbook with me then I'll write at that figure *know this* some things. they explain or write extra stuff I'll add. may not record the classes - you don't listen so well in class-glad they took it away- take so much time to listen and focus more in class.Then one focuses more in class. study in dead silence. first read through the slides, textbook and underline with a pencil,

S13: When I study I **must study in dead silence.** I am a pain with that like many people will study in the library on campus, I can't **I must study in my room** in a quiet relaxed, usually if there are people, **friends come to visit my parents then I use earplugs in my ears,** so that I can have silence. So if there is a bit of noise like sounds then I worry and people like Sotho doesn't bother me, because I don't understand, but I **won't make like summaries**, because I am **very perfectionistic**, then I see things doesn't look neat then I delete everything. So it **takes a lot of time**. I'll take my textbook, **I'll first read through the slides**, you know what the lecturers want what is important to them and take my **textbook and underline with a pencil**, and when I'm done with that then a **coloured fine liner** and then I go through again, and if I skipped something and then I only study the coloured parts. I'll make like a **cheat seat and then here and there like crip notes** and then the things that I struggle with the night before the test I'll scan just to make sure, but the summary thing takes too long, it's too much work, but I've also **heard the medical students say the Physiology they do now it takes too long to summarize. So I have decided to leave the summary thing** I leave it and s**tudy from the book where I summarise it half, because it saves time.** I could **sit for one day and do summaries and then I still don't know the work which I could have studied.** I: That is an interesting approach. S13: I know summaries are actually the best but oh well to save time, I study that way. I: What time of the day do you usually study? S13: I will say let's say my class start at 09:00 then I won't study before class, because that's useless you don't even start for an hour then you need to pack up and go. Say my classes finish at 12:00 then I go home, rest, eat lunch and then start studying and then take a break from 18:00-20:00 and watch TV and then study again. So like with exams I can get up in the mornings and study. One must just get started, when you are going then it is right yes and I won't really study before classes. I just get going then I must go to class. **I usually study in the afternoons and in the evenings.** If like today I don't have class, I will get up and study, but today I took off. I: And preparation **for** Physiology classes? S13: I have tried it but it **happens very rarely** so I will **look through the stuff as they put on the slides beforehand** they don't do it a lot, but as from this semester, they haven't last semester not even if they gave the lecture they out it on. So usually I will before they give the lecture I will quickly read through it just to see from being curious, but it is all about. I won't in the book, I have done it once underlined I went further I was thinking I am busy now, let me go further. **One knows more of what is going on in a lecture if you go through it beforehand.** Then You think hey I've wondered about that but now I know and now she explains it other than sitting in class like what the hell is this. I: Exactly. S13: I rarely do it because if we have class and you go through that class's stuff before the time (laugh) one has some sort of laziness which you should not have. (Laugh). I:That is very true.	study from the book where I summarise it half.rarely prepare- will look through the stuff as they put on the slides beforehand knows more of what is going on in a lecture if you go through it beforehand.
I: Let's discuss the ***class environment***, the dynamics and how that may contribute to your performance or motivation. S13: The **lecturers are a bit intimidating,** they are friendly and would not stand like monsters in front, but would sometime **scare you and say you should have started studying for the test and then you think oh my I haven't**, but I was planning on starting today. So then you realized if they say you must have started then I should have most probably. **I think they only say it to scare you, so they look intimidating but they aren't actually.** I: But you don't find it **motivating** if they do that? S13: No I do (laugh) it **helps actually to realize oh my I should have started already**. So it motivates you to work, you can't just sit there and think they talk nonsense, and sometimes they'll ask something in class, and you think what the hell is that? Then they will ask one student and the student gives the answer and then you think where do they get that and then **you realize you**	*class environment:* lecturers say you should have started studying for the test and then you think oh my I haven't- think they only say it to scare you, so they look intimidating but they aren't actually- helps actually to realize should have started already. helps if they ask questions in class –realize you are behind –get direction. are some

have fallen behind with this part. So it actually helps if they ask questions in class, then you know ok I must study that again, it helps that you don't fall behind and know what is going on in class. I: Would it be in class that you get lost or do they refer to previous lectures? S13: No let's say we sit in class and **stuff we did previously would be applicable it is in class when they lecture they will ask randomly**. Luckily not for me that much, it helps to keep people updated, and think you must man up, you can't think the answer will come to you, you must look up the answer. **I think it helps if they ask questions and scare you**, I don't think they want to scare you, but that **you get direction**, because there are **some people in class without direction. It feels you can hit them into a direction to wake up**. I think they do it to wake them up. I: Tell me the material you receive in class, does it help with your Physiology module? S13: Yes the **notes they give** which I read before I go through the textbook, because otherwise I will study unnecessary work in the textbook which is not applicable, because I am someone that likes detail so the sometimes I go and study unnecessary work. Then I first read through their notes, they call it **study outcomes and therein they specifically say what they want you to know you only have to underline those things and study them.** So it actually helps to first go through their notes and then the textbook so their notes actually work. I: Tell me do you experience your lecturer as passionate? S13: Yes many of the students don't like her they say she is mean and rude, but I don't think so I think she has a small heart and **many of the English students the black cultures feel you don't have respect, you must earn it so** I think they must force respect on such a way otherwise the students will walk all over them so that's why they think she is mean but actually she is just a human. So if you stand in front of a class and everyone talks you must find a way to get order so then you'll have a bitchy attitude then they will listen. I don't think they are mean, but just human but you must make a mark on your way. I: How do you manage a rambling ***disorganised lecture***? How do you make sense if it is confusing? S13: Our other physiology lecturer, the sir, he once forgot to come to class and then we waited till quarter past and if he doesn't come we go to his office and fetch him, but he sometimes was diffused then we fetch him and he comes. I: In class, let's say someone talk and you lose track of what they explain, how do you make sense of it? S13: If I like daydream and I realize and don't know what they're talking off then I'm like just forget and focus on what's going on now. You can later try and figure out what happened earlier, just be attentive now, **you can later figure out where you got lost**. So I will move the mess and the chaos aside, and focus on now. With the **strikes**, last year with the **fees must fall** it was like sjoe we must have class now and can't strike now. We had to watch the lectures on videos which the lecturer made. It was bad because you are used to looking at the lecturer and now you have to listen to a voice on Blackboard. It was a **bit chaotic and confused** and you don't know what's going on and then you must make the best of the bad situation but you take it as it comes. I: Ok could you see the lecturer explaining or only the voice? S13: It was the lecturing slides and the voice talking. I: So do you think it would have been better if they made a video of the lecturer speaking and also see the slides? S13: It feels as if it would be better to go to the class yourself because usually people will ask question in class and then you realized you've never thought of that and you realize you don't understand that part so well. You don't even know it and then they ask something and that's what **makes class nice, because usually you don't think of a question and then someone else asks it and then hey that can be useful.** I: So you learn from your peers asking questions? Tell me quick, ***why don't you ask questions in class?*** S13: I am more like... it feels I go to class and **don't want to keep the others with unnecessary stuff** like if they know it already so I will ask interesting things afterwards, after class. I am **someone that rather tries to solve the problem myself,** rather go home and study and see whether I can get the answer myself and if not I will go to the lecturer's office and ask.	people in class without direction. It feels you can hit them into a direction to wake up. study outcomes -specifically say what they want you to know you only have to underline those things and study them *disorganised lecture:* you can later figure out where you got lost. strikes -fees must fall - bit chaotic and confused makes class nice, because usually you don't think of a question and then someone else asks it -can be useful. don't ask questions in class-don't want to keep the others with unnecessary stuff. someone that rather tries to solve the problem myself.

I: So you are not scared to communicate with your lecturer? S13: No. I: How do you ***currently communicate*** with your lecturer apart from asking questions after class? S13: I **send an email** and **make an appointment to see them**. I know you can phone them at the office but maybe they are busy and you disturb them. I rather send an email for when they have time they will reply and get back to you. I: Have you gone to see them in the office? S13: Yes. Usually they reply within half an hour or an hour. Some take 2 days, **but at Physiology they are fast.** I: Is there anything which you think can improve communication between you and your lecturer? S13: I think I am… one gets tensed sometimes and think this will be a stupid question, let me rather leave it. One makes up all sorts of scenarios you plan if you are going to ask a question, and he will react like this and this, your mind runs away. There is this joke of two people knocking on a door, and the one must open, the one is too scared to knock and other one will ask. **Sometimes you are too scared to ask, it comes down to respect,** and you respect them. They are better qualified than you, and you are scared that your question is stupid, and maybe they don't understand why you can't understand this easy thing. **So you feel you disturb then with your questions**. One can approach it differently, that you go and see them more often, communicate more with them. I: Why do you feel like that? S13: I think I am more an **introverted person, and I keep to my own business and try to solve my own problems,** like I don't like if people come to me with many questions, it feels as if they waste my time. So I won't go with unnecessary questions, I will take the things I know I am not sure of and take the time rather than going every 5 minutes.	*Communicate:* send an email (get fast reply) make appointment. introverted person, and I keep to my own business and try to solve my own problems. Scared to ask – respect for their time.
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S13: Hmm **I think I can do better in my studies,** I would be very chilled but then with a test or something I am **so stressed and then that cripples me and my marks drop.** Usually I have a very good predicate, and then in the exam I do very badly. **I stress myself to death so I take a sedative before I write** so that I can relax a bit. I **think I possess the abilities to do well, but stress and tension play a role which disadvantage** you in a way. I: Does it feel as if **you doubt your abilities?** S13: **Yes** sometime you get a question and then you think is it this or that and then you confuse yourself and don't know whether it is the right thing you answered which they were looking for. **So one doubt yourself** and sometimes when you don't write a test, you sit in class and study and then someone will come with a question and you think but they are now very clever you don't know of this one and actually they also know nothing and then you doubt yourself if they come with these funny high questions of which you know nothing, but it's because they watch more YouTube videos and look for stuff that are actually unnecessary and not applicable on what we are doing. So I think you doubt yourself. I: Do you think your abilities are sufficient to pass Physiology? S13: **Yes**. I: Would you say you have **high abilities?** **S13: Yes** I think I should actually get a distinction, but I don't. So yes our lecturer also said we all have the abilities to get a distinction 80-90%, but we doubt and don't know whether we are on that level. She **sees the ability, and motivate us to get there and if you have done well she sees it and say good,** and if you've done badly, she says good you have tried but you can do better. They won't say you are stupid or haven't studied, they won't say those things.	*Appraisal:* think I can do better in my studies. so stressed (to death)- take a sedative before I write -stress cripples me and my marks drop. think I possess the abilities to do well, but stress and tension play a role which disadvantage. doubt yourself. Think high ability.
I: What do you think is meant by the term student ***self-efficacy?*** S13: I think it is **how you use your time effectively. Time management** is important, if you don't manage your time well, then you won't like say you've given yourself 2 hours to study and you don't use that time to study, you go onto your phone and then you haven't used your time effectively. So I think it is students' efficacy. You must use your time efficiently like if you are an hour in the	*self-efficacy:* effective time management. quote from a teacher "be where you are"

class, then you must be there and not think of what you will do this afternoon or tonight or during the holidays. We've once heard a **quote from a teacher "be where you are**". If you are where you are now like in class and you don't use that time and then you can't go back to class later, it's done. You must ask now what you want to know, and listen because otherwise it's done and you can't go back. Time is ticking, life goes on you can't say stop I'm lost. I think it is more about time management and not wasting others' time, if that makes sense? I: Yes yes that makes totally sense. Tell me, is it the first time you hear of the term student self-efficacy? S13: Yes. I: Tell me is there ***anything else*** you can contribute to studying Physiology which can improve it, any recommendations to study Physiology? S13: The **practicums we had to do in the dissection venue.** That was actually **very nice** and you don't only learn about it, you can see it. So you learn how it works and nice to see it and touch it. I am someone that touches things and study it, don't just want to see a picture I know they once showed as plastic models and I was very disappointed because I study about indigestion and think they will show the intestines and stuff and then it was plastic. I was so excited about wrinkled intestines and think gross but **if you see it, it makes you more motivated to study it further**. You see how it looks and works, I know some people go and watch videos, but then it is extra information which we don't need, and then some kids come with questions and then were like we didn't have to study that and then the class is upset, because they don't know the stuff and watched the videos. I: Is it videos on YouTube? S13: Yes. **The practicums are nice when we can see the stuff.** I: Is there anything else you can think of? S13: No every day we learn something different, it's nice I want to learn something every day, I like going home and telling my parents we did this and this today and do you know of this and that. I like informing people and maybe it's irritating to them because last semester we did Neurophysiology where we did the entire spine and then my dad braai some meat and then I think this bone and say where it sits and the keep quiet because they eat and I can't explain now. I like informing people. One thinks your stomach sits with your navel and actually your stomach is not sitting there, it feels to me people must be informed about what's going on, broaden their knowledge. I: And if you tell your parents what you have studied, are they enthusiastic or don't they listen anymore? S13: No they listen, but they don't know what it is, so I will come with scientific terms and they are like what the hell is that, and then I will explain on a lower level, so that's nice for them. **One does want to feel you come here to learn,** you don't want the same every day. Sometime I walk out of class and I think I haven't learnt anything new, and it is a waste of time. So I want to study new things and know of them, one is never too old to learn, and to get new information. I don't know if there is anything else. I: No nothing form my side. Thank you very much... S13: It's a pleasure.	Anything else: practicums we had to do in the dissection venue -very nice if you see it, it makes you more motivated to study it further

PHASE 2 Transcribed data: Students

Student 14 (Low marks < 50%)

Questions and answers **Demographic data** **Student 14 (S14); Interviewer (I); 26min 05sec**	**Comments**
I: Which degree are you currently registered for? S14: BSc Biochemistry and Physiology	
I: In which academic year of study are you? S14: Second year	2nd year
I: Is this your first degree? S14: Yes	
I: How old are you? S14: 20 years	20 years
I: Name the module of Physiology that you are registered for. S14: 2626	
I: Are you registered for the module for the first time or are you repeating it? S14:	
I: What is your home language? S14: Tswana I: And you take classes in English? S14: Yes.	Tswana
I: What is your understanding of this reseach project? S14: What I understand? I: Yes just a little background. S14: Well I am not informed I just came and given a clue. I was just told this time this date I should be here.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. That would be how much ***effor***t you put into your studies. S14: I would say that I am **an average student** you know not really **but obviously aiming for better.** So I usually **make notes ok not before class but after class** and then try to **go through the information on my own before test days**, so I go through it **not every** day may be once (laugh) and post it somewhere in my ? and **do some revision may be over weekends** and then **I go to classes because I also realized that when I am in a test I kind of remember what the lecturer had said and hearing contributes to that**. So it's studying, hearing and also yes it's that**. Sometimes if it's really interesting** I **would go to internet and do research** on some info and yes that's that. **Obviously assignments and tutorials and what I think they add up to the info** that I obtain. That's how I make it to exams. I: Tell me do you put in a lot of ***effort*** into Physiology specifically?	*Approach:* an average student but obviously aiming for better. **m**ake notes not before class but after class. go through the information on my own before test days -not every day. do some revision may be over weekends. go to classes because -realized that when I am in a test I kind of remember what the lecturer had said and hearing contributes to that. Sometimes if it's really interesting I would go to internet and do research

S14: I wouldn't say that because my marks the way they are just fine. I **put in effort but it's not that much I still feel like I can do more** put in more effort**. I have that potential yes.** I: What do you think should happen for you to take that next step. S14: I think I should **try to engage with other students** then I can learn may be their study ways and I can may be **try to go to the lecturer more often**. I can just go based on my marks and discuss them with her may be the topics I don't understand because most of the time **when I don't understand I just leave it** and like it's ok I just try to going to ok it's that thing **I have to speak up.** So ok now I just **usually go like after class** but sometimes I just don't go so I feel like and also **time management obviously** so that I can because **without time it just gets hard to study effectively.** I: Do you also when you realize you **don't understand** sometimes forget to ask and then leave it and then you see it in the exams again. S14: Yes **I leave it** and actually I've done that. It usually happens.	Obviously assignments and tutorials- they add up to the info. *effort* : put in effort -not that much. still feel like can do more. have that potential. try to engage with other students. try to go to the lecturer more often. when I don't understand I just leave it-I have to speak up. usually go after class. time management-without time it just gets hard to study effectively. realize you don't understand-I leave it
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? This is with regard to your study, so why do you want to study? S14: Like study the whole degree? I: Yes S14: Ok I'd **like to become to be somebody** one day like a Physiologist you know like **I want to be involved in the science like researcher** for industry like I see myself as somebody who does a lot of lab research you know and anything to **assist in the science as a Physiologist.** I: Ok and what motivates you to study Physiology? S14: I always **thought Physiology was fun** I've **always loved it from high school**. So I just thought I enjoy this and should continue with it and see where it leads. **I enjoy it.** I: Ok that's good.	*motivational levels:* like to become to be somebody- want to be involved in the science like researcher -assist in the science as a Physiologist. thought Physio was fun-always loved it from high school-enjoy it.
I: Which specific skills or ***strategies*** do you use when you are in class? S14: Hmm usually **I take notes** because you find that if you don't go to class you miss like the way sometimes **lecturers like things their way they would say not like it's done in the book** and I want it in this way. So me **taking notes of whatever she say especially makes me focused** not focused **but can get tips** of what she would like I mean she is the one who marks it or the way she wants it. So I usually take notes from whatever she says and I listen and take notes that I would remember later. Because sometimes you can listen but something may be it's the first time you hear it, it wouldn't so **I have to go and write it down so that later on I can go back and review.** I: What strategies and skills do you use when you are learning? S14: I **summarize I put up like small notes on my clip board**. I usually s**peak it out I study aloud because then it stays.** After may be when I study from the library because there it's quiet I would go through it and when I get to my res I just try to say it out loud. I make notes every time because I feel like if you can have your book and stuff but information from the book it's more hard not hard but **if you write it out in your own way you have your notes and if you have to study you have your own notes** packed up and they still there and can go **through it in your own understanding rather like going to the book in the last minute** and then you don't really understand what they are saying. I: OK and when do you learn in the day? S14: I learn most effective during the day and at night. I'm a morning person sorry. I: It's ok no problem.	*Strategies:* I take notes -lecturers like things their way they would say not like it's done in the book. taking notes of whatever she say especially makes me focused -can get tips. have to go and write it down so that later on I can go back and review. summarize -small notes on my clip board. speak it out I study aloud because then it stays. go through it in your own understanding rather like going to the book in the last minute.
I: Let's discuss the ***class environment*** the dynamics in class and how that may contribute to your performance or motivation of Physiology.	*class environment:*

S14: The **lecturer I think she is very clear most of the time.** She is like she is even it's like I would say she is you would say she is a primary teacher because she would ask you to write **definitions and ask you to define** it's not like you doing your own work like it's your own life. It's **kind of like a push.** She checks every time these definitions and say it's going to be in the exam so even sometimes **she makes us study so like tomorrow you are going say this in front of class**. So in a way I find it very interesting **she makes like the content more easy to understand** and very clear rather than just reading through the slides and also **I don't usually ask questions but when the other people ask questions you get more clearance** of whatever you struggling with and may be you didn't know that and just raise it up and also yes that's it. I: And tell me the material you get in class? S14: What material? I: Like your notes and slides do you think that always help your performance? S14: It help because she also **stated that you should print out the slides** and when you study you should like write out your own understanding like you should have something to write rather just looking on the screen and you leave it there when you look at the screen and may be not having access to the internet. So it's better having the slides by your side and also the fact that **she also make use of slides. It shows that she is like a summary in a way not a summary but high lights.** That's very important. I: So you then use the slides and make the notes on the slides while she is going on the projector or in class? Where do you make the notes? S14: Oh on my note book or my slides. Because if she goes through something I feel like I should be looking at it because she is going up and **pointing at this thing** and **me coming with my slides** that really helps so I she where is she pointing at. The notes I just take on the note book, slides I just take on my own and remember what she said. I: That is a very good approach. Tell me how do you manage a rambling ***disorganised lecture?*** S14: I like..? I: In class like the lecturer is giving you like very complicated information or she is speaking too fast. How do you make sense of all the information you are receiving? S14: I would say I **study on my own** because I didn't understand them and if I don't really get it because they have consultation hours, if I don't really get it, maybe **I'll ask a friend** to help me understand that because most of the time I'm not going back to them you know you are not making sense. I would just do it on my own and if I feel like it's not enough **I 'll go to them in the consultation hours.** I: Tell me about ***the communication*** between you and your lecturer would you say you ask questions sometimes after class? S14: Yes I do . I: OK can you elaborate, you go after class , do you sometimes make an appointment or go and see your lecturer in her office? S14: No it not for Physio it's usually your Math classes because your **Physio classes if you don't understand you just read and type in on google or You tube and there is an explanation** unless it's like Math and calculations then I would go to her. I: OK let's say in Physiology it's not because you have a problem going to and speaking to your lecturer. It's because **at the moment you see it's not necessary to go and speak** to your lecturer. S14: Yes because it's not that necessary **because it's theory and all over the internet**. I just feel like **then I get an explanation from You tube.** We're **getting free data, it's for academic purposes.**	lecturer I think she is very clear most of the time. definitions and ask you to define- kind of like a push. she makes us study so like tomorrow you are going say this in front of class. she makes like the content more easy to understand. I don't usually ask questions but when the other people ask questions you get more clearance. make use of slides -like a summary in a way not a summary but high lights *disorganised lecture:* study on my own. ask a friend. go to them in the consultation hours. *Communication:* don't understand you just read and type in on google or You tube and there is an explanation. not necessary to go and speak -because it's theory and all over the internet.-get an explanation from You tube. getting free data, it's for academic purposes. quite a struggle some other modules, social life everything just gets in. discussions -there is always she forms groups of people to present something. individually I'm always nervous and go after class not in front of everybody. feel like I might sound stupid people will laugh. fear of peers. Help: preparing for class that's one thing that's keeping me down if I come prepared it means I know what's she's talking about so I think I have to prepare before and not after

I: Are there any factor that you can think of that makes it ***easier to communicate*** with your lecturer? S14: Hmm I think hmm **preparing for class that's one thing that's keeping me down**. Because I go to class and hear something new and study afterwards but **if I come prepared it means I know what's she's talking about**, I have a problem with this and ask a question because most of the time people ask questions it's the first time you hear this and only going to revise it later so you can't add up much. OK I have to go through it first myself and try to see **so I think I have to prepare before and not after.** Because the next day she is on another topic and you only did what she did. I: Yes you have a good idea of what you should be doing then ***why are you not doing it?*** S14: (laugh) Classes keep in the way, **I don't know I just I try and hope to get there.** I: You have the intention of doing it in the future may be. S16: Yes. Because **now it's quite a struggle some other modules, social life everything just gets in.** I: Do you sometimes ask questions in class or take part I class discussions? S14: Yes in **class discussions I would say because there is always she forms groups of people to present something** so I would say discussions but **individually I'm always nervous and go after class not in front of everybody.** I: Why don't you want to ask your questions in class? S14: I just **feel like I might sound stupid people will laugh** or something. I: So is it fear of you peers or are you also scared of the lecturer will think it's a dumb question? S14: No I wouldn't mind my lecturer because she will help. **It's fear of peers.**	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S14: So I should elaborate on my appreciation? I: Yes do you think you have enough capabilities to complete your studies? S14: I **do think I have.** I: Ok and tell me about your capabilities to complete Physiology. Are you confident in your capabilities? S14: Yes **I'm quite struggling but I do think I have the ability** or is it capability to do better yes to do better to study **more to engage in class may be questions and everything** and may be **also go to the lecturer one on one** if I feel like my marks or understanding I need help and I have yes. I: Would you say that your capabilities are quite high? S14: Now or in the future? I: Now S14: They are just reaching in it (laugh) but **I would hope for them to develop** yes I think I can but right **now it's not still looking up.**	*Appraisal:* quite struggling but I do think I have the ability. more to engage in class may be questions and everything. also go to the lecturer one on one. would hope for them to develop (capabilities) now it's not still looking up(not high).
I: What do you think is meant by the term ***student self-efficacy?*** S14: Efficacy? I: Yes S14: Sorry but I have no idea of what efficacy is. I: Student self-efficacy. IS it the first time that you hear this term today? S16: Efficacy? Yes I don't know it's the first time. I: I can show you this is how you spell it. S14: Self-efficacy it is more or less self-efficiency I would say that. It kind of goes there. I: Ok tell me do you have ***anything more*** you would like to say about your learning strategies or learning of Physiology? May be any suggestion that can make it easier?	*self-efficacy:* *Anything:* more like tests before the semester test -like pushes us. a lot of tutorials so far and I think they are contributing. think I must just study harder and study harder, that's it. Make more time for studying.

S14: OK on Physiology I think if you have **more like tests before the semester test I think that also like pushes us**, it helps us before the semester test but so far there are **a lot of tutorials so far and I think they are contributing**. In my studying **I think I must just study harder and study harder, that's it. Make more time for studying.** I: Ok thank you very much.	

PHASE 2 Transcribed data: Students

Student 15 (High marks 70-79%)

Questions and answers Demographic data Student 15 (S15); Interviewer (I); 16min	Comments
I: Which degree are you currently registered for? S15: BSc Physiology and Genetics	
I: In which academic year of study are you? S15: Second	2nd year
I: Is this your first degree? S15: Yes I also have an extra Microbiology module since you need 3 modules to fill your credits.	
I: How old are you? S15: 20	20 years
I: Name the module of Physiology that you are registered for. S15: PHBG 2616 last semester and PHBG2626 now this second semester.	
I: Are you registered for the module for the first time or are you repeating it? S15: Yes for the first time	
I: What is your home language? S15: Afrikaans I: Do you attend classes in Afrikaans? S15: Yes	Afrikaans
I: What is your understanding of this reseach project? S15: I don't really know, I just know she said they will ask us questions about our experiences of the modules and of her, but that's all I know. It's for her PhD.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S15: Hmm ok I have **always been studying quite easy** and it is not always a good thing, because I must say I **tend to procrastinate a lot**, but **when I study I can concentrate for a long time.** So I sit **for many hours and study hard, but then it would be like the day before**. So it's **very wrong I know, but I study a lot from the slides and sometimes there are things that don't make sense, but if you look in the book** then you know exactly what she means. So I also study from the book, but not a lot, but for the last test that we wrote, I only studied from the book. It is ok it is interesting and difficult and the **quantity is a lot** but it is **nice and easy for me to study, but it is very difficult also.** So you can study very hard and then it doesn't necessarily mean you will do very well. I: Describe the amount of ***effort*** you put into your studies. S15: I will say I put in the same amount of effort into all three my modules, I won't say I favour any one. I: How do you feel about your answer? Is there room for improvement?	*Approach:* always been studying quite easy-not good-because tend to procrastinate a lot. when I study I can concentrate for a long time and study hard but then it would be like the day before -very wrong. study a lot from the slides and sometimes there are things that don't make sense, but if you look in book, make sense. the quantity is a lot-nice and easy for me to study, but it is very difficult also.

S15: Yes of course there is **always room for improvement**. I **am very lazy** and try to work hard, but there is always room for improvement. I: What do you think will motivate you to be less lazy? S15: If I **do bad one day like in really bad then I will get a fright**, but what will motivate me, I don't know.	*Effort:* always room for improvement-very lazy
I: Talk to me about your ***motivational levels*** with regards to your studies. What motivates you? S15: Well I think when I **started I wanted do study medicine**, but I didn't get selected and as the year went on I **realized its ok I don't want to study Medicine**, and I am glad I didn't get selected, but then I were **between two fires, because I study a BSc degree, this difficult thing, but I don't really know what I want to do with it**. So this year I looked hard into what I want to do, then I had **physiotherapy and Vet**, but both are also selection courses. So I **will complete my degree end of next year and then hopefully I have a better chance of getting i**n. So I think **my motivation at the moment is to pass my degree very well**, then I will **have a better chance to go further** with what I want to do. So it is important for me to do well. I: Are there any other external or internal levels of motivation? S15: Hmm **my parents are very good to me, they don't put a lot of pressure on me** and are always **very supportive**. They are very nice in that way, they don't pressure me. It's like a good type of thing, **they tell me you can do a bit better**, but they won't say it in a nasty way, so they are good with motivation.	*motivational levels:* started I wanted do study medicine realized later don't want to study Medicine, between two fires, because I study a BSc degree, this difficult thing, but I don't really know what I want to do with it-complete degree-try get in for physiotherapy and Vet. motivation at the moment is to pass my degree very well –then have a better chance to go further. parents are very good to me - don't put a lot of pressure on me- very supportive.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S15: What skills? Is that like my notes and stuff? I: Yes S15: **I don't write everything down that she says**. I **write down the things which she says is not on the slides**. **All extra information I will write down**, I will also study it. Furthermore I like to **rather sit and listen than to make notes**, because I feel if I only sit and listen I take in more as oppose to writing because then she is two sentences ahead and you don't know what she said. So I like **attentive listening** and then the occasional thing she says which is not on the slides which I will write down. I: And the specific skills and strategies you use to study? S15: I've said that **I don't make summaries**, because when I write I concentrate so hard on writing I don't take it in to understand. **So I don't make summaries, I sit and read through it a couple of times.** The **facts you need to know I will say out loud for a few times,** whatever, but I don't make summaries. The **time it takes to make summaries that 3 hours I could have used to study**. You see then I have been through my work once and understand so much more. I: You also referred to the slides you use? S15: The slides are very good, **I love her slides especially the pictures are very good, it shows you what is important,** and if you want more information you go to the book, but that's sometimes too much information, its unnecessary information. So her **slides are very good to indicate what you must study, to state it easier.** She gives us **definitions on a weekly basis**, because she only asks you those definitions in a test. So then you know you must study those definitions and **we go through it in class, and she says how she wants you to say it**. It helps because I don't like definitions, because it is very **difficult for me to recite word for word**. So **I try to understand a concept, in my own words** and then many times like at high school they wanted you to write down definition exactly like that. **So now she gives us definitions and we state it in our own words as long as it is the right concept** and then I know what to study, because definitions have always been a problem. I: Ok and what time of the day do you usually study?	*Strategies:* don't write everything down that she says. All extra information I will write down. rather sit and listen than to make notes -attentive listening. don't make summaries (time it takes to make summaries that 3 hours I could have used to study). read through it a couple of times. facts you need to know I will say out loud for a few times. love her slides-the pictures are very good-it shows you what is important. definitions on a weekly basis-go through it in class -she says how she wants you to say it difficult for me to recite word for word -I try to understand a concept, in my own words. procrastinate a lot.

S15: I study well early in the morning like especially the day I am writing the test I will get up at 2:00 and study hard right through, because I **procrastinate a lot,** I must study so hard in the mornings, but I succeed at that, but hmmm I can't study late at night. So after 21:30 I won't study anymore like I don't know what I am doing anymore, but I will study in the afternoons and early in the mornings. I: Ok	
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S15: Hmm well […] she talks to us she is very good at learning our names, she **knows everyone's name and you know she knows of you and if you do bad then it feels as if you disappoint** her in a way and she is very **passionate** about her work. So **she also motivates you** what she does and how she talks to you and whatever and it motivates you because you don't want to disappoint her and the whole class participates. She talk to all of us and you feel you don't want to do badly, **because you are part of this class, and must do stuff so that the class can do well** and everything. We feel we are very close to one another we aren't all friends but it's not a stiff environment. I: Like a **supportive class environment**? S15: Yes I won't mention names, but my friend went to her today, and she couldn't submit her tutorial assignment, it was like personal problems, and she went to talk to [lecturer] and she was very stressed because she will lose marks and [lecturer] was very supportive and said its fine she can submit tomorrow, its fine don't worry about it. So [lecturer] is very good. I: Ok it's very good and tell me the material which you receive in class like slides? S15: Hmm we mostly get the **slides that we work from in class and the definitions**, that's what we get. I: You say that also helps a lot? S15: Yes it helps a lot. I: How do you manage a rambling ***disorganised lecture***? Let's say there are a lot of information given to you, what do you do? S15: It's ok I **am not a very precise person**, I am a **bit rambled so I won't say it affects me badly. I**t's always nice if something is given precisely, and everything is neat and so, But a **disorganized environment won't bother me**. I am like that, my mind is also a bit confused… I: Would you ask questions in class and ***contribute*** to class discussions? S15: **I will if she asks something**. I: Specifically for you and she mention your name and ask? S15: Yes then I will say what I think and whatever**, but I won't ask questions in class,** because I know I've never been asking questions in class. I: Why don't you like it? S15: I think it's **just the way I am**, and honestly if I don't know something **I will find out I will first ask my student friends** if they understand and if not **I will go privately to the lecturer** and ask her what's going on, but I won't say I ask in class, but **there are many of the other students that ask.** I: Would you go and ask after a lecture? S15: Yes I have. I: Let's talk about ***communication*** with your lecturer. Have you ever made an **appointmen**t to go and see her in her office? S15: Not this semester, but **last year I did it a few times**. Last semester with the previous lecturer, **I send a few emails** and privately delivered a few things, but not this semester. I: But you feel comfortable in going to see your lecturer? S15: Yes I: Is there anything that can improve that? Improve communication between you and your lecturer?	*class environment:* lecturer knows everyone's name- you know she knows you and if you do bad then it feels as if you disappoint. Lecturer is very passionate, motivates us, makes feel part of the class, supportive. *disorganised lecture:* I am not a very precise person- bit rambled- won't affects me badly *Contribute:* will contribute if she asks something-but won't ask questions in class-just the way I am. will find out, will first ask my student friend. will go privately to the lecturer / send a few emails

S15: I think **she does everything from her side, she makes herself available, and you must just make an appointment and she is easy to approach**, but I haven't had anything to go and ask about. I: Are there anything that makes it difficult or that bother you to make an appointment? S15: No.	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S15: **I think my abilities are good**, like I can do it. I think it **is more like finding that balance between your social life and your work**. That's my biggest obstacle at the moment. So **I don't think my abilities are the bad thing, I just think I must work harder at my studies**, but yes I think the abilities are there. I don't always use it so well always. I: Do you belief in your abilities to pass Physiology? S15: Yes I think so. I don't want to sound as if I'm bragging? I: No not at all we ask your honest opinion. S15: I **think I am blessed with a strong enough brain to be able to do it and I have enough love for Physiology** because I love Biology. So I have enough love for it to pass and if not it would be my own fault and not my abilities. I: So do you have ***the motivation to want to pass***? S15: Yes I have. Definitely I will **always want to pass.**	*Appraisal:* think my abilities are good. more like finding balance between your social life and your work. don't think my abilities are the bad thing -just think I must work harder at my studies. blessed with a strong enough brain
I: What do you think is meant by the term student ***self-efficacy?*** S15: Students self-efficacy? Hmmm how effective one can hmmm what do you call it? Your **self-discipline, your effective self-discipline like execute**. How strict you are with yourself to be efficient. I: Is today the first time you hear of the term self-efficacy? S15: Yes I: Is there anything else which you think can ease the studying of Physiology or of your study patterns and motivational levels? S15: I don't think so. You must study, You must just go and sit and study otherwise you won't pass. **Everybody can do as much as they want, the lecturer can help, but if you don't study you won't pass.** I: Ok thank you very much.	*self-efficacy:* self-discipline, your effective self-discipline like execute Everybody can do as much as they want, the lecturer can help, but if you don't study you won't pass.

PHASE 2 Transcribed data: Students

Student 16 (High marks 70-79%)

Questions and answers Demographic data Student 16 (S16); Interviewer (I) ;	Comments
I: Which degree are you currently registered for? S16: BSc majoring in Genetics and Physiology.	
I: In which academic year of study are you? S16: Third.	3rd year
I: Is this your first degree? S16: Yes.	
I: How old are you? S16: I am 21.	21 years
I: Name the module of Physiology that you are registered for. S16: This semester and last semester? I: Yes: S16: Can I see the codes? Well is were PHBN 3712 and PHBG 3716 and this semester PHBG3726 and PHBE 3722.	
I: Are you registered for these modules for the first time? S16: Yes. I: You are not you repeating it? S16: No.	
I: What is your home language? S16: Tsonga. I: And you are taking the classes in English? S16: Yes.	Tsonga
I: What is your understanding of this research project? S16: She didn't basically tell us anything but from what I read when she told us you can have an interview she told us it's how you study for the lectures.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S16: Hmm firstly it's a lot of work so I have to mention that I **make notes prior before I write** yes and when I make notes I **need to revise and ask for past papers** from previous students and as I am doing my work I have to look on how they set the paper, how do they allocate marks and study. I: And with Physiology or do you refer to Physiology? S16: It's with reference to Physiology? I: How much ***effort*** would you say do you put into your studies?	*Approach:* make notes prior before I write. need to revise and ask for past papers.

S16: Can I rate it out of 10? I: Yes. S16**: 8 like 80%.** It's a lot of work so I put in a lot. I: So you put a lot of effort into Physiology? S16: Yes I: Do you think there is room for improvement or are you happy with your effort that you put in at the moment? S16: I think there **is room for improvement** well ok I usually **go to exams with good predicates and when I write usually it doesn't seem like I had a good predicate**. So yes but it depends usually when I have lower predicates so **I feel like relaxed when I have good predicates**. Yes **but room for improvement I can go through my work more regularly.** The thing is I have other modules it's not only Physiology so I just **have to make time** regarding to study and everything.	*Effort:* 8/10 like 80%. is room for improvement - can go through my work more regularly - go to exams with good predicates and I write usually it doesn't seem like I had a good predicate. feel relaxed when I have good predicates. have to make time to study.
I: Talk to me about your ***motivational levels*** with regard to your studies. S16: **When I love something I feel like I should not fail it**. I love Physiology and I feel like why should I fail something that I love. There are other things that I don't like that and failing something that I like and work hard for. For example if I **know I am capable of an 80 and I get 60, I feel bad** I should have done better. I actually compete with my previous marks. If my marks like I got like 80 in the first test and now I got 70 than I feel like wow it's a disgrace. I **want to keep up my goal.** I: OK and do you have certain ***goals*** that you would like to achieve with your studies? S16: You mean outside the degree? I: Yes. S16: I would **love to do Honors in Medical Physiology or Pharmacology**. Those are the only things that I actually enjoy, the Health science things. I: Ok	*motivational levels:* If I love something I feel like I should not fail it. know I am capable of an 80 and I get 70, I feel bad. want to keep up my goal- love to do Honors in Medical Physiology or Pharmacology.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S16: I make notes **I do make notes but not all the time.** I listen. So when **I go to class** I have the guarantee I am going to pass, so I am **a good listener** and when they use examples. I: Do you use the **slides** in class or only afterwards? S16: I **use them afterwards at home**. I: Ok and what skills or strategies do you use when you are learning? S16: I **write down**. I: Ok if it's in the book do you write it over again? S16: Yes I copy (laugh). I: Do you summarize it also? S16: Yes **I feel like I won't write something down that I don't understand**, it's difficult. I write something that I understand. Sometimes I go and call on some things I don't understand. I call on **You tube** to get like more clarity on that thing. I: Are there certain web pages that you use or is it just random Wikipedia pages or? S16: Usually I will **type whatever** on **Google** and whatever they will give me to get clarity in it. Sometimes they will give a web cite on You tube. I: Oh like your lecturer gives you a web cite? S16: Yes like You tube on the web that we can go to.	*Strategies:* make notes but not all the time. go to class -a good listener. slides-use them afterwards at home. When learning- write down- won't write something down that I don't understand. Use You tube, Google for clarity. motivation is there I study no matter what time. no schedule-**so many things that go on in a day**. Study before we write. *have never prepared for class* *once in first year - prepare for class- feel like I know more than the others and my concentration is not much.* *it's better if I am like other students*.

I: So you don't say it out loud, you only write it over. Tell me what time of the day do you usually study? S16: I don't have a specific day, I can wake up and if I know that I am behind with my work and have to catch up and wake up early and study and usually I would sleep late around 3:00. When the **motivation is there I study no matter what time.** I: Do you leave it to the last minute to study or do you have a good preparation ***schedule of learning*** a bit? S16: Well I think that is what every student would love to have but there is **so many things that go on in a day**. I have practicums, other modules so I do try to actually do it **before we write and prepare**. I: But it's not always possible? S16: Yes it's not always possible. I: So you know what you are supposed to do (laugh). S16: Yes (laugh).	
I: Let's discuss the ***class environment*** the dynamics in class and how that may contribute to your performance or motivation. S16: The dynamics? I: Yes like your lecturer, would you say your lecturer is enthusiastic about the subject and would you say that she is knowing what she is talking about? S16: Oh yes the lecturer I can say that. They do try by all means to make us understand actually and think I would say like **[lecturer] she likes this thing of making us think outside the box.** She **would just ask questions and that make you concentrate and I actually like that because I am not a person who actually raise a hand**, when **they ask me I'll answer** and other students who are participating. If **another student ask something that I did not know it makes me think** oh ok I did not study it, it gives me a hint, you must study girl. Yes that is actually what happens. I: And the material you get in class like the slides, does that also contribute with to your understanding of Physiology? S16: No no no like this one we are doing now we don't have a text book, it does but not everything is in the text book. The slides are actually not actually explaining and explicit so it's not actually contributing. I: Would you rather prefer a text book? S16: Yes a **text book and slides will do, not only slides.** I: What if the **slides are more explanatory and explain the concepts**? S16: Yes that would be better. I: Ok tell me how do you manage a rambling ***disorganised lecture***? Like when the lecturer is just going on and on and you are just missing her. S16: **I miss focus** I do whenever she is explaining an example like we are doing something and she is explaining and example, an alone example **I'll just loose it and not concentrate** and be writing things on my book but not things related it's like my mind is somewhere else. I: How do you get back to focus? S16: Usually when **they start asking questions** or they say this is important and then I go **oh I have to get back on track.** I: Then ***after class*** do you try to make sense of it or use your text book or cite? S16: Yes I do **try to make sense** of it I don't like writing something down that I don't understand so I know that it will be so difficult for me when I study that I try by all means to understand and know what they want.	*class environment* : [lecturer] she likes this thing of making us think outside the box. would just ask questions and that make you concentrate - I am not a person who actually raise a hand. When they ask me I'll answer another student ask something that I did not know it makes me think. text book and slides will do, not only slides *disorganised lecture*: I miss focus. I'll just loose it and not concentrate. they start asking questions - I have to get back on track.*after class*- try to make sense contribution: even if I have question but I won't ask –Shy. Even if they ask the question and I know the answer I won't answer. maybe I am scared of being wrong of scared of what they think. never actually thought about it why I am not answering. talk a lot and even if we have a group discussion, love writing and presenting the work. must accommodate everyone who is shy and if you have questions you can come after class.

I: Ok and how do you feel about asking questions in class? You said you don't ask questions in class, why don't you like it? S16: I don't know I don't know **even if I have question but I won't ask**. I don't know I think it's because **I am shy I just feel like ok whatever. Even if they ask the question and I know the answer I won't answer**. I don't know why. I: Are you scared about what your peers, the students in class would think about your answers or questions? S16: No not really (laugh) I don't know it's (?13:50) it's just a bit of I don't know or **maybe I am scared of being wrong of scared of what they think**. I have **never actually thought about it why I am not answering.** I: And class discussions? S16: Oh I am good at that I **talk a lot and even if we have a group discussion** I **love writing and presenting the work**. I am that selfish person with work (laugh) I want the marks like oh yes I will do it I don't mind that as long as my marks are good. I: So you feel more comfortable with class discussions that asking questions? S16: Yes I think so I am *more comfortable with class discussions.* I: Would you ask your lecturer questions after class if you have questions? S16: Yes I would and will also probably go to them. I: Have you made appointments to ***see them in their office***? S16: **Yes I have but not always regarding the work**. Sometimes I go there if I need clarity on how the test was and how the test will be and if I got something wrong and I don't understand whys it's marked wrong. So yes I go and ask things. I: And do you think there is a way to make communication between you and your lecturer ***better***? S16: Hmm ok well **with emails they do reply** when I send them emails and another thing for me when I go there they are also there so maybe they can say that after each and every lecture they can see everyone with questions and **accommodate everyone who is shy and if you have questions you can come after class.** I: To their office? S16: To their office and **tell them and remind them I am still available for you** even after the lecture because some people they don't actually feel like they are obligated to go there. I: Is there anything else you can think of that make communication with lecturer ***difficult?*** S16: I can be difficult firstly when a lecturer gives you **a wrong impression at firstly when you went to him or her usually it's not easy for you to go back maybe they like 'hi why didn't you come to class' and you will never go the them again or maybe you've missed a practicum or a tutorial and the lecturer would say 'no I don't want to hear about it', usually that hinders a student and feel like no I can never go there, so first impressions.** I: Anything else? S16: ***Anything*** I want to add? I: Yes like consultation hours should it be more or less? S16: I can't say it should be more or less depending on how many people should go there. It also actually depends on how many people are actually looking for help. Another thing I didn't know that people failing Physiology until we got the third year and I was asking my peers oh what is going on and they were like people are failing. So they **should motivate them and not focus on the work is a lot but on the good part that it is a good module** and you can do it and you could manage to do it and maybe **help them to find question papers** written previously because	Difficult: when a lecturer gives you a wrong impression at firstly when you went to him or her usually it's not easy for you to go back

it also helps. **If you know how they allocate marks** and you know how to study like that question is for 50 marks and you study like for 2 marks and tell them about the allocation of marks this is how it is going to be multiple choice or long questions. I: Only for third years? S16: Second years also. I: And second semester. S16: Like for second semester you just have to keep up like you told me that you asked me if I study every day. I think that would do in second semester it's a lot of work especially when you do other modules as well. Physiology is not only your other module and **everything is hectic so it will be better that you make notes and study every day after the lecture** and that **only takes one and a half hour probably, an hour for you to make notes it's a lot of work for you to.** I: Class preparation, do you prepare for class can you prepare? Let's say you have your text book and guide and can read through the work before you go to class. S16: I **have never prepared for class**. I just go to class and find it there. I did it **once in first year** and when I prepare for class **I feel like I know more than the others and my concentration is not much**. I feel like I have done it and know what is going to happen. So **it's better if I am like other students.**	
I: Please elaborate on your ***appraisa***l of yourself regarding your capabilities, referring to your studies? So do you think your abilities you have are good enough to reach certain goals or complete your studies? S16: Yes I think so I **do have the capability**. I also have other things I mean I am a social person so I **feel like my social life is also contributing to do much work** on my studies because I have family and friends that want to go out and do that and I probably tell myself that today I have to study and then **somebody come and say we must go somewhere and I would go.** I do have the capability to do what I feel like I **have to do if I can give it time and do it often I can have like pretty good marks.** I: Yes and also the same with Physiology you feel that you are able to pass Physiology? S16: I feel like **if you love something why should you fail it. That's why you should give your best.** I remember when I was on the top I'm not good at Maths and Physics so my **parents w**ere giving me this speech and I was like oh I still **can get distinctions and imagine that I can get distinction** in Life Sciences and Geography **that's where I actually start and do something about it.** I actually feel that there is something out of something good and I got distinctions for the others besides those two and I feel like oh ok. I: That's amazing. S16: Yes.	*Appraisa*l: do have the capability. feel like my social life is also contributing to do much work (neglect). say we must go somewhere and I would go. have to do if I can give it time and do it often I can have like pretty good marks. **if you love something why should you fail it. That's why you should give your best.** my parents were giving me this speech –imagine to get a distinction -start and do something about it
I: What do you think is meant by the term student **self-efficacy?** S16: Student self-efficacy? I: I can show you how it is spelled. Have you heard about the term before today? S16: No. It comes from the word efficiency. I have never heard of it and don't know even where to start oh in my own opinion? I: Yes. S16: Well maybe it means that hmm we students hmm I don't know (laugh). I: Ok it's no problem. You say you haven't heard about it. Is there anything you can add about learning Physiology and your learning strategies or your motivation? ***Who motivates you to study***? S16: **Me**.	Motivation: Motivate myself -feel like I owe that to myself I have to pass with good marks.

I: You? S16: Yes I am the one. If you don't have good marks then do something about it there is always a way. People always say of something is difficult and not passing yet and if you know that you have the ability to pass why not pass so we know definitely in our work our abilities each and every one of us know how capable we are of doing something and you know I will get that thing if I work. **I feel like I owe that to myself I have to pass with good marks.** I: Anything else? S16: No. I: Thank you.	

PHASE 2 Transcribed data: Students

Student 17 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 17 (S17); Interviewer (I); 34min 43sec**	**Comments**
I: Which degree are you currently registered for? S17: BSc Genetics and Physiology.	
I: In which academic year of study are you? S17: Second year.	2nd year
I: Is this your first degree? S17: Yes	
I: How old are you? S17: 40 years	40 years
I: Name the module of Physiology that you are registered for. S17: PHBG 2626	
I: Are you registered for the module for the first time or are you repeating it? S17: No I was doing it as a Physiology and Anatomy study student some years back when I was doing a diploma. I: Ok but it's not the same institution and not the same lecturer. So here you are not repeating it, this is what they mean with the question. S17: Yes.	
I: What is your home language? S17: Sesotho. I: And you take English classes? S17: I take English classes.	Sesotho
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. How much ***effort*** would you say you put into your studies? S17**: A lot of time** because it started very much difficult in the beginning because maybe I had a very **huge gap between my last schooling previous and present**. I has been a **very tough game to play** at the beginning of my studies last year when I was starting my BSc and it gets very tough to and each semester feels like 10 years each but **I tried to manage my time** in a way that the more I put the better I get because I **was putting in more and getting less**. I as putting in too much and getting less so it was **too much frustrating** and maybe discussing structure of approach in different modules so it became better much more better but this first semester of this year it was much more better in my two modules because I was doing Biochemistry 2nd year module and Genetics were a bit better and I somehow got how to approach them better. The **big problem was left with the Physiology** part because I **didn't exactly get the point where exactly what to drive me** like that but I **tried to revise my strategy again** on that. So I'm expecting my first result on my first test now to see whether my approach is working anyhow on Physiology.	*Approach:* *Effort:* A lot of time -huge gap between my last schooling previous and present. very tough game to play. putting in more and getting less –frustrating. didn't exactly get the point what exactly drives me - tried to revise my strategy again. Am old person- having a lot of stress outside school.

So if I get good marks now I'll see that I got the good track now. Apart from that the only problem I am facing is that one of coping because I am a little bit **old person** who **is having a lot of stress outside school.** So if school is stressing me and the outside world is putting pressure on me I get much more confused than before yes.	
I: Talk to me about your ***motivational levels*** with regard to your studies. What motivates you to complete your Physiology? S17: The other thing that I see contributes my not only Physiology module ok **it is how the lecturers are presenting their module** so maybe there are some people that is full of **motivating stories**. Sometimes before lecturing or in the **lecture she or he can tell you about something that can put yourself motivated even if it is difficult that at the end I will reach the destination.** So such **things like this makes you push,** push and go away but apart from that you might remember of I left my daughter, so I **have a do or die moment** now and something that can drive me through. I: So would you say you've got **high motivation**? S17: **Yes**. In the beginning you don't have anything that motivates you. You just feel like I'm at the school I will just do the school work and pass but **the time you see your passing rate is low** it's then you see no no no no I am **not doing anything right**. So have to **try to accompany yourself with better people around you** with better talking and you **get motivation out of them.** You see they want to know about me I want to know about them they are getting interested and say man we have to work now and at the end we work hard. The group that you maybe may come across plays very much a better role. I: Did you form a study groups or is it just support from your class mates? S17: We **don't have a solid study group**. Yes because normally we do different modules but we know at specific times even as we work hard individually at that specific times **we have to come together and do our work together**. **Experiments, lab reports, assignments and all those things that keep us together** and **we do much more better when we are together.** I: For group work? S17: For group work yes. I: Tell me are there certain ***goals*** you would like to achieve with your degree and also Physiology? S17: Very much very much because I am working and I am **working as a lab tech in Biomedical Sciences so in my country**, I am from **Lesotho** there we **don't have people who can suggest some specific projects**. So some big projects are been done by people from outside so even after they are leaving there are no people who have acquired knowledge from those people. So it has been **my dream to drive something like that because there will be a lot of projects that will be taking place in the future.** So we are also having the school that I am talking about they train still lab technicians and nurses of the older stuff. So our plan is to see in the future that much more better curriculum in our school that can match or much more equivalent to other schools. So if **I am studying this I guess at the end I will reach somewhere better**.	*motivational levels:* how the lecturers are presenting their module- motivating stories. lecture tell you about something - even if it is difficult that at the end I will reach the destination. things like this makes you push. high motivation - the time you see your passing rate is low. accompany yourself with better people around you- get motivation out of them. come together and do our work together- **we do much more better when we are together.** goal: my dream to drive projects in Biomedical Sciences- studying this I guess at the end I will reach somewhere better.
I: Which specific skills or ***strategies*** do you use when you are in class? S17: I use **different strategies in different classes**. I: Let's focus on Physiology. S17: Hmm Physiology we have been **given a set of guidelines** which **we consider as notes** but they are not notes as such they are guidelines where we should go and study the direction. I have a text book and I **normally take my text book with me to class. I only use the text book in class for marking where I should focus on** when I **do my own notes separately**. So on Physiology I've been doing that from the beginning for ever but maybe as I said	*Strategies:* use **different strategies in different classes**. given a set of guidelines we consider as notes. normally take my text book with me to class. only use the text book in class for marking where I should focus on. do my own notes separately. take my text book , remember what she said and the

I changed the approach on Physiology but maybe I was not able to pick up the important information on my own by starters ok so the method is still the same I just changed here and there to focus more on important matters in the content so that is how I do my Physiology. I: And when you learn the subject? S17: I take my text book and open my laptop for those guidelines and see ok [lecturer] talked about this in class and she didn't talk about it the way she wrote it here and she didn't talk about it as the text book says so this is maybe how I change things. I can **take my text book , remember what she said and the guidelines and get the main point out of it.** I am waiting for the result of this test I hope it is better because it was not difficult. I: And what time of the day do you study? S17: Normally I get distracted with this and that. I have **told myself** that in the week I have to take all my modules in the week, at least one module study and not doing other parts of the work **at least three hours** are enough per module for reading unless I have a class test or semester test then I will **take my energy and look into that one** because when you do a specific assignment you still reading don't just do an assignment. So three hours I don't think it is very few hours for me it is too much because I am still doing that part of work every day just have a continuous three hours covering this thing not that you do it three hours a week and you put it there now. I: And how is it going? Could you get to it? S17: Like I said I am getting there may be at the **beginning I digested things very slowly** very very slowly and time was going like very fast. So **now I am coping with time** because I can see now **if I'm writing on the weekend and I can see ok today is Wednesday and I have done all my work for the test and enough time to revise my work coping with time.** But previously oh I am writing on the weekend and I see it is Wednesday I have never done two chapters, when am I going to do those because I was not coping with time but now I am better. I: That's very good. You said you work, how many hours a day? Is it every day that you work? Working as a lab tech. S17: No now I am a full time student.	guidelines and get the main point out of it. at least three hours are enough per module. beginning I digested things very slowly -now I am coping with time.
I: Let's discuss the ***class environment*** the dynamics in class and how that may contribute to your performance or motivation for Physiology. S17: **Studying with young people**. This young people may be not only Physiology but all of the classes they are so young. So you are **getting interested to see that these young people having motivation** to do all these things and you are getting happy to be next to them and you feel young also (laugh). So that issue of making us friends that makes you ashamed how can they see me fail so it push you much more bigger and when they see I am passing more than them which they are shaking their heads 'oh man **you cannot pass better than us. You are old'. So this is how nice it is in class.** I: Your class environment? S17: Yes **it's conducive.** I: And your lecturers are they also passionate about their subject and know what they are talking about? S17: Yes specifically we can talk about [lecturer] in Physiology class because when she presents the class she doesn't just present the class that you know the very same thing in the class because **she will add it to the outside experience**, her experience and she is **making you aware hey guys this is not only a thing that stops in class**. I did get experience of it when I was somewhere and it was happening like this and I got it another time happening like this. It means you will get it but in a different experience also. So it also **helps you writing a test remembering what she said about that thing.** She is **presenting very well really making us understand**. I: And tell me about the material you get in class like your **slides.** Does it also help a lot?	*class environment:* studying with younger people contributes to my performance -getting interested to see that they have motivation.-t's conducive. lecturer adds it to the outside experience- making you aware this is not only a thing that stops in class. help you writing a test remembering what she said about that thing-presenting very well really making us understand-slides are very good really and it helps.

S17: Yes but a student cannot say he is happy with that one because a **student needs straight forward information** (laugh) so if you give us information we need and we need to dig another information we need, we are not happy. So the **slides are very good really and it helps.** I: If you are in class and it's a rambling ***disorganised lecture***, she is continuing and talking about stuff you don't understand. How do you make sense of that? How do you get back to focus again? S17: It's not easy it's not easy to do like that. **When students just keep quiet when asking questions and no one responding is one sign people are not following** ok but in other forms like Biochemistry it's a little tougher, tougher module because it needs somebody to think a little bit deeper so they give us time to ask questions or to see please I did not hear from one point to this point can you please elaborate on it in a simple way that I can follow yes **it is not easy to just stop the lecturer and say I don't hear you**. You have to give him time and **say I did not follow** and see how long will it take not to understand him and if it takes too long I am not following because sometimes it's a difficult concept and you are going to describe it simple. So don't have to be in a hurry to stop the lecturer to explain the concept you have to go a little bit with what is going on, no it's taking too long I didn't follow from the beginning, I tried to follow but I did not take it anyhow. I: So **you ask questions in class?** S17: **Exactly.** I: You don't have a problem? S17: No I don't have a problem. I: And **class discussions, no problem with that**? S17: Yes tutorials and whatever, no. I: And also if you don't understand the work, do you sometimes go back and try to make sense of it on your own or do you ask questions after class sometimes? S17: I normally don't ask questions after class but I go on my own because I remember one chapter in Genetics two weeks ago I took on a week grading it one chapter without following anything so towards the weekend we went to a practical and I asked the lecturer, 'mam I don't follow anything of this'. She was so surprised like hey man you cannot say you don't follow because a week already past. I said yes I tried to figure this thing out alone and she did it for a **second time taking it from a point and I saw I was thinking far more different than the content was saying** then I did follow after that. I was **asking my friends also** and they helped because they are from the same school and they called me 'hey oupa it is not like that. You have to do it like this' so they are also helping me. I: Specifically in Physiology? S17: A lot of them because we cannot focus on only one module. All of them they are doing their best. I'm also doing my best. I: Let's talk about ***communication*** with your lecturer, have you made an appointment with your Physiology lecturer? S17: No we **normally meet in class or after class** saying 'hey […] or […] I haven't seen this one' or sometimes you don't follow because the content been done that day it have to start somehow and you know a little and you don't know the upper level and something get confused. I can see when I **was doing my diploma the content that I did then is somehow what I am doing now but you can see we didn't have the foundation of that content we just took it from somewhere** like it was suspending in the air we just took it there. So when you arrived here first year they are **searching for your foundation**, how was your foundation formed and I **did not have a good foundation** and I have to start building my foundation now myself. Because this people they are just finding whether you have a good foundation or not building your foundation so **you have to build your foundation**. So that is where your	*disorganised lecture*: When students keep quiet when asking questions and no one responding is one sign people are not following. it is not easy to just stop the lecturer and say I don't hear you. don't have a problem with asking questions in class *Communication:* normally meet in class or after class. you have to build your foundation. go and see your lecturer. are communication provided. rare cases when I have to meet her face to face than I do. email **did not have a good foundation**

questions are when you ask a lecturer, **you are asking something far from here from the present content**. You are asking about three lectures to come because that is where you are. You don't do about the bottom part of the issue that is done. I: Let's get back to the communication between you and your lecturer. Do you have a problem to **go and see your lecturer** in his or her office or you just did not need to do it yet? S17: **No I did not have a need.** I: Is there anything that you can propose to make it ***better*** the communication between you and your lecturer? S17: **No we are communication provided** with it it's a misunderstanding like last week for example I received my tutorial marks and found that I did not submit a full report of that tutorial and I had to make an **email to her**. […] due to this and this I misunderstood the submitting process. Even in the class I did go face to face saying I misunderstood. So **in rare cases when I have to meet her face to face than I do.**	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? So do you think your capabilities are good enough to reach certain goals? S17: I have been through so much difficulty in my life and I went through a lot of difficulties to achieve a lot of things so since ever I **told myself that if this is done by a man you are a man, you can do it.** So it **shows me that I have that strength of doing specific things.** So I think I am capable so when I was frustrated last semester with Physiology I said, man **you are capable of this why stressing yourself? Just revise your strategy** and so this thing and I took a different attitude and I think it is working now. I: So you think your capabilities are good enough to pass Physiology? S17: Exactly and **I want a distinction and just want to show** it 'Physiology I can do you'.	*Appraisal:* Tell myself: you are a man, you can do it-shows me that I have that strength of doing specific things. you are capable of this why stressing yourself? Just revise your strategy. want a distinction and just want to show
I: What do you think is meant by the term student ***self-efficacy?*** S17: That is a big English term now. I: Yes I can show you how it is spelled. S17: It's a big term I don't know. I: So you haven't heard about it before today? S17: May be it's just a simple something that is been put in a good English. I: It's about the belief in your capabilities that you can achieve something, student self-efficacy is just a fancy word for that. S17: Ok I believe in that I don't know **when I was still young what I will believe about it because you are just doing things because you are doing things**. This small **young guys I always tell them** 'guys you don't have to win or lose this opportunity because you are able to go through this opportunity very well and if you don't see your capability now you will be attending school at my age and it not nice because my age mates are working and building their emperors outside and I am focusing with you here'. I **always tell them, yourself is only yourself and the self of you is able and couldn't help the capabilities** of things going through here and anything we meet here this means that it is **our challenge and we are capable to go through** and let us strive to through here and we'll always go through and even with much more difficulties but at the end we will be through. I: Your view is very good. Is there may be anything else that you can add to may be help your learning of Physiology or anything to add about you learning strategies or motivation? S17: It is a very good thing that happened here **extending the computer hours to 00:00. It has helped us a lot** because during the day if I get tired I can go home if I don't have lab practicums I can go home around 15:00 and try and rest a bit and prepare a meal and I know I have 6 hours left at school that I can use before I sleep. So that has	*self-efficacy:* is only yourself and the self of you is able. our challenge and we are capable to go through. extending the computer hours to 00:00-helped us a lot-added much value to our studies. don't have internet where we stay outside. travel far to residence

added much value to our studies. So last time they were closing at 22:00 so when you come back from home arriving here at 18:30, 22:00 is very near and we **don't have internet where we stay outside** but now school has made a much better approach to our studies. I: I am glad to hear that. Do you have to **travel far to your residence where you stay?** S17: **Yes** I: More than half an hour? S17: No or roughly I won't go quick but slowly because I am a man I can go at night I don't mind. I can go from here at 00:00 to home. I: What time do you go to sleep? S17: Normally not later than 00:00. I have to wake up between 5:00 and 5:30 to prepare and prepare a meal and coming to school not in a rush and it is very cool, it is in the morning. That is that. A whole lot of academic wake up here and sometime I am tired because **Saturday we still take as a school day.** It's only Sunday I will wake up around 9:00 and you feel you are tired and you can't sleep long because you have to do the laundries and cleaning the room and you cook that will take you there to four days and I will cook again towards the weekend. (Laugh) I: Thank you.	

PHASE 2 Transcribed data: Students

Student 18 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 18 (S18); Interviewer (I); 20min 24sec**	**Comments**
I: Which degree are you currently registered for? S18: BSc Genetics and Physiology	
I: In which academic year of study are you? S18: Third year.	3rd year
I: Is this your first degree? S18: Yes it is.	
I: How old are you? S18: I turned 25 this year in May.	25years
I: Name the module of Physiology that you are registered for. S18: Currently I am registered for Exercise Physiology (PHBE3722) and PHBG3726.	
I: Are you registered for these modules for the first time? S18: Yes.	
I: What is your home language? S18: Sesotho. I: Do you take the classes in English? S18: Yes.	Sesotho
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S18: My approach to my studies in the sense of how do I cope with my studies? I: No let's start with how much ***effort*** do you put into your studies. S18: It's **quite a lot because Physiology particularly is a lot of work**. First and foremost the effort I put into my academics is to **attend classes every day** because without that it's a whole lot of work you won't be able to understand and I make effort in **at least taking notes in every class** that I attend afterwards after class and especially when we walking towards our test and stuff I try to **study over the weekends so that I can be really prepared for my test** because it's quite a lot of work. I: So you feel confident that you put in a lot of effort into Physiology? S18: Yes I do. I: You don't feel that you're lacking or can or need to improve? S18: Well as I said I **don't necessarily make notes every time after class** but I try to and I think I **could improve in that department because the more days you skip, the more the work piles up** and more the lack of understanding	*Effort:* quite a lot because Physiology particularly is a lot of work. attend classes every day. at least taking notes in every class. **study** over the weekends so that I can be really prepared for my test. don't necessarily make notes every time after class. could improve in that -the more days you skip, the more the work piles up

in what you do because doing it when there is a lot of chapters to cover is quite difficult so I think I could improve in notes taking each time after class.	
I: Tell me what ***motivates*** you to study Physiology? S18: I initially **wanted to study Medicine** so me studying the **Physiology modules make me feel so much closer to my goal** because that is mostly what it deals with the human body how it works and all of that. In class what **really motivates me, one lecturer of mine** in particular every time we do a certain section instead of just talking the basics of what we are doing, **the lecturer will go into more detail** of what this and this and this does and the particular disease it causes. So that make me feel so much closer to Medicine and **motivates me to work harder** because eventually I would like to apply to. I: For Medicine? S18: Yes.	*Motivate:* wanted to study Medicine. Physiology modules make me feel so much closer to my goal-motivates me to work harder. one lecturer of mine really motivates me- the lecturer will go into more detail
I: Which specific skills or ***strategies*** do you use in class? S18: I **need to be able to write very fast** because not everything you need to know about the modules is in the slides. **Every time the lecturer say something that could help you in studying then you have to be very attentive** because it's not all the time they would repeat because of time obviously so I have to be very attentive. I have to be able to orientate my eye sight, my hearing so that I can keep in mind what the lecturer say and write it down very fast. I: OK and tell me which skills or strategies do you use when you study? S18: When I'm studying well, **our lecturer is a kind of a tool**, always giving us videos and extra links to look at and stuff like that. I think I **use You tube** a lot. If I didn't get everything I need in class I watch a certain video in You tube where it gets explained over and over again to me and that will help in my understanding also the **books that we use**, the **questions and answers at the back,** I use that quite a lot. Also memory may be study something, **write it down, erases write down again** to make sure it's **getting into my long-term memory.** I: Do you also make notes? S18: Yes I **make notes too.** I: And if you go through the slides, do you use the slides? S18: Yes because the **slides are a summary of everything** what we are supposed to be doing so it get to the point of what we are supposed to be doing but mostly the **text book are very important** because the text book are detailed and when you use the slides only you wouldn't really have much to go on when you answer long questions and stuff so actually I use them both the slides and book. I: OK tell me what time of day do you study mostly? S18: Although this is not advised and our lecturer is always telling us not to do this. I study right after all the soapies (TV) like 7de Laan, Generation etc. So only after 9pm I start studying throughout the night and maybe I will sleep in the early hours of the morning. I am trying to work on that to stop because the best time to study is from 6 -10pm but that our students listen. I: Why shouldn't you do it after your soapies? S18: Because after the soapies, the brain is registered in a certain way you know so and this is the time you have to sleep and your hormone levels, you just gonna mess everything up. Now when you study after that the time you should be studying you are busy doing other things. The time you should be sleeping you are awake, when you are awake you should be sleeping and it messes u your… I: Do you it only when it is like crunch time, when it's like test the next morning. S18: Last minute yeah and I didn't study ahead of time.	*Strategies:* need to be able to write very fast our lecturer is a kind of a tool, use You tube. books that we use -questions and answers at the back, write it down, erases write down again - getting into my long term memory make notes too. slides are a summary of everything text book are very important procrastination is going be the death of me. but it's us being us (as students) distractions more than anything else (not motivation)

I: Do you in the week do a little bit little bit after your soapies? S18: Yes and **procrastination is gonna be the death of me.** I: So you know what you should do but it's difficult to do it. S18: It is it is and it shouldn't be but now the world we live in everybody is going to class and talking about Game of thrones and now you want to watch all of it and neglect your books and before you know it, tomorrow you write a test. So I know what I should be doing and our lecturers always tell us what we should be doing especially the Physiology lecturers. They tell in in each and every module that Physiology is not a subject that you can study overnight, you will fail and we hear them and even if you go to class you see that it is a lot of work **but it's us being us.** I: Do you think it is a lack of motivation of your side? S18: Hmm I don't think it's lack of motivation because we know we want to do good and I always want to do good but now I think it's **distractions more than anything else.**	
I: Let's discuss the the dynamics in ***class (environment)*** and how would you say it might contribute to studying Physiology. S18: The dynamics hmm? I: Yes let's start with your lecturer. Is your lecturer enthusiastic, do they know enough about the subject, how do you experience that? S18: Our lecturers first and foremost **they are always prepared** and they are **very enthusiastic a**bout their job and they **know everything about their job there is to know**. **You could ask anything that is related to the topic but not in the syllabus and they will give you the answer** and the **one thing I love most of them they are very interactive. That motivates us** because you know they are interactive and might ask you something in class, you gonna want to know the answer because nobody want to look dumb in front of the class. So every time they will be busy doing something and will ask a question, you **will be motivated to answer if you know your work** so they will always tell you the next class will be dealing with 1,2,3 and that motivates you to go and read up on that because before the lectures starts may be they will start talking to you about the stuff and **you feel inferior if you never answer** in class and you feel inferior if the lecturer asks you something and you can't answer and your **fellow class mates answer that also motivates you to know your work** so they are always on point with their work. I: OK and would you say there is like a supportive class environment, do you sometimes get together with your peers to discuss work in Physiology? S18: We do, sometimes we even have **Whatsapp groups**. We have every one's numbers and open up a group and ask questions and ask what did we do in class and what are we doing next time. Do you guys have this answer to this particular question**. We are very interactive and our lecturers have an open door policy.** You **can email them and go to their office if you have problems**, so we do have a very interactive class environment, especially towards test when everybody is asking questions. I: Tell me about the material you get in class, the slides you also happy with the slides would you say it helps a lot? S18: Yes the **slides are very informative, they are always up on time**, they got all the information that will lead you to the book and there is nothing on the slides that is not in the book. So I am very happy with those. I: How do you manage a rambling ***disorganised lecture***, like when you are in class and a lot of information in thrown in your way and you can't make sense of it all, what do you do? S18: Ok **I will wait for the class to dismiss and the first thing that I will do is set up an appointment with my lecturer** and explain to her I didn't quite get what we were talking about and they will be friendly enough to assist. I: So let's talk about the ***communication*** between you and your lecturer, how do you handle that?	*class (environment):* lecturers are always prepared-very enthusiastic. know everything about their job there is to know. could ask anything that is related to the topic but not in the syllabus and they will give you the answer one thing I love most of them they are very interactive - motivates us you will be motivated to answer if you know your work. you feel inferior if you never you can't answer. fellow class mates answer that also motivates you to know your work - Whatsapp groups very interactive and our lecturers have an open door policy. can email them and go to their office if you have problems. slides are very informative *disorganised lecture:* will wait for the class to dismiss -first thing that I will do is set up an appointment with my lecturer *communication:* I will go to them immediately after class and talk to them about whatever is bothering me

S18: If I **want to see my lecturer I will go to them immediately after class and talk to them about whatever is bothering me or I will email them or set up an appointment by their office.** I: Do you experience any problem or is there any way we can make the communication better or are you happy with the system? S18: I am really happy with the system. I can get them on emails and **they are very responsive to emails**. You can email them today and receive a reply today still. I: If you don't understand something in class, **would you raise a hand and ask questions in class?** **S18: Hmm not really.** I wouldn't do it and don't get me wrong **it's not on the lecturer's part**. Personally I wouldn't do it because everybody will be looking at me like 'eish she didn't get that'. Although the lecturers always would say 'it's good that you ask in class' because there are so many other people that don't know the answer. I would prefer it's not me and I would **rather go to the lecturer personally.** I: Are you **scared what your peers might think** about you? S18: Yes I would much rather raise my hand if I know the answer. I: And class discussions? Do you participate in class discussions in class? S18: Only when I am up to date with my work, if I am not I will just **listen to others and take a few pointers from them.**	or I will email - very responsive to emails. will not raise a hand and ask questions in class - scared what your peers might think
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? S18: Hmm one ability of mine that I really appreciate a lot that I take in consideration, **I feel like I have a photographic memory,** so I don't need to see something a lot to remember and also once I am determined to do something I know I will not stop until I get it and with theory, I really love theory a lot because the minute I understand a concept, even if I don't study for the test in advance or a day before but me grasping a concept I can answer almost anything about it from the top of my head. So I just get to a question paper and may be this question is asked, even if I don't know exactly the answer **I can come up with an answer that is right** and that is what our **lecturers look for mostly because they wanna know that you understand what you are doing** so **that ability of mine I really love.** I: Do you think you are confident enough in your capabilities that you will be able to pass Physiology? S18: Yes I am. I: Ok that's good.	*Appraisal:* feel like I have a photographic memory. ability of mine I really love - can come up with an answer that is right
I: What do you think is meant by the term student ***self-efficacy?*** S18: Student self-efficacy? I: Yes. S18: Efficacy is derived from efficiency. So I think that student self-efficacy implies that before the lecture step in or do anything **you have to be self-reliable**. You have to know you can do 1,2,3,1,2,3 and **you can self-study, self-motivate and self-empower in your academics.** I think that's what it means. I: How do you see **your self-efficacy?** S18: I would say it's **fairly good**, not extremely good, it's moderate, it's **just average.** I: But you are **confident that you will reach your goals?** S18: **That I am, yes**. I: Is there ***anything else*** you can add to may be help your learning of Physiology or mentioned yet about your learning strategies or motivation? S18: Hmm not really just that I think I **could put more effort into attending classes** every single day. I think this is the most important part of the academic career because there I so much information being shared in class than when you	*self-efficacy:* have to be self-reliable. you can self-study, self-motivate and self-empower in your academics. mine fairly good -just average. confident that I will reach my goals *anything else:* could put more effort into attending classes. reasons why not attend - transport money, hangover

miss a class you will be a bit lost in your academics and also hearing and seeing something improves your learning so much instead of going blind to a chapter and nothing was explained to you, so **class attendance is very important.** I: Is class attendance in Physiology compulsory? S18: It is **compulsory and not that we attend always**, you know student life. I: Have you missed some of your Physiology classes? S18: Unfortunately yes. I: In this and last semester? S18: Yes I: If you can rate it is it about 5 classes? S18: This semester I think it's a bit over 5 classes. I: And the reason? S18: Well the **reasons** most honestly is money, **transport money,** yeah it's quite a lot and sometime a struggle and otherwise because of a **hangover,** just once but mostly transport money **but I always ask what we did in class** but **I think it would be a lot more easier if you are in class.** I: DO you mind saying how much it is to travel here every day. S18: It's R40 a day and like R200 per week and R800 per month. I: That's a lot but thank you very much.	

PHASE 2 Transcribed data: Students

Student 19 (Low marks <50%)

Questions and answers **Demographic data** **Student 19 (S19); Interviewer (I); 27min 48sec**	**Comments**
I: Which degree are you currently registered for? S19: BSc Behavioral Genetics	
I: In which academic year of study are you? S19: In between, in my final year (third) but still half one and a half subjects left. I: The subjects that are left over are they second or third year? S19: Second year modules, one that I have failed and one that I wasn't told that I was supposed to register for.	2nd year Failed module
I: Is this your first degree? S19: I started with another degree and changed in my second year. I: What did you start with? S19: BSc Forensic Science	
I: How old are you? S19: I am 22.	22 years
I: Name the module of Physiology that you are registered for. S19: PHBG2616 last semester.	
I: Are you registered for the module for the first time? S19: Yes	
I: What is your home language? S19: Afrikaans I: But you take classes in English? S19: Yes	Afrikaans but English classes
I: What is your understanding of this reseach project? S19: I must be honest I am not completely sure I just know it has to do with our lecturer's pertaining you PhD but it has nothing to do with her as individual it's her studies.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
S19: I should probably say that this is the subject that I do again next year because I have failed it, the first semester I: Tell me about your ***approach*** to your studies. S19: As in study method? I: No how much ***effort*** do you put into your studies? S19: Hmm honestly my first and second year ok my **first year I didn't know how to find my feet** kind of thing, it was all over the place and **did not put effort into not because I didn't want to but I played sport** for the varsity and for the province under 21's hockey and I did Stage door and Sêr and **physically didn't have time and second year was**	*approach* : *effort:* first year I didn't know how to find my feet did not put effort - not because I didn't want to but I played sport physically didn't have time second year was just wasn't a good year from my side

just wasn't a good year from my side. I **didn't put in effort** and this year is actually the year that I put in a lot of effort so study a week and a half before tests. So **as time goes on I think my study method and attitude towards studying is getting better** and I think it was **necessary to grow up a bit.** Partly I came from a **background with a very small school** and the **system you were on, you work at your own rate so you determine how much work** how often kind of thing. So when I came to **varsity I didn't know how to handle time management** and all that stuff but as I said **as time goes on I'm developing** a better attitude towards it. I: And your attitude towards Physiology then? S19: Physiology is actually one of my **favourite subjects (laugh) but because of outside, personal reasons I didn't end up being able to study for the exams** and for the first semester test so I end up getting really bad marks for that and would have **love to have invest more time** but yes honestly Physiology is one of my favourite subjects, the subject on its own bit I am not saying this, even if the lecturer would know or not it wouldn't change how I felt that this **lecturer honestly goes out of her way to make sure she accommodates people** and when she is in class , she **interacts with the people** and doesn't just read and she'll **give you extra bits of information.** You can have an awesome subject but not a good teacher because you often get people that are good in their subject but not **good educators or teachers** but **she is both and actually made it an enjoyable class.**	didn't put in effort as time goes on -study method and attitude towards studying is getting better necessary to grow up a bit. background with a very small school system -work at your own rate varsity -didn't know how to handle time management as time goes on I'm developing personal reasons I not able to study for the exams lecturer interacts with the people give you extra bits of information. good educators or teachers - she is both -made it an enjoyable class.
I: Talk to me about your ***motivational levels*** with regards to your studies. S19: Wow (laugh) I am somebody who **often procrastinates because I get anxious** and then I end up not doing something and then **last minute** like Ok so yes and because I **get so anxious I can't sleep and that goes through my day as well** and then usually I end up like ok I have to get this done. But like I said earlier my **motivation to study is getting better as I am trying to handle the stress** and all that stuff. I don't know if that answers the question. I: It does and may be support structures that motivate you let's say like parents, friends, hostel? S19: I was in hostel not anymore. My **parents** are in Durban and when we get in contact we like very close and they are **very supportive** and my mom is a Maths and Science teacher and my dad is a Biology, History, Geography teacher so it perfectly fits in. There is never this thing because we are educators in this field you must do well, there is always support so yes from them I get a lot of support. I stay with **my sister** here in Bloem and she is also, she is like very **highly motivated with her studies and she will also give me advise** and stuff and **motivates me** to study when I feel a bit down. I have a **very strong support** system yes. I: Tell me certain ***goals*** that you would like to achieve with you degree? S19: Hmm because I chop and change with degrees and stuff and with this extra subjects that's coming through now, my straight forward goal obviously is **to finish next year** and I would like to start Criminology next year as well so first year of that and because of my degree we have Psychology and Genetics as our majors and some of that might flow with the Criminology degree. So my goal is to because I know with my degree that I am doing now I might not get in for Honors because of the string group we have this year. My **goal is to get into Honors** but I am making **also a plan B** of doing Criminology as well next year and I would like to get Honors in that because I want to specialize more in Criminology.	*motivational levels:* often procrastinates because I get anxious last minute get so anxious I can't sleep motivation to study -getting better-trying to handle the stress parents, sister -very supportive goals: to finish next year to get into Honors
I: Which specific skills or ***strategies*** do you use when you are in class? S19: OK up until the point where I didn't know it was unethical to do so, **I use to record lectures** so I don't know how legal it is and use to record it **on my phone** then I would listen to it afterwards. Generally if I **have my text book there with me underline whatever**, write notes over and above in the book and the voice recording and when I go home that day I go through the work that we did that day and then **listen to the voice recording** and **make extra notes** that I missed out on and then **generally I read ahead** to what we would do in the next class just to prepare like that preparation. I: So scanning the points that will be discussed in the next class as you reading the section.	*Strategies:* use to record lectures on my phone have my text book there with me underline whatever listen to the voice recording and make extra notes that I missed out on generally I read ahead

S19: Reading like obviously if they give you an activity I don't always do it it's depending on how much time you have because if it's on Wednesday I have class till 20:00 at night. So I can't be as flexible there but on a Thursday I have one class and that's when I catch up on Wednesday. So then reading through the work and if there is **a big scientific word I don't understand then I will go and look it up in my book or google the definition** just to know when the lecturer talks about that word I kind of know what's going on. I: Tell me about your study ***strategies*** or skills that you use. How do you study? S19: Ok when I am at home I usually have my **slides open on my computer** with half the screen and **half the screen I have open on Word documents with my notes and then my text book** and then I **summarize everything** unto a Word document and **prepare that for a test.** I: So you make summaries and you print that out and learn only from the Word document. S19: Yes because by that time I've already done the whole like in class making the vice recording after that day going through **the voice recording making extra notes in the text book, slides and then all of that compile together to make a summary.** I: Do you read it in your mind or say it out loud sometimes? S19: I use to just read through it but now I have a **study partner a**nd she lives next door from me. So a **week before the test we will do all of that together** and about **four days before the test we will start testing each other** on it and **make like little rhythms and acronyms** about it and test each other. So we will say you read up the full question so that you can associate the answer with the question and we **colour code everything**. I haven't ever actually going the whole spider web mind thing, it's a little confusing. So this is what I do. I: Have you used **it since the beginning?** **S19: No that's why it's working now**. I started using it middle of first semester. That's when her and I started to study together. I did use that form but not where I study with somebody else who test me. **It's amazing how much kicks in when somebody test you and not just reading it.** Or when you have to summarize one chapter and we'll teach each other while looking through the notes. That forces you to understand the work and not just read through it he whole time. I: What time of day would you normally study then? S19: For a test when I have to do the continuing study thing is during the day or evening whenever I have time, so generally probably 20:00 till 23:00/0:00 but with test when the anxiety levels goes on, some mornings I battle to sleep and some mornings I'll only fall asleep after 7:00 in the morning. So that depending on what my sleeping pattern is I will end up studying for tests like 1:00 , 2:00 in the morning but the night before the test we try and get a full night's sleep but that does not always work out.	word I don't understand -will go and look it up in my book or google slides open on my computer -half the screen I have open on Word documents with my notes and then my text book summarize everything -compile together to make a summary. prepare that for a test. study partner –started recently make like little rhythms and acronyms colour code everything amazing how much kicks in when somebody test you and not just reading it.
I: Let's discuss the ***class environment*** the dynamics in class and how that may contribute to your performance or motivation of Physiology? Let's focus on your lecturer first. S19: OK the **lecturer like I said earlier is very enthusiastic** about her what she is teaching. You can see that it's her passion although her **enthusiasm isn't distracting**. She is **very knowledgeable** in what she does and **because she has so much knowledge and passion it makes you to start to listen.** So she **gets you involved in class** like she has this thing that every week you have to do the **definitions and that for me actually helped a lot** and she actually make you like why don't you read what you got. So **she makes effort to get people involved** in class and not just sit there and absorb the whole time and I think that comes back to the thing I said earlier **if you have to teach someone what you have just learn you start instantaneously understanding better** and also it **gets us out of our comfort zone** which is **important for anyone who would do postgraduate studies** which I know it's something I really like to do and it's a bit of a suffer way that you don't get a shock when you have to do it.	*class environment:* lecturer interacts with the people give you extra bits of information. good educators or teachers - she is both -made it an enjoyable class the lecturer like I said earlier is very enthusiastic every week you have to do the definitions she makes effort to get people involved if you have to teach someone what you have just learn you start instantaneously understanding better

I: The material how would you say, the notes, the slides? S19: The slides she give us has a lot of information on it so you have to keep concentrating and if you lose concentration you might not be able to catch up again or if you skip classes and she is very good with this is more important than this and try and focus on this, this could may be in a test and what is just general knowledge and you could read over and **she is good at giving extra information and not just in the book.** Like this is in the book but go and read about that in your own time it will really help you to get background knowledge of this topic I: How do you manage a rambling ***disorganised lecture***? When you are in class and a lot of information in thrown your way and you cannot make sense of it really. What do you do? S19: That happens to me quite often with lecturers in general not specifically in Physiology because I'm **not a very fast writer** then I find myself like in the middle of a sentence and they have moved on. **That's where the recordings helped a lot that you could replay and made sense but now without the voice recording is kind of hectic** but I found now the best is not even to take an exam pad but your text book and everything she speaks about in the text book just underline because I don't sell my text books and keep them so I might as well write in what she says and color code and make extra notes in the text book and go and write it out in your notes. I: How do you feel about asking questions in class if you don't understand? S19: **I get very nervous like to talk in class** and stuff but has **nothing to do with the class or lecturer it's just me personally. I'll answer when I have to** for instance when I have to **give a presentation and I am sick for a week before the presentation** and go up and give a flawless presentation and when I'm done I'll cry and feel sick again. So generally I don't asking questions **I'll go afterwards then or ask somebody in class** that I know got the notes. I: Tell me about the ***communication*** between you and your lecturer. S19: Specifically with this lecturer if wasn't as good as I wanted it to be purely because of the fact as I said there were reasons that I couldn't go to class. In the beginning I spoke to her a lot so she knew who I was kind of thing and then I knew she was going to notice I was not in class because I sit always in the front row so it was kind of I am not going to message or email her but when I did communicate with her it was by **email or in person** and **she get back to you immediately in person but by email she replies as soon as possible** even though she is very busy. She is always after class like she has to go to this place and this place but she make an effort to get back to you and it's not like a vague reply, it's an **informed reply.** I: Is there anything that you think can ***improve communication*** with her? S19: I think the only, not problem I had with Physiology was that **the slides expired after two weeks.** So if you were not on **Blackboard** and downloaded it, it expired. So that was the only frustrating thing because like saying I couldn't go to class all the time and you fall behind and like for instance there **wasn't an announcement every time a new work content came up** so you would not always know unless you were into that section of Blackboard and two weeks go by it's gone and you can't get it again. It catches up with you at the end of the semester but other than that, this specific lecturer make a lot of contact with the students. Like still now that I am not doing it this semester I still get the emails and **she really honestly communicates a lot with the students, most of all the lecturers**, if there is a content change or venue change, it's not like you go to the old venue and don't know what's going on, she is with it with that.	gets us out of our comfort zone-important for anyone who would do postgraduate studies most organized lecturers that I have seen *disorganised lecture:* not a very fast writer- the recordings helped a lot get very nervous like to talk in class nothing to do with the class or lecturer it's just me personally. I'll answer when I have to go afterwards then or ask somebody in class *communication:* email or in person -she get back to you immediately to improve: slides expired after two weeks -Blackboard if not on class -wasn't an announcement every time a new work content came up
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? Are you confident that you can reach a certain goal? S19: **Not so much as I use to be because in school I was the top student** in our school in my matric year and I **came to varsity and all just fall apart** and **I had to kind of find myself again as a person in general but also in my academics** so that's **why my study method change every semester** to accommodate the amount of work for the	*Appraisal:* school I was the top student (97%) came to varsity and all just fall apart had to kind of find myself again as a person, academics

amount of time or the style that we get. So my **confidence did take a bit of a knock** especially in my first year when it went so badly and now I am at a better place than I use to be. So I constantly have to tell myself that's a good job and that **scripture** of 'through Christ I can do all things'. I literally had to put that up at my study table and encourage myself and **that's where the support system comes in** and I often doubt myself and trying to fix this. I know I can do it like I said I was the **top matric student in my school with like a 97% average** and now I come here and just need to pass so it was a knock but I am putting in steps to improve my emotional and spiritual and physical. I: So would you say with this new methods that you are confident that you will pass? S19: Yes my study methods have improved and I am confident that the study methods will help me next year and I will be able to go to classes then. I **know it sounds funny that I failed the subject but I am actually so excited to go back to those classes** like I said **it's one of my favourite classes** and I know what to expect.	why my study method change every semester confidence did take a bit of a knock scripture that's where the support system comes in excited to go back to those classes
I: What do you think is meant by the term student ***self-efficacy?*** S19: A big word. I: Is it the first time that you hear about this? S19: Yes I: So student self-efficacy is when you believe in you capabilities and you believe you have enough capabilities to achieve something. S19: That's actually very similar to the first question. I wasn't always confident but it's like my **natural instinct now to condition myself to think I can do it. I know physically I should be able to do it so now I tell myself you have the physical things, you have the mental capacity to do it** and now I just **have to start believing it and** I think that was my **biggest problem the last four years the fact that I don't believe in myself** which is **sad because everybody else believes in me.** I: IS there anything else you would like to add of how they can ***improve*** the learning of Physiology? S19: The only thing I think they can improve on is the **Blackboard thing,** the notes are complete and very informative and indicates to you what is important. You get your test dates early. They are very organised, there is not much they can improve on because they are doing really well. They are **one of the most organized lecturers that I have seen.** I: Good, thank you so much.	*self-efficacy:* natural instinct now to condition myself to think I can do it know physically I should be able to do it tell myself you have the physical things -have the mental capacity to do it biggest problem the last four years the fact that I don't believe in myself is sad because everybody else believes in me.

PHASE 2 Transcribed data: Students

Student 20 (Middle marks 50-69%)

Questions and answers Demographic data Student 20 (S20); Interviewer (I); 11min 57 seconds	Comments
I: Which degree are you currently registered for? S20: BSc Behavioural Genetics	
I: In which academic year of study are you? S20: I am in my third year, but I next year I also have third year modules. I also have **second year modules** now.	2rd year
I: Is this your first degree? S20: Yes	
I: How old are you? S20: I am 21.	21 years
I: Name the module of Physiology that you are registered for. S20: I did my first Physiology last semester, PHBG 2616, and now PHBG2626.	
I: Are you registered for the module for the first time or are you repeating it? S20: First time.	
I: What is your home language? S20: Afrikaans. I: Do you take Afrikaans or English classes? S20: Afrikaans.	Afrikaans
I: What is your understanding of this research project? S20: No I don't know anything about it	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S20: I am **playing rugby** and after Grade 12 I **applied for BSc to make time to play rugby. My actual goal is Medicine**. I **struggle a bit with the rugby** at this stage but after my degree, I want to study Medicine. I: You still play rugby, would you say you put in a lot of ***effort*** with your studies currently? S20: Yes I **put in a lot of effort.** I: To pass or to get good marks? S20: The **rugby takes a lot of time, and I put in a lot of effort then I only just pass**. I: How do you feel about your answer? S20: I can definitely make more effort, I think one can always make more effort, but I feel I am **sometimes a bit lazy.**	*Approach*: applied for BSc to make time to play rugby. actual goal is Medicine struggle with the rugby -takes a lot of time -put in a lot of effort then I only just pass. sometimes a bit lazy.
I: Talk to me about your ***motivational levels*** with regards to your studies. S20: I am **definitely very motivated**, I feel I am **still not doing what I want to do**, and I enjoy the Physiology because I have a **big passion for Medicine** and once I can do that I will be much more motivated, but I am **motivated to get there.**	*motivational levels:* definitely very motivated-still not doing what I want to do- passion for Medicine

I: Any specific ***goals*** you want to reach except medicine? S20: This semester I want a **good average for my modules, at least 65%.**	motivated to get there. *Goals:* good average for my modules, at least 65%.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S20: When **in class, I only listen, sometimes I take notes**. Actually I **only make notes if she says something is important** and I **mark it in my book self**. I: And strategies you use to study? S20: When I **study I open the slides** of the module and sit the **textbook next to me and also notes and summarise** so that it is less than on the slides and then I study that. **As I summarise, I try to learn it.** I: Would you read it or say out loud? S20: No I don't say it out loud. I **write and repeat a lot.** I would for example if I had to study 5 points first the first 2, then the first 3 and then 4 and then 5 and then I repeat like that. I: What time of the day do you usually study? S20: I only study in the evenings.	*Strategies:* in class- I only listen, sometimes I take notes. only make notes if lecturer says something is important and I mark it in my book. Study: open the slides and textbook next to me and notes and summarise. write and repeat a lot
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. S20: With the **lecturer herself I feel she is good and on our case, so I will say I try to impress her**. She knows **everybody's names** and I feel quite motivated and **don't want to disappoint her, she is kind of nice.** I: Your environment, your peers, do you feel they are also motivated? S20: I don't feel as on it as them, I always feel as **the one that is a bit behind, they are quite motivated.** I: The **material you receive in class,** would you say it also helps? S20: Yes it **definitely helps.** I: How do you manage a rambling ***disorganised lecture***? How do you make sense of all the information? S20: Like let's say you are busy and you don't know what is going on? I: Exactly. S20: Then I will **do my best to listen and after class I will ask a clever person who knows what is going on to explain**. I **try my best to immediately make sense** if I can and if I can't I will ask someone. I: Would you put up your hand and **ask questions in class?** S20: **No not really, I don't like it, only if very necessary I will.** I: Have you ever put up your hand in Physiology? S20: No not yet. I: Is it about the rest in the class and the lecturer what they will think? S20: **Rather the people with me in class, I am bit shy.** I: And the **class discussions**, have you participated in them? S20: **Yes I have.** I: Say you don't understand something would you go and **ask the lecturer after class?** S20: Yes I would **rather do that** than put up my hand in class. I: Tell me about the communication between you and your lecturer. S20: Emails and I've gone to see her when I couldn't attend class. I: Is there anything that could help your communication with your lecturer? S20: No. I: Are there any problems you see at this stage? S20: No not at all.	*class environment:* lecturer - is good and on our case. so I will say I try to impress her/ don't want to disappoint. knows everybody's names her, kind of nice. I feel as the one that is a bit behind, others are quite motivated. material you receive in class-definitely helps *disorganised lecture:* do my best to listen. after class I will ask a clever person who knows to explain. try my best to immediately make sense. only if very necessary I will ask in class-shy. ask the lecturer after class class

I: Please elaborate on your **appraisal** of yourself regarding your capabilities, referring to your studies? S20: I **think I am intelligent because I can pass with little studying** and yes I am **relatively motivated and feel if I study hard I can do well.** Like first year my marks were, I had first year modules, I **played rugby in my first year, and failed a few modules**. And then in my second year I left the rugby then I did well again and this I year I was thinking I can do rugby again and then it was difficult again. I: Do you think your **abilities are enough** to pass Physiology? S20: **Yes definitely.**	Appraisal: think I am intelligent -I can pass with little studying relatively motivated. feel if I study hard I can do well. failed a few modules
I: What do you think is meant by the term student ***self-efficacy***? S20: I think it is **what you do when you are alone with regards to your studies, what you are prepared to put in by yourself**. The effort you put in and will you contact your lecturer, would you do the effort to get test or exam papers. I: Would you say your student self-efficacy is relatively high? S20**: No not as high as I would like it to be. I** will definitely have to work on that. I: Is today the first time you have heard of the term student self-efficacy? S20: Yes. I: Is there anything you can recommend with studying Physiology or something that we left out? S20: No. I: Thank you very much.	*self-efficacy*: what you do when you are alone with regards to your studies, what you are prepared to put in by yourself No not as high as I would like it to be

PHASE 2 Transcribed data: Students

Student 21 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 21 (S21); Interviewer (I); 28min 48sec**	**Comments**
I: Which degree are you currently registered for? S21: BSc in Genetics and Physiology	
I: In which academic year of study are you? S21: Third year	3rd year
I: Is this your first degree? S21: Yes	
I: How old are you? S21: 23	23 years
I: Name the module of Physiology that you are registered for. S21: PHBG3726 and PHBE 3722	
I: Are you registered for the module for the first time or are you repeating it? S21: First time	
I: What is your home language? S21: Tswana. I: Do you take the classes in English? S21: Yes.	Tswana
I: What is your understanding of this reseach project? S21: I don't really understand it I feel that it is wanting to know more of what is happening and how to change where we struggle.	
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S21**: At first it was difficult because theory is a lot** and years went by to develop and the section I struggle with I have to look more at it. I **prefer first to go to class** because **I am slow when I do things on my own.** I **need a lecturer to tell me** this is the structure we are going to do in this module and from there I take it. I: How do you feel about your answer and about the amount of ***effort*** you put into your studies? S21: I **think I must put in more effort** because sometimes you try too hard and they say you should study smart and hard at the same time and **sometimes I feel like I don't study smart but too hard and then it doesn't work. When you study hard you don't understand the concept** because **when a question is given to you, you don't know what to give even though you know the answer.**	*Approach:* At first it was difficult because theory is a lot . prefer first to go to class. am slow when I do things on my own. need a lecturer to tell me. *effort:* think I must put in more effort sometimes I feel like I don't study smart but too hard and then it doesn't work -When you study hard you don't understand the concept, when a question is given to you, you don't know what to give even though you know the answer.
I: Talk to me about your ***motivational levels*** with regards to your studies.	*motivational levels:*

S21: What motivates me **is home, like my background** because I am **tired of my mom begging and struggling** so I feel like it's **time I bring about the change** because life is not the same. Even though you present yourself differently because normally **people will think life is fine and deep down you know it's really bad and that's what beat me up every day.** I: And they motivate you to push every day. S21: Yes. I: You do have certain ***goals*** that you would like to achieve? S21: Yes I have a few actually which is taking time and feel like everything is happening for a reason, like **I want to do Medicine** but I feel like the time God has set for me wasn't in this past three years getting to Medicine and feel like **these three years were not a waste** and it was the **foundation to grow because if I was directly going into Medicine I wouldn't be able to sustain and stand any difficulties that would come.**	home, like my background -tired of my mom begging and struggling –feel like time I bring about the . people will think life is fine and deep down you know it's really bad and that's what beat me up every day. *goals:* want to do Medicine. these three years were not a waste-foundation to grow.
I: Which specific skills or ***strategies*** do you use when you are in a lecture? S21: **I like asking questions**. I am somebody if I don't understand and go home, the possibility of me understanding is low. I am somebody who **asks questions no matter what**. I **don't care if you laugh at me.** There is no use of me pretending that I understand so I ask questions. I: What about class discussions? S21: I **don't like working with people** sometimes because if you work with people it is difficult because you are **assigned to a group that you do not know** and you don't work accordingly. I **feel it's good to work in a team** and **sometimes it's draining for me** because I **still have to develop that skill to work with other people.** I: Which specific skills or strategies do you use when you learn? S21: I wouldn't lie to you and say that I do my **notes at home, I don't, I am very lazy**. The thing with me is I try like this semester, previously I never use to, I **cram my work too much** and it becomes, it **drains you a lot**. *Now I try to do my notes like a week before and then study properly* but then I cross night and usually say I overdo myself across night. I: Is this like the night before the test? S21: I'll **cross night like three days before the test or so but then I'll have my notes at that time and going over and past papers.** I: What does cross night mean? S21: Oh it's like you **don't sleep** so I study from 20:00 till 4:00 in the morning and **go home from the library** when the sun is up because I live in Universitas. I: Do you have classes that day then? S21: When I do that I make sure that I don't have classes at 8:00 or I'll skip the class as a sacrifice for the test but I'll make up the class that I've missed. I: That sounds hectic. S21: I **don't like failing and can't live with failing.** I: Is your environment in Universitas where you live not good to focus on studying? S21: **I am not disciplined, I'll stand up and do other things**. I: So it's **better here in the library?** **S21: Yes** but here are a lot of people and if you came after this person and this person does not leave I don't do anywhere and that's the kind of motivation that I use. It's in the **study logs** in the library, those small rooms.	*Strategies:* like asking questions -asks questions no matter what don't care if you laugh at me. don't like working with people don't do notes at home - I am very lazy. feel it's good to work in a team-sometimes it's draining for me. still have to develop that skill to work with other people. cram my work too much-drains you. cross night like three days before the test or so but then I'll have my notes at that time and **going over and past papers.** don't like failing and can't live with failing. I am not disciplined. Study better in the library.
I: Let's discuss the ***class environment*** the dynamics and how would you say that may contribute to your motivation with Physiology?	*class environment:*

S21: I feel like with Physiology **you need to interact**. It's difficult to cram with Physiology because you **need to understand because they won't ask you a question directly**. Like the environment we are exposed to and we are not that much and feel like we **already comfortable with each other to asks questions we are no more shy**, we know each other and allow each other to ask. I: How do you see the lecturer, is she passionate about the subject and knows her subject, does that help? S21: It does because **she comes prepared and obviously when a lecturer comes prepared and you shoot a question out of nowhere she will just know, this is how students are** and sometimes we ask silly questions and she will know when to say this is not a question. I: Does that ***motivates you more and keep you interested when the lecturer knows the answers***? S21: It **does sometimes because some of us think we are not yet in the right path and searching for ourselves.** For me the human body, she has made me understand some aspects and I always thought Physiology is like Life Sciences of high school but it is something different and because she majored in it she knows it and can uncover it. I: Tell me about the material that you get in class like the slides and stuff, does that also help? S21: Yes but **she will prepare you to use mostly your text book and the notes will be like a structure** what to follow. I: And a supportive study environment like do you and your class mates have a study group or do you talk about word afterwards? S21: No we don't. I used to study with a friend of mine and studied together and that helped because what I know you might not know. **With studying it's good to work with other people but when you do group work it does not work** and you **don't work at the same pace.** I: How do you manage a rambling ***disorganised lecture?*** S21: Woof I think it's a **waste of our time** because **why would you expect me to respect your time and wellbeing if you don't do the same** because it shows that you don't take your job seriously and you don't take us too hard because of you did you will make sure you are prepared for the students. I: So you space out bit do you do the take the effort afterwards to try and understand the work? S21: I have to and don't have a choice and at the end of the day whether I fail or pass the lecturer gets a (?) **and I have to do my part also and will go after the lecture and ask to explain what I don't understand.** I: Does you have to do that with Physiology? S21: No. I: So you said that you are fine with asking questions and don't prefer class discussions. S21: It's not that I don't prefer class discussions but it's the groups work when they give as presentations as a group and I don't prefer that because you do things this way and the other does it that way. There is a lot of **possibility that we are going to fight.** I: How do you think will it be in the work place one day? S21: O don't know I feel I have **to mold myself and have to grow in that weakness** because I **suffer in that one**. I feel I suffer too much and feel I can't. How do you deal with it? I: Me as a student didn't see the point of group work but now in the working environment, growing up and getting older and you have to work in a group sometimes. I: Tell me about the ***communication*** between you and your lecturer. S21: I communicate **with email** and sometimes, I'm not supposed to do this I **go to their offices, without even making appointments.**	you need to interact. already comfortable with each other to asks questions we are no more shy. lecturer comes prepared. *motivates you more and keep you interested when the lecturer knows the answers*. With studying it's good to work with other people -you do group work (assignment) it does not work. *disorganised lecture:* waste of our time. I have to do my part also. *Communication:* with email. go to their offices, without even making appointments. have something like that on their doors where you can write. Prefer face to face.

I: So they encourage appointments? S21: Yes they do but if I disrespecting them I am very sorry because but you know sometimes you do something at night and you **don't understand then you urge to go to them in the morning**. I: Before the test? S21: Before you forget something then you just have to run and barge in and say sorry there is something I have to understand. I: Is that then the day of the test? S21: No. I: Is there anything that makes communication difficult with your lecturers? S21: I **prefer face to face** because I don't like writing but the thing is they respond quick to emails but I prefer face to face. I: Is there anything that makes communication ***better*** with your lecturers? S21: May be if **we have like a suggestion box** or something because some people don't like writing emails or **can't afford buying data**. So I feel it would be better to have a suggestion box, it's not friendly to everybody. I: Suggestion box for? S21: Anything. I: Or a pin board? S21: But they **have something like that on their doors where you can write.**	Help: have like a suggestion box. can't afford buying data.
I: Please elaborate on your **appreciation**/appraisal of yourself regarding your capabilities, referring to your studies? S21: My appreciation? I: Yes. S21: I appreciate a lot of things, even being far from home and being here **and feel like I am not in my comfort zone.** You know if **you're not in your comfort zone you are exposed to be strong**, you are forced to do things you're not used to and grow in so many ways. I appreciate meeting different people and you learn how to tolerate different cultures and races because we don't think the same, we don't see things the same and at the end of the day we help each other. So I really appreciate being here in general. I have learned a lot and learned to accept that whatever is happening in my life maybe in the future it's going to help you in the future, even if it's something you don't want. You end up loving it. I: And your appreciation of you capabilities or abilities? S21: I **appreciate being smart even though I am not that smart**. I appreciate to be able to do science because not all of us being really able to understand what is happening and learn. I am somebody even though it takes **time to grasp something I am able to learn** different things and absorb things. I: Do you think your **abilities are good enough** to pass Physiology? S21: **Yes. Second year** I was going to tell you, no because second year Physiology **I was too relaxed**, **I was too playful.** You know when you don't know your abilities or undermine yourself, that was me second year Physiology it was just too much and I can't. But I **feel like I grow and developed ways of how I am going to trigger and demolish it** and how I am **going to beat this.** So this year it is yes plus it's my final year, I don't want to go to Callie Human next year (meaning registration). I: So that is what's **driving you** to finish your degree. S21: **Yes to finish and get to Medicine** but if I don't I'll do Honors and still try to get into Medicine.	appreciation/appraisal: feel like I am not in my comfort zone-you are exposed to be strong. appreciate being smart even though I am not that smart. takes **time to grasp something but I am able to learn**. Second year -I was too relaxed, I was too playful. feel like I grow and developed ways to beat this
I: What do you think is meant by the term student ***self-efficacy?***	*self-efficacy:*

S21: I feel like it's **how efficient you are and goes with many things like self -discipline** because **with discipline you can be productive and self-respect** and with respect, you don't grow alone, others help you, like your problems also in your life help to grow and shows you there are much bigger things in life that I can overcome. So I feel like self-efficiency is **how effective you can be on your own.** I: Is it the first time you hear about the term today? S21: Yes. I: Ok student self-efficacy is when you have a belief in your capabilities that you can reach your goals. Would you say you have **high efficacy?** S21: I am **still getting there** I am not yet there as I'm saying grow each and every day. As they say you never grow old for education so you **never grow old for self-efficacy.** I: Good that is cool. Is there anything else you would like to mention? ***Anything*** or suggestion that can help learning Physiology? S12: I feel like Physiology it's ok because we are taught by die **same lecturers in second and third year. So you already know how this lecturer asks questions** but for instance for other faculties it's different you are exposed to different lecturers every time and there is **a friend of mine that told me once, in order for you to pass to need to know the lecturer.** You don't need to learn the module to know how this person asks and likes and you are going to make it. In **other faculties we are taught by different people** like in Genetics, every semester another lecturer. So it **takes time to understand somebody**, **not 6 months** but by the time you know the person it's over. So it's **difficult in a learning environment when you have different lecturers.** I: And teaching styles are different? S21: Yes and you don't all learn the same like with me I prefer speaking and saying things loud because I feel when I read silently I don't understand. So some students prefer verbal education like "go over this chapter alone". If I go over it alone and don't understand I'll go to the lecturer and ask please explain then it's better and he is digesting it for me. I: Anything else? S21: **Sometimes I feel like lecturers don't take us seriously when you say I have a break down,** like making things up and studying is too much**. Learning is a different thing like when you have to study for a test it becomes nerve breaking. You know if tests were not that scary, with scary you can't reach your full potential, you are scared and feel like no. We are trying our bests and facing a lot of things,** this are the years of our lives where we are trying to find ourselves and get to know ourselves more because now we are not in that shade like some us acted like our friends we were not ourselves. There are so many things and life is not only about school, so **many things after school you get exposed to.** I: Balancing your life. S21: Yes but luckily I am anti-social, I don't like Facebook and Instagram, like being at home. I don't understand it, some people say they find other people on Facebook and stuff. I feel like there is no use of creating bigger groups, it's too much. I: Thank you.	how efficient you are and goes with many things like self -discipline with discipline you can be productive and self-respect I am still getting there Anything: same lecturers in second and third year –helps. takes time to understand somebody (lecturer), not 6 months Sometimes I feel like lecturers don't take us seriously when you say I have a break down

PHASE 2 Transcribed data: Students

Student 22 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 22 (S22); Interviewer (I); 20min 39sec**	**Comments**
I: Which degree are you currently registered for? S22: BSc Physiology and Biochemistry	
I: In which academic year of study are you? S22: Second year	2nd year
I: Is this your first degree? S22: Yes	
I: How old are you? S22: 20 Years	20 years
I: Name the module of Physiology that you are registered for. S22: PHBG 2626 and last semester PHBG 2616.	
I: Are you registered for the module for the first time or are you repeating it? S22: First time.	
I: What is your home language? S22: Setswana. I: Do you take the classes in English? S22: Yes.	Setswana
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S22: I usually my workload is so I have a lot of things to do, so **most of the times I study I start three days before I'm writing** but I **try to study weeks before even if it does not happen most of the times. Firstly I look at the text book and write notes** from the text book and **then look at the slides and compare my notes with the slides** and if something is on the notes and not on the slides I try to write it and this is how I study most of the times and **try to memorize it afterwards.** I: Do you say it out loud or just read through your notes? S22: I **read through the notes because most of the time I have headsets on.** I: Listen to music or block the noise? S22: No I listen to rain falls and it calms me down. I: Do you memorize and write it down of just read it? S22: If I **feel I can't memorize something, I write it down** again **and most of the times I do it with structures,** if I have to know a certain structure and annotations then I'll draw it again. I: What time of the day do you normally study?	*Approach:* most of the times I start three days before I'm writing. try to study weeks before even if it does not happen most of the times. look at the text book and write notes then look at the slides and compare my notes with the slides try to memorize it afterwards. read through the notes because most of the time I have headsets on. If feel I can't memorize something I write it down again. Exam-three days straight forward with no sleep.

S22: I study at night. I: Ok and you say it's usually crunch time so it's like three nights that you focus. S22: Yes but during an **exam like last semester I studied three days straight forward with no sleep** and I didn't even pass it with satisfaction. I: Was that Physiology? S22: Yes it was because I felt like it is a lot of work and it's still a lot of work but yes I am coping. I: Have you changed your approach or is it still you approach? S22: I am **trying to change my approach** like we wrote a test last week and I studied every night and studied Saturday and Sunday, we wrote on Monday, taking breaks. Last time I studied without breaks and it did not go well as I planned. I: Do you think it's better with the new approach? S22: Yes I saw my results and it's much better. I: Which specific skills or ***strategies*** do you use when you are in a lecture? So when the lecturer is speaking so you make notes or just listen or what do you do? S22: I usually **listen for the important parts**, most of the times she would say this is important **and I write in down on the slides** that I have printed out. I: Describe the amount of ***effort*** you put into your studies. S22: I **put in effort but wouldn't say it's that much** effort because I also make time for watching TV and go out with friends and things like that. I know a lot of people who put in much effort, I wouldn't say I am one of them. I: How do you feel about your answer? S22: The thing is if I tell myself I am going to change the things I used to do, it gets tougher because **most of the times I am tired**. When I get home I sleep and tend to forget about what I said I was going to do. Yes this is what happens most of the time. I: May be your motivation.	*Strategies:* listen for the important parts and I write in down on the slides. *effort*: put in effort but wouldn't say it's that much. most of the times I am tired
I: Talk to me about your ***motivational levels*** with regards to your studies and to Physiology. S22: For my studies is knowing that if I work hard there will be rewards afterwards and **my family because one of my parents are unemployed** and with Physiology **what motivates me is the programme I want to get into for Honors**. I want to do an Honors in Pharmacology so if I get better results it will be easier for me to get in. I: Do you think your marks are good enough at this moment or going to work harder in your third year. S22: I am going to work harder in my third year, I would say **I am average I am passing but not to my satisfaction.** I: What do you think must change or what would be to your satisfaction? S22: I could get distinctions like last year when I got so many distinctions. It's **too much workload now and I think me, I only had to choose one elective, so I chose two electives.** I: So you have an extra subject. S22: Yes. I: Did you consult an academic advisor? S22: Yes he said it was fine. It's Chemistry but just two different modules of Chemistry. I: So it wasn't really necessary for your degree, it is extra. S22: So I have over extra credits. Ones that I don't actually need. I: But now your workload is high. S22**: And my schoolwork is suffering** but I try to balance it out though.	*motivational levels:* if I work hard –reward for my family -one of my parents are unemployed. want to get into for Honors. Lecturer posted the top 10 on Blackboard who passed the test. own SE: **I am average I am passing but not to my satisfaction.** Problem: It's **too much workload now and I think me, I only had to choose one elective, so I chose two electives**
I: Let's discuss the ***class environment*** the dynamics and how that may contribute to your performance or motivation.	*class environment:*

S22: Yes yesterday before the test results came [lecturer] **posted the top 10 who passed the test.** That **was a motivation**. It made me feel that next time I should be in that top 10. That is some kind of motivation. I: Would you also say your lecturer is passionate about helping students? S22: Yes I: Tell me about you ***class environment***, your peers, would you say they are also motivated? Does it help you to be motivated? S22: I don't know because I **talk to like three people in class.** I: Are those people your friends? S22: Yes. I: And do you sometimes discuss Physiology? S22: Yes I have contacts. I: Do you sometimes sit together and study? S22: No we **study individually**. We **only meet in class and chat.** Most of the times we complain to each other about the work. I: Tell me about the slides you get from Physiology, does it help? S22: Yes but obviously se is not going to put all the work in there, you still have to use the text book use and so research about the work. It **would be easier if she included all of the work so that we don't need to use the text book.** I: It's good to learn that skill. Do you sometimes look at videos when you don't understand, to google on the internet? S22: I started to do it this semester but not with Physiology, with the other modules. I: Wasn't it necessary with Physiology? S22: I guess the way the workload was too much I didn't really had time to do that but with Biochemistry I did that and helped me a lot. I: How do you manage a rambling ***disorganised lecture***? If you don't understand and the lecturer is just continuing. What do you do? S22: I am a very **shy person and I don't raise my hand**. I **go home and try to understand** it from there. I: Do you look at your notes and book and then? S22: Something like that and if I don't understand I would ask a friend. **But I have never found myself in a situation like that.** I: Why do you say you are shy in class? S22: My voice projection isn't that high (hard). When I speak to the lecturer, she has to come to me and will be like "what?" She can't really hear me. I: Is it also may be about what your peers might think of you when you ask a question? S22: Yes because sometimes **when people ask questions in class I feel it is unnecessary**. They **ask questions about things we don't need to know about yet**. **I only want to understand what we are being taught now.** I: Do you go after class and ask her a question? S22: I have never done that in Physiology. I have done it in my other modules. I: Why not in Physiology? S22: I feel like it is straight forward. I: Ok so you haven't seen the need yet. And ***communication wi***th your lecturer, have you emailed her of made an ***appointment*** to go and see her? S22: No.	strategy: study individually. would be easier if she included all of the work (in notes) so that we don't need to use the text book. **talk to like three people in class.** *disorganised lecture:* shy person and I don't raise my hand. go home and try to understand. have never found myself in a situation like that. Contribution: when people ask questions in class I feel it is unnecessary. ask questions about things we don't need to know about yet

I: why not? S22: I **haven't seen the need yet. Maybe in the future but not now.**	*Communication:* haven't seen the need yet
I: Please elaborate on your **appreciation**/appraisal of yourself regarding your capabilities, referring to your studies? S22: My capabilities. Sometimes I appreciate it when I have done well in a test but sometimes no, I **feel like I should put in a little bit more effort.** I: But you are **confident that you are able to pass** Physiology? S22**: Yes but if I put enough effort in it I'll pass** it to my satisfaction. I have been passing it but just not that well. I am **confident in my capabilities**.I just **have to stop sleeping a lot and watching a lot of TV.** That's what I have to do. I: So you know what to do to reach your goals actually. S22: Yes. It's just a lot of times I get mad at myself for not studying earlier and not a day before the test. That's what make my marks so low sometimes. I: Do you think with better planning? S22: Yes but the **planning is difficult to follow sometimes**. When I tell myself I must do this then there is something on Blackboard that must be done. I: Then you leave it for the last? S22: Then I'll tell myself I must do it tomorrow because most of the times after doing something I feel tired.	Effort: **feel like I should put in a little bit more effort.** appreciation/appraisal: confident -able to pass. put enough effort in it I'll pass. confident in my capabilities. have to stop sleeping a lot and watching a lot of TV. planning is difficult to follow sometimes.
I: What do you think is meant by the term student ***self-efficacy***? S22: (Laugh) I don't know. I: Is it the first you hear about it? S22: Yes I don't know what it means. What does it mean? I: When you have a belief in your capabilities to achieve your goals. Is there anything you can think of to help you studying Physiology? S22: No I **just wish it was not such a lot of work** because I have to juggle a lot of things but so far it's fine. I: Thank you.	*self-efficacy:* don't know

PHASE 2 Transcribed data: Students

Student 23 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 23 (S23); Interviewer (I); 18min**	**Comments**
I: Which degree are you currently registered for? S23: BSc Genetics and Physiology	
I: In which academic year of study are you? S23: Third year	3rd year
I: Is this your first degree? S23: Yes	
I: How old are you? S23: 26	26 years
I: Name the module of Physiology that you are registered for. S23: PHBG3726 and PHBE3722 and last semester it was PHBN3712 and PHBG3716	
I: What is your home language? S23: Sesotho I: Do you take classes in English? S23: Yes	Sesotho
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Talk to me about your ***motivational levels*** with regards to your studies. S23: I've always **been curious about the human body**, I think that's why I went to study. For me to end up with Physiology it was actually because I was supposed to do good very good in my second year in Genetics so then but I wasn't aware of this and before I was doing Human Molecular Biology and then they explained to me I cannot continue because of the Genetics. So then I had to change my degree to Genetics and Physiology and then as times goes by I fell in love with Physiology. So I will **continue next year with it with Honors**, I really like it now. I: So do you also feel you have to get your marks at a certain stage for Honors? S23: Yes I was speaking to my lecturer yesterday and she explained to me how much I'm supposed to be getting like an average of 65 and I'm working towards that and I'm getting really good marks. I: Would you say you put in a lot of **effort** into your studies? S23: **Yes** especially this year because I want to continue with **Honors**, also if I find a job it's good but I'm willing to do Honors. I: In Physiology? S23: Yes I: Was there a clear decision from your side to put in more effort going from second to third year?	*motivational levels:* curious about the human body. continue next year with Honors Effort: A lot -want to continue with Honors. In 2nd year - didn't see where I was going and happening with this degree-wasn't putting in effort-and what is happening with this degree and how I as going to use that. first priority is to get a job financial situation at home- I am really under pressure to get a job and help at home.

S23: I think **in second year** I wasn't putting in much effort, to be honest I **didn't really see where I was going and what is happening with this degree and how I as going to use that.** So I got to know more as time goes by and this year I know what I want to do and that's why I put in more effort. I: Do you want to apply for a full time job next year or carry on with Honors or does it depends? S23: Hmm it depends on getting a job. I have applied for jobs. So my **first priority is to get a job** and it I don't get a job I hope to get into Honors. I: Is there a reason why you don't want to do Honors full time? S23: Because of my **financial situation at home, I am really under pressure to get a job and help at home.** I: Are you happy with the effort you have put in? S23: First semester I did good but I think I should have **put in more effort but either way I did good it's just me judging myself.** I am satisfied.	
I: Which specific skills or ***strategies*** do you use when you are in class? S23: Hmmm during class, well I **don't ask questions a lot of times in class**, I just **go there and listen and do answer questions when my lecturer ask** questions. I do interact but me I would **rather ask questions after class.** I: Is there a reason why you don't want to ask questions in class? S23: I don't know sometimes I just think my questions are a bit, I don't know. **May be I don't have that much confidence.** I: Are you **worried about what your peers might think** or are you worried about what your lecturer might think? S23: Hmm I **think my peers.** I: Ok and class discussions? S23**: Not that much confident but I participate and I am good in working as a team.** I: Let's get back to when you sit in class, do you make notes or do you listen? S23: I **make notes.** I: On your slides or on a note book? S23: I make notes in my book, a note pad. I: Which skills and ***strategies*** do you use when you study? S23: When I study I use the slides, also the text **book**. Mostly I use the text book, I just refer to the slides. I: Do you high light and underline in your text book or make notes in your text book or what do you do? S23: I **make notes from the text book and then look at the tables or graphs that are important**. I: How do you learn it then? Do you read it or say it out loud? Do you try to write and memorize it? S23: I make notes from the text book and after I am done with that, I **go back to the notes and read it and try to memorize it.** I: Ok and what time of day do you normally study? S23: During the day. I don't study at night. I used to but it don't really works for me because at night I am tired and nothing gets in, so I study during the day. I: When you study for a test how do you prepare? S23: I have since **changed from studying three days before the test to preparing a week before**. So I'm writing next week and have been preparing since this week. I: OK and also the same with exams? S23: I prepare beforehand.	*Strategies*: don't ask questions a lot of times in class go there and listen and do answer questions when my lecturer ask rather ask questions after class. May be I don't have that much confidence. worried about what your peers might think. Not that much confident but I participate good in working as a team. *Strategies:* make notes in class. make notes from the text book -look at the tables or graphs that are important. Notes -read it and try to memorize it. changed from studying three days before the test to preparing a week before.

I: Let's discuss the **class environment** (dynamics) and how that may contribute to your performance /learning of Physiology or motivation. S23: It **does really, a lot actually**. Both physiology that I am doing, I find my lecturers so, I **really understand them and the way they give the lecture and they make me feel want to learn more** because they in terms of asking questions, it's challenging for me and makes me to want to learn more so the next time I will be able to answer as well when they ask questions. I: And your ***peers in class***, do they also motivate you? Do speak to them sometimes after class about Physiology or not really? S23: **Sometimes we do discuss especially before a test or exam** when we just discuss on what was said in class or just revise. I: How many of you in in the group. S23: For now it's three of us and I also invited another girl to come and join us. I: And the ***notes or slides***, does or help you in learning Physiology? S23: They do help me but sometimes I feel like they don't have enough information on them. Well obviously you **can't just study the slides and go and write a test so I feel they don't have enough information on it.** I: How do you manage a rambling ***disorganised lecture***? When you're in class and the lecturers carry on and you don't understand what's going on, how do you make sense of it all? S23: If I **didn't understand it I note it down so I can ask him or her after class what is happening**. I: Tell me about the ***communication*** between you and your lecturer. Have you communicated with your lecturer before? S23: Yes I: How do you communicate? S234: Usually I just do it **after class**, I **don't make appointments** to see them in the office. I: Is it because it's difficult or you haven't seen the need? S23: I **haven't seen the need.** I: Is there something that can make the communication better? S23: Not really, I think the **communication is good**. If I have questions I will ask after class, I do ask but after class and don't consult them at the office. It works for me.	class environment: contribute to your performance? a lot actually. understand them and the way they give the lecture and they make me feel want to learn more. peers-sometimes we do discuss especially before a test or exam. can't just study the slides and go and write a test so I feel they don't have enough information on it. *disorganised lecture:* if I din't understand it I note it down so I can ask him or her after class *communication:* after class, don't make appointments -haven't seen the need. communication is good
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? Do you think your capabilities can help you to reach your goals? S23: I am **happy with my capabilities and I know what I can do and cannot do.** So **I do not put myself under pressure** and feel like I could have done better. The best that I could, I did. I: Are you confident in your capabilities that you will complete Physiology? S23: Yes I am.	*Appraisal:* happy with my capabilities and I know what I can do and cannot do
I: What do you think is meant by the term student ***self-efficacy?*** S23: Student self-efficacy? I: Yes, I'll show you how it is spelled. Is it the first time that you hear about it? S23: No I heard about it in Genetics, hmm although I forgot what it means. Doesn't have to do with hmm efficacy, can you define it? I: It's when you are confident in your abilities that you can achieve something or your goals. Do you think you have **good self-efficacy?** S23: I think I do, **I do.**	*self-efficacy:* *don't know* good self-efficacy? I do. *Anything:*

I: Is there ***anything*** you want to contribute that can help you to learn Physiology? S23: I think although what I have been doing it's been working for me. **I think if I would put in more effort and interact with my lecturers more, I think I can perform better.** How I can improve and get tips on how to perform better, I mean I have been there before and get advice to do better. I: Why aren't you going to them now? S23: I don't know why I am not doing it but I **just think I am doing well and maybe I am comfortable with that.** I: Thank you	think if I would put in more effort and interact with my lecturers more, I think I can perform better

PHASE 2 Transcribed data: Students

Student 24 (Middle marks 50-69%)

Questions and answers **Demographic data** **Student 24 (S24); Interviewer (I); 34min 17sec**	**Comments**
I: Which degree are you currently registered for? S24: BSc Medical Sciences majoring in Genetics and Physiology	
I: In which academic year of study are you? S24: Third year, my final year.	3rd year
I: Is this your first degree? S24: Yes	
I: How old are you? S24: 23	23 years
I: Name the module of Physiology that you are registered for. S24: PHBG3726 and PHBE3722 and first semester was PHBG3716 and PHBN 3712	
I: Are you registered for the module for the first time or are you repeating it? S24: Second semester is the first time but **repeated the first semester's** Physiology this year.	Repeater
I: What is your home language? S24: Sotho I: Do you do the classes in English? S24: Yes	Sotho
Self-efficacy questions: *I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.*	
I: Tell me about your ***approach*** to your studies. S24: **From the start it was very very difficult** especially when it comes to Physiology. You know from the first year most of the work like the capabilities, like you do a lot of modules **but there is not that effort. Physiology I failed in my second year, the way I pushed it like I would study two days before we are writing and Physiology is not about you cramming the work it's about you applying the work.** So my experience towards it was very difficult to adapt honest because the way things are done in [Faculty] is whereby the**y will give information, they will give their 100% so you as a student must give your 100%.** The lecturer will say do this and this and you as a student you will say and **won't start the same day, maybe two weeks later at the time you are writing and that's the time where I see it is difficult.** Like with Physiology **if I started to do things the way I do now, things will be very easy.** One thing **I've learned about the lecturers** ok first thing when you are failing you are like, no this lecturers don't like us but they are very supportive and will even give you extra work and they are open for you to help especially let me give an example. I am writing on Tuesday and they said there are no classes this week and you can study and if you have a problem you can make a session with us and then we can discuss. This is how it is. I: Did you use the invitation?	*Approach:* From the start it was very difficult not that effort failed in my second year- would study two days before we are writing and Physiology is not about you cramming the work it's about you applying the work. they will give their 100% so you as a student must give your 100%. started to do things the way I do now, things will be very easy when you are a student you always blame the lecturer but no, the problem is me

S24: (Laugh) Before I didn't because I still remember there was a time in my second year whereby it was during the exam when I procrastinate and two days before the exam I went to the lecturer and the lecturer said, ok do it in steps, **I didn't know anything and the lecturer said will you please go and prepare and I thought he didn't like me. Then I realized I must study a chapter before I go** and from there I'd never go to consult with anything until I wrote the exam and failed it. You know **when you are a student you always blame the lecturer but no, the problem is me** but the experience as compared with before like I am pushing and consulting. I: So your approached changed? S24: Yes [lecturer] gave us the, I remember it was the first lecture**, study methods for Physiology. The information was there I but I didn't use it but as time goes by I start using it last semester after failing and they work.** She took like information from different sources and combine it and said that is the study pattern and motivation and **every time we have class she would give us some motivation for studying.** I: So you put in more effort now to finish? S24: Yes and studying before that for me wasn't like that. It has changed a lot.	every time we have class she would give us some motivation for studying.
I: Talk to me about your ***motivational levels*** with regards to your studies. S24: My **motivation starts with my sister and my father** because they are only what I'm left with and for now and first semester I **lost my father** and now it's my sister because **I believe I can make a better life for her and also makes a better life for my children**. The motivation that keeps me going, no matter the circumstances I am going through now but **one thing I know is that I will get what I want in life.** I: How old is your sister? S24: She is 17 years old. I: Still at school? S24: Yes.	*motivational levels:* my sister lost my father I believe I can make a better life for her and also makes a better life for my children. one thing I know is that I will get what I want in life.
I: Which specific skills or ***strategies*** do you use when you are in class? S24: Ok one thing I know, **my strong point is writing down what the lecturer say** and **high light** when she says ok this is important and preparation for the class, that is the important one for me, most of the time I will prepare just looking at the slides and the lecturer will to go deeper into the slides. **My weak point is asking questions** because **I have that thing of no self-esteem** but sometimes it **goes with the mood** like sometimes I will just ask and answer and **sometimes even if I know the answer will go like no** because Physiology is **about application** and will apply a certain chapter in a certain chapter and the thing is preparation before the class and high lighting what the lecturer says and writing down because listening I 'm not that good at listening, I study I prepare and high light the important things. I: Do you have your slides with you then? S24: Yes they **put up the slides before the lecture so that we can prepare but sometimes because we are not attending classes,** they will give a lecture after they gave us the slides. I: Tell me how do you ***learn?*** S24: Firstly for me to get something I **must go over and over** like now for next week's test. I study everything and they even get some **previous question paper** so that we can see if we understand. Then later I must go back because sometimes I feel like I understand this process but when I go back then maybe I know only two point and forgot the other points or maybe I know the question but the approach to answer I don't know. I: Do you use your text book? S24: Yes **my text book, my summaries and the slides**. I: And then do you read it or?	*Strategies:* strong point-writing down what the lecturer say high light weak point is asking questions I have that thing of no self-esteem go over and over previous question paper my text book, my summaries and the slides. write the summary must go through at least three times before I understand, studying like in general must write down

S24: Firstly I **write the summary and I must go through at least three times before I understand**, secondly I'm **studying like in general** and thirdly I **must write down**. I only study loud at home, yes this is how I approach Physiology. I: And sometimes you don't get to the third step to write down. S24: Yes because of time. Sometimes because of time I get only to the first step. I: And what time of the day do you study? S24: To be honest any time because it will depend. Like now I will study at night and weekend and sometimes I have to chill doing nothing. Ever since last semester my approach of studying has really changed. Sometimes I can't go two days because one day I will rest but the next is difficult for me to say I will do nothing and maybe it's just one slide of a lecture before I go to sleep but before that I will just sleep.	
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. Tell me about your ***goals.*** After the degree to you want to continue with Honors? S24: Yes **I want to do Honors** and have already applied for Physiology and Pharmacology. I will just wait and see. I: Do you want to study and work or be a full time student? S24: For **next year a full time student and my prayer is after my sister finishes matric I will find a job** but for Honors just want to study but **maybe Masters** I can't go full time I will go part time. I: So you want to do master's? S24: Yes and (?13:12). I: Oh that's good. Let's talk about the ***class environment*** in Physiology. Would you say it motivates you to learn the subject? Let's start with the lecturers, are they passionate and knowledgeable about the subject? S24: Yes and **they really know what they are doing**, even the examples, general examples let's say on the topic cardio and the lecturer sees when don't understand he will try to something we are doing every day. That's where I can see they really know their work. Even preparation, their approach are application and it's not very difficult and that **shows they really know their work and the environment,** yes I can say 50-50 because sometimes it's how they are going through because sometimes the lecturer like Monday will be cool even if you don't understand and sometimes he will be furious and you don't know why and feel like it's a waste of time to come here but most of the time they really do their job even if they can't come to class they will tell they have a workshop but they will even cover that lecture. Even if they say it's self-study, the day we go to class they will discuss it. I: Tell me about your peers, the students with you in class, are they also dedicated? S24: They are one of the craziest **class mates I had, we support each other**, that's **one thing I respect about this class.** There will be a time when we don't understand the work and maybe somebody will understand, then that **person will discuss it and we share a question paper**, they are **not selfish** especially this year, this semester. In first semester we were a lot because in Physiology you have to pass the first semester to continue with the second semester. In the first semester we were a lot and everyone was for himself but this semester the **group is smaller and we can communicate.** I: Do you have a group of friends that share and communicate with? S24: Yes I do we even **have a class group where we discuss what the lecturer said** to write on that day and we feel we are not ready, there is someone that will represent us to discuss the date and time to write and they try to meet us half way. I: Do you sometimes discuss the work also if you don't understand? S24: Yes with my friends I do but not in the group. In the group we just share information but not the work. **The work I will consult with an individual and ask if they understand.** I: You say you ask **questions in class.**	*class environment:* they really know what they are doing class mates we support each other- one thing I respect about this class. person will discuss it and we share a question paper group is smaller and we can communicate. have a class group where we discuss what the lecturer said work I will consult with an individual and ask if they understand. It's like a community they can understand you and meet you halfway. *goals* - I want to do Honors my prayer is after my sister finishes matric I will find a job */Honors just /*maybe Masters

S24: **Yes** with that one I am happy. I: And class discussions? S24: With class discussions especially with Physiology there is a discussion say three days before we write maybe first session for 30 minutes it will be [lecturer], you come with your questions and **she will ask what do you understand and help you to approach the question**, they will give you steps and then [other lecturer] will come and we discuss his section. But you have to prepare to go to that class even I am very useless there but I catch something there. First semester I didn't study before because I was writing and I am not staying on campus I am staying at home, so travelling is difficult but this is how is go, first study and then discuss it. I: How do you manage a rambling ***disorganised lecture*** that you don't understand? When the lecturer is just talking and talking. S24: Now we are doing a session with [other lecturer], the way we are close to him sometimes he will say something and say it is a joke, then you raise your hand and say 'eish I don't understand' and maybe sometime he will try to explain it. Mostly now we are sitting at the back and if you don't understand you will say something to your friend and there is that one other girl in class that will always interactive in class and say she don't understand and then [other lecturer] will try to make it. That's how we are. **It's like a community**. Sometimes like on Tuesday we went to [other lecturer] class and we are done with the work, so continuing with the work we don't going to write about is useless and we asked that girl to ask him to give us a free lecture day and [other lecturer] was like ok if everyone is ok I can give you off. They are really, **they can understand you and meet you halfway.** I: Tell me about the ***communication*** between you and your lecturer, have you ever made an appointment to go and see your lecturer? S24: I communicate **via email**. Ok with [lecturer] it's difficult for me, not that she is a bad person but there the lecturer that you feel more free. I have consulted with her but maybe I understand [lecturer] work more than [other lecturer] so I have more private consultation with [other lecturer]. You **make an appointment via email.** I: So you don't have any problem with communication? S24: No the problem they had was like asking different maybe asking a question in a chapter and it's better for you to come to class and then please they also have their time they are also studying so you have to make an appointment and not just come to their office. I: Do you think there is anything that can make communication ***better*** between students and lecturers? S24: Emails or maybe ***whatsapp group but we don't want the lecturer in the group***. Sometimes we discuss jobs and it's useless for her. I: Do you have a whatsapp group? S24: With my class mates yes without the lecturer we decided without the lecturer because maybe we share a question paper and might be similar to the test that's why we said we don't want the lecturer in that one. If we have a question we consult the class rep to consult with the lecturer. I: Do you think it's easier to make an appointment with a lecturer if you are comfortable with the lecturer? S24: Yes I feel that is the simplest way it will make it easier for the lecturer and maybe the lecturer will prepare more for the chapter for you to understand. I: Do you feel that if your relationship with the lecturer isn't that good then you will go? S24: Because with me **I never had a good relationship with my lecturers in my second year because I was no man,** even if I asked the lecturer didn't give to me. You know as a student you want the answer in the exam and the lecturer	*Communication:* make an appointment via email. Help: *whatsapp group but we don't want the lecturer in the group*.

will never give you that and then you feel there is no use for me to go and see the lecturer because I won't get any information but actually you get more information if you know.	
I: Please elaborate on your ***appraisal*** of yourself regarding your capabilities, referring to your studies? So are you ***confident in your ability*** to be able to complete your studies? S24: **Yes especially this year** because this year like it or not next year I am getting my degree because I blame myself alone, the problem was really me and every time blame perhaps [lecturer] and other lecturers from other modules **but to see you are the reason you're not passing and doing well. It** started with me seeing I must bring my part to meet the lecturer so that I can pass everything. I: You are confident that you have it to pass? S24: Like it or not even if [lecturer] is going to set the hardest question paper I **am going to pass**.	*Appraisal:* *confident in your ability?* Yes especially this year but to see you are the reason you're not passing and doing well. am going to pass
I: Have you heard about the term student ***self-efficacy?*** S24: No. I: So you don't know what it means? S24: No I **don't know.** I: OK student self-efficacy is when you believe in your abilities that you can reach certain goals, so you believe in your abilities that you can complete Physiology. S24: Yes because that's the module I have failed for my degree compared to other modules, the most challenging one. I: Are there ***anything*** you would like to add that might make the learning of Physiology easier. S24: Ok Physiology specifically started from second year because not everyone were catching information fast like others, so ok I **know the lecturers go the extra mile** but I feel there should be a time whereby **there is a group of students from first semester test who they can see is struggling and try at least to group them together and give them more task** even though the lecturer will give those other guys the ?? but with those but when it comes to second year, first year is still like high school. So this is where you can see I am at varsity now, so learning now goes from 30% to 60%. It is very difficult, so for them to maintain and to pass and **not spoon feeding them. They should take that group of students take them and give them extra work. Facilitate them and may be every week they must come and make something and find their strong point (? 28:27) in order for them to pass Physiology.** I: Maybe something **like optional tutorials?** S24: Yes or maybe they can say, ok I see you don't understand and **give a site where they can watch videos.** Ok they are doing that now. **Before we start a chapter they give a site on You tube to watch and after you understand you can watch again.** I: **Did you go watch the video, did it make a difference?** **S24: Yes a lot.** Because sometimes you don't understand the text book and in the video they put in in a different way and that's how it make it easy. I: That's interesting. Is there something else that you can think of, maybe the learning of Physiology that can help your lecturers. S24: One thing they must know is Physiology is not child's play, I'm sure they must know it and they are specializing and have been a student before and know their role but sometimes it's like they forget when it comes to Physiology and most of the medical modules, they have a lot of work, a lot of work and when you are a student **you know to learn but when it comes to medical modules you have to apply everything. Cramming cannot work at all.** So one thing they must know, their approach is very rare, it shows that they have done their studies that students are really suffering at this part	*self-efficacy:* don't know Anything: know the lecturers go the extra mile - respect about them but I feel there should be -group of students from first semester test who they can see is struggling and try at least to group them together and give them more task give a site where they can watch videos.

and that part, they focus more in the one they know and we find it very difficult. **For them to say they must add more, I don't know because they have done a lot, like everything is been done.** I: Maybe if they give extra classes for students like how to prepare for Physiology or learning strategies? S24: **From starting during the orientation time they should show them the steps** and say like from last year a **certain percentage of students have failed and after failing will try this and maybe it will change.** For you to be one of the students who pass you should they must show students can and will fail Physiology if you will not bring you effort. That **will motivate students** and especially when it comes to second semester, the lecturer were furious because some of the students who failed went to the management of the faculty. [other lecturer] goes extra mile and he was furious and he was like I give all my effort and from now on like I am going to **treat you all like students and stop spoon feeding you and then the first semester test, everybody has passed**. He pushed us you are going to fail explaining to us the second semester is about application. So the lecturer will give you slides and everything is about second year and then and just add up but everything is about second year and if maybe study and forget everything it will be very difficult for you. Like the one we writing Tuesday, everything there is like foundation and last semester it is combine. So for you to study you must go back and study. It's just showing you the path to follow. Like now Physiology is really difficult. If I thought second year was difficult, oh no, this second semester is difficult. When it comes to them they are very supportive. They will go an **extra mile and that thing I respect about them.** You know as a student sometimes you take advantage and say, 'no we are not comfortable with this thing' and then the lecturer say, 'no you are going to write'. Our reason is very lame for us not the write that day but most of the times they are fair in everything. I: Thank you.	

PHASE 2 Transcribed data: Students

Student Pilot 1 (Middle marks 50-69%)

Questions and answers **Demographic data** **Pilot Student 1 (Ps1); Interviewer (I)** **14min 56sec**	**Comments**
I: Which degree are you currently registered for? Ps1: Hmm I am enrolled for a BSc Genetics and Physiology.	
I: In which academic year of study are you? Ps1: My 3rd year.	3rd year
I: Is this your first degree? Ps1: Yes it is my first degree.	
I: How old are you? Ps1: I am 21.	21
I: Name the module of Physiology that you are registered for. Ps1: There are two modules currently at the moment, PHBG3726 and PHBE3722, the exercise one.	
I: Are you registered for the module for the first time or are you repeating it? Ps1: Yes	First time
I: What is your home language? Ps1: English	English
I: What is your understanding of this research project? Ps1: For my lecturer to compile any guidelines to better the students in the future.	
Self-efficacy questions: I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.	
I: Tell me about your approach to your studies. Ps1: With the degree that I am currently studying I would like to get into **Medicine** and am **trying to get the best mark as possible.** So when I do go to class, **for me class is where I do the majority of my learning.** I **take notes, listen to the lecturer and go back to my notes and then compare it to my text book**, so yes hopefully it's working. I: Describe the amount of effort you put into your studies. Ps1: Hmm with my studies I try to study at least **two hours per subject per day** hmm for sometimes the day does not allow for that so if I have a test for Physiology that week, I put in more hours for Physiology. **Physiology is a bit of a difficult course** because it's very intricate in its contents or I try to **spend a little bit more time on the weekends with Physiology especially if I do have a test.** I: How do you feel about your answer? Ps1: Hmm I think it reflects truthfully. It does depend on the week though of how many hours I spend but I do like to spend quite a lot of hours on **Physiology because it is a bit more in depth than my other courses** and with other courses I am doing, for me I do find them a bit more interesting, so for me I do need a bit more effort for Physiology.	Approach to your studies: trying to get the best mark as possible. for me class is where I do the majority of my learning. take notes listen to the lecturer and go back to my notes and then compare it to my text book two hours per subject per day. little bit more time on the weekends if I have a test.

I: Talk to me about your motivational levels with regards to your studies. Ps1: Hmm **studying is for me a big part of getting to where to need to go hmm in this country** you **can't do really anything if you haven't gone to tertiary education**. So also the fact that I want to do Medicine do push me a bit extra hmm I would say a bit more than some just doing this course. Also if I do not get in for Medicine I would do Honnors. So I hope to do well. I: And about Physiology? Ps1: Hmm Physiology is very interesting hmm I think it covers quite a lot of different subjects with regards to the human body which is interesting hmm so to do **Physiology is a another stepping stone for my for where I want to go.**	Motivational levels: To get into Medicine.studying is for me a big part of getting to where to need to go hmm in this country. you can't do really anything if you haven't gone to tertiary education. Stepping stone fo future.
I: Which specific skills or strategies do you use when you are in a lecture? / When you study? Ps1: In class hmm I do like colours and I have about 10 different colours and like headings. What is I do is like heading, each heading is in a different colour and **highlighting only the most important points** in my notes that mam gives because **she gives us notes** so that we **can go back and see what the most important content and of information is.** I: So it is while you are in class using this different colours. Ps1:Yes, but I do use different colours all the time. I: Laughs, yes I understand. So tell me when do you study then? Ps1: Hmm **study in the afternoons into the evenings** because with my modules I do not really have mornings open so afternoons and evenings so afternoons and evenings are the only times I have open. On **Saturdays I will study from may be 10:00 till lunch time**, have a break like a big break obviously here are other breaks in between for 20 min and than I will study till about 18:00 on a Saturday and then just rest for the rest of the day. On **Sundays** I go the church in the mornings and evenings so **I study in the afternoons.** I: Ok, and also on Sunday evenings? Ps1: Depending on how late I get back from church and if there is a test the next day, I'll study on the Sunday evening.	Strategies to study: highlighting only the most important points- she gives us notes. study in the afternoons into the evenings Saturdays I will study from may be 10:00 till lunch time Sundays – afternoon.
I: Let's discuss the ***class environment*** (dynamics) and how that may contribute to your performance or motivation. Ps1: Hmm **I haven't really thought of that** just when I go to class I go to class just **another class and I am here to learn** kind of thing. With this year I don't have a lot of friends in Physiology because they are doing other things now so I am more **focused on myself**. One thing that **does irritate is when people come to class late** hmmm so if mm, I don't know if varsity is allowed to do this but if they are 15min late they are not allowed into the venue. Because that does **distract** everybody in class that was on time but other than that I thinks its good. We have a projector so mam can show us slides. I think if there were a little bit **more interaction, like say there was a white board that could better our understanding** of specific systems instead of reading off a slide. I: So the ***teaching style*** how would you describe that? Ps1: Hmm the lecturer is very knowledgeable in her subject and hmm do **most of the time she really does get across what she wants to say** what sometimes though like with us does need to dump down a little bit. I think that is where **diagrams mam can draw on the board can help**. But other than that it's pretty good. I: How do you manage a ***rambling disorganised lecture***? Ps1: Hmm I think for me it would be to **stop taking notes** because that might distracts me from what mam is actually saying and then **I'll just sit there and listen** and t**ry to figure out the most important thing** and then after class I'll go back and make my notes based on that. I: How do you feel about ***asking questions*** in class or to ***contribute*** to class discussions? Please explain why you feel like this. Ps1: Hmm I like saying my two cents (laugh) so especially that our **class is quite small. I don't feel intimidated** or whatever with regard to Physiology. I think I have a fairly good knowledge of Physiology so **it's not like I am scared I am going to make a mistake**. **If I do make a mistake it is corrected nicely not like you stupid kind of think.**	Class environment: **I** am here to learn. irritates -people come to class late-distract. more interaction-a white board that could better our understanding. diagrams drawn on the board can help. *disorganised lecture*: stop taking notes I'll just sit there and listen. try to figure out the most important . Contribution: don't feel intimidated-small class. it's not like I am scared

I: So you ***prefer more smaller*** classes? Ps1: I do **yes.** It's a bit more easier on one on one and when we have class discussions is more **easier for everyone to speak up because it's not so much pressure.** I: Tell me about the ***communication between you and your lecturer***(s). Is it easier to see your lecturer after class to ask question or during class? What do you prefer? Ps1**: If it is something I am struggling with, I'll go to her afterwards** or if it is something with regards to hmm just hmm something general I need to ask her like when is class or I can't make this class, I'll speak to her afterwards. **Otherwise** if it is contributing to the lesson hmm what we are busy with then **I'll ask in class.** I: What factors ***help / hinder your communication*** with lecturers? Ps1: I think for me sometimes just like **emails** and stuff and I only have a **set amount of wi-fi and can't always check my emails** but **mam's door is practically always open** and when **I need her I can go to her office.** So I think its just only on my side that I can't access my emails always all the time.	corrected nicely not like you stupid kind of think. prefer more smaller classes- easier for everyone to speak up because it's not so much pressure. Asking in class -struggling with, I'll go to her afterwards *help / hinder your communication:* set amount of wi-fi and can't always check my emails. open door always – go to office.
I: Please elaborate on your ***appraisal of yourself regarding your capabilitie***s, referring to your studies? Ps1: (laughing) It's never easy to say good things about yourself. Hmm with me I think I have a **pretty analytical mind** so to **go into depth and stuff is quite interesting for me** but things get a little bit **too monotonous** I go like "hmm I don't want to study this" so think it's just **more lazy** (laughing) when I don't want to do things then lack of intelligence or lack of understanding kind of thing but yes huh I don't know what else to say. I: So you would rate yourself capable for completing your studies. Ps1: Yes I: And in Physiology. Ps1: (laughing) I think so yes. I: Would you say your rating is sufficient? Ps1: I think it is a **little bit more than sufficient** (laughing)	Appraisal of self: little bit more than sufficient
I: What do you think is meant by the term ***student self-efficacy?*** Ps1: Hmm **I think it's your ability to be efficient in the classroom and out of the classroom** to reach the goal that you want to achieve. I: Have you heard anout the term before? Ps1: Yes but only in Genetics. I: When did you hear this in Genetics? In your 3rd year? Ps1: Third year 2nd semester, no, first semester when we speak about clinical trials and practicals. I: How do you see ***your own student self-efficacy?*** Ps1: Hmm I think its **pretty good** (laughing). I think with that it's all **about motivation and discipline and how far you want to go** it's not based on anything else how comprehensive the notes are or how the text book is and at the end of the day it all depends on you and what you want to do. So I think it's pretty good. I: And your ***motivation***, do you think it's only what you want to do or are there external factors? Ps1: Hmm the majority is what I want to do get or **make my parents proud or teachers.** There is a little bit of how people see me as well. I: Is there anything that you would like to state or say anything? Ps1: Hmm I don't think so I think that about covers it. I: Thank you very much.	Student self-efficacy*:* your ability to be efficient own: pretty good Motivation: make my parents proud or teacher

PHASE 2 Transcribed data: Students

Pilot student 2 (High marks 70-79%)

Questions and answers **Demographic data** **Pilot student 2 (Ps2); Interviewer (I)** **16min 40sec**	**Comments**
I: Which degree are you currently registered for? Ps2: I am not registered at the moment for a degree, I already obtained a degree. I am registered for occasional studies. I got my degree in 2015. BSc Agric	Got BSc degree, occasional student
I: In which academic year of study are you? Ps2: I am first year with occasional studies. I have worked last year and came back and is working at Paraxel, but I want to study something else and want to move into that direction I almost want to say. I've studied Medicine in 2011 and failed one module and I had to do it all over and I couldn't do it at that stage and then in 2012-2015 a studied BSc Agric and now I am working, but I want to study Medicine again and am working towards that.	2rd year
I: So this is not your first degree? Ps2: Yes	
I: How old are you? Ps2: 25	25years
I: Name the module of Physiology that you are registered for. Ps2: I was registered for PHBG2616. I: Are you going to continue in the second semester? Ps2: I still have to decide. I will have to decide before tomorrow or today (4 Aug), but a doubt it very strongly. I: But you were registered for the 2nd year 1st semester module Ps2: Yes.	
I: Are you registered for the module for the first time or are you repeating it? Ps2: Yes I was registered for the first time.	
I: What is your home language? Ps2: Afrikaans	Afrikaans
I: What is your understanding of this research project? Ps2: I am not sure what it is about, so I am not 100% sure. The way I see it, it is on how students study and not about Physiology. That is my understanding.	
Self-efficacy questions: I am going to ask you questions about your experience as a student in class, especially the Physiology module. Please give your honest experience of studying/learning Physiology.	
I: Tell me about your approach to your studies. Ps2: My approach is the fact that I am on campus makes it easier to take it because my work is on campus. So I've got it...my approach and so on was to do it because I want to go into a medical direction. So that is the biggest reason why I did it. Well,	approach to your studies:

some of my friends took Physiology and they said it was a very nice module and I thought it is a stepping stone to get into that direction, I can almost say. So that is the biggest reason why I start moving into that direction. I: Was it just to fill you credits or just because it was a nice module? Ps2: No just because it looked like a nice module and because I wasn't registered for a degree...I won't say it doesn't mean anything, but understand it is not something I had to take. I: So it was your own choice? Ps2: Yes and it was really nice. I: Describe the amount of *effort* you put into your studies. Ps2: No I was actually committed to the class. I think I've put in the necessary effort to do relatively good. So no, I would not say I did not do my best. I went to the class and I studied for the tests and I did all the practicums. I: So are you happy with your effort? Ps2: Yes yes yes I: You're not sorry and think you could have done more or less?? Ps2: No with the job I did enough, I can almost say.	*Effort:* actually committed to the class I went to the class and I studied for the tests and I did all the practicums.
I: Talk to me about your *motivational levels* with regards to your studies. Ps2: No I think, I think if you enjoy it, motivation comes much easier. I almost couldn't wait to go to glass in the mornings, It really was a nice module and it was very interesting. Hmm so for me the motivation was the module, hmm when I studied Agriculture my motivation wasn't always that high, because it wasn't my first interest. So this was actually a new love I can almost say, because the motivation for it was very high. I: Was there *external motivation* that pushed you to pass this module? Ps2: Hmm no not really, like I said I didn't need anything else. It just was, the only motivation because I really want to do it and because it is really nice. I: So would you say you have certain milestones and goals you want to reach with this Physiology? Ps2: Yes, well I want to, at WITS they have this programme that you can do to study medicine, and then you start in your third year. One of the sections is Physiology. That is also a reason I took this module I want to use it as stepping stone for other things.	*motivational levels:* if you enjoy it, motivation comes much easier
I: Which specific skills or *strategies* do you use when you are in a lecture? Ps2: Yes well I do, I always sit and listen. That is what I found is best for me. I sit and listen and don't really make notes, only now and then. I try to read a page or 2 the previous night about the next day, and then it feels like I hear it for the second and third time when the person explains it. I: And how do you approach it then when you study? Ps2: When I study I summarise, that's how I study. I actually tried with this module to summarise the work weekly and the in the exams I only study the summaries. It's not always working like, like for the second semester test I only started studying 3 days before, but I always try to summarize. I: And what did you find is the best time to study? Ps2: Do you mean the time of the day? I only could study in the evenings because of my job. I: Throughout the night? Ps2: No, only when there was class, I try to study after every class. When I get home for about an hour, from 5-6 or 6-7 I study and try to summarize that day's work. I: And when there were tests? Ps2: No then I will, say the test was on Monday I would study 4 hours the Sunday and 4 hours the Saturday.	*Strategies:* I always sit and listen try to read a page or 2 the previous night summarise I try to study after every class. When I get home for about an hour
I: Let's discuss the class environment (dynamics) and how that may contribute to your performance or motivation.	class environment:

Ps2: Hmm well I think the, this might sound stupid, but I think the class was very respectful towards the lecturer and nobody talked and it helps you to not be distracted by someone talking or trying to be funny of those things. Yes in class, that made I easier. I: In the class, was the lecturer passionate about the module? Ps2: O yes, absolutely. Both of them was well prepared you could see that they knew their story when they spoke comparing to someone that hmm and ahh in front of the class and it made it easier. I: And the material you received? Ps2: Well we mostly worked from of the textbook. There were slides as well. I think [lecturer] slides were very good, I don't think [other lecturer] slides were very good. Well you do have the book, but I think for entry Physiology slides are very important and [lecturer] was excellent, but I don't think [other lecturer] was that good. I: How do you manage a rambling *disorganised lecture?* Ps2: No I hate it. It feels like you can't listen and it feels like, I hate it when things don't work. I don't function well in an unorganised or if the lecturer doesn't know or can't ask good questions. I am struggling with that. I: But did it happen with you Physiology module? Ps2: Hmm no not at all. With [other lecturer] I can say it wasn't that organised, but it didn't bother me. I just think if you've been with the one, [lecturer] that was so organised and then you have to go to him, but it didn't bother me. It still was good, it didn't bother the Physiology. I: But how do you make sense if it is unorganised? Ps2: Well then I try to read through the book myself and cut myself off from the lecturer, because he is almost confusing you more. Then I will just sit in the class and read, but that wasn't the case with this, but if it had to be. I: Tell me how do you *feel about asking questions* in the class? Ps2: Oh no that is easy to do. I think it is because I am a little bit older than the rest of the students and I am not shy or think someone is going to think something if you ask. So no I can easily do that. I: So class discussions are also not a problem? Ps2: No that's no problem. I: Tell me about the *communication b*etween you and your lecturer(s). Ps2: I went and see them say once or twice, but it wasn't about the work for example where is the practical but not about the module self what I can remember. I: But were you comfortable to do it? Ps2: O yes absolutely. If I had to see them, I would. I: What factors help / hinder your communication with lecturers? Ps2: Oh if I think if the lecturer is closed off then I won't go and see them or if they are just a bit unfriendly. Sometimes some of the lecturers are just a little bit better (laugh) and on the other side, I could almost say if they invite you and they treat you with respect you treat them with respect then it is just a little bit easier to see them. To be open with them then it is easier to see them.	respectful towards the lecturer nobody talked well prepared lecturers slides were very good slides are very important *disorganised lecture:* I don't function well in an unorganised I will just sit in the class and read Contribution: easy to do I think it is because I am a little bit older than the rest of the students- not shy invite you and they treat you with respect - bit easier to see them.
I: Please elaborate on your appraisal of yourself regarding your capabilities, referring to your studies? Ps2: Jissie (laugh) I: Would you say your capabilities are good enough to pass Physiology? Ps2: Well I think it is and it is more than just capabilities, I think it is 50-50 capabilities and motivation and I think my capabilities and motivation are both there to pass the module, I think you can be clever but if you aren't motivated then you won't pass. Hmm I think it is for any module you study, your capabilities and motivation to pass.	appraisal of yourself: capabilities and motivation are both there to pass the module I already have a degree I know how to study and how to divide my time (experience helps)

I: Would you say 50-50 or how was your motivation and capabilities in with Physiology? Ps2: No I would say 80-80, it doesn't add up to 100%, but my motivation was very high and I think my capabilities are also ok. Because I already have a degree I know how to study and how to divide my time, I believe my capabilities were also enough to pass this module.	
I: What do you think is meant by the term *student self-efficacy?* Ps2: Hmm I think it means it is how you divide your time and how effective you are in a specific time. If you know you've got a half an hour, how effective you are in that half an hour, I think that is something you must determine yourself. I think that is self-efficacy. You can't tell me I must sit an hour and study, but I'm not effective and maybe get 2 minutes of study in that hour. But if I want to be self-efficient or want to improve efficiency then I need to get an hour's study from that. I: Have you heard of the term before today? Ps2: No I: Would you say you are self-efficient? Ps2: No I think my **self-efficiency is relatively high**, especially closer to the deadline I can say, sometimes you would rather want to do this or that but a week before exams or a day before the semester test and you know the pressure is on, and my self-efficacy is much higher than before. I: Thank you very much, anything you would like to ask or add? Ps2: No	student self-efficacy: how you divide your time and how effective you are in a specific time my self-efficiency is relatively high - know the pressure is on- much higher