DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

by

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I, Margaritha Johanna Eksteen, declare that the doctoral research thesis and interrelated, publishable manuscripts/published articles that I herewith submit for the Philosophiae Doctor in Health Professions Education at the University of the Free State are my independent work and that I have not previously submitted it for a qualification at another institution of higher education. Where help was sought, it has been acknowledged.

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"If the Lord does not build the house,

the work of the builders is useless..."

Psalm 127:1 (Today's English version, The Good News Bible)

"I have the strength to face all conditions

by the power that Christ gives me."

Philippians 4:13 (Today's English version, The Good News Bible)

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

α :	**Cronbach's Alpha**
ADA:	**American Dietetic Association**
AND:	**Academy of Nutrition and Dietetics**
APMIS:	**Acta Pathologica, Microbiologica, Et Immunilogica Scandinavica**
BEME:	**Best Evidence Medical Education**
BPharm:	**Bachelor of Pharmacy**
CCFOs:	**Critical Cross-Field Outcomes**
CFA:	**Confirmatory Factor Analysis**
CFI:	**Comparative Fit Index**
CHE:	**Council of Higher Education**
CRD:	**Centre for Reviews and Dissemination**
***d* :**	**Cohen's *d*-value**
DHET:	**Department of Higher Education and Training**
DoH:	**Department of Health**
DoHSA:	**Department of Health, South Africa**
DoL:	**Department of Labour**
EFA:	**Exploratory Factor Analysis**
ELO:	**Exit Level Outcome**
ECUFS:	**Ethics Committee, University of the Free State *(changed to HSREC)***
FIP:	**International Pharmaceutical Federation**
HEQSF:	**Higher Education Quality Sub-Framework**
HPE:	**Health Professions Education**
HET:	**Higher Education and Training**
HREC:	**Health Research Ethics Committee**
HSREC:	**Health Science Research Ethics Committee**
HW SETA:	**Health and Welfare Sector Education Training Authority**
IF-AT:	**Immediate Feedback Assessment Tool**
iRAT:	**Individual Readiness Assurance Test**
JHNEBP:	**Johns Hopkins Nursing Evidence-Based Practice**
KMO:	**Kaiser-Meyer-Olkin**
M:	**Mean**

MBBS:	**Bachelor of Medicine and Bachelor of Surgery**
MCQ:	**Multiple Choice Questions**
MPharm:	**Masters of Pharmacy**
MTBL:	**Modified Team-Based Learning**
NHREC:	**National Health Research Ethics Council**
NKR:	**Nasionale Kwalifikasie Raamwerk**
NMMU:	**Nelson Mandela Metropolitan University**
NQF:	**National Qualifications Framework**
NR:	**Not reported**
NWU:	**North-West University**
***p*:**	***p*-value significance**
PBL:	**Problem-Based Learnign**
PharmD:	**Doctor of Pharmacy**
PhD:	**Philosophiae Doctor**
PICO:	**Population/patient(s), Intervention, Comparison intervention and Outcome**
***r*:**	**Spearman's Rho**
RAP:	**Readiness Assurance Process**
RAT:	**Readiness Assurance Test**
RMSEA:	**Root Mean Square Error Approximate**
RSA:	**Republic of South Africa**
RU:	**Rhodes University**
SAPC:	**South African Pharmacy Council**
SAQA:	**South African Qualifications Authority**
SEM:	**Structural Equation Model**
SD:	**Standard Deviation**
SEP:	**Single Exit Price**
SMS:	**Short Message Service**
SoTL:	**Scholarship of Teaching and Learning**
SPSS:	**Statistical Packages for Social Sciences**
TBL:	**Team-Based Learning**
tRAT:	**Team Readiness Assurance Test**
TUT:	**Tshwane University of Technology**
UFS:	**University of the Free State**
UKZN:	**University of KwaZulu Natal**

UL:	**University of Limpopo**
UWC:	**University of the Western Cape**
WHO:	**World Health Organisation**
WITS:	**University of the Witwatersrand**
UAE:	**United Arab Emirates**
US:	**United States**
USA:	**United States of America**

LIST OF DEFINITIONS AND TERMINOLOGY USED IN THE STUDY

Assessment: "the process used to identify, gather and interpret information against the required competencies in a qualification or part-qualification in order to make a judgement about a learner's achievement" (NQF 2016:online).

Baccalaureus Pharmaciae degree: a degree consisting of the eleven exit level outcomes prescribed by the SAPC for an entry-level pharmacist (SAPC 2016a:8).

Bachelor of Pharmacy qualification: a 560-credit degree spread over a minimum of four years and registered on a NQF level 8 (SAQA 2012a:online). "The purpose of the qualification is to scientifically train and equip pharmacists with the necessary knowledge, specific skills and relevant competencies, so that in rendering a professional pharmaceutical service as members of a health team, according to the demands of the time, the needs of the community and international standards, they can make an indispensable contribution to the promotion of health of the population of the Republic of South Africa. In this way students will be given the opportunity to continued, personal, intellectual and professional development in which the country is supplied with a sufficient number of competent pharmacists. The programme is not only directed at intellectual development, equipping and formation of the student but also to her/his general formation as a person" (NWU 2016:66).

Case study: a systematic inquiry into the topic of interest to describe and explain the single phenomenon of interest, a particular or unique group of people or a specific social setting or event (McMillan & Schumacher 2014:37).

Constructivism: "a paradigm or worldview [that] posits that learning is an active, constructive process. The learner is an information constructor. People actively construct or create their own subjective representations of objective reality" (Learning Theories 2016:online).

Course: "a set of classes in a subject at a school or university" (American) or "a set of classes or a plan of study on a particular subject, usually leading to an exam or qualification" (British) (Cambridge dictionary 2017:online). The word 'course' is similar to

'**module**' used at the NWU and was used in the articles submitted to international journals.

Credit: "a measure of the volume of learning required for a qualification or part-qualification, quantified as the number of notional study hours required for achieving the learning outcomes specified for the qualification or part-qualification. One credit is equated to ten (10) notional hours of learning" (NQF 2016:online).

Critical cross-field outcomes: "the generic outcomes which inform all learning and teaching" (NQF 2016:online).

Curriculum: "a statement of the training structure and expected methods of learning and teaching that underpin a qualification or part-qualification to facilitate a more general understanding of its implementation in an education system" (NQF 2016:online). "The term curriculum [could also] refers to the lessons and academic content taught in a school or in a specific course or program" (The Glossary of Education Reform 2015:online).

Deeper learning (deep approach to learning): students learning to understand the context of the content and focus on comprehending the text and critically engage with content, relating the new knowledge to prior learning and experiences, interpreting the logic of the arguments and relating the evidence to the conclusion (conceptualized based on Entwistle & Ramsden 1983; Marton and Säljö 1976).

Designated group: "[a] particular group of people identified in current employment equity legislation and applied in admission policies by education and training providers (currently black people, women and people with disabilities)" (NQF 2016:online).

Doctoral thesis: "the sole research component of a doctorate. It must demonstrate that the candidate has made a specific contribution to the enhancement of knowledge in the chosen field, while providing evidence of independent critical ability. A doctoral thesis ought, either in part or in its entirety, to be published in a suitable journal or book. A doctoral thesis generally comprises between 70 000 and 100 000 words, or three publishable articles" (UFS 2015:5).

Employability skills: "[skills] concerned with the way in which those who have completed university courses can be assimilated into national and international employment" (Glover, Law & Youngman 2002:296).

Exit level outcomes: "the knowledge, skills and attitudes that a learner should have obtained or mastered on completion of a qualification and against which the learner is assessed for competence" (NQF 2016:online).

Graduate attributes: "the qualities, skills and understandings a university community agrees its students would desirable develop during their time at the institution and, consequently, shape the contribution they are able to make to their profession and as a citizen" (Bowen, Burton, Cooper, Cruz, McFadder, Reich & Wargo, as quoted by Bridgstock 2009:32).

Graduateness: "generic qualities that might be expected of any graduate" (International Dictionary 2017:online).

Health professions education: "Health Professions Education is currently receiving unparalleled attention worldwide. It is now generally accepted that lecturers can and should receive training in curriculum development and instruction. Schools of medicine and other health professions find themselves in a period of experimentation with new educational approaches, with a view to better prepare professional health care workers for practice and continuing professional development. Do those responsible for training our professional health care corps have the vision, knowledge and skills to plan and implement their education and training in order to improve the educational process?" (UFS 2016a:online).

Health professions team: *see* **Healthcare team**.

Health science education: "The mission of the Division Health Sciences Education is to support and develop students and staff at under- and postgraduate levels by coordinating and facilitating education and educational research activities with a view to contribute to the academic success of students and the educational expertise of staff" (UFS 2016b:online).

Healthcare team: "A range of health care workers, e.g. physicians, physician extenders, nurses, medical assistants, and those providing ancillary and diagnostic services, e.g. radiology and lab technologists, physical therapists, nutritionists, psychotherapists, [and] massage therapists who provide diagnostic and therapeutic procedures on a patient" (The Free Dictionary 2016:online). Also including the above-mentioned health care workers' input in decision-making on patient health and –care.

Higher education: "education that normally takes place in public universities and registered private higher education institutions which offer qualifications that meet the requirements of the HEQSF" (NQF 2016:online).

Learning outcome: "the contextually demonstrated end-products of specific learning processes, which include knowledge, skills and values" (NQF 2016:online).

Level descriptor: "a statement describing learning achievement at a particular level of the NQF that provides a broad indication of the types of learning outcomes and assessment criteria that are appropriate to a qualification at that level" (NQF 2016:online).

Module: "subjects are presented according to modules, to which a certain number of credit values are allocated. Modules have a code and a descriptive name e.g. PSYC111" (NWU 2017:9).

National Qualifications Framework (NQF): "The comprehensive system, approved by the Minister: HET, for the classification, co-ordination, registration, and publication of articulated and quality-assured national qualifications and part-qualifications. The South African NQF is a single integrated system comprising three co-ordinated qualifications Sub-Frameworks for: General and Further Education and Training; Higher Education; and Trades and Occupations" (NQF 2016:online).

Pharmacy education: "the educational design and capacity to develop the workforce for a diversity of settings (e.g. community, hospital, research and development, academia) across varying levels of service provision and competence (e.g. technical support staff, pharmacists and pharmaceutical scientists) and scope of education (e.g. undergraduate, postgraduate, life-long learning). This multi-dimensional conceptualization

embodies a systematic approach to education development that enables and supports a sustainable expert healthcare workforce to effectively improve health" (FIP 2009:16).

Pharmacy student: "a natural person registered as such in terms of the Act (Pharmacy Act, Act 53 of 1974). Any person registered with a provider of a qualification in pharmacy" (RSA DoH 2000:6).

Publishable manuscripts: "A publishable article is a manuscript that is ready for submission for publication in an academic journal or similar scholarly publication. This means that the content of the article has been supervised extensively and that the text has been edited and formatted according to the specifications of the particular publication" (UFS 2015:6).

Qualification: "a registered national qualification consisting of a planned combination of learning outcomes which has a defined purpose or purposes, intended to provide qualifying learners with applied competence and a basis for further learning and which has been assessed in terms of exit level outcomes, registered on the NQF and certified and awarded by a recognised body" (NQF 2016:online).

Skills development: "the intended output of education and training efforts[;] should be an enabler for growth" (Elphick-Moore 2012:online).

Surface learning (surface approach to learning): a student attempt to remember the text and focus on what they think would be asked later (in assessments) to gain a passing grade; characterised by students who memorise sections of course content without questioning the information presented, memorise text without identifying principles or patterns, and study with the assessment particulars in mind (conceptualized based on Entwistle & Ramsden 1983; Marton and Säljö 1976).

Team-based learning: "an active learning and small group instructional strategy that provides students with opportunities to apply conceptual knowledge through a sequence of activities that includes individual work, team work and immediate feedback" (Parmelee, Michaelsen, Cook & Hudes 2012:e275).

Traditional lecture methods: "a teaching method where the instructor acts as the primary information giver. The instructor typically stands in front of the students and may use a visual aid. Students are expected to listen and take notes during lectures, and there is limited interaction and exchange between teacher and student" (Reference 2016:online).

Undergraduate: "a student in a university who has not yet taken a degree, and thus is still below the academical standing of a graduate" (Oxford English Dictionary 2016:online).

University: "a higher education institution registered as such with DHET" (SAPC 2014:82)

SUMMARY

Keywords: team-based learning (TBL), teaching strategy, undergraduate, pharmacy students, health professions education, health professions team, learning experience, guidelines, pharmacy curriculum

An in-depth study was done with a view to develop guidelines for the implementation of team-based learning (TBL) in an undergraduate pharmacy curriculum. The research was initiated in response to the identification of a gap in the knowledge regarding the usage of TBL in a management module within a BPharm curriculum in South Africa.

TBL is an active, small group-based teaching strategy where students are actively engaged with one another and the module content to solve real-life problems they might encounter in future. This structured, student-centred strategy allows minimal time for traditional lecture methods. Instead, students are required to acquire knowledge independently prior to class. This opens up time during class for students to work together in teams on an issue, similar to what will be expected of pharmacists as part of the health professions team.

The aim of this study was to develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning. It was attained by means of the following six objectives: to conceptualise and contextualise TBL as a teaching strategy in higher education; to determine the experiences of the pharmacy students regarding team work in the pharmacy profession before they were exposed to TBL; to determine pharmacy students' learning experience of TBL in the management module of the BPharm curriculum after they were exposed to TBL; to identify whether TBL as a teaching strategy increase pharmacy students' understanding of the theoretical work (curriculum) presented in the module; to determine whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving and precision, as required for pharmacists on a NQF level 8; and to develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning.

A case-study research design was followed because a single phenomenon of interest in one fourth-year pharmacy group was investigated. A mixed-method research approach

was followed including both qualitative and quantitative methods. During the first phase of the study in the beginning of the semester, data were collected via written narratives as part of the exploratory design of mixed method research. This was followed by focus group interviews to further explore the themes identified and to establish the initial experiences of pharmacy students regarding team work in the pharmacy profession before exposure to TBL. At the end of the semester, after student exposure to TBL, a questionnaire was used to collect both quantitative and qualitative data on students' learning experiences with TBL in comparison with traditional lecture methods, whether TBL fostered the development of a deeper approach to learning, and to investigate the possible development of generic skills essential to the health profession team.

From the results of the first phase, it was clear that students had some exposure to being part of the health care team. The focus group interviews pointed out that pharmacy students could identify several contributions a pharmacist can make to the health profession team, which competencies they will need and how university training should prepare them to effectively contribute to the health professions team. The results of the questionnaire indicated that TBL provided students with an enjoyable learning experience and that they prefer TBL over traditional lecture methods. TBL also promoted deeper learning and understanding of course content and fostered the development of essential generic skills commonly referred to as graduate attributes or employability skills.

The findings of the study were used to develop guidelines for health professions educators to implement TBL in undergraduate pharmacy education. These evidence-based conclusions can be used to optimise the teaching and learning of pharmacy students in South African higher education.

OPSOMMING

Sleutelterme: Span-gebaseerde leer, onderrigstrategie, voorgraads, apteker-student, gesondheidsprofessie-onderrig, gesondheidsorgspan, leerervaring, riglyne, farmasiekurrikulum

'n In-diepte studie is uitgevoer met die oog op die ontwikkeling van riglyne vir die implementering van span-gebaseerde leer (SGL) in 'n voorgraadse farmasiekurrikulum. Die navorsing is geïnnisieer as gevolg van die identifikasie van 'n gaping in die kennis aangaande die gebruik van SGL in 'n bestuursmodule in 'n BPharm-kurrikulum in Suid-Afrika.

SGL is 'n aktiewe, kleingroep-gebaseerde onderrigstrategie waar studente aktief met mekaar en die moduleïnhoud betrokke is om probleme uit die werklike wêreld wat hulle moontlik in die toekoms mag teëkom op te los. Hierdie gestruktureerde, studentgesentreerde strategie laat minimale tyd toe vir tradisionele lesingsmetodes. In plaas daarvan word daar van studente verwag om kennis selfstandig vooraf op te doen. Dit maak tyd gedurende klas beskikbaar vir studente om in spanne saam te werk aan 'n kwessie, soortgelyk aan wat van aptekers as deel van die gesondheidsorgspan verwag sal word.

Die doel van hierdie studie was om riglyne te ontwikkel vir hoe om SGL effektief in farmasie-onderrig te implementeer om studenteleer te verbeter. Dit is bereik deur die volgende ses doelwitte: om SGL as 'n onderrigstrategie in hoër onderwys te konseptualiseer en te kontekstualiseer; om die apteker-studente se ervarings van spanwerk in die farmasieberoep voor hulle aan SGL blootgestel is te bepaal; om apteker-studente se leerervaringe van SGL in the bestuursmodule van die BPharm-kurrikulum nadat hulle aan SGL blootgestel is te bepaal; om te identifiseer of SGL as 'n onderrigstrategie apteker-studente se verstaan van die teoretiese werk (kurrikulum) in die module aangebied verbeter; om te bepaal of SGL studente toelaat om generiese vaardighede soos tydbestuur, spanwerk, kommunikasie, verandering, innovasie, probleemoplossing en presiesheid te ontwikkel, soos vereis vir aptekers op 'n NKR-vlak 8; om riglyne te ontwikkel vir hoe om TBL effektief in farmasie onderrig toe te pas om studenteleer te verbeter.

'n Gevallestudie-navorsingsontwerp is gevolg omdat 'n enkele verskynsel van belang in een vierdejaarsfarmasiegroep ondersoek is. 'n Gemengde-metode navorsingsbenadering is gevolg wat kwalitatiewe en kwantitatiewe metodes ingesluit het. Tydens die eerste fase van die studie in die begin van die semester is data ingesamel deur middel van geskrewe narratiewe as deel van die verkennende ontwerp van gemengde-metode navorsing. Dit is gevolg deur fokusgroeponderhoude om die temas wat geïdentifiseer is verder te ondersoek en om apteker-studente se aanvanklike ervarings van spanwerk in die farmasieberoep voor blootstelling aan SGL te bepaal. Aan die einde van die semester nadat student aan SGL blootgestel is, is 'n vraelys gebruik om kwantitatiewe en kwalitatiewe data in te samel aangaande studente se leerervarings van SGL in vergelyking met tradisionele lesingmetodes, of SGL die ontwikkeling van 'n dieper aanslag tot leer bevorder het, en om die moontlike ontwikkeling van generiese vaardighede noodsaaklik tot die gesondheidsorgspan te ondersoek.

Op grond van die resultate van die eerste fase was dit duidelik dat studente 'n mate van blootstelling gehad het aan om deel van die gesondheidsorgspan te wees. Die fokusgroeponderhoude het uitgewys dat apteker-studente verskeie bydraes kon identifiseer wat 'n apteker kan maak tot die gesondheidsorgspan, watter vaardighede hulle gaan nodig hê en hoe universiteitsopleiding hulle moet voorberei om effektief by te dra tot die gesondheidsorgspan. Die resultate van die vraelys het aangedui dat SGL studente met 'n genotvolle leerervaring voorsien en dat hulle SGL bo tradisionele lesingmetodes verkies. SGL het ook dieper leer en verstaan van kursusinhoud bevorder en die ontwikkeling van noodsaaklike generiese vaardighede, oor die algemeen verwys na as gegradueerde kenmerke of indiensneembaarheidsvaardighede, gekweek.

Die bevindinge van die studie is gebruik om riglyne te ontwikkel vir gesondheidsorgopvoeders om SGL in voorgraadse farmasie-onderrig te implementeer. Hierdie bewysgebaseerde gevolgtrekkinge kan gebruik word om onderrig en leer van apteker-studente in Suid-Afrikaanse hoër onderwys te optimaliseer.

DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

CHAPTER 1

ORIENTATION TO THE STUDY

"Education is the most powerful weapon we can use to change the world…"

(Mandela, 2003)

1.1 INTRODUCTION

This in-depth case study consisted of an investigation of team-based learning (TBL) and the development of guidelines for the implementation of TBL in undergraduate pharmacy education to enhance teaching and learning for pharmacy students.

The aim was twofold. The first aim was to investigate how pharmacy students experienced TBL in the management module forming part of the fourth year of the Bachelor of Pharmacy (BPharm) qualification in the School of Pharmacy, Faculty of Health Sciences on the Potchefstroom campus of the North-West University (NWU). The second aim was to develop guidelines for TBL for an undergraduate pharmacy curriculum.

The overall goal of the study was to investigate whether TBL as a teaching strategy increased students' understanding of the theoretical work presented in the module and facilitated a deeper understanding of the link between module content and practice, and to determine whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, and precision, as required for pharmacists on a National Qualifications Framework (NQF) level 8.

This doctoral thesis is presented in the form of five publishable articles (cf. Chapter 2 to 6) written and submitted for publication in accredited research journals. To provide

fundamental information regarding the research process and the findings, the first chapter includes a more comprehensive discussion of the research than a mere orientation. It gives background and context to this study, and discusses all relevant aspects pertaining to the study, e.g. the research questions, objectives of the study, research design and methodology, quality assurance and ethical implications. Chapter 1 concludes by providing an outline of the thesis and the following chapters.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

The BPharm qualification is a four-year, 560-credit degree registered on the NQF level 8 (SAQA 2012a:online). The purpose of this qualification is to deliver pharmacists as members of the health care team with the necessary knowledge, skills and competencies to promote the health of South African citizens. The *Baccalaureus Pharmaciae* degree is structured around eleven exit level outcomes (ELOs) prescribed by the South African Pharmacy Council (SAPC) (SAPC 2016a:8), the statutory body for the pharmaceutical profession. It is important that these ELOs are integrated into the BPharm curriculum as they form the basis of practice for an entry-level pharmacist (SAPC 2016a:8). One of the ELOs specifically refers to the ability of the pharmacist to apply management principles in the practice of pharmacy (NWU 2016:64). These management principles include basic financial management, human resource management, strategic management, change management, risk management and quality improvement principles and strategies as applied in the practice of pharmacy (SAPC 2016a:11).

To meet these outcomes prescribed by the SAPC, a 16-credit management module forms part of the BPharm curriculum at the NWU. The module is presented in the first semester (February to June) of the fourth year of the curriculum. The module is one of seven practice-related, soft-skill modules presented by the Department of Pharmacy Practice within the School of Pharmacy. Besides the theoretical outcomes, the general management module aims to develop students' skills in time management, team work, communication, change, innovation, problem solving and precision (NWU 2016:153) which are required of pharmacists on NQF level 8 (Royal College of Physicians and Surgeons of Canada 2005:3; SAQA 2012b:11; WHO 1997:3).

Research by Eksteen and Reitsma (2015) made it clear that students at this point of time in their studies do not understand the necessity of the management module, as is evident

from comments such as: "*Because we are not in a management position currently, many students see some module content as irrelevant*" (Eksteen & Reitsma 2015:6). However, in reality, due to a shortage of registered pharmacists in South Africa (SAPC 2011:11) and the increasing population who seeks medical attention, a pharmacy student may be appointed as a pharmacy manager as early as two years after graduation. Furthermore, although pharmacists focus on improving patient health outcomes and quality of life, pharmacies are businesses and must be managed to ensure continuity and return on investment (Rollins, Gunturi & Sullivan 2014:1). Management is thus an essential component of the health professions education curriculum. It is especially important for pharmacists in South Africa, whose profit is restricted by legislation such as the Single Exit Price (SEP) (RSA 2004:3).

One of the strategic focuses of the Faculty of Health Sciences on the Potchefstroom campus of the NWU is the renewal and improvement of teaching and learning practices for both students and lecturers respectively (NWU 2014:2). With this objective, the faculty aims to ensure revised learning practices and learning skills. Current lecture methods, which are teacher-centered and discipline-based, result in students being passive learners who mostly memorise module content (Altintas, Altintas & Caglar 2014:46). It has been proven that passive lectures provide a lower level of knowledge retention and cognition (Deslauriers, Schelew & Wieman 2011:864).

Active learning methods have become increasingly popular. Small group learning, one such active learning method, promotes the development of problem solving, critical thinking and interpersonal communication skills. In contrast to lectures, small group learning can increase student engagement and behavioural interaction (Clark, Nguyen, Bray & Levine 2008:111). TBL is a small group-based instructional strategy developed in the late 1970s by Dr Larry Michaelsen for teaching a business course to a large class of students. It has been rapidly employed in other disciplines, particularly in medicine (Clark *et al*. 2008:111; Jafari 2014:7).

TBL is grounded in the constructivist learning theory of student-centred principles and supportive scaffolding. Learning occurs by integrating information obtained by new experiences into existing mental schemes. Students are actively engaged with one another and the material in solving problems (Whitley, Bell, Eng, Fuentes, Helms, Maki & Vyas 2015:11), and this active process thus models and teaches critical thinking.

Reflection in action is constant throughout TBL when students are required to evaluate the contributions of all team members and also reflect on the feedback they receive from other team members on their own performance as a member of the team (Hrynchak & Batty 2012:797).

As a type of active learning, a minimal amount of time is spent on lecturing in TBL. It is a structured, student-centred learning strategy (Mennenga & Smyer 2010:1) where students are required to acquire knowledge independently through reading and then to apply this newly acquired knowledge during participation in team exercises (Michaelsen 1994:140; Parmelee 2008:5). It uses theoretically based and empirically grounded strategies for ensuring the effectiveness of small groups working independently in classes with high student-to-faculty ratios without losing the benefits of faculty-led small groups with lower ratios (Clark *et al*. 2008:111). It is a structured form of cooperative learning, i.e. active learning in which small groups of students work together on an issue. This method provides opportunities to develop social and communication skills and group thinking (Parmelee 2008:6). Active learning strategies contribute towards more active roles for students that engage them in the content of the module, ways of knowing and forms of practice that characterise a field, promoting students' learning experience (Hincapie, Cutler & Fingado 2016:6; Hutchings, Huber & Ciccone 2011:11). TBL provides students with these valuable learning experiences that support their learning, assist them in developing a new language for talking about their learning, expose them to different learning strategies and provide them the opportunity to reflect on the goals and purposes of their education (Hutchings *et al*. 2011:40).

TBL is an effective way to transfer knowledge about both basic and complex terminology (Macke & Tapp 2012:151). It also provides a more positive and engaging academic teaching and learning environment than more traditional teacher-centred methods (Mennenga & Smyer 2010:10). Because of learner engagement in the course and in the teams, multiple learning outcomes are addressed, including depth of knowledge, cognitive structures, problem-solving skills, team communication skills and leadership skills (Kim, Song, Lindquist & Kang 2016:117; Mennenga & Smyer 2010:3; Sealy 2015:3).

Health care educators are aware of the limitations of didactic methods for developing critical thinking skills in learners. Research on newer approaches grounded in constructivist principles are showing promise in teaching effectiveness. TBL, one of these

newer approaches to teaching and learning, is an effective and economical teaching method based on constructivist learning principles that enables students to develop the critical competencies of critical thinking skills and team work abilities (Hrynchak & Batty 2012:800).

The specific characteristics of TBL are: (1) small-group work; (2) a grading system based on individual work, team work and peer evaluation; (3) a division of course content into five or six units; (4) a focus of class time on team projects rather than lectures; and (5) an emphasis on applying knowledge rather than regurgitating it (Michaelsen 1994:140). The instructor's role is to facilitate and assist with the consolidation of learning (Michaelsen & Sweet 2008a:10). Rather than having to focus on covering content, instructors using the TBL approach focus on developing applied exercises that will infuse a sense of excitement and motivation in the classroom (Michaelsen & Sweet 2008a:10). Due to a lack of exposure to proper team work, students often have low expectations of it, especially in an academic environment. When working together, students often demonstrate characteristics of working in "groups" rather than "teams" by demonstrating a neutral or sometimes negative synergy rather than a positive synergy. In these contexts, they prefer individual accountability rather than mutual accountability in the team, sharing information to reach the goal rather than performing collectively and not using their skills in a complementary way to benefit the team (Robbins, DeCenzo & Coulter 2015:311).

TBL involves a three-phase process: pre-class preparation, covering of content and assessment, and application of course concepts. During the pre-class preparation, reading assignments are selected (textbooks and assignments) and teams are formed. One of the main concepts in TBL is the forming of teams. Teams need to be created by distributing students' abilities equally across teams (Michaelsen & Sweet 2008a:10). Teams usually consist of five to seven students and remain intact for the whole semester. Teams should be heterogeneous in terms of skills and ability to promote students' development (Mennenga & Smyer 2010:3; Michaelsen & Sweet 2008a:11). Phase two consists of assessment of the content through individual and team tests. In the third phase of TBL, course concepts are applied in activities designed to enhance student understanding of the course content and to increase team cohesion. Students focus on applying material rather than simply memorising it, and they work together to solve challenging problems created by the lecturer (Mennenga & Smyer 2010:3; Michaelsen & Sweet 2008a:10).

For TBL to be effectively implemented, Michaelsen and Sweet (2008a:10) suggest four main principles to be followed. Firstly, teams need to be created by distributing students' abilities equally across teams. It can be done in a variety of ways, but it is important that the students think that distribution is done in a fair and equal way.

Secondly, students are required to spend time studying the assigned material individually before class and then during class through interaction with their team members. When students attend class, they are tested on the material they have studied. They then take the same test as a team. This assures that students are accountable for their work. When students review and master the content through this process, they use class time to work on assignments aimed at strengthening their ability to apply the knowledge they have learnt to clinical situations which are presented in case scenarios or classroom activities.

The third principle is that team assignments must require team interaction. This principle can be fulfilled most effectively when assignments require teams to use course concepts to make decisions about complex, clinical situations. However, the exercise must be structured so that teams report their decisions in a simple and concise fashion. The principle requires that team members work together on projects and not divide the work. Team interaction requires that most assignments are the same for all teams and that all students work together to come up with one solution.

Lastly, feedback is important, not only for learning but also for team development. After students take the test on the content they had to prepare, they receive immediate feedback. This allows students and faculty to be aware of how well students understand the content. This immediate feedback during class time enables faculty to clarify any content that is unclear to students instantly. Students are quickly able to apply this new or corrected information to more complex situations that build throughout the course.

Course-relevant characteristics of the students must be used to form the teams. In the studies reviewed, a strategy that ensured diversity was commonly implemented (Allen, Copeland, Franks, Karimi, McCollum, Riese & Lin 2013:3; Burgess, McGregor & Mellis 2014:3; Cheng, Liou, Hsu, Pan, Lui & Chang 2014a:348, Cheng, Liou, Tsai & Chang 2014b:26; Huitt, Killins & Brooks 2014:3). Mennenga (2013:476; 2015:76) started the formation of teams by asking students a question such as "*Do you have an interest in community health nursing?*" This is a typical example of a specific student characteristic

applicable to this course. When students answer yes to such a question, they assumed their place in a line formed by students who already answered yes to previous questions. Once all students wind up in the line, they start counting off by the number of groups that will be in the class until all students have counted a number which is then their group number (Michaelsen 2004:29; Michaelsen & Sweet 2008a:32). The number of groups is calculated from the total number of students enrolled to form groups of five, six or seven students.

Although TBL involves some form of problem-solving, it is not problem-based learning (PBL) *per se*. TBL is similar to PBL as both are highly structured pedagogical approaches that promote higher-level cognitive skills. Both approaches centre primarily on small-group work while maintaining a strong element of self-directed learning (Michaelsen 1994:148). However, the team projects used in TBL are not case studies, as used in PBL. Rather, they consist of questions that require the application of knowledge. This suggests that in TBL the content precedes the team work, whereas in PBL, the content flows from the team's collective work (Macke & Tapp 2012:150).

Several educational researchers have reported on the benefits of TBL. Bahramifarid, Sutherland and Jalali (2012:10) report that students find the learning process of TBL particularly beneficial and prefer it to conventional didactic approaches. Students are highly engaged and satisfied in class, and they appreciate team work and peer contributions to their learning. Academic performance with TBL has been rated equal to or better than achievements under more traditional teaching methods.

Anwar, Shaikh, Dash and Khurshid (2012:722) report the development of higher reasoning skills among the members of teams during mutual discussion sessions. Students are less likely to be in the habit of cramming before exams and do not feel overwhelmed by the volume of information as their understanding of the topic are clarified during TBL sessions. The authors also found that the class attendance of students is much better compared to regular resource sessions.

Clark *et al*. (2008:115) found that the TBL class has a high level of engagement and that there is improved interaction among students and between students and the lecturer. Faculties expressed satisfaction about this teaching method because it shifted the burden of content learning to out-of-class preparation and in-class team problem solving.

However, students' evaluations were mixed, largely because of the increased emphasis on out-of-class studying. Some students said they preferred the lecture format. Some students expressed fear that the out-of-class learning without complementary lectures put them at risk of missing important content.

As with every teaching method, TBL has some limitations. It requires an initial time commitment from the lecturer to convert a course to implement TBL. It also requires more physical classroom space when compared to traditional methods, such as lectures. Students need physical space to move around and interact with team members (Mennenga & Smyer 2010:10).

TBL was initially developed for teaching business management and later applied in health science education. The purpose of this study was to explore TBL's application in a management module in the BPharm curriculum. The learning experiences of students were measured after the presentation of TBL. This information was used to develop guidelines on how to effectively implement TBL in pharmacy education to enhance effective student learning to prepare pharmacy students for the world of work.

1.3 PROBLEM STATEMENT

Current teaching methods used in most higher education institutions, which are teacher-centred and discipline based, do not challenge students to become more involved and self-directed in their own learning experience (Altintas *et al*. 2014:46). There is evidence that passive lectures provide a lower level of knowledge retention and cognition (Deslauriers *et al*. 2011:864) and it does not develop skills such as team work and problem-solving that is important for the workplace.

TBL as an active learning strategy may address these shortcomings. The primary learning objective of TBL is to go beyond simply covering module content but rather to focus on ensuring that students have the opportunity to practice using course concepts to solve problems (Michaelsen & Sweet 2008a:10). TBL is relevant to the teaching and learning of pharmacists because:

- Pharmacists are part of the health care team and thus prior training to develop team work is relevant;

- Pharmacists are constantly in interaction with colleagues and other health care providers, thus team work and problem-solving are relevant; and
- Pharmacists need to apply theoretical knowledge to day-to-day scenarios on patient health, thus TBL could assist in integrating theoretical knowledge (the curriculum) with practice.

To the knowledge of the researcher, no research on the implementation of TBL in a management module within a BPharm curriculum has been published in South Africa. This study intends not only to contribute to the field of health professions education research, but also to contribute to quality teaching and learning at the NWU and, as a result, to work towards the implementation and integration of this teaching strategy into the BPharm learning programme at the NWU and other higher education institutions in South Africa.

1.4 OVERALL GOAL OF THE STUDY

The overall goal of this study was to develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning. This investigation determined whether TBL as a teaching strategy increased students' understanding of the theoretical work presented in the module, facilitated a deeper understanding of the link between module content and practice, and whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving and precision, as required for pharmacists on a NQF level 8.

1.5 AIM OF THE STUDY

The aim of the study was to develop guidelines on how to effectively implement TBL in an undergraduate pharmacy curriculum to enhance student learning.

1.6 RESEARCH QUESTIONS

In order to address the problem statement, the following research questions were considered:

i. *How can TBL, as a teaching strategy in higher education, be conceptualised and contextualised in this study?*
ii. *What are pharmacy students' views of team work in the pharmacy profession before they are exposed to TBL?*
iii. *What are pharmacy students' learning experiences of the use of TBL in the management module of the BPharm curriculum after they were exposed to TBL?*
iv. *Does TBL as a teaching strategy in the management module of the BPharm curriculum increase pharmacy students' understanding of theoretical work (curriculum) presented in the module?*
v. *Does TBL allow students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, and precision, as required for pharmacists on a NQF level 8?*
vi. *How can TBL be implemented in pharmacy education to enhance effective student learning?*

1.7 OBJECTIVES OF THE STUDY

To achieve the aim and answer the research questions of the study, the following objectives were pursued:

i. To conceptualise and contextualise TBL as a teaching strategy in higher education via a literature study. This objective addresses research question i.
ii. To determine pharmacy students' views of team work in the pharmacy profession before they are exposed to TBL via written narratives and focus group interviews. This objective addresses research question ii.
iii. To determine pharmacy students' learning experience of the use of TBL in the management module of the BPharm curriculum after they were exposed to TBL via a questionnaire. This objective addresses research question iii.
iv. To identify via a questionnaire whether TBL as a teaching strategy in the management module of the BPharm curriculum increases pharmacy students' understanding of theoretical work (curriculum) presented in the module. This objective addresses research question iv.
v. To determine via a questionnaire whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation,

problem solving, and precision, as required for pharmacists on a NQF level 8. This objective addresses research question v.

vi. To develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning. This objective addresses research question vi.

1.8 RESEARCH DESIGN

1.8.1 Case study research design

Case study research is a systematic inquiry into the topic of interest to describe and explain the (single) phenomenon of interest, a particular or unique group of people or a specific social setting or event (Bromley 1990:302; McMillan & Schumacher 2014:370; Mouton 2001:149). Case study research involves extensive collection of data and multiple sources of evidence (Yin 2009:8). Using a constructivist perspective as the theoretical framework, case studies typically strive towards a holistic understanding of how participants relate and/or interact with each other given the specific situation and their understanding of the phenomenon under study (Nieuwenhuis 2016a:75). A great advantage of this research design is that the researcher can use multiple techniques in the data collection process, e.g. questionnaires, focus group interviews and documentation review (Yin 2009:8). The researcher determines in advance what research method will be used and what evidence will be gathered to answer the research question (Nieuwenhuis 2016a:83). Data gathered is largely qualitative but may include quantitative data, as will be the case in this study.

In this study, the particular or unique group of individuals was the undergraduate students registered for the management module in the BPharm curriculum in the Faculty of Health Sciences at the NWU for the year 2016. The focus was on one issue: to develop guidelines for TBL in an undergraduate pharmacy curriculum.

1.8.2 Mixed method research approach

Mixed method research is defined by Creswell (2015:537) as a procedure for collecting, analysing and mixing both quantitative and qualitative data in the study to better understand the research problem. The researcher includes quantitative and qualitative strategies in one study to collect both numeric (numbers) and text (word) data, either

concurrently or in sequence (Teddlie & Tashakkori 2009:28). It ensures that the best strategies are chosen to address the research question. In this study, both qualitative and quantitative methods were employed to gather the required data, namely written narratives (qualitative), focus group interviews (qualitative) and a questionnaire (quantitative).

Creswell and Plano Clark (2011:12) provide four main reasons for using mixed method research in a single study:

a. Use qualitative data to explain or elaborate on quantitative results;
b. Use qualitative data to develop a new measurement instrument or theory that is subsequently tested;
c. Compare the two different data sets to produce well-validated conclusions; and
d. Enhance the quality of a study with a supplemental data set.

In this study, written narratives and focus group interviews were used to develop the questionnaire to evaluate the impact of TBL (cf. 1.8.2(b)). Both qualitative and quantitative methods were used to enhance the quality of the study (cf. 1.8.2(d)).

There are four basic mixed method designs that are most frequently used by researchers: explanatory design, exploratory design, triangulation design and the embedded design (Creswell & Plano Clark 2011:68). In this study, exploratory design was used, allowing a researcher to first explore a topic by identifying qualitative themes from qualitative data collected and for that exploration to guide a subsequent quantitative investigation (Creswell & Plano Clark 2011:71). In this study, the research was conducted in three phases as indicated in Figure 1.1.

In the first phase, the qualitative results from the written narratives identified themes/topics used to establish the initial experiences of pharmacy students regarding team work in the pharmacy profession before exposure to TBL. During the second week of the semester, all students registered for the management module in the fourth year of the BPharm curriculum at the Potchefstroom campus of the NWU was invited to participate in writing a narrative regarding their experience of team work in the pharmacy profession.

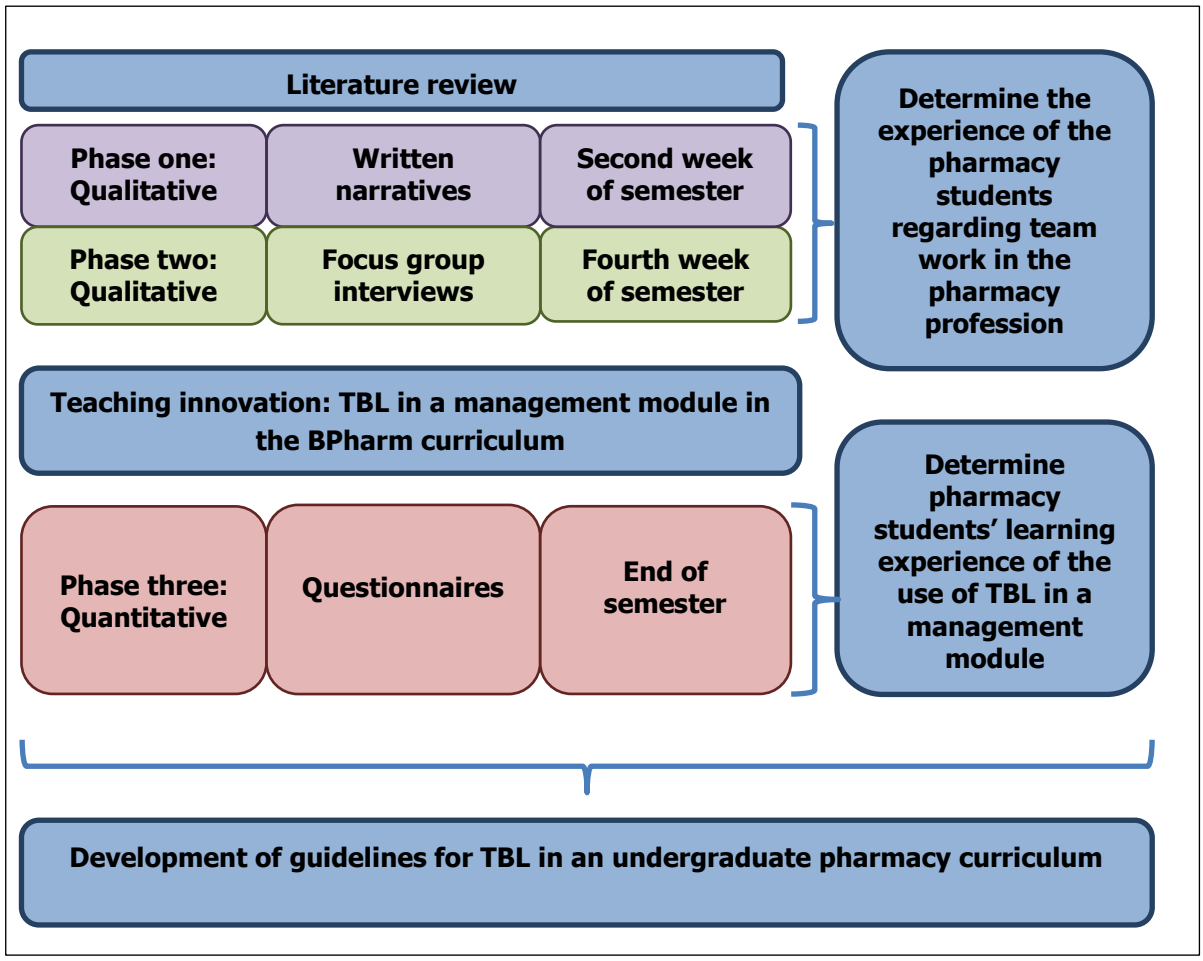

FIGURE 1.1: OVERVIEW OF THE THREE PHASES OF THE STUDY
[Compiled by the researcher, Eksteen 2015]

The written narratives were followed up with phase two, namely focus group interviews to explain the views of the students as presented in the written narratives according to the exploratory sequential design. Phase three consisted of a quantitative questionnaire given to all students at the end of the semester after exposure to TBL. The questions in the questionnaire were formulated using the data gathered in phase one and two as well as the literature review. The questionnaire was developed and tested during the pilot study (cf. 1.9.4.3). After all data were collected, the findings of all three phases were used to explore and explain the pharmacy students' experience of TBL. This information was used in combination with the information gathered from the literature review to develop guidelines for TBL implementation in an undergraduate pharmacy curriculum (cf. Chapter 7). Table 1.1 illustrates the three phases of the research study.

TABLE 1.1: PHASES IN THE RESEARCH STUDY
[Compiled by the researcher, Eksteen 2015]
(This table continues on the next page)

	QUALITATIVE PHASE ONE Written narratives	QUALITATIVE PHASE TWO Focus group interviews	QUANTITATIVE PHASE THREE Questionnaires
Purpose	Gain understanding; baseline for developmental and re-design process	Clarify findings of and gain deeper insight into written narrative data on students' view of team work at the beginning of the semester	Assess students' learning experiences of TBL at the end of the semester; determine if TBL increased understanding of module content; assess the development of generic skills
Population and sample	All students registered for the module who were willing to participate voluntarily in the study (N=200, n=65)	Randomised purposive sample of students (n=23); number of focus groups was determined by data saturation (not less than 3)	All students registered for the module who were willing to participate voluntarily in the study (n=183)
Instrument	Written narratives	Interview schedule	Structured questionnaire (developed and tested during pilot study)
Development of instrument	Topics emerging from literature review	Questions emerging from findings of phase one	Questions emerging from re-designing and development of course materials; literature review; phase one and two
Data analysis	Inductive coding of data; content analysis; organising themes; classifying main categories	Recording and transcribing interviews; deductive coding of data; organising themes; classifying main categories	Descriptive statistics; frequencies, mean values, standard deviation, factor analysis; Cronbach's alpha; nonparametric correlations, independent *t*-tests with Cohen's *d*-values.
Validation			Content validity – establishing whether data collected will be appropriate, meaningful and correct by statistician; Face validity – ritical evaluation of questionnaire by colleagues and experts in the field; Cognitive interviewing – critical evaluation

	QUALITATIVE PHASE ONE Written narratives	QUALITATIVE PHASE TWO Focus group interviews	QUANTITATIVE PHASE THREE Questionnaires
Validation *cont.*			of questions in the questionnaire for cognitive level and level of understanding by members similar to the target population but not part of the target population Construct validity – by statistician at NWU once questionnaire was compiled
Reliability			Factor analysis; Cronbach's alpha
Credibility	Spending extensive time in the field; member checking	Using thick description and feedback from students; using a variety of activities and instruments to collect data	
Transferability	Closely comply with the original theoretical framework to prove how data collected and analysis were guided by concepts and models	Closely comply with the original theoretical framework to prove how data collected and analysis were guided by concepts and models	
Dependability	Verification through step-by-step transcription of interviews; code-checking	Verification through step-by-step transcription of interviews; peer coding.	
Confirmability	Check by co-coder to ensure correctness (auditing)	Member checking	Analysis done by statistician (NWU)
Ethical issues	Ethics clearance number: ECUFS-107/2015 and NWU-00182-15-S1; information leaflet; informed consent form; voluntary participation; withdrawal at any stage with no harm; confidentiality of information	Ethics clearance number: ECUFS-107/2015 and NWU-00182-15-S1; information leaflet; informed consent form; voluntary participation; withdrawal at any stage with no harm; confidentiality of information	Ethics clearance number: ECUFS-107/2015 and NWU-00182-15-S1; information leaflet; informed consent form; voluntary participation; withdrawal at any stage with no harm; confidentiality of information

1.9 DESCRIPTION OF THE METHODS

1.9.1 Literature review

The aim of a literature review is to conceptualise a research problem and locate it in a body of theory. It also serves to put the researcher's efforts into perspective, situating the topic in a larger knowledge pool and creating a foundation based on existing, related knowledge (Fouché & Delport 2011:134). Mouton (2001:87) describes a literature overview as not a collection of texts but a body of accumulated scholarship. A researcher should learn from other scholars: how they have theorised and conceptualised issues, what instrumentation they have used and to what affect. Definitions of the subject, different hypotheses in the field of study, existing data and findings that have been produced by previous research, and measuring instruments (e.g. questionnaires) that have been developed are investigated. The above provides the necessary background and context to the stated problem.

In this study, the literature review was conducted in the form of a systematic review of the literature. A systematic review of research studies consisting of seven steps (ADA 2008:6; Melnyk & Fineout-Overholt 2005:116) was done to condense evidence on the specific topic through identifying, appraising and synthesising the studies to best answer the research question (Akobeng 2005:845; Whittemore & Knafl 2005:537).

According to Higgins and Green (2011:6), the characteristics of systematic reviews are:

- A clearly stated set of objectives with pre-defined eligibility criteria for the study;
- An explicit, reproducible methodology;
- A systematic search that attempts to identify studies that meet the eligibility criteria;
- An assessment of the validity of the findings of the included studies, for example through the assessment of bias; and
- A systematic presentation and synthesis of the characteristics and findings of included studies.

Health care professionals conduct systematic reviews for the following reasons (Khan, Kunz, Kleijnen & Antes 2003:4):

- Supporting evidence-based practice;
- Personal professional development;
- Informing clinical policy;
- Publishing in a peer-reviewed journal;
- Writing an introduction to research or a thesis;
- Preparing a presentation at a conference;
- A technical report; and
- An invented commentary.

In this case, a systematic review was conducted for the purpose of introduction to a doctoral thesis, publishing in an accredited, peer-reviewed journal and supporting evidence-based practice.

The main advantage of carrying out systematic reviews is that they allow the researcher to consider the whole range of relevant research outcomes on a particular topic, and not just the result of one or two studies (Akobeng 2005:845). As a result, systematic reviews lead to less bias and more generally applicable answers. They can be used to determine whether the findings are consistent and generalisable across populations, settings and treatment variations, or whether findings vary significantly.

A systematic review was used as study method and was discussed according to seven steps. These steps ensure a structured, systematic, detailed, comprehensive, rigorous search process, using rigorous methods and tools to select, critically appraise, summarise and communicate the best available evidence.

1.9.1.1 *Identifying and formulating the clear, focused review question (step 1)*

The review question guides the research and contains the core variables of the study, abbreviated as PICO, namely the population/patient(s), the intervention, the comparison intervention and the outcome(s) (ADA 2008:1; Aromataris & Pearson 2014:55; Kitchenham 2004:6; Melnyk & Fineout-Overholt 2005:30). For this study, the population was undergraduate health professions students, TBL was the intervention and the outcome(s) were best practices.

1.9.1.2 *Generating a search strategy, comprehensive identification and review studies' relevance (step 2)*

The search strategy includes the determination of search words, possible sources of studies such as databases and manual search, as well as formulation of inclusion and exclusion criteria (ADA 2008:16; Aromataris & Pearson 2014:55; Burns & Grove 2005:345; CRD 2009:9; Kitchenham 2004:7). In this step both published and unpublished primary studies related to the research question were searched for in multiple databases (cf. Article 1, Research methodology).

Specific keywords were used to search for research articles or research-related information applicable to the review question. The four core variables of the acronym PICO (cf. 1.9.1.1) guided the formulation of the search words. The words used for the variables as well as their synonyms were used as search words. Search words were combined and mixed and matched according to each specific database to find the best results and to ensure all areas of the literature were reached and explored. Where applicable, the search words were used in different categories to ensure that no data such as title, abstract and keywords were missed.

Different databases and catalogues were searched to increase the possibility that all relevant studies were included and to increase the sensitivity of the selection of all relevant studies applicable. The reference lists of key studies found were also searched to identify any studies missed during the search of the databases. The interlibrary loan facility was used to retrieve documents not obtainable from the local university's library.

For the research to be all-inclusive but precise and to exclude research material not applicable, specific pre-determined selection criteria were formulated to retrieve only studies relevant to the research question, therefore increasing the specificity of the search. The selection criteria consisted of inclusion and exclusion criteria which were used to prevent investigator bias (ADA 2008:16; Aromataris & Pearson 2014:55; Burns & Grove 2005:245; CRD 2009:9; Greenhalgh 1997:243; Kitchenham 2004:9). In this study, as many studies as possible relating to the research question were searched for. All qualitative and quantitative primary research studies in any language with an English abstract were included initially. Grey literature and unpublished studies such as conference proceedings and higher degree dissertations were also sought.

The inclusion criteria for studies were as follow:

- Studies in any health care profession;
- Studies on any health care professionals;
- Studies in higher education (post school education) in any country, subject, course, level or year group;
- Studies published after 1970 (after TBL was conceptualised by Michaelsen);
- Any study designs;
- Any studies in English;
- Any study on TBL and its use, implementation and effectiveness; and
- Studies describing validation of instruments or new technologies.

The exclusion criteria for studies were as follow:

- Research reports in non-English languages with no English abstract available;
- Duplicate reports on the same study;
- Non-research reports, letters and commentaries;
- Studies not including any of the components of TBL;
- Studies not related to health professions education;
- Studies that did not answer the research question; and
- Other small-group teaching methods.

1.9.1.3 *Executing the search and selecting the relevant studies (step 3)*

The search process was executed at four different levels to increase the specificity and sensitivity of the search. A scoping search was done by searching through the literature roughly by looking at different types of databases. The purpose of the scoping search was to see if the literature contained any valuable studies applicable to the research question.

After the initial scoping search, the formal search commenced. At the first level, the titles and abstracts of the studies selected were evaluated for duplication and their relevance to the review question. All the apparently relevant studies were documented for audit purposes. A second reviewer (the promoter of this study) also screened the titles and abstracts, and a list was compiled based on consensus between the researcher and the second reviewer. Next, abstracts of remaining studies included in the list were evaluated again according to the pre-determined inclusion and exclusion criteria at the second level

of evaluations. For all studies remaining, full text versions were obtained and thoroughly assessed according to the inclusion and exclusion criteria to produce a final list of studies found to be relevant to the research question. At a fourth level, the final list of studies was compiled for critical appraisal of the applicability and rigour (ADA 2008:15; Aromataris & Pearson 2014:55) (cf. Article 1, Research methodology).

1.9.1.4 *Performing the critical appraisal and evaluating the methodological quality of selected studies (step 4)*

The final list of studies was critically appraised for methodological quality and validity using the Johns Hopkins nursing evidence-based practice (JHNEBP) appraisal tool (Newhouse, Dearholt, Poe, Pugh & White 2007:84) (cf. Article 1, Research methodology). Studies were excluded during critical appraisal for one of two reasons: either the study did not meet the relevant cut-off point of the instrument used, or it had a serious defect such as, for example, ethical considerations not met (Burls 2009:online).

The process followed for critical appraisal of a study was to establish its methodological quality to determine the validity of the results. If the review was not conducted with methodological rigour, it is unlikely that the results will reflect the truth. Such studies were therefore not taken into account, or the deficiencies were considered. The studies that were included after critical appraisal served as the final sample for the next step.

The reviewer (the researcher of this study) conducted a critical appraisal of the selected studies and consensus was reached regarding the different critical appraisal mark allocation after the second reviewer (the promoter of this study) performed a 5% quality check (ADA 2008:21; Aromataris & Pearson 2014:56; Kitchenham 2004:15). Studies were included with a score of 9/10 and above when JHNEBP appraisal tools were used or marks were converted to a mark out of 10. This score was used to ensure that only high quality research studies were included. The total marks of the appraisal tools were adjusted according to the relevant items for each study as some questions (items) were not applicable to certain studies.

1.9.1.5 *Extracting the data and summarising all relevant studies (step 5)*

Findings relevant to the research question were selected and extracted from individual studies. These findings were drafted in table format which makes for easier comparison

between studies (ADA 2008:52). Data extraction tools were designed to ensure that all relevant data were collected, to allow the accuracy of the data to be checked and to serve as a record for the extracted data (O'Mathuna, Fineout-Overholt & Kent 2008:103). Two data extraction tools were designed to capture data extracted according to study demographics (health profession, country, subject, period of TBL implementation, length of TBL session, year/level and staff resources) and according to TBL essential principles (team formation, team size, assigned reading, readiness assurance test (RAT), peer assessment, immediate feedback, appeals, session conclusion and application exercises) (cf. Article 1, Results).

1.9.1.6 *Synthesising the findings (step 6)*

A thematic analysis and synthesis was done by combining and comparing the findings of the final studies (cf. Article 1, Interpretation of results), looking for similarities and differences and identifying consistent or inconsistent results among the studies to summarise the best practice for implementation of TBL (ADA 2008:33; Aromataris & Pearson 2014:56; Kitchenham 2004:18). From the data extraction tools, shared themes and sub-themes were identified.

1.9.1.7 *Formulating the conclusion statement (step 7)*

After conclusions were drawn from each theme and/or sub-theme individually, key conclusion statements were formulated (ADA 2008:38; Aromataris & Pearson 2014:56; Kitchenham 2004:22) by integrating all the findings with supporting evidence and clearly identifying what the results informed the researcher of (cf. Article 1, Conclusions and recommendations). By performing this structured review of the literature, a comprehensive overview of TBL as a teaching strategy in undergraduate health professions education was achieved (cf. 1.7(i)).

1.9.2 Phase one: written narratives

The word *narrative* comes from the verb "narrate" which means "to tell (as a story) in detail" (Oxford English Dictionary 2015:online). Narrative research is used when individuals or participants in the research study are willing to tell their stories, and these stories are used as data. Narratives provide practical, specific insight into personal

experiences of the individual/participant (Creswell 2015:504) and, in return, make the individual/participant feel that their stories are important and heard.

When designing narrative research, the researcher needs to consider what type of narrative to conduct. Firstly, it is important to determine who writes or records the story. Because the participating students in this study wrote their own narratives, Connelly and Clandinin (1990:7) would classify them as autobiographies. Secondly, it is important to clarify how much of a life will be recorded. In this study, the students only wrote about their individual, personal experiences regarding team work in the pharmacy profession. Because these personal experience stories were not their whole life story, the narratives cannot be classified as autobiographies according to Botma, Greeff, Mulaudzi and Wright (2010:194) and Denzin (1989:44). Thirdly, the researcher must consider who provides the story. In this study, the focus was on student stories and not on the lecturer's. Lastly, the researcher needs to decide on the theoretical lens being used. In this study, the guiding perspective that provided structure was teaching-learning with the focus on active learning and its improvement in the classroom setting.

1.9.2.1 *Target population*

A target population consists of a group of individuals who has and shares certain specified characteristics (Arkava & Lane 1983:27; Burns & Grove 2005:236; Fraenkel, Wallen & Hyun 2015:93). In this study, the target population was all fourth-year students registered for the management module in the BPharm curriculum on the Potchefstroom campus of the NWU for the year 2016 (N=200). All registered students were invited to participate in the study.

1.9.2.2 *Description of sample and sample size*

The sample was the total number of all current, active, registered undergraduate students for the module who were willing to participate in the study voluntarily. Sarantakos (2013:168) describes some reasons for sampling:

- It is not always feasible to cover the total population;
- Even if it is feasible to cover the total population, there are major time and cost considerations to do so; and

- If the total population is included in the study, it will produce a massive amount of data, which could be difficult to process, analyse and interpret.

For phase one of this study, the target population was easily accessible and there was not a big difference in time and cost to collect the data from the whole target population versus only a sample population. The processing, analysis and interpretation of the collected data were also easily manageable.

Although all students in the target population were invited to participate in the study, particularly phase one and three, not all students agreed to participate and/or give consent that their data may be used. Only 65 students gave informed consent that their written narratives may be included and analysed for research purposes, who therefore formed the sample for phase one.

1.9.2.3 *Data collection*

Data were collected by means of written narratives. The students were requested to write a single narrative regarding (a) the importance, (b) the relevance and (c) their experience of team work within the pharmacy profession (cf. Appendix A1). Narratives were hand written. The topic was presented in writing in both Afrikaans and English on a data projector. Each student present on the particular day in the second week of the first academic semester of 2016 was invited to participate in the study and received an information leaflet (cf. Appendix C1-1 for English & Appendix C1-2 for Afrikaans). An independent person explained the process, benefits and risks (cf. 1.11.5) to the students after which they were requested to sign an informed consent form (cf. Appendix C2-1 for English & Appendix C2-2 for Afrikaans). Each student who gave informed consent received a coloured A4 paper on which they wrote the narrative. Students who formed part of the target population but who did not attend that particular class did not have the opportunity to participate in phase one of the study.

1.9.2.4 *Data analysis*

Nieuwenhuis (2016b:104) explains that, in the analysis of narratives, the researcher traces sequences, chronology, stories or processes in the data. In most narratives, meaning is conveyed at different levels. Content analysis can be done to determine trends

and patterns from the data presented in the narratives (Mayring 2000:online; Nieuwenhuis 2016b:111).

Bogdan and Biklen (2007:173) explain the process of coding in three steps. The first step involves searching through the data for repetitive words, phrases and patterns. The second step involves writing down words and phrases to represent the topics and patterns. These topics and patterns form the coding categories. The third step involves sorting material according to these coding categories.

In this study, a process of inductive coding was applied. Organisation of data started with the removal of all the unfilled coloured forms from the collection box. A number was then allocated to each of the 65 narratives. By reading through the data, an overview of the information was formed keeping in mind who wrote it, what the purpose of the narratives was and what the three main questions of the narratives were. Using the three main questions (cf. Appendix A1) as the original main categories, the data were approached from an inductive perspective by the co-coder (co-promoter of this study). This includes open coding, creating categories and abstraction, all of which are not done according to pre-identified themes or concepts (Elo & Kyngäs 2007:109) but according to themes and/or concepts that appear as the data is analysed. Each narrative was analysed by identifying the main theme in the sentence/paragraph and allocating a code to the theme (e.g. "importance of team work: less mistakes" or "importance of team work: support"). These themes were expanded as new themes emerged during the analysis. The promoter did code-checking for dependability, a form of reliability in qualitative data coding (Delport & De Vos 2011:48). Since the written narratives were hand written, the researcher, who was also the lecturer of the module, was not allowed to participate in this process of coding due to ethical considerations.

1.9.2.5 *Data interpretation and reporting*

During the analysis, it became clear that the students understood *importance* and *relevance* as the same concept, as many of the themes identified under the one was applicable to the other also. It was then decided to combine *importance* with *relevance*, resulting in only two main themes with sub-themes. The interpretation of the data was used to determine how students experienced team work before they were exposed to TBL

in the module (cf. 1.7(ii)) and to formulate the questions used in the focus group interviews (cf. Article 2, Methods).

1.9.3 Phase two: focus group interviews

Focus group interviews include a group of participants with a common characteristic to the research topic, who focus on the topic of discussion to provide the researcher with a better understanding of how people feel or think about something (Greeff 2011:360). It is possible that a wider range of responses, activating forgotten details or experiences and releasing inhibitions, may be collected during focus group interviews (Nieuwenhuis 2016a:95). Focus group interviews have the potential to provide data rich in detail as participants build on each other's ideas and comments, providing an in-depth view on the topic that cannot necessarily be achieved in other research methods such as questionnaires (Nieuwenhuis 2016a:96). Focus group interviews are focused on a specific research topic, and both debate and conflict are encouraged to provide as much insight as possible into the experience of the participants on the topic of discussion.

There are three general uses for focus group interviews, as explained by Morgan (1997:2):

- It can be used as the principal source of data (self-contained);
- It can be supplementary to another primary method e.g. questionnaire; or
- It can be used in a multi-method design with no specific primary method.

In this study, the focus group interviews provided deeper and more in-depth insight on data collected from the written narratives of phase one.

1.9.3.1 *Target population*

Like with phase one of this study (cf. 1.9.2.1), the target population were all fourth-year students registered for the management module in the BPharm curriculum on the Potchefstroom campus of the NWU for the year 2016 (N=200).

1.9.3.2 *Description of sample and sample size*

It is suggested that between three and five focus group meetings (Greeff 2005:306; Morgan 1998:77) with between six and ten participants in each (Greeff 2011:366; Morgan

1998:71) are enough to reach data saturation. It is important that if there is no repetition after the fourth focus group interview, one more focus group interview is needed (Greeff 2011:367).

Randomised purposive sampling is employed when there is a very large pool of potential information-rich cases and no obvious reason to choose one case over another (Sandelowski 2000:249; Strydom 2011:226). In phase two of the study, a sample of pharmacy students registered for the module was selected by randomized, purposive sampling. All students included in the target population were equally competent to participate in the focus group interviews as it was assumed that they all have had the same educational experience while studying towards this degree. Participants were asked during phase one to indicate whether they were willing to participate in phase two by indicating it on the informed consent form (cf. Appendix C2-1 for English & Appendix C2-2 for Afrikaans). Only the participants who indicated their willingness were contacted to participate in phase two.

A total of 36 students indicated that they may be contacted for participation in the focus group interviews. The independent person contacted all students via email. From these students, eight indicated that they would like to withdraw from this research phase and do not want to participate in the focus group interviews anymore. Another one did not respond to the communication. This student was followed-up with another email but no further actions were taken thereafter. This resulted in 27 students who were scheduled to participate in the focus group interviews but only 23 students attended the interviews.

1.9.3.3 *Data collection*

Each of the focus group interviews was facilitated by an independent facilitator so that no student felt pressured or intimidated by the presence of the researcher, who was also the lecturer of the module. The focus group interviews were scheduled during the fourth week of the first semester of 2016, after the written narratives had been collected and analysed. Students who agreed to participate in the focus group interviews had the opportunity to decide which of the three scheduled session they want to attend according to their personal schedules.

The facilitator welcomed all participants to the focus group interview and explained the purpose of the session as well as its benefits and risks (cf. 1.11.5) so that participants felt at ease (Greeff 2011:371). After the brief introduction, the facilitator guided the participants through the process and the questions (cf. Appendix A2), ensuring that all participants contributed to the discussion. Students were asked to voice their opinions and thoughts regarding: (a) how they can contribute to the effective functioning of the health professions team? (b) what competencies do they need to develop at university to help them function in a health professions team? and (c) how can training at university prepare them to function effectively in a health professions team? With consent, all interviews were video- and audio recorded to ease the transcribing process. After transcribing, the recordings were stored in a secure, locked cupboard to ensure confidentiality (cf. 1.11.4). At the end of the session, the focus group interview facilitator summarised the main topics briefly before thanking the participants for their attendance.

The video- and audio recordings were transcribed by an independent transcriber to protect the identity of the participants (cf. 1.11.4) before data analysis commenced. All the focus group interviews were conducted in Afrikaans which was the preferred language mutually agreed to by each group's participants. The focus group interviews were accordingly transcribed in Afrikaans. Only quotations from the transcribing used in Article 2 were translated into English (cf. Article 2, Results). As soon as data had been transcribed, the original recordings were deleted (cf. 1.11.5.2).

1.9.3.4 *Data analysis*

The aim of the analysis was to identify trends and patterns among the various focus groups (Greeff 2011:373). When analysing focus group interviews, it is important that the focus is on words, context, internal consistency, frequency of words/phrases, specificity of words/phrases, etc. (Krueger 1998:31; McMillan & Schumacher 2014:398). In this phase, deductive reasoning was applied where a sample was observed (e.g. during focus group interviews) and these observations were used to draw conclusions about the population from which the sample comes (Leedy & Ormrod 2016:18; Neuman 2014:48).

The coding was done by the researcher and the co-promoter (co-coder). In qualitative research, it is advised that the co-coder be someone close to the researcher/study and deeply involved in the research to ensure that the co-coder truly understands the

research to produce quality coding. The co-promoter of this study therefore acted as the co-coder of the qualitative data. Because all qualitative data from narratives and focus group interviews were transcribed and anonymous and because the co-coder has no involvement in the actual data collection, it did not present an ethical problem or conflict of interest. The promoter of this study was the independent co-coder and confirmed coding done by the researcher and co-promoter afterwards for quality assurance and accuracy.

1.9.3.5 *Data interpretation and reporting*

The data from the focus group interviews gave deeper insight into the students' experience of team work in the pharmacy profession (cf. 1.7(ii)) and thus also clarified data from phase one. Repetition of answers for all three questions indicated data saturation. From this data, a broad view was formed on how students think pharmacists can contribute to the health professions team, what competencies they need to develop at university and what academic training components were regarded as valuable or less valuable in preparation for being part of the health professions team (cf. Article 2, Discussion). From this data, several areas of tertiary training in need of improvement and gaps in approaches to team work were identified and brought to the attention of the researcher, which was not known before.

1.9.4 Phase three: questionnaires

McMillan and Schumacher (2001:602; 2014:253) describe survey research as the assessment of a known population by means of questionnaires. A questionnaire is effective to obtain facts and opinions about the phenomenon under study from people who are informed on the particular issue (Delport & Roestenburg 2011:186). Babbie and Mouton (2001:233) and McMillan and Schumacher (2014:253) explain that questionnaires not only consist of a collection of questions but also just as many statements, especially if the researcher wants to determine the particular extent to which the participant holds an attitude or perspective.

There are different types of delivery of questionnaires: mailed/postal, telephonic, hand-delivered, electronic, face-to-face and group administrated (Maree & Pietersen 2016:175). In this study, the questionnaire used in phase three was completed individually by the

students during a scheduled class period towards the end of the first semester of 2016. This process was not repeated and only students present in class had the opportunity to participate in this phase of the study.

An advantage of this face-to-face approach was that it was time and cost effective (Delport & Roestenburg 2011:189; Maree & Pietersen 2016:177), e.g. finding a suitable venue for the completion of group-administered questionnaires was not a problem. A disadvantage of this method was that participants in this survey might have experienced difficulty understanding certain questions and instructions but were too embarrassed or shy to ask for clarification in a group (Delport & Roestenburg 2011:189). This potential disadvantage was overcome as participants could, after the independent person explained the process to the group, put up their hands and the independent person came to the participant privately to answer any questions. If the independent person felt that the problem could be common among other students, she announced and explained it to the whole class.

The aim of the questionnaire was to explore students' views and learning experiences regarding TBL and whether TBL as a teaching strategy contributed to their understanding of theoretical work presented in the module. The questionnaire also investigated whether students developed generic skills (time management, team work, communication, leadership, change, innovation, problem solving and precision) as required for pharmacists on a NQF level 8.

The questionnaire was designed to include both quantitative and qualitative aspects by using both closed and open-ended questions. The questionnaire was compiled based on the literature on TBL and skills development as well as the information gathered in the written narratives and the focus group interviews.

1.9.4.1 *Target population*

Similar to phase one and two (cf. 1.9.2.1 & 1.9.3.1), the target population for phase three was all fourth-year students registered for the module in the BPharm curriculum on the Potchefstroom campus of the NWU for the year 2016 (N=200). All registered students were invited to participate in this phase of the study.

1.9.4.2 *Description of sample and sample size*

Although all students in the target population were invited to participate in phase three, not all students agreed to participate and/or gave consent that their data may be used in this research study. The sample population for the survey was 183 participants.

1.9.4.3 *Pilot study: developing and testing the questionnaire*

Developing and testing a questionnaire through a pilot study before it is utilised in the main investigation is of upmost importance, especially for newly constructed questionnaires (Delport & Roestenburg 2011:195). Errors in content and/or clarity of questions have to be detected before the questionnaire is administrated to the participants. A pilot study improves the face and content validity of the questionnaire by providing the questionnaire to similar respondents (who are not part of the study population) to check for the correct reading level and to experts to assist in improving the content (Delport & Roestenburg 2011:195). Both similar respondents and experts should complete the questionnaire rather than just read through it, as a question may seem straight forward but it may, in fact, not be answerable (Babbie 2016:259; McMillan & Schumacher 2014:255).

To understand how different cultures experienced the diversity in the teams, it was necessary to know from the data whether different cultures participated in the study and were included in the study population and data. It was important to know whether the data represented the opinion of study participants from different cultures or only from one culture. For this reason, demographic data regarding ethnicity was also collected.

The questionnaire was developed by using data collected during phase one and two of this study as well as all literature obtained during the literature review. Questionnaires and surveys published in these studies were reviewed for relevant questions that were included in this questionnaire. The questions were grouped according to learning experiences, understanding of module content and development of skills. Two questions were developed by the researcher for the purpose of developing the guidelines which formed part of the objectives of this study (cf. 1.7(vi)).

For the purpose of this study, the questionnaire was administered to respondents similar to the target population and to experts. A few first year post-graduate pharmacy students, who were not enrolled in the module in 2016 but completed the module in 2015, completed the questionnaire through a cognitive interview with the researcher, as described by Wills (2005:34). The researcher asked each question of the questionnaire to the similar respondent to see whether the potential respondent (1) understood the question in general, (2) understood all the words in the question, (3) could provide the relevant answer(s), and (4) could provide any advice on whether the question should be restructured, rephrased or can stay as is. The same questionnaire was also administered to five experts in the field of health professions education (HPE) and pharmacy, e.g. senior lecturers and colleagues at the NWU and/or the University of the Free State (UFS). In both cases, they were asked to give their opinion on aspects such as:

- The clarity and distinctness of the questions;
- The amount of time needed to complete the questionnaire;
- Any bias that may be created by the questions; and
- Any other suggestions and/or recommendations.

The completed questionnaires from similar respondents and experts were captured in the same way as the data from participants would be. In this way, the researcher made sure that the data from questionnaires could easily be transferred into electronic data sheets for statistical analysis. All feedback from similar respondents and experts was included in the questionnaire to improve the quality after which it was sent to a statistician for final evaluation on face and content validity.

1.9.4.4 *Data collection*

All students were invited to complete the questionnaire (cf. Appendix A3-1 for English & Appendix A3-2 for Afrikaans) regarding their experience of TBL in the specific module. Each student present in class on that particular day towards the end of the first academic semester of 2016 was invited to participate in phase three of the study. An independent person explained the process, benefits and risks (cf. 1.11.5) to the students after which their informed consent was obtained (cf. Appendix C3-1 for English & Appendix C3-2 for Afrikaans). Each student who gave written informed consent (cf. 1.11.3) received a questionnaire. Students who formed part of the target population but who did not attend

this particular class did not have the opportunity to participate in this phase of the research study. The questionnaire took 20 minutes to complete. All data were collected anonymously and handled confidentially (cf. 1.11.4). As an incentive for participation in completion of the questionnaire, ten gift vouchers of the value of R50 each was selected via a lucky draw from the completed informed consent forms (cf. Appendix D2-3).

1.9.4.5 *Data analysis*

The quantitative data were analysed by the Statistical Consultation Service, NWU, by using descriptive statistics, including frequencies and percentages, means and standard deviations (SD), exploratory factor analysis (EFA), Cronbach's alpha, confirmatory factor analysis (CFA), correlations and independent *t*-tests with Cohen's *d*-values.

The descriptive statistics provided the frequency (n) and percentage (%) of the biographical data, namely the age, gender and ethnicity as collected in Question 1 of the questionnaire. For each of the items in Questions 3, 4 and 5, the frequency (in percentage), mean (out of four) and standard deviation were calculated. For Question 6, only frequencies were calculated as students were instructed to select more than one square for each question.

Questions 3, 4 and 5 were analysed separately from each other. For each question, a full factor analysis was performed. Since this was a newly developed questionnaire, EFA was used to explore the structure of constructs within the data. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted to determine whether there was sufficient data available for each specific analysis, which should be more than 0.7 (Field 2014:685). The Bartlett's test of sphericity determined whether there was enough correlation between items, which should be more than 0.05 (Field 2014:685). The determinant was calculated to confirm that there was not too much correlation between items, which should be greater than 0.00001 (Field 2014:685).

For each of the three questions mentioned above, the loadings in the pattern matrix group certain questions together. This grouping was confirmed with Cronbach's alpha to indicate internal reliability, which should be more than 0.7 (Pietersen & Maree 2016:239). A CFA by means of a structural equation model (SEM) using Amos 23.0.0 (build 817) was used to test the fitness of the model resulting from the above-mentioned analysis. Several

goodness-to-fit statistics, which consisted of different measures, was used to determine how well the covariance structure predicted by the factors resulting from the model corresponded to the covariance structure in the data (Cao 2011:73-93). Three different categories were used to assess model fit, namely Chi-square test statistics, comparative fit index (CFI) and root mean square error approximation (RMSEA).

For each factor identified from Questions 3, 4 and 5, nonparametric correlations were calculated between each factor and age. Independent *t*-tests with Cohen's *d*-values were calculated for each factor with gender and ethnicity. The Mann-Whitney test was used to analyse each factor with ethnicity.

The qualitative data from the questionnaire (Question 2) were analysed by the researcher. Themes were formed into specific categories after reading, identifying and summarising concepts, similar to what was done for phase two (cf. 1.9.3.4). An initial deductive coding process was conducted by the researcher and co-coder (the co-promoter), and code-checking for dependability (a form of reliability in qualitative data coding) was done by the promoter.

1.9.4.6 *Data interpretation and reporting*

The analysis of the biographical data (Question 1) provided context for the student profile who participated in this research phase. The sample population was representative of the target population in terms of age, gender and ethnicity, according to the Pearson's chi-square test that was greater than 0.05.

The data analysed from Questions 3, 4 and 5 provided insights into the learning experiences of students after being exposed to TBL (cf. Article 3, Results), the promotion of deeper learning when using TBL (cf. Article 4, Results) and whether essential generic skills are developed with TBL (cf. Article 5, Results and discussion).

Data from Question 2 (qualitative) and Question 6 (quantitative) of the questionnaire were used in the formulation of the guidelines (cf. Chapter 7) and are included as an appendix (cf. Appendix A4-1 for Question 2 & Appendix A4-2 for Question 6).

1.9.5 Development of guidelines

From all formal literature, it was clear that TBL consists of several essential components which each contribute a specific aspect to TBL. Although TBL was implemented previously in undergraduate pharmacy education internationally, no studies were found of its implementation in a management module in a BPharm curriculum in South Africa, a country whose diverse cultures bring unique challenges to the TBL table.

After a comprehensive literature review and the results of the three research phases, guidelines were developed on how to effectively implement TBL in pharmacy education to enhance student learning. It was done by identifying current best practices in the literature study as a result of previous research done on TBL in health professions education and higher education. Data from the three research phases as collected during this research study highlighted some critical pitfalls and success factors for the implementation of TBL in pharmacy education specifically. During phase three of the research, Questions 2 and 6 of the questionnaire were included to evaluate students' specific experiences of the different components of TBL. This data were not included in any of the articles prepared and was included in chapter 7.

1.10 QUALITY AND RIGOR OF THE STUDY

To assess the quality of qualitative research, as used in phase one and two, the trustworthiness of the data must prove to be high. When assessing the quality of quantitative research, as used in phase three of this study, the validity and reliability of data must prove that the measuring instrument did test what it was supposed to and that it is repeatable in similar conditions. The criteria for ensuring the quality of qualitative and quantitative data are summarised in Table 1.2.

TABLE 1.2: SUMMARY OF QUALITY CRITERIA FOR QUALITATIVE AND QUANTITATIVE RESEARCH
[Compiled by the researcher, Eksteen 2015]

QUALITATIVE RESEARCH	QUANTITATIVE RESEARCH
Credibility/authenticity	Internal validity Face validity Content validity
Transferability	External validity/generalisability
Dependability	Reliability Internal reliability
Confirmability	Objectivity

1.10.1 Quality of qualitative approaches

Trustworthiness is best defined as the "believability" of a researcher's findings (Golafshani 2003:597). There are four criteria for the evaluation of the quality (trustworthiness) of qualitative research: credibility, transferability, dependability and confirmability. A qualitative study cannot be called transferable unless it is credible, and it cannot be deemed credible unless it is dependable (Babbie & Mouton 2001:277).

Credibility in relation to qualitative research refers to the level to which research was conducted in such a manner as to ensure that the subject was accurately identified and described (Schurink, Fouché & De Vos 2011:419). In this study, several provisions were made by the researcher to promote confidence that the subject was accurately recorded (Shenton 2004:64):

- A comprehensive literature study (cf. 1.9.1) was conducted after approval of the research protocol and before the collection of any data to ensure the subject was correctly identified and described;
- All possible previous research findings were evaluated to ensure that the study was in line with what was done before and to avoid potential pitfalls;
- Only well-established research methods were used/adopted and the correct/known procedures were followed;
- Different methods were used to confirm data, e.g. after the narratives (phase one), focus group interviews (phase two) were conducted to confirm data collected in phase one (cf. 1.9.3);
- Randomised purposive sampling was used to determine the participants for the focus group interviews (cf. 1.9.3.2);

- Member checking was included in the method of research for phases one and two to increase credibility and it was executed by the promoter (cf. 1.9.2.4 & 1.9.3.4);
- An early relationship was developed with the participants to establish a relationship of trust. This research study was introduced to the target population before data collection and the information leaflet (cf. Appendix C1-1 for English & Appendix C1-2 for Afrikaans) was distributed so that all members of the target population familiarised themselves with the aim of the study and their role in the study;
- Participants had the choice to participate in this research project or not, and they were not discriminated against if they decided not to participate (cf. 1.11.5.2). This was highlighted in the informed consent form (cf. 1.11.3) which participants signed before participating in a phase of the research study. All data collected were anonymous, thus there was no means of identifying students afterwards (cf. 1.11.4), ensuring honesty in participants;
- There were frequent debriefing sessions between the researcher and her promoters to ensure all processes were according to approved methods;
- There was opportunity for scrutiny of this research study by colleagues, peers and academics during the Evaluation Committee (UFS), Health Science Research Ethics Committee (HSREC, UFS) (cf. Appendix D1-1, Appendix D1-2 & Appendix D1-3) and Health Research Ethics Committee (HREC, NWU) (cf. Appendix D2-1, Appendix D2-2, Appendix D2-3 & Appendix D2-4) to enable the researcher to refine the methods, develop greater explanation of research design and strengthen arguments based on comments made. This research was also presented at conferences during the duration of the study for the same reasons (cf. Appendix E1-1 & Appendix E1-2); and
- The researcher had the necessary qualifications and experience to ensure credibility to the research project, as evident from publications and presentations from previous research studies (cf. 1.11.1).

Transferability refers to whether the findings of a research study can be transferred to other settings and the probability that the study findings will still be true and valid (Schurink *et al.* 2011:420). To overcome potential weaknesses in this study, the researcher closely complied with the original theoretical framework to prove how data collection and analysis were guided by concepts and models. It was important to give a rich description of the subject under investigation so that other researchers might have a proper understanding of it, including the following (Cole & Gardner 1979:167; Marchionini & Teague 1987:139):

- The number of organisations taking part in this study and where they are based: this study was conducted in one higher education institution in South Africa;
- Any restrictions in the type of people who contributed data: only participants registered for a fourth-year management module in 2016 were included;
- Number of participants involved in the fieldwork: the researcher was assisted by a mediator, independent person and facilitator to assist with data collection in the three phases;
- Data collection methods used: written narratives (cf. 1.9.2), focus group interviews (cf. 1.9.3) and questionnaires (cf. 1.9.4);
- Number and length of the data collection sessions: written narratives were collected in one single session of 10 minutes, data in focus group interviews were collected in three separate sessions of 45 to 60 minutes each, and questionnaire data were collected in a single session of 20 minutes (cf. Appendix C1-1(4) for English & Appendix C1-2(4) for Afrikaans);
- Time period over which data were collected: first semester of 2016.

Others researching in those same parameters can then decide whether or not the case described can be generalised for their research study (Schurink *et al.* 2011:420; Shenton 2004:70).

Dependability determines whether the research process is logical, well documented and audited (Schurink *et al.* 2011:420). The researcher achieved this criterion by documenting all processes and actions step by step in detail so that future researchers may repeat it (Shenton 2004:71). To ensure that proper research practices had been followed, this research report includes a description of the research design and its implementation, the exact procedure during data collection and the evaluation of the effectiveness of the process of inquiry undertaken (Shenton 2004:71).

Confirmability refers to the objectivity of the analysis and interpretation of the data (Klopper 2008:69; Shenton 2004:72). The researcher must be able to provide evidence that links the data and its interpretation by means of auditing. In this study, the process followed during the three data collecting phases (narratives, focus group interviews and questionnaires) strengthened the confirmability of the results. Data were analysed by either a statistician (quantitative data) or the researcher under direct supervision of the

promoters (qualitative data). The researcher's interpretation of the findings was also checked by the promoter to ensure correctness (Van Breda 2005:6).

1.10.2 Quality of quantitative approach

Validity is defined as the extent to which the instrument measures what it purports to measure (Babbie 2016:148; Leedy & Ormrod 2016:96; Pietersen & Maree 2016:239) or how truthful the research results are (Salkind 2014:173). There are four categories for validity: face, content, criterion and construct validity (Delport & Roestenburg 2011:173; Pietersen & Maree 2016:248).

In this study, internal validity was established for phase three by providing a detailed outline of how the quantitative measuring instrument (questionnaire) and data were analysed and interpreted (cf. 1.9.4.5 & 1.9.4.6). Validity was increased by conducting a pilot study on the newly constructed questionnaire (cf. 1.9.4.3). The validity of the questionnaire was increased with a comprehensive literature review, data from the written narratives and focus group interviews used to create the questions as well as the pilot study.

In this study, face validity was assured by experts in pharmacy and health professions education evaluating the questionnaire. Content validity was done by the statistician prior to dissemination of the questionnaire to the study participants (cf. 1.9.4.3). After data collection, the statistician calculated construct validity (cf. 1.9.4.5).

A measuring instrument is **reliable** if the same instrument produces the same findings if it is used at different times or for different subjects from the same population (Delport & Roestenburg 2011:177; Pietersen & Maree 2016:238). There are several procedures to establish reliability of an instrument: test-retest, equivalent form (or alternate-form), split-half technique and internal reliability using the Cronbach's alpha coefficient.

In this study, reliability was established for phase three by providing a detailed outline of how the quantitative measuring instrument (questionnaire) and data were analysed and interpreted (cf. 1.9.4.5 & 1.9.4.6). The reliability of the questionnaire was ensured through well-structured questions (from the literature review and data of phase one and two), conducting a pilot study (cf. 1.9.4.3) and calculating Cronbach's alpha.

1.11 ETHICAL CONSIDERATIONS

1.11.1 The role of the researcher

The researcher is a senior lecturer in the School of Pharmacy at the NWU and a registered pharmacist with the SAPC. She obtained a BPharm degree in 2006 and a Masters of Pharmacy (MPharm) degree in 2008. After working in the public health sector as a community service pharmacist for one year and in private sector as retail pharmacist for almost two years, she returned to the academy.

The study was done in collaboration with two promoters. The promoter is the previous head of the division Health Science Education at the UFS. The co-promoter is an experienced researcher in teaching-learning and is the head of Health Professions Education at the NWU. Advice was obtained regularly from both promoters.

The researcher is a female, teaching BPharm fourth-year students in a permanent appointment with five years' experience at this higher education institution, and the influence of personal experience and subjective judgement in research was recognised. Measures to forestall or overcome excessive subjectivity was in place and the researcher was as far as possible neutral during the data collection and analysis process. To achieve the aims of the research and to adhere to ethical considerations, the researcher did not participate in person in any data collection phase of this research study as the researcher was also the lecturer for the module where TBL was implemented. The participants (students) were fully informed in advance of the role of the researcher in this research study.

The researcher conducted a quantitative study during her MPharm degree where data were collected via a self-constructed questionnaire. The researcher had experience in developing a questionnaire and performing a pilot test to enhance face and content validity. The researcher attended two bio-statistic courses on quantitative data analysis.

The researcher had previous experience of qualitative data collection techniques that included observing the co-promoter when collecting narrative data and performing focus group interviews. The researcher had also attended a research methodology workshop of the faculty regarding coding of qualitative data. The researcher and the promoters were

acquainted with the qualitative research methodology, and if any uncertainty occurred, advice and guidance were obtained from an experienced and knowledgeable qualitative researcher.

The researcher consulted with her co-promoter who was versed in qualitative methodology when interpreting the qualitative data. The initial findings were discussed with the promoter and co-promoter before being documented and finalised. However, there was also tensions and issues in ethical and methodological matters (Atkins & Wallace 2012:48) that needed to be considered such as the anonymity and privacy (Drew, Hardman & Hosp 2008:72) of participants and conflicts in institutional practice. The researcher therefore consciously aimed at professionalism in the continuum between being an insider or an outsider since there are advantages and disadvantages to both (Atkins & Wallace 2012:48).

The researcher declared beforehand to all role players and participants that she was the lecturer in the module used to implement TBL in the BPharm curriculum and that she wanted to do research on her own teaching practices (as customary in the scholarship of teaching and learning (SoTL)) and that she engaged not only as the researcher but also as the lecturer. SoTL research focuses on where the researcher is in the classroom researching his/her own teaching practices and/or student learning. This research study was thus not uncommon for educational research.

However, the researcher used several precautions to limit her conflict of interest and the potential power relation by implementing the following:

- A **gatekeeper**, who was not a member of the research team and not involved in the teaching and/or administration of this module, to control access to the participants;
- A **mediator**, who was not a member of the research team and not involved in the teaching and/or administration of this module, to facilitate collection of phase one and phase three data and to communicate with participants;
- An **independent person**, who was not a member of the research team and not involved in the teaching and/or administration of this module, to assist with gathering informed consent;

- A **focus group interview facilitator**, who was not a member of the research team and not involved in the teaching and/or administration of this module, to facilitate the focus group interviews; and
- A **transcriber**, who was not a member of the research team and not involved in the teaching and/or administration of this module, to transcribe the video- and audio recordings of the focus group interviews.

1.11.2 Approval

This research study was registered with the Division Health Sciences Education in the Faculty of Health Sciences of the UFS. However, the research study was conducted in the School of Pharmacy in the Faculty of Health Sciences on the Potchefstroom campus of the NWU. Approval for the study was requested (cf. Appendix B1) and obtained from the Dean of the Faculty of Health Sciences at the NWU, Potchefstroom campus (cf. Appendix B2-1), the Campus Registrar at the NWU, Potchefstroom campus (cf. Appendix B2-2) as well as the Dean of Students at the NWU, Potchefstroom campus (cf. Appendix B2-3).

This research study was submitted for approval to the Evaluation Committee, Faculty of Health Sciences, UFS; HSREC of the Faculty of Health Sciences, UFS (cf. Appendix D1-1, Appendix D1-2 & Appendix D1-3); and the HREC of the Faculty of Health Sciences, NWU (cf. Appendix D2-1, Appendix D2-2, Appendix D2-3 & Appendix D2-4).

1.11.3 Informed consent

Participants in all phases of this research study received information leaflets (cf. Appendix C1-1 for English & Appendix C1-2 for Afrikaans) outlining the aim of the research study and information about the researcher. Procedures and information regarding the specific phase were explained so that the participants clearly understood what was expected of them during each research phase. Potential benefits and risks were highlighted so that the participants could make an informed decision whether or not to participate in the particular research phase. Information regarding remuneration, funding of the project, ethical approval as well as who to contact with any questions or discomforts were provided in the leaflet. It was clearly stated that participants have a choice whether to participate in the research study or not and that, should they decide not to participate, it

did not affect their performance or marks in the module in any way. Participants could have withdrawn from the study at any stage without any consequences.

If the participants agreed to participate in this study or any phase of it, they had to sign a written consent form prior to phase one and two (cf. Appendix C2-1 for English & Appendix C2-2 for Afrikaans) and another one prior to phase three (cf. Appendix C3-1 for English & Appendix C3-2 for Afrikaans) before they were allowed to participate. Participants acknowledged that they willingly gave permission to participate, that they understood the benefits and risks associated with this study and that they understood that they may withdraw from the study at any stage.

1.11.4 Right to privacy

Anonymity was ensured during the research process by not collecting any personal data from participants in phase one and three of the study. During phase two, focus group interviews were only partially anonymous as participants interacted and engaged in conversations with other participants, but the data were handled anonymous. During the focus group interviews, an experienced researcher who was not familiar with the participants acted as the facilitator. Afterwards, a transcriber transcribed the data and coded all participants so that when the researcher, who was also the lecturer of the module, received the data, there was no means to identify who said what during the sessions. Reporting of findings was anonymous.

Confidentiality was ensured by keeping all electronic data (transcribed focus group interviews and electronic data) on the researcher's password-protected computer to which only the researcher had access. Hard copies of the written narratives and questionnaires were kept in a locked cabinet in the co-promoter's office until July 2016 (after teaching concluded), after which it was kept in a locked cabinet in the researcher's office until the project was completed. These documents were then moved to a locked cabinet in the department of Pharmacy Practice, School of Pharmacy, NWU to which only the secretary of the department had a key. The researcher, promoter and co-promoter had access to all data collected. The transcriber had access to the data from the focus group interviews while transcribing the interviews from the video- and audio recordings after which she presented the data to the researcher and deleted all copies of the recordings and data. The statistician also had access to the quantitative data as she had to analyse it but it was

provided to her by the researcher via password-protected file in an email and the password was sent via another method i.e. SMS. All original data collected (written narratives and questionnaires) will stay on the NWU Potchefstroom campus in the above-mentioned place. All parties mentioned above signed confidentiality agreements.

All data will be kept for seven years and then destroyed in the presence of a member of the ethics committee.

1.11.5 Benefit-risk ratio

1.11.5.1 *Benefits*

By participating in this research, participants were exposed to a teaching strategy that had been proven to have a positive effect on learning. They also had the opportunity to directly communicate their experience of TBL to the lecturer. Their skills in working in diverse teams were enhanced and this increased their personal competitive advantage when entering industry. By participating in this research they contributed to the development of guidelines on how to effectively implement TBL in undergraduate pharmacy education to enhance student learning.

1.11.5.2 *Risks*

The risks in this study were minimal. Participants might have experienced some feelings of discomfort and insecurity participating in the data collection processes, as this might not have been familiar to them. No additional time was requested from them for phase one (written narratives) or phase three (questionnaire), as this data were collected during scheduled class time. For those who were selected to participate in phase two (focus group interviews), additional time (about one hour) was needed from them to participate as this was scheduled outside of scheduled class time. To address these discomforts, the research process was explained in detail before each phase of data collection.

Participants might also have felt exposed in the class room context when data collection of phase one and three took place. Although participation might not have been totally anonymous (cf. 1.11.4), all data collected was anonymous and the researcher, who was also the lecturer, had no means of identifying who participated in the research and who

did not. The lecturer was also not personally present during any data collection phase; if participants therefore did not want to participate in a phase(s), they might have left the class room without the lecturer knowing. Should leaving the class room have made them feel uncomfortable, they might have pretended to participate and hand in a blank page or questionnaire with no means of identifying them afterwards.

Participants might have felt uncomfortable writing the written narrative in their own handwriting as they might have felt that the lecturer could trace the handwriting to examination papers when marking assessments. To protect their anonymity, the lecturer did not handle the written narratives before July 2016, when the module was concluded. The mediator collected the data during the class time and handed it to the co-promoter who kept it in a safe place and not present it to the lecturer until after the module was concluded. The lecturer could therefore not identify any student based on their hand writing.

Participants might have felt discomfort in expressing their opinions and experiences in the presence of other students. They might also have felt discomfort knowing that the focus group interviews were audio- and video recorded. Complete anonymity could not be ensured during the focus group interviews as they were engaging in conversations with other participants, but the data were anonymous and handled confidentially (cf. 1.11.4). The audio- and video recordings were used to ease the transcribing process after which it was deleted. There was no risk of being discriminated against if participants decided to withdraw from this study.

The lecturer was never present at; or facilitating any of the three data collecting procedures, therefore no student could be penalised or discriminated against for not participating in the research project. If they had the need for further discussion after participating in any of the research phases, an opportunity was arranged for them to discuss any discomforts with a member of the research team.

The benefits of this study outweighed the risks.

1.12 SCOPE OF THE STUDY

This study was done in the field of HPE and focused on TBL as an active teaching strategy. The six research questions mentioned this chapter (cf. 1.6) determined the foci of the research.

Since this was the first time that TBL was implemented in undergraduate pharmacy education in the BPharm curriculum in South Africa, a comprehensive review of existing literature on TBL in undergraduate health professions education formed the basis and foundation of this study (cf. Article 1). This provided the researcher with sufficient relevant data on varied ways of implementation, evaluation and modifications of the basic TBL principles as initially developed. It was also important to establish the study participants' current experiences in terms of team work in the pharmacy profession before they were exposed to TBL as teaching strategy (cf. Article 2). Following implementation of TBL in the management module for the first semester of 2016, a comprehensive investigation was conducted to determine pharmacy students' learning experience with the use of TBL (cf. Article 3), to identify whether TBL as a teaching strategy increased pharmacy students' understanding of theoretical work (cf. Article 4) and whether TBL allowed pharmacy students to develop generic skills as required for pharmacists on NQF level 8 (fourth year level) (cf. Article 5).

This study concluded by developing guidelines on how to effectively implement TBL in undergraduate pharmacy education in South Africa (cf. Chapter 7). The findings of the study may be of value to pharmacy schools and lecturers involved in undergraduate pharmacy education at higher education institutions nationally.

1.13 VALUE, SIGNIFICANCE AND CONTRIBUTION OF THE STUDY

The value of this research study was to develop guidelines for TBL in undergraduate pharmacy education which will ensure that all students who are exposed to TBL during their undergraduate studies will be equipped with sufficient knowledge and skills to enable them to handle team work in the professional pharmacy environment as part of the health care team. This study researched whether TBL offers a way in which positive team work can be encouraged in pharmacy students to equip them to be positive contributors to the health care team that they will form part of as practicing pharmacists.

The study outcome led to guidelines that included evidence-based conclusions for undergraduate higher education educators to optimise the teaching and learning of pharmacy students in South African higher education. The study also contributes significantly to the introduction and eventual implementation of a TBL education and training programme in pharmacy education nationally as well as in other health care professions. This research contributes to the available information regarding TBL in undergraduate health professions education globally.

The contribution of this study to the pool of existing knowledge is to develop guidelines for implementing TBL in undergraduate pharmacy curriculums. Guidelines are defined as general rules or principles (Oxford English Dictionary 2016:online). In this study, the literature study (cf. 1.9.1) was used as a platform on which the data from the three research phases (cf. 1.9.2, 1.9.3 & 1.9.4) was built and integrated to find evidence-based best practice for the implementation of TBL in an undergraduate pharmacy curriculum in South Africa. These guidelines are discussed in Chapter 7 as the contribution of this study. It is available for other undergraduate pharmacy curriculums in South Africa as well and can be used by other schools of pharmacy.

1.14 SCHEMATIC OVERVIEW OF THE STUDY

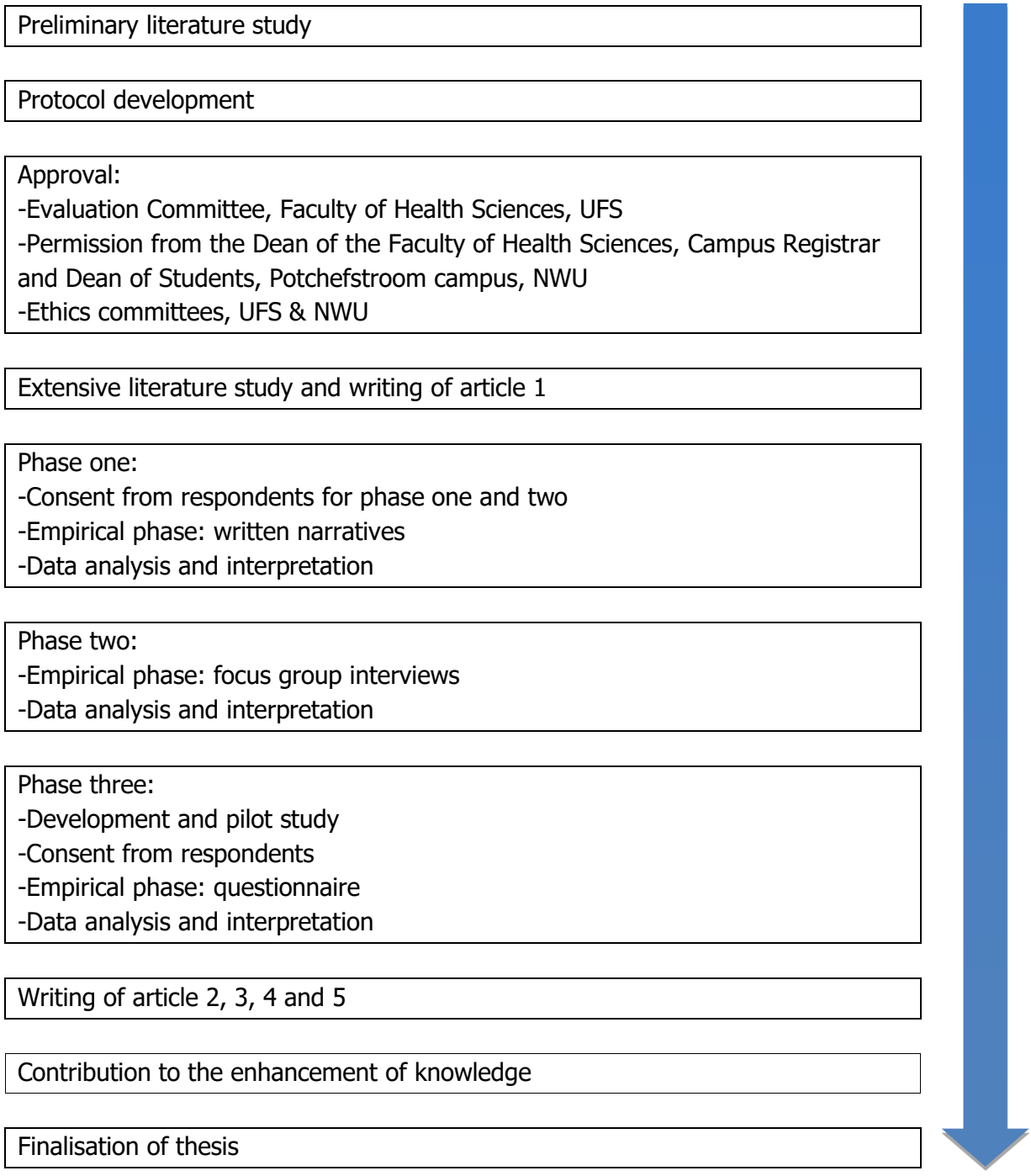

FIGURE 1.2: A SCHEMATIC OVERVIEW OF THE STUDY
[Compiled by the researcher, Eksteen 2015]

1.15 LAYOUT OF THESIS

For this study, the Policy on Masters and Doctoral Degrees (UFS 2015:5) was followed. This policy stipulates that a doctoral thesis must demonstrate a specific contribution to the enhancement of knowledge as well as independent critical ability. A doctoral thesis

usually is between 70 000 and 100 000 words, or three publishable articles. In the context of this policy, publishable articles are defined as manuscripts ready for submission for publication in an academic journal, which has been supervised extensively and formatted according to journal submission guidelines (UFS 2015:6). However, due to quality and scope of the data during the third research phase, five articles were included in this doctoral thesis and not only three as required. This doctoral thesis therefore consists of eight chapters. Each chapter addresses a different aspect of the study. The arrangement of the chapters is as follows:

In this chapter, Chapter 1, **Orientation to the study**, an introduction and background to the study was provided. It also includes the overall goal, aim, research questions and objectives of the study. The research design and methods that were used are described in full as this thesis does not contain separate literature review and methodology chapters.

As this thesis was written in article format as specified by the requirements of UFS (UFS 2015:13), Chapters 2 to 6 contain the results of the study. Five publishable articles were prepared to address the first five objectives of the study (cf. 1.7). Each article was prepared in accordance with the specific journal submission guidelines specified by each journal. Each article is presented as submitted, complete with the relevant reference lists attached in the style required by the journals. These references are also included in the full reference list of this thesis in the style prescribed by the Division Health Science Education, Faculty of Health Sciences, UFS. Results not discussed in these articles are included in Appendix A4-1 and A4-2 and included in chapter 7. Page numbers continue through these chapters similar to the rest of this thesis.

In Chapter 2, **Best practice for implementation of team-based learning in undergraduate health science education in the 21st century: a review of the literature**, the first objective of this study is addressed (cf. 1.7(i)). The research methodology used for this article is a systematic review of the literature. This article explores current available literature on TBL in undergraduate teaching of health professionals. The article was prepared according to the journal submission guidelines for a journal of higher education and was submitted in February 2016. After nine months no communication was received after the initial acknowledgement and the article was withdrawn from this journal. The article was then prepared according to the journal submission guidelines for a special edition of *Alter*nation Journal (cf. Appendix F1-1) and

submitted in January 2017 (cf. Appendix F1-2). The promoter and co-promoter of this study were co-authors of this article.

In Chapter 3, **Undergraduate training for a health professions team: the voices of fourth-year pharmacy students**, the second objective of this study is addressed (cf. 1.7(ii)). The article includes the data collected from the first and second research phases, namely the written narratives and focus group interviews. The written narratives informed the questions for the focus group interviews which focussed on how university training can prepare pharmacy students to effectively contribute to the health profession team. The qualitative research article was prepared according to the journal submission guidelines for *Currents in Pharmacy Teaching and Learning* (cf. Appendix F2-1) and was submitted in August 2016 (cf. Appendix F2-2). The promoter and co-promoter of this study were co-authors of this article.

In Chapter 4, **Team-Based Learning Experiences of Fourth-Year Pharmacy Students in a South African University**, the third objective of this study is addressed (cf. 1.7(iii)). The data obtained in Question 1 and 3 of the questionnaire were included in this article which reports on pharmacy students' learning experiences of TBL during the semester in comparison with traditional lecture methods. The article was prepared according to the journal submission guidelines for the *American Journal of Pharmaceutical Education* (cf. Appendix F3-1), submitted in October 2016 and **accepted for publication** in January 2017 (cf. Appendix F3-2). The promoter, co-promoter and statistician of this study were co-authors of this article.

In Chapter 5, **Promoting deeper learning in pharmacy education using team-based learning (TBL)**, the fourth objective of this study is addressed (cf. 1.7(iv)). Questions 1 and 4 of the questionnaire were included in this article which was prepared according to the journal submission guidelines for the *African Journal of Health Professions Education* (cf. Appendix F4-1) and submitted in October 2016 (cf. Appendix F4-2). In this article, it is highlighted that TBL promotes deeper learning in comparison to surface learning. The promoter, co-promoter and statistician of this study were co-authors of this article.

In Chapter 6, **Does Team-based learning (TBL) develop essential generic skills in pharmacy students?**, the fifth objective of this study is addressed (cf. 1.7(v)). This

article focuses on Question 1 and 5 of the questionnaire. The development of generic skills for pharmacy students on a NQF level 8 is important for graduateness. The article discusses how TBL assisted in the development of these skills. The article was prepared according to the journal submission guidelines for the *South African Journal of Higher Education* (cf. Appendix F5-1) and submitted in November 2016 (cf. Appendix F5-2). The researcher was the sole author of this article.

In Chapter 7, **Contribution and significance of the study**, the sixth objective of this study is addressed (cf. 1.7(vi)). This chapter integrates all research findings from the first five objectives as well as data not already included in research articles (questionnaire Question 2 & 6, cf. Appendix A4-1 & Appendix A4-2). For each of the essential elements of TBL, guidelines are provided on the optimisation and improvement of these elements in a South African pharmacy education environment.

In Chapter 8, **Conclusions, limitations and recommendations of the study**, evidence for achieving each of the objectives set out in this study is discussed. The limitations and recommendations resulting from this study are provided for future consideration in other research.

1.16 CHAPTER SUMMARY

In this chapter, the background and context of this research study were laid out. The problem was stated, with the goal, aim, research questions as well as the research objectives in order to achieve the aim and answer the research questions. The methodology followed for the literature review study were included and discussed. The research design and method was described in full for all three research phases including information on the target population, sample and sample size, data collection, analysis and interpretation. The quality and rigor for both qualitative and quantitative phases were discussed. Ethical implications applicable to this study were also addressed including the role of the researcher, approval for this study, informed consent, students' right to privacy and possible benefits and risks associated with this study. This chapter conclude with what the scope of this study was, the value and significance, schematic overview and the layout of this thesis.

Chapter 2 to 6 provides the results of the first five research objectives, in the form of articles (cf. 1.15).

CHAPTER 2

ARTICLE 1

The article was prepared according to the journal submission guidelines for the special edition of *Alter*nation Journal (cf. Appendix F1-1) and submitted in January 2017 (cf. Appendix F1-2).

Best practice for implementation of team-based learning in undergraduate health science education in the 21st century: a review of the literature

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Best practice for implementation of team-based learning in undergraduate health science education in the 21st century: a review of the literature

Abstract

Team-based learning (TBL) is a structured, student-centred learning strategy with several interlinking activities where students are required to acquire knowledge independently through reading and then to apply this newly acquired knowledge during participation in team assignments. However, it seems as if not all TBL activities are included in all published studies. A review of all literature on TBL in undergraduate health science education was conducted. All original research on TBL in any health profession and in all countries was included. The authors identified 15 articles out of 2137 that satisfied the inclusion criteria. Data was extracted according to the essential principles of TBL. The results highlighted the importance of inclusion of all activities in order to ensure successful TBL in the classroom. No other published study has indicated that excluding one or more activities limits the positive results on health science students' perception, indicating that there is no replacement for the basics of TBL. When implemented correctly, TBL leads to multiple learning outcomes, including depth of knowledge, cognitive structures, problem-solving skills, team communication skills and leadership skills, having the potential to advance the health profession.

Keywords: health professions education, health science education, learning strategy, small-group learning, team-based learning, undergraduate

Introduction

"Team-based learning (TBL) differs from other small-group work in that it involves developing and using learning teams as an instructional strategy" (Michaelsen & Sweet 2008a). TBL was developed in the late 1970s as a solution for large-class teaching in a management course. TBL is grounded in constructivist principles which enable students to develop essential competencies of critical thinking skills and team work abilities (Hrynchak & Batty 2012; Michaelsen *et al.* 2004). The purpose of TBL is to deepen students' learning and to promote the development of high-performing learning teams (Michaelsen & Sweet 2008a). As a result of the sequence and structure of TBL, high levels of group cohesiveness and trust are developed among students.

Four essential principles are critical for the success of TBL's implementation (Michaelsen 2004; Michaelsen & Sweet 2008a, b):

1. Teams must be properly formed and managed. They must be compiled so that each team have adequate resources and approximately the same level to draw from in completing their team

activities. This means that teams must be as diverse and heterogeneous as possible with a mix of student characteristics, between five and seven members, and compiled by the instructor to avoid the possible formation of coalitions or subgroups within a team that can disrupt team cohesiveness. Students must also stay in the same team throughout the entire course because, over time, teams become cohesive enough to evolve into self-managed and truly effective learning units.

2. Students must be accountable for the quality of their individual and team work. Students are held accountable for individual pre-class preparation of assigned reading in order to be able to participate in the in-class activities. Lack of preparation before class hinders the development of cohesiveness in the team and creates frustration as prepared students then have to carry their peers in team assignments. Preparation is tested with readiness assurance tests (RAT), with individual readiness assurance tests (iRAT) being written by all students to assess their individual preparedness for the class. These answer sheets are graded for individual preparedness. The same test is then completed as a team (tRAT), with consensus over team answers having to be reached via team discussions and explaining the concepts to each other. Thirdly, students also have to be evaluated by their peers to accurately assess members' contribution to the success of their team, which can include individual preparation for team work, reliable class attendance, attendance of team meetings (outside of class), positive contributions to team discussions, and valuing and encouraging input from fellow team members. Students are lastly also accountable for high-quality team performance during a team application exercise when answers can be compared across teams in a frequent and timely manner.
3. Students must receive frequent and timely feedback. Immediate feedback is the instructional prime mover in TBL because feedback is essential for content learning and retention as well as its impact on team development. Timely feedback on application exercises takes place in class after all teams worked on the application-orientated activities. During the group discussion, teams simultaneously report back on their chosen answers followed by a class discussion where teams have to defend their choices. The outcome of each applications exercise is thus a series of lively discussions, first within the team and then between all teams.
4. Team assignments must promote both learning and team development. In TBL, team assignments must promote team cohesiveness because cohesiveness is the degree to which members of a group are attached to each other and committed to the achievement of group goals (Michaelsen & Sweet 2008c). For a team assignment to truly build team cohesiveness, the assignment should bring members into close physical proximity, represent a basis for a common goal among team members, promote individual accountability, motivate discussion among team members, ensure immediate feedback, and provide explicit rewards for team performance. Team assignments should require teams to use course concepts to make

decisions that involve a complex set of issues and allow teams to report their decisions in a simple format.

The advantages of TBL have been widely proven in various studies. When courses are designed and managed so that the above-mentioned principles are implemented, student groups naturally evolve into cohesive learning teams (Michaelsen & Sweet 2008a). TBL is effective in enhancing students' understanding of and participation in the problem-solving process (Altintas *et al.* 2014), requires students to exercise professionalism and communication skills (Kelly Orr *et al.* 2015), allows students to apply therapeutic principles (Bleske *et al.* 2014), contributes positively to workgroup emotional intelligence (Borges *et al.* 2012), improve student performance (Haber & Boomershine 2015), increases student engagement and satisfaction (Takeuchi *et al.* 2015), promote team work (Martínez & Tuesca 2014), leads to improved and deeper learning (Deardorff *et al.* 2014), promotes self-development (Persky & Dupuis 2014), and ensures better retention of learning (Hashilkar & Gelula 2014).

Regardless of the wide use of TBL in undergraduate courses since its inception, this study's literature review only found four articles published as systematic reviews. Two of these review articles focused on the effect of TBL on educational outcome between 2001 and 2012 (Ofstad & Brunner 2013) and learning outcome between 2001 and 2011 (Sisk 2011). The third article only focused on the fundamentals of TBL in pharmacy education and only in controlled studies up to 2011 (Fatmi *et al.* 2013). The last article summarized the published evidence of TBL in medical schools between 2002 and 2012 (Burgess *et al.* 2014). Thus no review article has been written to assess or monitor the evolution in best practices since the inception of TBL in the 1970s, especially for undergraduate health science education, to determine the current best practices for implementation of TBL in the 21st century.

Since the first implementation of TBL as an active learning strategy, many changes, inclusions and/or exclusions to TBL were tested and tried. A synthesis of the evidence from this review will provide the basis for implementation of TBL in a BPharm curriculum according to the four fundamental elements of TBL as described by Michaelsen and Sweet (2008a, b). Unlike other review articles with limitations to included articles, e.g. time frame, health profession or study design, no limitations on publication date, health profession or type of study design were used in this study. In this study, a review of all literature was conducted to determine current best practices for implementation of TBL in undergraduate health science education in general. The purpose of this study was to highlight from the current literature how TBL has evolved over time in order to decide which essential principles of TBL are still required when implementing TBL in undergraduate health sciences education.

Research methodology

The research question for this review was: "What is the current available evidence for the implementation of TBL in undergraduate curricula in health science education?"

The search strategy consisted of three main components: the selection of search words, proposed sources of studies such as databases and manual searches, and the formulation of inclusion and exclusion criteria (AND 2012). Specific words and terms were used to search for the research articles applicable to the review question. We had access to 262 databases of which 180 were eliminated on the grounds of lack of relevance. Of the 82 remaining databases, 62 contained data. We restricted our results to published articles because inclusion of data from unpublished studies can introduce publication bias as the studies that can be located may be an unrepresentative sample of all unpublished work (Higgins & Green 2011). Furthermore, unpublished studies may be of lower methodological quality than material in the literature. Although studies from all languages were searched, only those with full text available in English were included. Furthermore, all articles reporting on postgraduate education, secondary education and continuing professional education were excluded. We admitted all studies on any group of health professionals in training regardless of the country, subject, course, level or year group. Because we are interested in the current best practice for implementation of TBL, studies on all relevant aspects, e.g. team formation, readiness assurance tests, immediate feedback, team assignments and/or the outcomes of such learning, were included.

Our literature search yielded 2 137 potential publications on TBL in undergraduate education for the health professions (see Figure 1). At the first level, the titles and abstracts generated from the electronic database searches were collated in a software program. The studies were screened for duplication and relevance. This process eliminated 1 830 studies. Next, the full text of 253 was obtained online or through our university's interlibrary loan facility. A total of 54 studies were not available in English or in full text, even after contacting the authors directly. The third level involved thoroughly assessing these full-text studies according to the inclusion and exclusion criteria to gain a final list of studies found to be relevant to the research question.

A total of 134 studies were critically appraised for methodological quality and validity using the Johns Hopkins nursing evidence-based practice (JHNEBP) research evidence appraisal tool (Newhouse *et al.* 2007). This instrument provided a systematic and objective rating of the methodological quality for both research and review studies. Studies were included when the score from the JHNEBP was 90% and above, excluding another 119 studies. Using such a high score was determined up front to ensure only high quality research studies were included. To ensure accuracy and consistency, a 5%

sample of the articles was randomly selected by a second reviewer and no significant discrepancies or errors were detected.

In order to extract the findings relevant to the research question, we used the four essential principles set out by Michaelsen and Sweet (2008a) discussed in the introduction. Data relating to the implementation of TBL in two categories were extracted: study demographics and TBL essential principles. Data from the selected articles were entered into an electronic data extraction form created in Microsoft Excel (see Table 1 and 2).

Results

Figure 1 presents a flow diagram of the literature selection process.

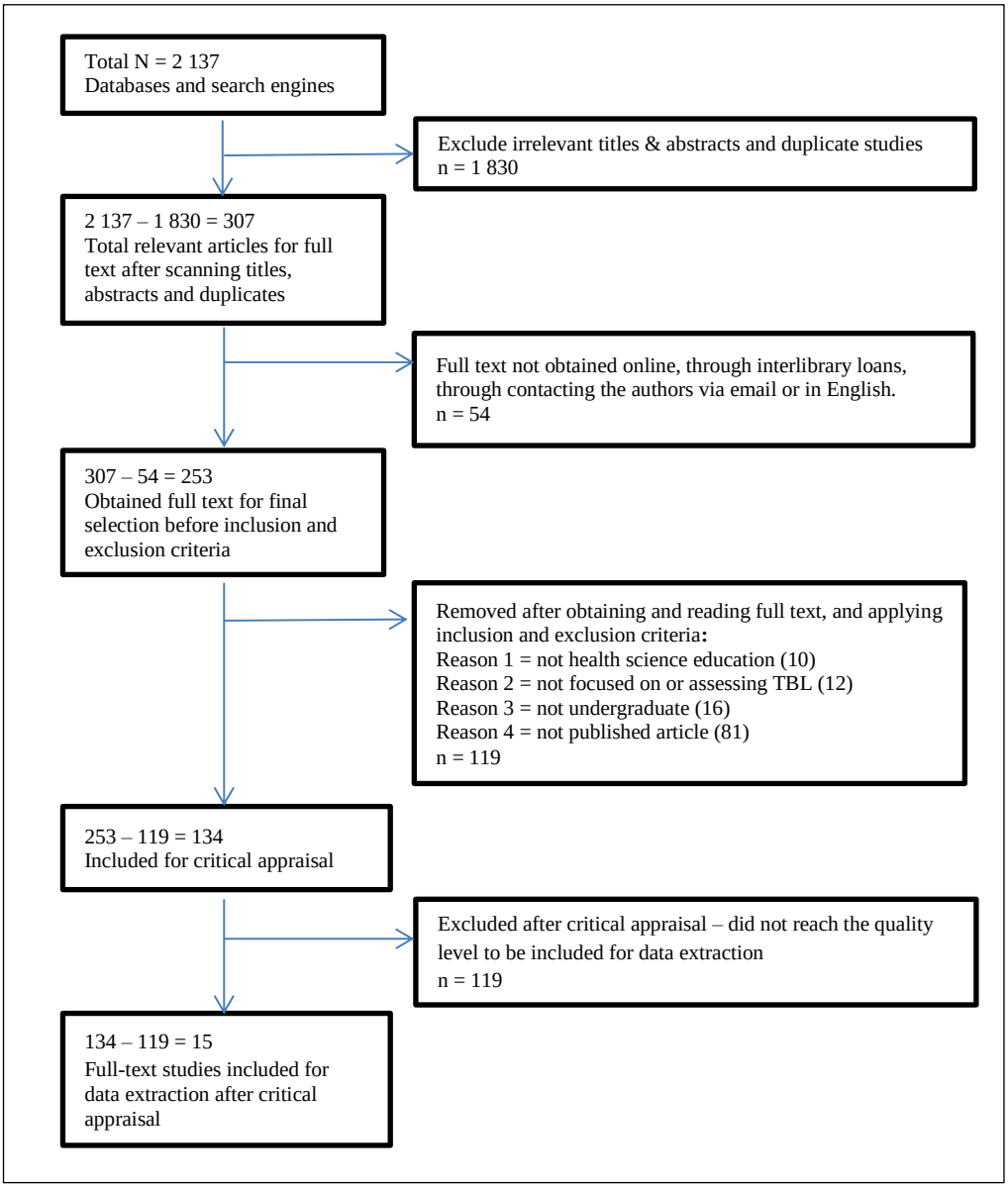

Figure 1: Flowchart of the search strategy to select articles on TBL for subsequent analysis

From the 15 studies included, data regarding the demographics of each of the studies were extracted first (Table 1) followed by details on the TBL essential principles as described in the introduction (Table 2).

Study demographics

TBL was implemented and evaluated in several health profession settings, including medical (4), nursing (6), pharmacy (2) and physical therapy (1). One study included both medical and dental students and another considered medicine, pharmacy, dentistry, nursing and internal medicine. Articles included in this study represented the United States (6), United Arab Emirates (1), Taiwan (2), Oman (1), Singapore (1) and Republic of Korea (2). Two studies were systematic reviews and included reports from Australia, Japan, India, Austria and Lebanon. A diverse list of subjects where TBL were implemented according to these studies is included in Table 1.

In certain studies, TBL was implemented in the entire course which stretched over more than eight weeks (6) or for specific sessions or topics (3). Four articles did not specify the length of TBL implementation and two studies reported on including both entire course studies and specific sessions or topics studied. The length of the TBL fluctuated between one and two sessions of one and a half to five hours per week. Seven studies did not provide this information.

Although some studies specified preclinical and clinical or undergraduate level training, the majority of TBL studies were conducted with first-year or third-year students. Seven studies reported that these TBL sessions were conducted with only one instructor, two reported that the instructor was supported by other faculty members, e.g. content experts, two studies used four instructors and six studies did not report on the staff resources used.

Table 1: Data extracted according to study demographics

Citation	Health Profession	Country	Subject	Period of TBL implementation	Length of TBL session	Year/level	Staff resources
Abdelkhalek et al., 2010	Medical & dental	United Arab Emirates (UAE)	Introductory course in medical sciences education	12 week rotation (entire course)	1 session per week of 2 hours	Year 1	1
Allen et al., 2013	Faculty members of Colleges & Schools of pharmacy	United States (US)	Diverse	Diverse	NR	Diverse	1 to 3
Borges et al., 2012	Medical	United States (US)	Internal medicine clerkship	12 week rotation (entire course)	NR	Year 3	1
Burgess et al., 2014	Medical	United States (US), Singapore, Australia, United Arab Emirates (UAE), South Korea, Oman, Japan, India, Austria and Lebanon	Basic science, medical ethics, neurology, pharmacology, anatomy, evidence-based medicine, ambulatory care, psychiatry, pathology and psyciology	Diverse	1.5 to 2 hours	Preclinical and clinical years	NR
Cheng et al., 2014a	Nursing	Taiwan	Adult health nursing, maternal-child nursing, community health nursing, and medical-surgical nursing	NR	NR	Year 1, 2 and 3	NR
Cheng et al., 2014b	Nursing	Taiwan	Maternal-child nursing	18 weeks	2 hours per week	Year 1 & 2	1
Fatmi et al., 2013	Medical, pharmacy, denistry, nursing, internal medicine	United States (US), Lebanon and Austria	NR	NR	NR	Under & post graduate	NR
Huitt et al., 2014	Physical Therapy	United States (US)	Anatomy	15 weeks	2 hours per week	Year 1	8
Inuwa, 2012	Medical	Oman	Anatomy	11 sessions	2 hours	Year 1	NR
Kamei et al., 2012	Medical	Singapore	Basic science	43 weeks	5 horus	Year 1	1
Mennenga, 2013	Nursing	United States (US)	Community health nursing	NR	3 hours per week	NR	1
Mennenga, 2015	Nursing	United States (US)	Community health nursing	8 modules in the course	3 hours per week	NR	1
Muzyk et al., 2015	Pharmacy	United States (US)	Psycho-pharmacotehrapeutic	5 classes over 2 week period	NR	Year 3	1
Roh et al., 2014	Nursing	South Korea	Medical-surgical nursing	2 sessions	2 hours	Year 2	4
Roh et al., 2015	Nursing	South Korea	Medical-surgical nursing	2 sessions	2 hours	Year 3	4

NR = not reported

TBL essential principles

The 15 articles were further analysed to determine how the TBL essential principles were applied in those cases, as indicated in Table 2.

Teams must be properly formed and managed

Some of the ways in which teams were selected were through alphabetic order, random allocation, experience, intellectual talents or gender mix. The size of teams differed between four and twelve members with the majority between five and seven. Five studies reported that teams remained constant throughout the course/semester. One study reported that teams did not include a mix of gender due to cultural beliefs. Four studies did not provide any information on team formation.

Students must be accountable for the quality of their individual and team work

The assigned reading that students needed to prepare before coming to class included the prescribed textbook, journal articles, instructor notes or PowerPoint slides accompanied by clear learning objectives. Four studies did not report on any assigned learning. Following the preparation through assigned reading, 13 teams implemented the RAT via iRAT and tRAT. One of these teams made the iRAT part of the pre-class activity and only tRAT part of in-class activity. Two studies did not report on the readiness assurance process (RAP). Of the five articles who reported including peer assessment as part of the TBL session, four only dealt with a once-off assessment at midterm or at the end of the semester.

Students must receive frequent and timely feedback

Seven studies allowed discussion following the RAP to clarify remaining questions or misconceptions of the information. The other eight studies did not report on including immediate feedback during TBL. Only one study reported that teams were allowed an opportunity to appeal RAT questions. Six articles reported that TBL sessions were concluded by faculty highlighting the main concepts and nine did not report any form of session conclusion.

Team assignments must promote both learning and team development

Team assignments were part of eleven articles, with four not reporting on including team assignments in their teaching.

Table 2: Data extracted according to Team-based learning essential principles

Citation	Principle 1		Principle 2			Principle 3			Principle 4
	Team formation	**Team size**	**Assigned reading**	**RAT**	**Peer assessment**	**Immediate feedback**	**Appeals**	**Session conclusion**	**Application exercise**
Abdelkhalek et al., 2010	NR	8 to 9	Retrieving information, intra-group discussion, compare information	NR	NR	NR	NR	Class discussion	Group presentations; inter-group discussion
Allen et al., 2013	Strategy that ensures diversity	NR	Instructure notes, PowerPoint slides, textbook, journal articles, audio or video recordings of lectures, other online learning tools	iRAT and tRAT included	Included	NR	NR	NR	Activities applying content
Borges et al., 2012	NR	NR	Required	iRAT and tRAT included; 10 MCQ; same test	NR	Class discussion	NR	Class discussion	Challenging cases
Burgess et al., 2014	Random; Strategies that ensures diversity	4 to 12	NR	iRAT and tRAT included; 3 to 13 MCQ; same test; 12-30 minutes	Majority included; one online evaluation - score out of 10 with written comments; some last day of course	Class discussion	NR	NR	Group presentations; intra- and intergroup discussions; significant problem; same problem; specific choice; simultaneous reporting; written justification
Cheng et al., 2014a	Strategy that ensures diversity; constant throughout the course	NR	Reading papers	iRAT and tRAT included; same test	NR	NR	NR	NR	NR
Cheng et al., 2014b	Strategy that ensures diversity	7 to 8	NR	NR	NR	NR	NR	NR	NR
Fatmi et al., 2013	NR	NR	NR	iRAT and tRAT used	NR	NR	NR	NR	NR
Huitt et al., 2014	Strategy that ensures diversity	4 to 6	Learning objectives, text, atlas, dissector	iRAT and tRAT used; 10 MCQ; same test; IF-AT	Included; midterm	Class discussion	Allowed	Class discussion	Application exercises; same problem; simultaneously reporting

Inuwa, 2012	Same gender teams; constant throughout the course	6 to 7	Reading materials, tetbook, image bank, learning objectives	iRAT and tRAT used	Included; last day of course	NR	NR	NR	NR
Kamei et al., 2012	NR	7	Learning objectives, web sites, journal articles, books, video-taped lectures	iRAT and tRAT used; 25 MCQ; same test	NR	NR	NR	Class discussion	Application exercises
Mennenga, 2013	Strategy that ensures diversity	5 to 6	NR	iRAT and tRAT used	NR	NR	NR	NR	Application activities
Mennenga, 2015	Strategy that ensures diversity; constant throughout the course	5 to 7	Textbook, narrated lectures	iRAT and tRAT used; 20 MCQ; same test; IF-AT; open book	NR	Class discussion	NR	NR	Application activities
Muzyk et al., 2015	Random; constant throughout the course	≤7	Learning objectives, PowerPoint presentation, articles, question set, patient cases	iRAT and tRAT used; 10 MCQ; iRAT during pre-class preparation	NR	Class discussion	NR	NR	Active learning exercises
Roh et al., 2014	Random; constant throughout the course	5 to 6	Preparatory material	iRAT and tRAT used; 12 MCQ; same test; 25 minutes	Included; divide fixed number of points between team members; written justification	Class discussion	NR	Class discussion	Real-live case scenario
Roh et al., 2015	Random	5 to 6	Readings	iRAT and tRAT used; 12 MCQ; same test; 25 minutes	NR	Class discussion	NR	Class discussion	Real-live case scenario

NR = Not reported; iRAT = individual readiness assurance test; tRAT = team readiness assurance test; MCQ = multiple choice questions; IF-AT = immediate feedback assessment tool

Interpretation of results

Study demographics

Although TBL was developed for a management course at a university in the United States (Parmelee, 2008), our study highlighted the implementation of TBL in several health sciences departments in different countries on various topics. These results indicate the potential for TBL to be used in a diversity of classrooms, countries and subjects.

Unfortunately, we found that TBL was introduced as a teaching method for an entire course in less than half of the studies examined. TBL was mostly implemented for short periods (less than eight weeks) during the semester. Tuckman (1965) suggested that teams should work together for at least 40 hours in order to move through the Tuchman stages of team formation. Watson *et al.* (1991) stated that most groups require working together for more than 20 to 25 hours before they can fully access and benefit from the resources and skills of all members in the group. In order to achieve 40 hours of team work, we agree with Farland *et al.* (2013) that TBL teams should remain together for the entire course to promote optimal team performance. It is thus important to remember that when TBL is introduced in only some modules or classes of a course, the optimal outcome in terms of team cohesiveness cannot be reached.

This research found that the majority of studies were conducted with first-year students. The second most popular group was third-year. We note that no study indicated TBL to be more suitable for entry or exit level students. However, we foresee that in later years of study, courses allow for more application of content where students have enough basic knowledge and skills that are appropriate for TBL. Parmelee (2008) states that the biggest advantage of TBL over other active learning strategies, such as problem-based learning (PBL), is that only one instructor can administer a large group of students, and successful TBL implementation is thus suitable despite limited resources. This advantage was evident in our review, with most cases reporting that only one instructor was used. In cases where more than one instructor was used, it was due to different geographical sites which needed additional faculty support at the different locations, faculty who provided specific content for a learning unit as a content expert or additional staff who acted as course tutors.

TBL essential principles

The four essential principles of TBL as developed by Michaelsen (2004) include several activities that are invoked in the implementation phase.

Teams must be properly formed and managed

When forming the teams for TBL, course-relevant characteristics of the students must be used to form the teams. From the studies reviewed, a strategy that ensured diversity was commonly implemented. Mennenga (2013, 2015) started the formation of teams by asking students a question such as "Do you have an interest in community health nursing?" This is a typical example of a specific student characteristic applicable to this course. When students answer 'yes' to such a question, they assumed their place in a line formed by students who already answered 'yes' to previous questions. Once all students are in the line, they start counting off by the number of groups that will be in the class until all students have a group number (Michaelsen 2004; Michaelsen & Fink 2008). The number of groups is calculated from the total number of students enrolled to form groups of five, six or seven students. In contrast to this method of creating teams, Roh *et al.* (2015) assigned students to groups using student numbers. By doing this, mixed student characteristics in relation to course content and demographical characteristics cannot be guaranteed, which, according to our perspective, defeats the purpose of forming teams in the first place. Teams can end up insufficiently diverse, which could limit their perception and satisfaction with TBL. In this specific study, Roh et al. (2015) concluded that students were not greatly satisfied with TBL. Although they argued that it was because of their first exposure to TBL, the effect of inappropriate team selection cannot be ignored.

Undersized teams, e.g. only two students, score significantly lower in RATs than more appropriately sized teams of between five and seven students. Sibley and Ostafichuk (2014) explain that when teams are too small or homogeneous, it could lead to not having a sufficiently rich talent pool of individual resources needed to be successful. We found that the majority of the studies reviewed used this guideline for choosing the team size, which shows that the majority of researchers applied the theory in practice. Some studies used more than seven members without providing a specific reason for doing so.

Secondly, it is important in TBL that students stay in the same team for the entire course as this allows the members to form a cohesive unit over time (Sibley & Ostafichuk 2014). Five studies specifically mentioned keeping the membership of teams constant throughout the course, whereas one systematic review study conducted by Burgess *et al.* (2014) claimed that they changed the members of the team after each TBL session (Ravindranath *et al.* 2010). This single exception to the rule made us wonder what the influence of a lack of exposure to proper team work would have on students. We have experienced that students often have low expectations of team work, especially in an academic environment. This could be because, when working together, students often demonstrate characteristics of working in 'groups' rather than 'teams'. They demonstrate a neutral or sometimes negative synergy rather than a positive attitude, prefer individual accountability rather than mutual

interdependence in the team, share information to reach the goal rather than performing collectively, and do not use their skills in a complementary way to benefit the team (Robbins *et al.* 2015). Although both groups and teams consist of two or more people who interact in common, the aspect that distinguishes teams from groups is that teams are characterized by a high level of individual commitment to the welfare of the group and trust among the members in the group (Fink 2004). It is thus evident that students need to work together as a team over time for their groups to become cohesive enough to evolve into self-managed and truly effective learning units. When teams are changed with every TBL session, team cohesiveness may not be established, resulting in negative experiences of team work and contributing to students not being strongly satisfied with TBL.

The presence of built-in subgroups or smaller coalitions within teams limits team cohesiveness (Michaelsen & Sweet 2008a, b). We support the fact that teams have to be as heterogeneous as possible to avoid social loafing with members not coming prepared to contribute to the collective effort and needing to be carried by those who were prepared. The majority of the studies that reported on team formation mentioned that strategies to ensure diversity were applied. Diversity can be according to gender, interest, capabilities or background. One study did not allow teams comprising both males and females for cultural reasons. Students were reluctant to accept mixed gender teams, which may be because of their previous experience in secondary education where males and females were separated due to social tradition. Since this study was conducted with first-year students, we assume it was probably their first encounter with working with the opposite gender. The working environment of course involves both genders and we predict that a repeat of this study in later years would show different results. Inuwa (2012) postulated that the reason medical students in this same study did not seem to value team work could be related to the competitive atmosphere they developed in secondary school. Because ranking of students is widely used as a means of selection and reward, students were reluctant to share information. We agree with Mennenga and Smyer (2010) that this competitiveness among peers has serious implications for medical students who then have to work in a healthcare team where resources, knowledge and skills are shared to reach the common goal of patient health. It also conflicts with the purpose of TBL.

Students must be accountable for the quality of their individual and team work

Because lack of preparation by students places clear limits on individual learning and team development (Michaelsen & Sweet 2008a, b), we believe that it is important for students to prepare for TBL sessions. The assigned reading must prepare students for the in-class exercises. Surprisingly, stating clear learning objectives for each class as a guideline was the single most important aspect of helping students to do the assigned reading for their preparation. Reading material used by the majority of students included a prescribed textbook, instructor notes or presentations as well as

course-specific reading. However, we agree with Fatmi *et al.* (2013) that the extent of assigned reading for students to prepare for class is important because too much work can reduce student motivation, which could contribute to their negative experience of TBL as an alternative teaching method.

Pre-class preparation is tested with RATs. Almost all the studies reviewed made use of the iRAT and tRAT. Guidelines suggest 10 to 20 multiple-choice questions (MCQs) per RAT and that the same test should be used for both iRAT and tRAT (Sibley & Ostafichuk 2014). These guidelines were applied in most of the reported studies with between 10 and 25 MCQs utilised. In contrast, Burgess et al. (2014) was the only study to report using less than 10 multiple-choice questions. We were not surprised that they also reported the minimum duration of a TBL session at one and a half hours. It may be that the limited time of the TBL session prevented the instructor from including more questions in the RATs. We agree with Huitt *et al.* (2014) that the inclusion of frequent formative assessment encourages consistent study habits and prevents students from falling behind in their coverage of the material during the semester.

Peer assessment provides students with the opportunity to assess each other's contribution to the activities of the team (Sibley & Ostafichuk 2014) and to ensure their accountability for the time and effort they contribute. Michaelsen and Sweet (2008a, b) averred that peer assessment is essential because team members are typically the only ones who have enough information to accurately evaluate one another's contribution. This contribution may include factors like individual preparation for team work, reliable class attendance, attendance at team meetings outside of class, positive contribution to team discussions and valuing and encouraging input from other team members. Despite these reasons, only five studies reported on peer evaluation. This finding is concerning as Michaelsen and Fink (2008) explicitly state that without peer assessment, it is not TBL.

Students must receive frequent and timely feedback

Immediate feedback is firstly important to quickly correct any misconceptions and, secondly, to provide the opportunity for teams to quickly learn how to work together. It also encourages competition between individuals and teams and affects team development (Michaelsen 2004). In accordance with Michaelsen and Sweet (2008a, b), we believe that immediate feedback is the *single most powerful tool* to promote learning and cohesiveness in classroom learning teams. Yet, it is discouraging to find that less than half of the studies mentioned immediate feedback as part of their TBL strategy. If this single most powerful principle of TBL is not included, it raises the question of whether the teaching strategy used still qualifies as TBL.

The appeal process allows students to refer to their assigned reading and to appeal any question in the RAT. Students are thereby allowed to conduct a focused restudy of the assigned reading to support their answers in the RAT or to point out confusion created by either the quality of the questions or inadequacies of the assigned reading (Michaelsen & Sweet 2008a, b). We anticipated that this discussion among team members could get animated as students work together to build a case to support their appeal. Although Michaelsen (2004) regard this as phase four of the RAP and as an integral part which provides students with another review opportunity of the reading, we found that only one study reported on including the appeal process.

It is very important to provide immediate feedback on the application exercises to encourage learning and team development (Michaelsen & Sweet 2008a). Because the application exercise is designed to develop higher-level thinking whereas the RAP tests focus on basic concepts, we believe that it is much more difficult to grade. Michaelsen (2004) suggest that the outcome of each application exercise should be a series of lively discussions, initially within the teams during an exercise and then as a vigorous interchange between all teams where they challenge the reasons for choosing particular answers. Although these discussions foster concept understanding and team cohesiveness, only six studies included a class discussion as a session conclusion.

Team assignments must promote both learning and team development

The highlight of TBL is the application exercise, which provides students with the opportunity to deepen their understanding by solving problems as a team. The criteria for these exercises are referred to as the four Ss: they must be *significant* problems which students will encounter in real life in the workplace, they must be the *same* problems for all teams, exercises must allow a *specific* choice for each question, and teams must *simultaneously* report back on answers to all cases (Sibley & Ostafichuk 2014). The most important aspect of designing effective team assignments is to keep in mind that they should truly require team interaction. The majority of the studies reported inclusion of application exercises as activities applying content, challenging cases, real live case scenarios or team presentations. Unfortunately, no other specific information or examples were provided regarding the application exercises. However, since the majority of studies reported that the duration of TBL sessions was two hours from RATs to conclusion, we anticipate that the short amount of time could limit the size and impact of the application exercise when compared to the prescribed five to seven hour duration of a TBL session.

Including only studies that scored 90% and above during the critical appraisal process could be a limitation of this review as several other studies were excluded. However, we believe that the number of studies included were sufficient to demonstrate important principles and that these included studies

are really the best quality articles on TBL. Secondly, although the second reviewer did not critically appraise all 134 selected articles, the 5% sample that was checked did not indicate any abnormalities and was in line with the first reviewers' scores.

Conclusions and recommendations

This study confirms that essential principles as researched by Michaelsen since the 1970s stood the test of time and that all activities included in the TBL process are necessary and part of a whole. Our results provided compelling evidence supporting the inclusion of all TBL essential principles in order not to compromise the participants' experience of TBL. In fact, we can go so far as to say that in such cases, the teaching strategy can no longer be considered as TBL.

We conclude that this study highlighted the applicability of all activities in TBL, also in the 21st century, not because there has been no evolution or progress in TBL over the years but rather because the basic principles of TBL remain essential. Health science educators who want to include TBL in their classrooms must ensure that the four fundamental principles are acknowledged and understand the reason for their inclusion in order to use TBL successfully.

Although activities like team formation, team size, assigned reading and RATs were described in the majority of included studies, future application of TBL should include more reporting on the peer assessment, immediate feedback, appeal process and application exercise to ensure that the required potential of TBL can be realized. The future possibility of including TBL in at least one module of all health science curriculums will orientate health care professionals towards better team work in the health care sector, improved communication skills and the application of therapeutic and theoretical principles in practice.

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CHAPTER 3

ARTICLE 2

The article was prepared according to the journal submission guidelines for *Currents in Pharmacy Teaching and Learning* (cf. Appendix F2-1) and submitted in August 2016 (cf. Appendix F2-2).

Title

Undergraduate training for a health professions team: the voices of fourth-year pharmacy students

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Abstract

Objectives: Pharmacists in South Africa are trained to be part of healthcare teams with the necessary knowledge, skills and competencies to promote the health of their fellow citizens. Students' voices provide an instructive perspective on effective and high quality training. The aim of this study was to access fourth-year pharmacy students' views on how they saw

themselves contributing towards the effective functioning of a health professions team; the competencies they needed to develop during university training; and how this training could prepare them to function effectively as part of such a team.

Methods: A qualitative approach included voluntary student participation in focus groups. Interview data were transcribed verbatim and analysed according to themes. Quotations were selected to reinforce the themes and to give a voice to the students.

Results: Pharmacy students identified an extensive range of contributions that a pharmacist could make towards effective functioning in the health professions team, indicating that the pharmacy curriculum succeeded in training these students to identify how they saw themselves as members of the team. The students listed a wide range of competencies they considered they needed to develop at university during their training. These competencies resulted from working in the practice setting more than in the academic environment. However, the pharmacy students concluded that current group work as experienced in their curriculum did not prepare them fully for effective performance in the health professions team due to poorly structured team work and lack of appropriate formal teaching strategies.

Conclusion: Student voices highlighted the importance of a formal teaching strategy in order to prepare them for effective functioning in the health professions team.

Keywords: Healthcare team; Health professions team; Pharmacy education; Pharmacy students; Student voices; University students

Conflict of interest

None.

Financial disclosure

This work was supported by the Scholarship of Teaching and Learning, Potchefstroom Campus, North-West University.

Specific contribution to literature

Group work strategies have been part of higher education classes for a long time, especially since outcomes-based education became a philosophical framework for training institutions. Teachers and lecturers were encouraged to use group work in class, with or without the proper training and without necessarily applying good educational principles. This article contributes to the extensive literature already available on group work, in that it provides a unique view of pharmacy students' experience of group work in general and their suggestions on how group work can be implemented more effectively in class. The article further supports literature on the value of implementing group work during undergraduate training, as students explained how they see their roles as part of a team and how participating in formal group work in class taught them certain critical competencies. Although the study focused on pharmacy students, insight on formal group work activities were gained that lecturers in any higher education setting may find valuable.

Undergraduate training for a health professions team: the voices of fourth-year pharmacy students

Abstract: *Objectives:* Pharmacists in XXX are trained to be part of healthcare teams with the necessary knowledge, skills and competencies to promote the health of their fellow citizens. Students' voices provide an instructive perspective on effective and high quality training. The aim of this study was to assess fourth-year pharmacy students' views on how they saw themselves contributing towards the effective functioning of a health professions team; the competencies they needed to develop during university training; and how this training could prepare them to function effectively as part of such a team.

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Introduction

In XXX, the purpose of the *Baccalaureus Pharmaciae* degree is to deliver pharmacists who can be part of healthcare teams with the necessary knowledge, skills and competencies to promote the health of the country's citizens.[1] This qualification is structured around eleven exit level outcomes prescribed by the XXXn Pharmacy Council (XXPC),[1] the statutory body for the pharmaceutical profession. The achievement of these outcomes should be integrated into the BPharm curriculum as they form the basis of practice for an entry level pharmacist.[1] Healthcare educators are aware of the limitations of didactic methods for developing critical thinking skills in students.[2] Passive lectures provide a lower level of knowledge retention and cognition[3] and they do not develop the necessary skills such as team work and problem solving that are needed for the workplace.

Small-group learning, an active learning method, promotes the development of problem solving, critical thinking and interpersonal communication skills. In contrast to lectures, small-group learning can increase student engagement and behavioural interaction.[4] Elwyn[5] summarised the different types of small groups according to their purpose as problem-orientated learning, project, seminar, syndicate or tutorial groups. Within a small group, different techniques can be used such as brainstorming, buzz grouping, controlled or free discussion, games, simulation, role play or snowballing. Teaching strategies such as problem-based learning (PBL) or team-based learning (TBL) are examples of formal small-group teaching strategies,[6] that have structures and critical elements essential to the success of the strategy. When these formal structures and elements are not present and students are randomly grouped together, mostly via self-selection, for informal once-off group work on an assignment, the success of small-group work can be limited.[7]

Research has been conducted on the effectiveness of small-group work from a pedagogical perspective, but relatively few publications cover the students' experiences of the value of such work. Students' voices provide a different perspective on effective and quality training.[8] There is much to be gained from entering the students' world and respecting their version of reality. Using students' voices are a common practice in many higher education settings worldwide. The potential benefits for universities to include a process where students' voices can be heard on the university's core business are well documented.[9–15] Researchers in Australia used qualitative data as an effective tool to track and improve students' experiences. Students' voices were used to determine the best aspects and those in need of improvement of a specific course over a 10-year period.[10] This allowed the university to identify key trends in student experiences and areas that warranted improvement. In another study conducted in the United Kingdom, the effectiveness of the redesign of a lecture-centred course was explored through student focus groups. By including student voices in the process, critical insight was gained into how students reacted initially to the revised curriculum.[15]

In recent publications, the experiences of faculty members with TBL were investigated.[16–19] The authors concluded with various recommendations that could benefit other faculty researchers when planning TBL sessions. The aim of the study reported here is to describe pharmacy students' views on how they see themselves contributing towards the effective functioning of a health professions team; the competencies they need to develop during university training and how this training can prepare them to function effectively as part of such a team. This investigation formed part of a larger research project on the development of guidelines for TBL in an undergraduate pharmacy curriculum in XXX.

Methods

We followed a qualitative research design using focus groups. This enabled us to gather a wide range of responses, comments and opinions from the students, providing us with valuable information to improve training.[20-21] These responses were rich in detail and added to our overall body of knowledge.[11,22–24]

Ethical considerations

Ethical approval for this study was granted by the Faculty's ethics committee. University students who participate in education research are considered a vulnerable population when the researcher is also the lecturer,[25] and informed concent was first obtained from the students. Participation was voluntary and anonymous, and withdrawal from the study for any reasons whatsoever would not pose any disadvantage to the student. All data were handled and reported anonymously but only partial confidentiality could be assured due to the nature of the focus groups. Video-recording of the focus groups for capturing non-verbal cues in the transcribing process were explained.[24]

Data collection

A randomised purposive sampling technique was applied in which potential study participants from the target population (N=200) indicated on an informed consent form their availability to be contacted for the focus groups.[26,27] All 23 students who volunteered to participate were included in the focus groups. Focus groups comprising six to nine participants each ensured that the groups were small enough to promote active involvement by all the students.[28] An independent facilitator with experience in pharmacy education, facilitated the focus groups. Current available literature and the data from students' written

narratives regarding the importance and their experience of team work within the pharmacy profession, collected in the previous research phase, were used to compile questions for the focus groups. The three questions were as follows: (i) Describe how you can contribute to the effective functioning of the health professions team; (ii) What competencies do you need to develop here at university to help you function in a health professions team?; and (iii) How can training here at the university prepare you to function effectively in a health professions team? The focus groups were conducted in a seminar room easily accessible for students and without any disturbances. The duration of the sessions varied between 60 and 90 minutes. The focus groups were video-recorded and transcribed verbatim by a contracted company that also checked the transcripts for accuracy and anonymity.

Data analysis

Two researchers analysed the transcribed data for qualitative content independently, using descriptive coding according to Saldaña[29] in order to create categories and theme the data, using computer-assisted qualitative data analysis software ATLAS.ti version 7.5.12.[30] A third researcher acted as an independent co-coder to confirm the categories and themes identified. Although all responses were coded for the individual participants in each session, the focus groups were used to collect group data for each question. Repetition of answers towards the end of the focus group sessions indicated that data saturation had been reached[28] and that sufficient data for our purpose were generated with the three focus groups.

Results

The results are presented according to the main questions directed to the focus groups (Figure 1). A selection of direct quotes of students' responses from the focus groups is provided as evidence.

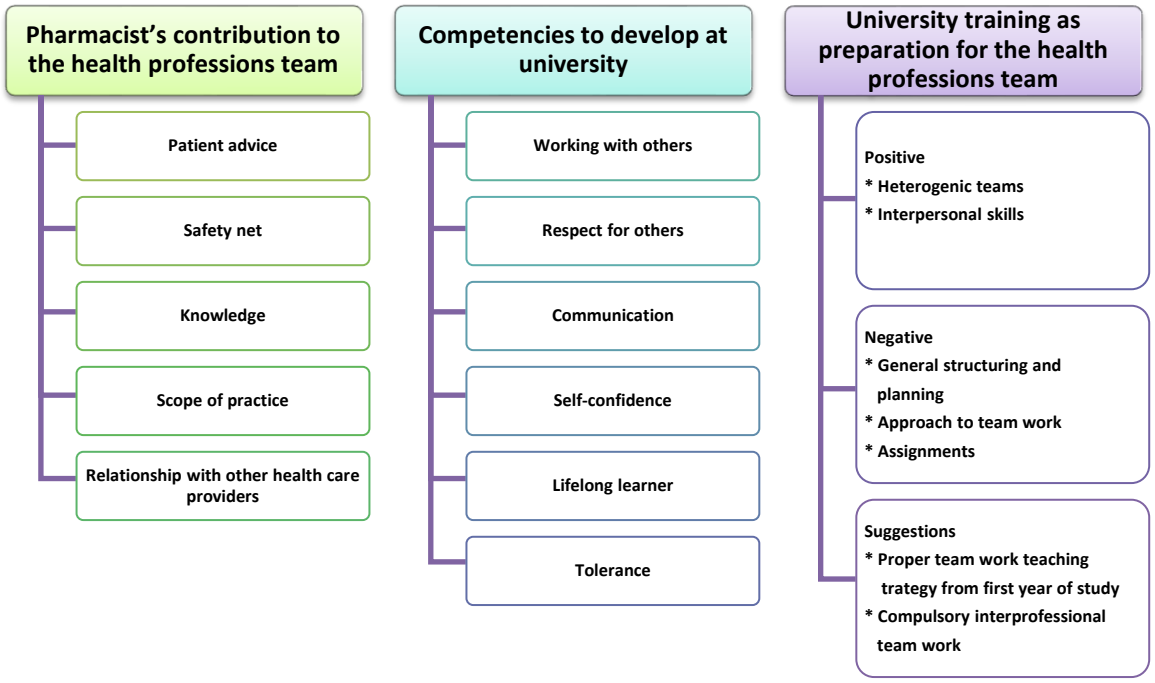

Figure 1. Summary of results from focus groups according to each of the three questions addressed.

Pharmacists' contribution to the health professions team

In the first question, the students were asked how they thought they (as pharmacists) could contribute to the effective functioning of the health professions team. They responded that *"as a pharmacist it is important for me, at the end of the whole care process, to ensure the patient is satisfied and that their medication is right for them and to provide the best advice to them."* Therefore pharmacists have an irreplaceable role in providing advice to patients on the medication that has been prescribed by the doctor.

Students also felt strongly that pharmacists, because they are at the end of the healthcare process, should *"detect errors, for example, with the medication that they* [the patient] *received"* and act as a safety net to pick up on potential prescribing errors that might harm the patient.

It was interesting that these students explicitly mentioned that *"where you mainly can make a difference and an effective contribution is in your field of knowledge, and that is medicine."* In XXX, pharmacy students graduate with majors in pharmacology, pharmaceutics, pharmaceutical chemistry, clinical pharmacy and/or pharmacy practice/pharmacy administration.[31–39] Given this broad range of majors, it is understandable that the pharmacy students see themselves as specialists with regard to medication.

Although a pharmacist's knowledge is important, the pharmacy students also believe that *"we have to know our role in the team; when we are no longer in our role we should hand over to a doctor or nurse or someone else. We have to know where our place is and not step on another's toes."* The pharmacist should know what their scope of practice is and be aware of the role each member of the health professions team plays, in order not to overstep one's area of expertise. This collaboration will ensure better patient outcomes.

Lastly, the pharmacy student also sees a good relationship with other healthcare professionals as a contribution that they can make towards the effective functioning of the health professions team. A bad or unfavourable working relationship between the pharmacist and other healthcare professionals may lead to the patient suffering the consequences. The pharmacist must play an active role in establishing a good relationship with other healthcare professionals by respecting them, their specialist knowledge and role in the healthcare team:

"I feel it is important that if you help a patient that you do it with a team approach. If one of the healthcare professionals is not there, then you may disadvantage the patient because he will not receive the best care that he should get."

Competencies to develop at university

In the second focus group question, we asked the pharmacy students what competencies they thought they would need to develop during their BPharm degree studies, which would help them to function in a health professions team. The first competency mentioned was that these students needed to develop the ability to *"cooperate with others, so that if you work someday, you can work with colleagues and not only do* [the] *work by yourself"*, especially with different health professionals. Pharmacists should not only be able to work on their own but rather as part of a team. The pharmacy students also mentioned that even when group work was sometimes not successful, it was still a learning opportunity for similar situations in the future: *"Even if the others* [group members] *do not cooperate during group work at university, it is exactly where you learn that life skill, so that one day when someone in a practice is not cooperating you know how to handle the situation."* The students felt that *"because our profession is focused on people. You work the whole day with patients and other healthcare professionals. Thus, general human relations are very important."* Students did mention that extracurricular university activites such as student leadership committees provide them with opportunities to develop these competencies for example how to handle different conflict situations. However, not all students participated in these activities.

Another important factor remarked on was that *"one of the most important aspects of team work is to respect each other. You don't just* [verbally] *attack someone. You make sure that*

you have all the information before you talk to someone in the team" – whether it is towards colleagues, patients of different cultures or other healthcare professionals.

Another competency identified by the students was good communication skills with colleagues and patients. These include both verbal and non-verbal communication skills: *"You should talk to the prescriber when there is a problem with a patient's medication. I think usually the majority of problems that occur are due to miscommunication between the prescriber and the pharmacist."*

The students also agreed that self-confidence is a very important competency to develop in order to contribute effectively to the health professions team. This includes confidence in the *"pharmacist's own ability"*, not to doubt oneself, as well as confidence in other members of the healthcare team. *"If I do not have confidence in the pharmacist, then I will go home and not open the medication package and not take my 'medication'."*

Although pharmacy students described their professional knowledge as their contribution to the health professions team, they also felt strongly that it was a competency that they acquired at university and which they needed to keep up-to-date throughout their professional lives as lifelong learners: *"We are actually going to learn for the rest of our lives. You cannot stop learning after university because things change. And to provide the best care for your patient you have to keep learning and updating your knowledge."*

Lastly, some pharmacy students also mentioned the ability to be tolerant with colleagues and patients, as well as the ability to listen to what the patient says and not to *"listen halfway through a question"* and jump to conclusions.

University training as preparation for the health professions team

In the third focus group question students were asked how their training at university could prepare them to contribute effectively to the health professions team in the workplace. Most of the discussion on this question focused on students' exposure to different forms of group work during the previously few years at university. It was clear from the discussions that they experienced some factors that contributed positively towards their learning, although other factors were identified as less favourable or not worth it at all, in their opinion. The first positive experience was that the correct approach to group work — for example, working in a heterogenic group compiled by the lecturer to avoid the possible formation of coalitions or subgroups because *"between friends, all of them have the same views."* This enabled them to see the bigger picture of their training as *"working in a group with five other people who all have different views, help you in that regard. It will change your view and sometimes you look past your tunnel vision and see the bigger picture of how things are supposed to be."*

Pharmacy students identified the second positive experience when working in groups during their training at university, and that is that group work improved their interpersonal skills. Group work provided them with the opportunity to work closely with other students *"to get to know people in some ways."* They got to know *"the person himself, his personality, and how to work with that person — to respect the way he does things or says things"* and were able to support a group member if he or she was having a problem because they would notice it.

On the other hand, students also had negative experiences of group work during the previous few years of university training. *"I think it is a case where group work is important but its*

structuring is more important, because if it is not structured correctly, the goal will not be achieved and we will not learn what we are supposed to learn." These experiences led them to conclude that there was still room for improvement before they could consider themselves as contributing effectively to the health professions team in the workplace in the future. Students mentioned that poor structuring and planning of group work did not contribute to their development of skills and competencies. *"In one course we were divided into groups of twenty — it was stupid. It was meaningless, according to me, because you will never find a time that will suit twenty people. You will need two days to discuss one subject because the number of people you ask is the number of opinions you will get."*

A second major aspect that impacted adversely on the students' experience of group work, in addition to lack of structure, was a lack of a formal approach to group work. They were able to identify where certain improvement was needed. *"I feel that at university we do not approach group work correctly because we say 'you do this section of the work and you do that section of the work.' But we are supposed to sit around a table and all discuss the question. This is how we are supposed to do the assignment but priorities differ at university. We need to do assignments together because then the assignment is going to be of better quality because your opinion is not necessarily the correct opinion."* It frustrated students when there was no value or benefit in the task on hand and that it was actually a wasted effort.

The third aspect where training at university did not prepare students optimally was where group work was a simple repetition of the theoretical content. The focus of group work should include the use of more application exercises and case studies to apply theoretical content in real-life scenarios. Students also felt it was important to apply theory in the

workplace itself and not only in the academic environment. *"Last year there was an interdisciplinary research project*[1] *and I participated in that. There we received a problem and then the interdisciplinary team had to solve the problem — it helped me a lot. I could listen to the other students sitting around me and I could also give my input."*

The students also had some suggestions with regard to improved training of pharmacists in future. *"I think we had, what, six, seven, eight versions of group work since our first year. If a formal type of group work, team work, is practised from our first year then the team would stand out at the end of the day and be a good team."* The principle suggestion was that a proper team work teaching strategy should be introduced from the first year of study in order to prevent wasteful efforts.

The second suggestion was that, in line with proper team work, the pharmacy students considered that their university training should also include compulsory interprofessional team work. *"It is very easy to think that I'm almost a pharmacist, and so if the patient complains of headache, I will give him two Paracetamol tablets. But now that you are in the interdisciplinary team, then the dietician will say: 'If the patient has a headache, let him drink more water because maybe he is dehydrated, or let him eat more healthily because maybe that's why he has a headache.' And the sport scientist will say, 'maybe his neck muscles are stiff due to something and that is why he has a headache'."* Students emphasised that they wanted first of all to understand what other healthcare professionals learned and desired to learn from them as well as this would enhance their own knowledge and practice.

[1] This interprofessional research project was the first-ever pilot project in the Faculty. It included third-year students training in seven different health professions: pharmacy, nursing, social work, psychology, nutrition, dietetics, consumer sciences, and human and movement sciences. Participation was voluntary.

Discussion

The research was motivated by the fact that pharmacy students traditionally disregard the importance of proper team work due to poor implementation of traditional group work or working-in-groups. Given their lack of exposure to proper team work, students often have low expectations of working with others, especially in an academic environment. When working together, students often demonstrate characteristics of working in groups rather than teams.[40] These findings reported here present a unique, detailed analysis of how students saw their preparation towards the health professions team and provided insight for the lecturer and faculty management. This qualitative research presents fourth-year pharmacy students at a XXXn university with the opportunity to voice their opinions regarding how they thought they could and should contribute to the effective functioning of a health professions team and how they believe university training should prepare them for it.

The pharmacy students came up with an extensive range of contributions that a pharmacist could make towards effective functioning in the health professions team. This originated from their personal experiences in practice, when they worked their practical hours in community or hospital pharmacies during holidays over the previous three years of training, as required by the XXPC.[41] Pharmacy students are aware of the importance of preparing them for the health professions team, as stated in the Good Pharmacy Education Standards,[41] that prescribes *"the development of pharmacy graduates who are trained to provide patient care services in a team with other health professionals."* It is remarkable to note that they could differentiate between their specialised role and contribution towards the patient's health, but also that when it is beyond their scope of practice, referral is needed. It was also rewarding to find that strong emphasis was placed on the students' relationship with other healthcare

professionals because this relationship could influence the potential health outcome of the patient. Because this relationship was not currently fully nurtured in the academic environment, it proved that their practical experience outside the university added value to their training as future pharmacists. This was in line with the purpose of the BPharm qualification[1] and indicated that the curriculum succeeded in training pharmacy students to identify how they saw themselves contributing to the effective functioning of the health professions team.

A wide range of competencies were listed by the students, which they considered they needed to develop at university during their training. It was surprising that these pharmacy students felt strongly about good communication as part of their skillset. In the BPharm curriculum in XXX, it is compulsory for all pharmacy students to enroll for a semester course in communication for pharmacists. At one institution, some students concluded this as a waste of time.[42] It is clear that in their fourth year of study, they have a better idea than earlier in their curriculum of what is expected of them as pharmacists. It is also significant to note that they considered that they had to learn from different cultures. XXX has eleven official languages and a diverse representation of cultures and religions. It is important to understand and be respectful of cultural differences and religious preferences in serving the public and working with health care team member from diverse groups. Students also specifically mentioned that working effectively in a team was a competency that they needed, especially the ability to work with other professions and not only by themselves. The competencies identified in this study reflect some of the roles identified by the World Health Organization (WHO) for a seven-star pharmacist[43] and the XXPC's eight star pharmacist[41]. It also indicated that the curriculum and exposure to the working environment created awareness of the type of abilities pharmacy students needed to develop at university.

As the pharmacy students in this study were approaching the end of their university training, they have accumulated extensive exposure to working in groups over several years of study. Consequently, they were in a position to point out what they had experienced as valuable and what they could conclude as less valuable in terms of preparation for working in a health professions team. Purposeful and well-structured team work is crucial for students to be able to learn how to function in such a team. Although students were exposed to ineffective group work during their university studies, they were able to identify bad practices that defeated the purpose of it. The students' call for a more formal team work structure needs to be implemented in the first year of study, so that good working teams, and not groups, are established as soon as possible. In these teams, students want to work on practical case studies or scenarios where they are expected to apply the theoretical knowledge gained from the textbook and other study materials to real-life situations and not merely a simple reproduction of content. They also want to work with other healthcare professionals in interdisciplinary teams, even at university, so that they can establish a good working relationship with other professionals as soon as possible. It was clear from these students that, up to this point in their university training, they had not been introduced to an appropriate teaching strategy for team work. This suggests that future research should identify a strategy to teach pharmacy students how to perform optimally in health professions teams.

Conclusions

This article aimed to understand, firstly, how students see themselves contributing towards the effective functioning of a health professions team as experienced during their exposure to practice. The students emphasised the essential, indeed irreplaceable, role a pharmacist plays

in the healthcare team. The second conclusion for the study is that students need to develop a broader range of competencies than just mere theoretical knowledgeto make a positive contribution to the health professions team. Currently, these competencies are neither developed through the formal teacher-centred approach, nor through current informal, unstructured group work. Thirdly, students indicated that they needed group work training to be formally structured. Students described informal and unstructured group work as inadequate to prepare them for operating effectively in a team. Students experienced informal and unstructured group work as ineffective, which did not prepare them for such a team.

These results led to unexpected and valuable information from the students of which lecturers need to take heed. Lecturers should revise their teaching approach to include formal team work in the future rather than informal group work. Through listening to students' experiences, we realised that lecturers are ofter unaware of how students perceive teaching and learning experiences. These findings provide insight into how changing from the current approach of group work to structured team work could result in better acceptance of the student's individual role. It would be interesting to investigate the impact of more formal team work strategies in the pharmacy curriculum of our university, based on the concerns raised by these pharmacy students on their exposure to group work. To further investigate the value of formal group work strategies to prepare pharmacy students for the health professions team, these pharmacists of the future could be invited to provide feedback on their experience of team work in the working environment after their one-year compulsory internship.

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CHAPTER 4

ARTICLE 3

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Team-Based Learning Experiences of Fourth-Year Pharmacy Students in a South African University

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Abstract:

Objective: Traditional lecture methods are teacher-centered and discipline-based. Team-based learning (TBL) aims to ensure that students engage more deeply with course content. We aim to determine fourth-year pharmacy students' learning experiences of the use of TBL at a South African university.

Method: A questionnaire was developed including biographical data and quantitative questions focusing on student learning experiences. A sample of 183 (91.5%) students participated. SPSS was used to analyze the data.

Results: Students had an enjoyable experience with TBL and found it valuable and more worthwhile than traditional lecture methods, regardless of their initial negative perception of TBL. Students enjoyed working in multi-cultural, mixed gender teams.

Conclusion: TBL is an effective teaching strategy to simulate the reality of health professions where practitioners are required to work in a team. TBL should be offered in more courses in health professions curriculum in South Africa to strengthen and uplift health care delivery.

INTRODUCTION

The purpose of team-based learning (TBL) is to deepen students' learning and, secondly, to promote the development of high-performance learning teams.[1] TBL was developed by Larry Michaelsen when faced with the same problems as many lecturers are facing today using traditional lecture methods: low class attendance, low student engagement during class, low value of lectures as it is being perceived as boring, and small-group work resulting in an achiever show-off opportunity.[2-3] Traditional lecture methods are teacher-centered and discipline-based and as a result, students become passive learners who mostly memorize course content.[4]

TBL, as described in detail in publications by Michaelsen and others,[1,3,5-8] aim to ensure students engage more deeply with course content than simply memorizing facts before an assessment or exam.[2] Secondly, it fosters students who are accountable for their individual preparation and the contribution to the team in the course. Thirdly, students must collectively make decisions based on real-life case studies and be able to motivate their judgments based on theoretical principles.

For the optimal learning experience during TBL, it is critical that each team has adequate and approximately the same level of resources to draw from during the application exercises. To ensure this, teams must be as diverse as possible, meaning each team should consist of a mix of student characteristics in relation to the course content, eg previous course work completed as well as demographic characteristics like gender and ethnicity.[1] Because the TBL class does not include a formal, elaborative theoretical lecture like in traditional lectures, all theory applicable to a specific scheduled class should be studied and accomplished before the specific class. It is crucial that students understand basic theoretical concepts and ideas in order to contribute and successfully complete the application exercise. In the application exercise, teams discuss and debate real-life case studies to decide on a correct answer. During peer evaluation the team evaluates each member's individual preparation for team work, reliable class attendance, positive contribution to team discussions, and value of their input.[1]

Although several publications in the *Journal* focused on TBL and its outcome in terms of course grades,[9] perception of faculty members,[10] comparison with traditional lecture-based learning,[11] or student performance and perception,[12] no article specifically focused on the learning experiences of students where TBL was the sole method of instruction. This is also the first report on TBL implementation in a South African university's school of pharmacy. This study formed part of a larger research project on the development of guidelines for TBL in an undergraduate pharmacy curriculum in South Africa. In this article, we aim to determine fourth-year pharmacy students' learning experiences of TBL as used in a pharmacy practice course of the *Baccalaureus Pharmaciae* curriculum after their exposure to TBL.

METHODS

Research Instrument and Pretesting

A questionnaire was developed using information from a literature review on TBL in undergraduate health professions education as well as data gathered in the previous phases of the larger research project. The questionnaire included biographical questions such as gender, age and ethnic group as well as 19 quantitative questions focusing on students' learning experiences. The 19 Likert-type questions were answered using a 4-scale rating (strongly disagree, disagree, agree, strongly agree). Berk[13] recommends measuring teaching effectiveness with an even-numbered scale to avoid a midpoint option that serves as an escape anchor. For each of the questions, the respondent had to make a cross in the square that best describes their opinion, where 1 is 'strongly disagree' and 4 is 'strongly agree'. Respondents may have only selected one square per question and had to answer all the questions.

The questionnaire was tested through an exploratory investigation to detect errors in content and/or clarity before being utilized in the main investigation.[14] Cognitive interviews were conducted with students who were similar but not part of the study population to see whether the potential respondent (1) understood the questions in general, (2) understood all the words in the questions, (3) could provide the relevant answer(s), and (4) could provide any advice on whether the question should be restructured, rephrased or could stay as is, as recommended by Wills.[15] Experts in the fields of health

professions education and pharmacy were asked to review the questionnaire for content validity and to give their opinion on aspects such as (1) the clarity and distinctness of the questions, (2) the amount of time needed to complete the questionnaire, (3) any bias that may be created by the questions, and (4) any other suggestions and/or recommendations. The completed questionnaires from students and experts were captured in the same way as the data from participants to ensure that the data from the questionnaires can easily be transferred into electronic data sheets for statistical analysis. All comments and suggestions were included in the questionnaire to improve the quality after which the questionnaire was sent to a statistician for final evaluation on face validity. The Flesch-Kincaid readability tool was used to assess the complexity of the text. Grade 8 should be the maximum targeted complexity level.[16] The level of this questionnaire was 7.

Target and Sample Population

Fourth-year pharmacy students enrolled in a management course in the 2016 academic year formed the target population (N=200), as TBL was introduced in this course for the first time in this year. Since the target population was easily accessible with little difference in time and cost to collect the data from the entire target population, all students were invited to complete the questionnaire. However, not all students agreed to participate and/or gave consent that their data may be used, which resulted in a sample population of 183 (91.5%) students. Pearson's chi-square test was used to determine if the sample represented the target in terms of age, gender and ethnic group. The *p* values greater than 0.05 (0.67, 0.91 and 0.79 respectively) indicated no statistically significant association. Thus, the sample population represented the target population in terms of biographical data (Table 1). All completed questionnaires received were included in the data of the study.

Table 1. Biographical Data of Target and Sample Population – Gender, Age, and Ethnic Group

	Target Population		Sample Population	
	n	**%**	**n**	**%**
Gender				
Male	41	20.5	34	18.8
Female	159	79.5	147	81.2
Age in years*				
22 and younger	130	65.0	117	58.5
23	45	22.5	44	22.0
24 and older	25	12.5	21	10.5
Ethnic group				
White	183	91.5	166	90.7
Other	17	8.5	17	8.3

*Age in years as on 31 December 2016

Data Collection and Human Subject Considerations

The questionnaires were completed during a scheduled class period when the target population was present. Pharmacy students were informed upfront of the date when the data would be collected. There was only one opportunity to participate in this research study. Due to data being collected anonymously, it was not possible to validate if a student who asked to complete a questionnaire at a later stage did not already complete a questionnaire.

An information leaflet was handed out to all potential participants prior to the selected class to provide students time to think about their participation in this study, as they were under no obligation to participate. The leaflet contained information regarding the purpose of the study, researchers, procedures, benefits, risks/discomforts, cost/remuneration, access to data, inquiries, funding, ethical approval and feedback on the findings. Students who agreed to participate gave written informed consent indicating their willingness to participate in this research and handed it in with the questionnaire but in separate containers in order to adhere to anonymity. Participation in this research was entirely voluntary and participants were free to decline participation or to withdraw from the study at any point, even if they did agree to take part. However, if they handed in their anonymous completed questionnaire there was no way of tracing the questionnaire back to the student and the data could not be withdrawn at that stage.

The research was conducted according to the ethical guidelines and principles of the International Declaration of Helsinki and the National Health Research Ethics Council (NHREC) of South Africa,

and ethical approval for this study was granted by the applicable faculty's ethics committee prior to commencement of the research.

Data Analysis

The data were captured manually in a Microsoft Excel spreadsheet using the options 1 to 4 for each question. After all data were captured, a random 10% of data entries were spot checked for accuracy, and data error identification and rectification measures were applied as an iterative process. Since there is no means to trace a questionnaire back to the student, missing data could not be followed up and were left as is.

The IBM SPSS Statistics version 23, release 23.0.0[17] was used to analyze the data. Descriptive statistics were used to summarize the collected data. Since this is a newly developed questionnaire, exploratory factor analysis (EFA) was conducted to explore the structure of constructs within the data. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated whether there was sufficient data available for this specific analysis. The guideline value is 0.7.[18] In this study, the KMO was calculated at 0.76, indicating that the sample size was acceptable. Bartlett's test of sphericity determines if there was enough correlation between the items. The guideline value is $p<0.05$.[18] The reported p value ($p<0.001$) indicated that there was enough correlation between the items. On the other hand, to confirm that there was not too much correlation between items, the determinant should be greater than 0.00001.[18] The calculated determinant was 0.03, which is higher than the guideline value. The extracted factors resulting from the Oblimin rotation and Principal Axis factoring methods explains a total variance of 57.7%. The loadings in the pattern matrix ranged between 0.27 and 0.84 and group together questions 1 and 2 (previous experience), questions 3 and 4 (external motivation to prepare for class), questions 5 to 8 (class attendance and participation), questions 9 to 12 (working in teams), and questions 13 to 19 (experience of TBL). The EFA indicated that question 8 loaded onto the 'class attendance and participation' factor. However, based on the literature study, it made more theoretical sense to group this question with questions 9 to 12, the 'working in a team' factor.

Although the EFA indicated that question 1 and 2 forms a factor, the Cronbach's Alpha indicated inadequate reliability (α=0.14) since it was below the guideline value of 0.7.[19] Therefore it was decided to analyze them separately going forward as 'negative perception of TBL' for question 1 and 'usual preparation in advance for all classes' for question 2. The other four factors' reliability was confirmed with the Cronbach's Alpha above 0.7:[19] external motivation to prepare for class (question 3 and 4; α=0.66; *M*=3.2, *SD*=0.65), class attendance and participation (question 5 to 8; α=0.74; *M*=3.4, *SD*=0.62), working in teams (question 8 to 12; α=0.66; *M*=3.4, *SD*=0.41), and experience of TBL (question 13 to 19; α=0.78; *M*=3.0, *SD*=0.52).

A confirmatory factor analysis (CFA) by means of a structural equation model (SEM) was conducted using Amos 23.0.0 (build 817) to test the fitness of the model as described above to the data. All the items contributed significantly to the factors, as indicated by the *p* values of <0.05 and the standardize regression weights of 3.88 and larger. These goodness-to-fit statistics, which consist of different measures, determine how well the covariance structure predicted by the factors resulting from the model corresponds to the covariance structure in the data.[20] Model fit was assessed using four different indices from four different categories. Chi-square test statistics (2.28) were indeed close to the guideline value of 1 which indicates a good fit. The comparative fit index (CFI = 0.83) still reflected a reasonable fit although it is slightly less than the guideline value of 0.95. A root mean square error approximation (RMSEA) of maximum 0.10 indicates a good fit. The RMSEA for this study was 0.08 (0.07; 0.09), indicating that the model fits the data well.

Although a convenience sample instead of a random sample was used and thus *p*-values are not applicable, it will still be reported for completeness sake.

RESULTS

Biographical Data

In the first section of the questionnaire, biographical data were collected, namely the gender, age, and ethnic group (Table 1). The target population was represented in the sample population in terms of all

three variables as confirmed by *p* values smaller than 0.05 of the Chi-square test. The majority of the study participants were female (80.3%), 22 years of age (63.9%) and white (90.7%).

Descriptive Statistics of TBL Questionnaire

Table 2 contains the results of the descriptive statistics of the TBL questionnaire's data. The majority of students (69.4%) agreed that they initially had a negative perception of TBL directly after being introduced to it (Q1). More than half of the students (53.3%) admitted that they do not usually prepare in advance for class (Q2) prior to the implementation of TBL. However, TBL changed this situation as only 15.3% of the students indicated that TBL did not motivate them to prepare for class (Q3[a]), even though it would be expected of them to discuss their opinions during class (Q4). TBL also increased most of the students' class attendance (88%, Q5), class participation (95%, Q7), and reduced the likeliness of them feeling sleepy during class (88%, Q6). Students experienced working in teams very positively, with 78.1% of the students indicating that they preferred working in multi-cultural teams (Q8) and 95.1% preferring mixed gender teams (Q9). Students (98.4%) agreed that they contributed to their team's activities (Q12) and nearly all of them (96.8%) were positive about working with their peers (Q10). From previous experiences, group evaluations, and especially peer evaluations, were not generally regarded in a positive way by students. However, in TBL, 75% of the students actually indicated that they enjoyed the use of peer evaluation activities (Q13) and acknowledged to working well as a participant in a team (95.1%, Q11). Overall, more than 80% of the students enjoyed the learning (Q14[a]) and team experience (Q13), and 68% of the students agreed that TBL should be offered more often in the Bachelor of Pharmacy (BPharm) curriculum (Q15) as the time spent on TBL is more worthwhile (Q16[a]) and valuable (Q17) than traditional lectures. TBL was also experienced as an effective teaching strategy to simulate the reality of the health professions team (Q19) and as motivation to give their best (Q18[a]) by over 90% of the students.

Table 2. Results of the TBL Questionnaire on Learning Experiences

	Percentage (%)				
	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**M (SD)**
Negative perception of TBL					
Q1 I had a negative perception of team-based learning after the lecturer introduced it but before we practiced it for the first time.	9.8	20.8	47.0	22.4	2.8 (0.89)
Usual preparation in advance for all classes					
Q2 I usually prepare in advance for class in most of my courses.	15.8	37.7	37.2	9.3	2.4 (0.86)
External motivation to prepare for class					
Q3 Team-based learning did not motivate me to prepare for this class.[a]	43.2	41.5	10.4	4.9	1.8 (0.83)
Q4 Knowing I would discuss my opinions during class motivated me to review study material prior to class.	1.1	10.4	50.8	37.7	3.3 (0.68)
Class attendance and participation					
Q5 Team-based learning increased my class attendance compared to traditional lectures.	6.0	6.0	24.6	63.4	3.5 (0.86)
Q6 I am more likely to feel sleepy during traditional lectures than during classes using team-based learning activities.	2.7	9.3	36.1	51.9	3.4 (0.77)
Q7 Team-based learning increased my participation in the classroom.	1.6	3.3	39.3	55.7	3.5 (0.65)
Working in teams					
Q8 I prefer to work in a multi-cultural team.	4.4	17.5	45.9	32.2	3.1 (0.82)
Q9 I prefer a mixed gender team.	0.5	4.4	45.4	49.7	3.4 (0.61)
Q10 I am positive about working with my peers in the classroom.	0.5	2.7	44.3	52.5	3.5 (0.58)
Q11 I work well as a participant in a team.	0.5	4.4	47.5	47.5	3.4 (0.61)
Q12 I contributed fully to my team's work in this course.[b]	0.0	1.6	33.9	63.9	3.6 (0.52)
Experience of TBL					
Q13 I enjoyed the use of peer evaluation as part of my team experience.[b]	4.9	19.7	49.2	25.7	3.0 (0.81)
Q14 The team-based learning approach made my learning experience less enjoyable.[a]	32.8	54.1	10.4	2.7	1.8 (0.72)
Q15Team-based learning should be offered in more courses in the BPharm curriculum.	13.1	19.1	46.4	21.3	2.8 (0.94)
Q16 The time spent in traditional lectures was more worthwhile than time spent in team-based learning.[a]	14.2	47.5	31.7	6.6	2.3 (0.79)
Q17 Team-based learning sessions were more valuable than traditional lectures.	4.4	26.8	42.6	26.2	2.9 (0.84)
Q18 Team-based learning did not motivate me to give my best in this course.[a]	35.0	50.8	11.5	2.7	1.8 (0.74)
Q19 Team-based learning is an effective teaching strategy to simulate the reality of the health profession where one is required to work in a team.	1.1	7.1	51.4	40.4	3.3 (0.65)

[a]Question 3, 14, 16, and 18 were stated negatively.
[b]Question 12 and 13 were only answered by 182 participants.

Correlation between Age and Factors

Spearman's rho is a correlation coefficient that indicates the relationship between two variables, eg age and a specific factor. The guideline values indicate that 0.1 is a small effect or practically non-significant relationship, 0.3 is a medium effect or practically visible relationship, and 0.5 is a large effect or practically significant relationship.[21] The *p* values indicate whether or not there is statistically significant correlation, the guideline value being less than 0.05.

The correlation between age and experience of TBL (r=0.19, p=0.01) leans towards a practically visible relationship which is also statistically significant. Practically and statistically non-significant correlations were reported between age and all other factors (r<=0.10 and p>=0.18).

Correlation between Factors

Spearman's rho indicated practically visible to practically significant relationships or medium to large correlations between the following constructs: external motivation to prepare for class with experience of TBL (r=0.37), class attendance and participation with experience of TBL (r=0.42), and working in teams with experience of TBL (r=0.39). The correlation between class attendance and participation with working in teams tended towards practical significance (r=0.46). All these correlations were statistically significant due to *p* values smaller than 0.05.

Independent *T*-test: Gender

Independent *t*-tests were used to compare the mean scores of continuous dependent variables, eg factor scores, to test for differences between groups of categorical or independent variables, eg gender (male/female) or ethnicity (white / other).[22] These tests indicate whether there is a statistically significant difference in the mean scores of the two groups. If the *p* value is less than 0.05, there is a statistically significant difference.[22] The effect size indicates the practical significance of the differences between the means of the two groups. The guideline values as described by Cohen[23] indicates that an effect size of 0.2 is small and has no practical significance, an effect size of 0.5 is medium and indicates practically visible differences, and an effect size of 0.8 is large and indicates practically significant differences. In Table 3, the independent *t*-tests results for gender groups

resulted in statistically significant and practically visible differences for initial negative perception of TBL (d=0.44, p=0.03), external motivation to prepare for class (d=0.51, p=0.01), and working in a team (d=0.44, p=0.02). In all cases except on usual preparation in advance for all classes, female students agreed more than male students.

Table 3. Independent *t*-tests between Questionnaire Questions or Factors and Gender and Ethnicity

		Gender	**Ethnicity**
	M (SD)	**Effect size *t*-test between male and female (*d*-value)[a]**	**Effect size *t*-test between white and other (*d*-value)[a]**
Negative perception of TBL			
Male	2.5 (0.90)	**0.44**	
Female	2.9 (0.89)		
White	2.8 (0.90)		**0.44**
Other	3.2 (0.81)		
Usual preparation in advance for all classes			
Male	2.4 (0.74)	0.02	
Female	2.4 (0.88)		
White	2.4 (0.87)		**0.31**
Other	2.7 (0.79)		
External motivation to prepare for class			
Male	3.0 (0.65)	**0.51**	
Female	3.3 (0.64)		
White	3.2 (0.66)		0.09
Other	3.3 (0.59)		
Class attendance and participation			
Male	3.3 (0.73)	0.25	
Female	3.5 (0.59)		
White	3.4 (0.63)		0.19
Other	3.6 (0.39)		
Working in a team			
Male	3.3 (0.42)	**0.44**	
Female	3.4 (0.40)		
White	3.4 (0.42)		**0.30**
Other	3.3 (0.37)		
Experience of TBL			
Male	3.0 (0.57)	0.06	
Female	3.0 (0.50)		
White	3.0 (0.52)		0.21
Other	3.1 (0.55)		

[a]An effect size of 0.2 is small, 0.5 medium and 0.8 large.[23]

Independent *T*-tests: Ethnicity

For ethnicity (with African, Asian, Coloured, Indian and Korean combined together as *other*), the independent *t*-tests did not indicate any statistically significant results, but practically visible differences for an initial negative perception of TBL was found (d=0.44, p=0.07). Usual preparation in advance for all classes (d=0.31, p=19) and working in a team (d=0.30, p=20) indicated small to medium practically significant differences between ethnic groups. Students who indicated white as

their ethnic orientation were less negative regarding TBL in the beginning (*M*=2.8, *SD*=0.90) and enjoyed working in teams more (*M*=3.4, *SD*=0.42) but usually prepare less for class in general (*M*=2.4, *SD*=0.87) than students from other ethnic groups. The Mann-Whitney test, the non-parametric alternative of the independent *t*-test,[24] also tests for differences between two independent groups on a continuous measure but compares medians, instead of means like the independent *t*-test.[24] The same guideline values are applicable as for the correlations. The Mann-Whitney tests indicated no statistically or practically significant differences.

DISCUSSION

The purpose of this study was to determine fourth-year pharmacy students' learning experience with the use of TBL in a pharmacy practice course. It was the first time that TBL was implemented in a South African School of Pharmacy, therefore there are no other data to compare this study to.

Biographical Data

According to the South African Pharmacy Council's (SAPC) statistics,[25] the majority of pharmacy students and pharmacists in South Africa are female, as reflected in the study population. This could be explained by current legislation like the Employment Equity Act,[26] which aims at purposefully diversifying the workplace through affirmative action to redress the employment inequity of apartheid and to ensure equitable representation in all occupational categories and levels in the workforce. Affirmative action is 'intended to ensure that suitably qualified employees from designated groups have equal employment opportunity'.[26] Females are included in the description of designated groups, along with black people and people with disabilities. It is thus seen as fair discrimination in South Africa to promote affirmative action, meaning accepting a suitable female application over an equal or even higher qualified male application.

The same legislation[26] is applicable for ethnicity, as black people are also part of designated groups, as described in this Act. Black people are a generic name used in this legislation for Africans, Coloureds and Indians in South Africa. These requirements as set out by legislation are also represented in the SAPC statistics[25] where the majority of pharmacy students in South Africa are

Africans (54%), Coloureds (5%) or Asian (16%). However, when compared with Table 1, a different representation is found at the university where this study was conducted, where 91.5% of students enrolled for the course were white compared to the national average of only 24%. This could be due to the primary language of instruction at this university being Afrikaans with simultaneous interpreting to English, whereas all other eight pharmacy curriculums presented at other South African universities are only presented in English.

South African students generally enter university at the age of 18 after completing their secondary education and are expected to complete a four-year course at the age of 22. Therefore, these final year students, except one, were the minimum age of 22 or older. However, it is common to find students failing a course or two earlier in the curriculum which then result in an extended study period of five or more years. To a lesser extent, it does happen that students transfer from another field of study to pharmacy after one or two years or do not continue with tertiary education directly following secondary education, explaining the spread of age groups.

Descriptive Statistics of TBL Questionnaire

As mentioned, this was the first time that TBL was implemented in this School of Pharmacy. The study participants were in their fourth and final year and have never been exposed to a formal educational team-based strategy during their curriculum. It was thus anticipated by the researchers that students would show a negative perception of TBL when they were introduced to it on the first day of this course, mainly because of previous negative experiences of group work. This type of reaction is commonly found among students when they are uncertain of the impact of change from a passive lecture method to an active teaching strategy[27] or when they fail to recognize the benefit of TBL.[28] The timing of TBL implementation in the curriculum may impact students' perception of the strategy.[11] Since these students were exposed to traditional teaching methods since primary and secondary school, they have a higher level of comfort with these methods and need time to adjust to TBL as a teaching strategy.[29] This proved the case in this study as students felt after being able to practice TBL for 10 weeks that TBL did make their learning experience more enjoyable and valuable. Time spent in TBL lectures was also more worthwhile than that spent in traditional lectures, as

students were more engaged in the learning process. Majority of students agreed that more courses in the BPharm curriculum should use TBL as teaching strategy. Unfortunately, this was the last semester consisting of formal scheduled classes for these students, so students' experiences of traditional lecture methods following this TBL course could not be explored. However, in previous studies, students described traditional lecture methods as frustrating due to the lack of self-directed, active learning involved.[30]

More than half of the students acknowledged that they do not usually prepare in advance for classes. However, the majority agreed that TBL motivated them to prepare for these sessions. Knowing that it would be expected of them to discuss their opinions during class motivated students to review the assigned reading prior to the TBL class. This finding echoes the important TBL principle that students are held accountable to both the lecturer and their team members for the quality and quantity of their individual work.[7] Almost all students answered that they worked well as a participant in a team and felt that they fully contributed to their team's work during the TBL course. To evaluate students' true contribution in terms of time and effort towards the team, peer evaluation was used to assess their contribution to team activities. The majority of students enjoyed the use of peer evaluation as part of their team experience, which indicates that their team mates' preparation and contributions were acceptable otherwise it would not have been as enjoyable.

As previously mentioned, students are aware of the passive nature of traditional lecture methods which resulted in low class attendance[8] or, when attending, students being prone to spend their time on social media or sleeping.[31] This was also acknowledged by the study participants, 90% of which acknowledged that they are more likely to feel sleepy during traditional lectures. With TBL, however, there is no time for passive behavior. In the beginning of the class, students participate in the readiness assurance process (RAP) where it is expected of them to complete a 10-20 multiple-choice question test, first individually to measure their level of preparedness for this class, and then again as a team. After a short discussion of the test and to clarify other misunderstandings, the rest of the scheduled class is allocated to the application exercises. In this study, both the individual and team tests contributed towards students' course grades. Although the application exercise did not contribute

towards the course grade, similar questions formed part of the formal assessments in the course which contributed towards the course grade. It is therefore clear why the participants agreed that TBL increased their class attendance and participation in class. We conclude that due to the valuable content of class activities, which they cannot necessarily study on their own or memorize from a memorandum, students wanted to come to class as they realized the benefit to their own learning.

One of the principles that differentiate TBL from other small-group-based educational strategies is the importance of properly formed and managed teams.[1] Teams should be as heterogeneous as possible to ensure that teams function as effectively as possible. Each team should have a mix of student characteristics, eg demographics like gender and ethnicity.[1] In a study conducted in Oman,[32] students were randomly sorted into teams consisting of members of the same gender because of the cultural sensitivities in this country regarding mixing of genders. When these students were asked whether they would prefer to be in a mixed gender TBL team, the majority of students strongly disagreed. The authors concluded that this behavior could be due to the fact that university is the first setting where both genders share a common learning environment. In South Africa, a country with eleven official languages, the population consists of a diversity of cultures. Pharmacists in South Africa will thus work with colleagues and other health care professionals representing different cultures and ethnicity, as enforced by legislation.[26] Sweet[33] explains the formation of fair teams which starts by identifying several characteristics which would make the course easier or more difficult for students. To ensure the above-mentioned diversity is represented in the teams during this study, one of the criteria's used to form the teams was 'all students who are not a South African citizen or whose mother-tongue is not Afrikaans'. Unfortunately, as indicated in Table 1, due to the low number of male students and students from other ethnic groups other than white, not all teams were evenly diversified in terms of gender and ethnicity. Nevertheless, students indicated that they prefer to work in a multicultural and mixed gender team.

It was also rewarding to see that students were very positive (strongly agree) about working with their peers in the classroom. Students agreed that TBL is an effective teaching strategy to simulate the

reality of the health profession where one is required to work in a team and it did motivate them to give their best in this course.

Correlation between Age and Factors

The older the students were the more positively they experienced TBL. It could be that students older than 22 years who had been studying for longer or entered university later in life are possibly more mature than the younger students. This enabled them to identify and accept the benefits of TBL for their future professional life earlier, which resulted in a better overall experience of TBL.

Correlation between Factors

It was also found that the higher students' external motivation to prepare for class was the more positively they experienced TBL. This is understandable as TBL relies on a scaffolding of individual accountability towards preparation for class. If this foundation is not present, students will not have a favorable experience of TBL as it will not be perceived as enjoyable, valuable or worthwhile. This explanation is also valid for class attendance and participation. A student who attends class and participates as required in team activities will have a better experience of TBL than a student who does not attend class or, if attending, does not participate as, in this course, the latter influenced course grades negatively. Since the majority of class time in TBL consists of working in teams, it goes without saying that an enjoyable experience of working in teams will result in an enjoyable experience of TBL. Students' behavior and attitude towards class attendance and participation will influence their experience of working in teams since TBL enforces in-class team activities where students are required to attend class as well as participate in activities. It is clear that all facets of TBL are interrelated and build onto each other. Should one aspect be neglected, it would influence another aspect negatively.

Independent *T*-test: Gender

In terms of gender, female students initially had a more negative perception of TBL directly after it was introduced but before they practiced it for the first time. These students also relied more on external motivational factors such as knowing they would discuss their opinions during class to

prepare for class than the male students. This contributed to female students enjoying working in a team more.

Independent *T*-test: Ethnicity

Like females, students from other ethnicities than white also initially had a more negative perception of TBL. Even though these students usually prepared for all classes initially to a greater extent than white students, it is possible that they were concerned regarding the impact of change and whether their current preparation methods would still be sufficient in TBL. However, white students enjoyed working in a team more than students from other ethnic groups and it could be debated that this is due to being in the minority during team work.

CONCLUSION

This article sets out to determine pharmacy students' learning experience with the use of TBL for the first time in a South African School of Pharmacy. We conclude that students had similar experiences of TBL as predicted by Michaelsen and Sweet[1] in terms of class attendance and preparation. The positive outcomes of TBL in this study highlighted that it is unfortunate that TBL was not included earlier on in the BPharm and other health professions curriculums in South Africa. TBL simulates the reality of the health professions team and fosters accountability and collaboration between members of the team. It further nurtures essential competencies and experiences that students should be exposed to from the start of their training and not only in the last year.

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CHAPTER 5

ARTICLE 4

The article was prepared according to the journal submission guidelines for the *African Journal of Health Professions Education* (cf. Appendix F4-1) and submitted in October 2016 (cf. Appendix F4-2).

Promoting deeper learning in pharmacy education using team-based learning (TBL)

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Abstract:

Background: The benefit of deep learning compared to surface learning is the ability to retrieve, apply and integrate previously learned knowledge rather than simply memorising course content that is most likely to be evaluated during assessments. TBL is an educational strategy that echoes the purpose of deeper learning.

Objectives: The objective of this study was to determine whether TBL improved students' perception of their understanding of theoretical work.

Method: Fourth-year pharmacy students completed a questionnaire consisting of biographical data (gender, age and ethnicity) and 16 questions regarding students' perceived understanding of course content. A total of 183 students (91.5%) participated after giving informed consent that their data may be included in this study.

Results: The study indicated that due to the implementation of TBL in the course, students perceived themselves to spend more time on learned and make more effort in learning. They also perceived that TBL enabled them to have better understanding of content and improved knowledge retention. They also felt that they performed better in assessments and achieved course outcomes easier.

Conclusion: TBL as a teaching strategy effectively promoted deeper learning of course content.

Keywords: team-based learning, teaching and learning, pharmacy education, undergraduate, pharmacy students, health professions education, deep learning

Introduction

Traditional lecture methods, where the lecturer lectures the full duration of class, results in students being passive learners due to limited student engagement.[1] These students mostly memorise course content[2] and accept all course content without questioning or distinguishing any underlying principles or patterns.[3] The passive nature of the lecture-centred class provides a lower level of knowledge retention and cognition for students.[4] This lecture method encourages surface learning, as defined by Marton and Säljö,[5] where students only remember facts they think they would be asked later during assessment in order to receive a passing grade.

In contrast to passive learning, active learning strategies allow students to engage more actively with course content, which promotes students learning experiences.[6] Currently, exit level competencies for health professionals has moved from knowing information to solving complex problems[7] which require collaboration and integration of information. To achieve this, students need not only to understand, but to critically interact with course content in order to relate ideas to previous knowledge and experiences.[3,5] This results in deeper learning where holistic insight into course content and the ability to integrate information take place through use of analytic skills and cross-referencing. However, deep learning depends on the student's level of engagement with course content.[8] It is thus important that health professions education incorporate strategies that foster deep learning.

The purpose of team-based learning (TBL) is to deepen students' learning.[9] This structured, student-centred, active learning strategy[10] includes three phases to deepen students learning of course content. Prior to class, students have to study the selected assigned reading to understand basic concepts and ideas relevant to the scheduled class. These assigned reading may include textbooks, scientific articles or lecture notes.[11,12] In the beginning of the class, students' preparation is assessed through individual (iRAT) and team readiness assurance tests (tRAT) focusing on foundational concepts. The purpose of this phase is to assess whether students have a sound understanding of basic and fundamental concepts required for the following phase.[13] Lastly, the remaining class time is allocated to the application of course concepts in exercises designed to deepen the students' understanding of course content.[10] These application-focused team exercises foster give-and-take discussion to solve the problem, which promotes collaboration and critical thinking.[14]

In a previous study on the effect of TBL on students' learning, Elliot[15] found that TBL improved student engagement and involvement in their learning compared to traditional lecture methods. She also acknowledged that students gained knowledge from their peers, similar to the working environment where it will be expected of them to work and collaborate with each other to solve patient problems. In another study, faculty members from several United States colleges and schools of pharmacy revealed that they perceive TBL as an educational strategy that not only fosters student learning and engagement in course content, but also supports the achievement of educational outcomes.[11] Huitt and colleagues[16] found that TBL provided an academic benefit as students performed better and their application of content and problem-solving ability increased.

Although several studies included questions to determine students' understanding of course content when TBL was implemented, no study was found which included a comprehensive investigation into whether students had improved achievement of learning outcomes, understanding of course content and knowledge retention in comparison to traditional lecture methods. In this study, we investigated whether TBL as a teaching strategy increases

pharmacy students' understanding of theoretical work (curriculum), thus promoting deeper learning.

Method

Target and sample population

The target population consists of all fourth-year pharmacy students enrolled in a pharmacy practice course where TBL was introduced for the first time (N=200). Although all students in the target population were invited to participate in this research, not all students agreed to participate and/or gave consent that their data may be included in this research. The final sample size was 183 (91.5%).

Pearson's chi-square test was used to determine if the sample represented the target in terms of age, gender and ethnic group. The p-values > 0.05 (0.67, 0.91 and 0.79 respectively) indicates no statistically significant association. Thus, the sample population represented the target population in terms of biographical data as indicated in Table 1.

Table 1: Biographical data of target and sample population in terms of gender, age and ethnic groups

		Target population (N=200)		**Sample population (n=183)**	
		n	**%**	**n**	**%**
Gender	Male	41	20.5	34	18.6
	Female	159	79.5	147	80.3
Age in years (as on 31/12/2016)	22 and younger	130	65.0	117	63.9
	Older than 22	70	35.0	65	35.3
Ethnic group	White	183	91.5	166	90.7
	Other	17	8.5	17	8.3

Two questionnaires did not specify the gender and one questionnaire did not indicate the age.

Research instrument

A questionnaire was developed based on existing information acquired through a literature review. The questionnaire consisted of biographical data such as age, gender and ethnical group as well as 16 questions related to students' understanding of theoretical work. Students had to indicate their level of agreement with these statements on a Likert-type scale of 1 to 4, where 1 was strongly disagree and 4 strongly agree.

Since this was a newly developed questionnaire, an exploratory investigation was conducted to assure validity before utilisation in the main investigation.[17] Cognitive interviews with students who were not part of the study population were done. The purpose was to determine whether these students (1) could understand the questions, (2) were familiar with all the terminology used in the questions, (3) could answer the questions, and (4) had any advice or suggestions on restructuring or rephrasing of the questions, as suggested by Wills.[18] To ensure content validity, experts in the field of health professions education and pharmacy reviewed the questionnaire and gave their opinion on aspects such as (1) the clarity of the questions, (2) time needed to complete the questionnaire, (3) presence of bias in questions, and (4) suggestions and/or recommendations. Finally, the questionnaire was reviewed by a statistician in terms of face validity. All recommendations were included in the questionnaire to improve the quality.

Ethical considerations and data collection

All students in the target population were invited to participate in this research study and received a leaflet containing information regarding the purpose of the study, researchers, procedures, benefits, risks/discomforts, cost/remuneration, access to data, inquiries, funding, ethical approval and feedback on the findings. Participation was voluntary and students were under no obligation to participate. Students who were willing to participate completed an informed consent form. It was explained to students that should they decide to withdraw from the study at any point, even if they did agree to participate initially, it would not affect them or their marks for the course in any way. All data were collected anonymously, thus it was not possible to trace the questionnaire back to the student. Ethical approval for this study was granted by the faculty's ethics committees prior to commencement.

Data were collected during a scheduled class in the particular course. Questionnaires were completed and collected separately from the informed consent forms to adhere to anonymity.

The quantitative data were analysed using SPSS 23[19] to determine descriptive statistics such as percentage (%), mean and standard deviation (SD), exploratory factor analysis (EFA), Cronbach's alpha, Spearman's rho correlation coefficients as well as independent sample *t*-tests with Cohen's *d*-value.

Results

The results of the questionnaire are presented in Table 2. For each of the 16 questions, the percentages for each response option are indicated as well as the mean and standard deviation.

Table 2: Results of the TBL questionnaire

Question		Percentage (%)				Mean ± SD
		Strongly disagree 1	Disagree 2	Agree 3	Strongly agree 4	
Learning through own understanding						
1.*	My understanding of the course content did not increase with the practical application of it in a team.	33.3	56.8	6.60	2.70	1.79 (0.684)
2.	Teaching my team members confirmed my own understanding of difficult concepts.	2.2	8.2	63.4	24.6	3.12 (0.640)
3.	Solving problems in a team is an effective way to practice what I have learned.	2.2	3.8	54.1	39.9	3.32 (0.653)
4.	I performed better in assessments where team-based learning was used to cover the material than assessments where only traditional lectures were used.	4.4	15.8	48.1	31.7	3.07 (0.805)
5.	We used feedback regarding team performances to help the team be more effective.	4.4	22.4	57.4	15.8	2.85 (0.733)
Learning from others						
6.*	Learning from mistakes while working in a team did not help me to remember information better.	35.5	48.6	11.5	4.4	1.85 (0.790)
7.*	I did not learn any new knowledge from fellow team members.	54.1	36.1	4.9	4.4	1.59 (0.779)
8.*	Assessments for this course were not in line with the learning outcomes.	59.6	36.1	3.8	0.0	1.44 (0.570)
Learning through TBL and/or teams						
9.*	Team-based learning did not promote my achievement of the learning outcomes.	42.1	50.8	4.9	2.2	1.67 (0.673)
10.	Learning outcomes set in this course were achieved easier due to the team-based learning approach.	1.1	4.9	55.7	38.3	3.31 (0.671)
11.	Teams helped me learn course content better compared to studying alone.	4.9	11.5	49.7	33.3	3.12 (0.798)
12.	Team work helped me to learn more than what I would have learned on my own.	4.9	15.3	47.5	32.2	3.07 (0.819)
13.	Team participation helped me to understand course content better than what I would have understood it on my own.	2.7	10.4	53.6	33.3	3.17 (0.720)
14.	Team-based learning helped me to remember the content better over a long period.	2.7	13.1	52.5	31.7	3.13 (0.737)
15.	It is necessary to have a traditional lecture before a team-based learning session on the same course content.	5.5	18.0	38.3	38.3	3.09 (0.881)
16.*	Team-based learning did not increase my interest in the course.	20.8	47.5	24.6	7.1	2.18 (0.842)

*Questions formulated in a negative trend.

An EFA indicated that the first five questions could be grouped together to form a factor concerning how students learned through their own understanding. The factor loadings of the questions ranged between 0.375 and 0.942. The Cronbach's alpha of 0.800 confirmed internal reliability. The following three questions formed a factor describing how students learn from others. Factor loadings ranged between 0.316 and 0.690. Although the Cronbach's Alpha was lower than the guideline value of 0.7 ($\alpha = 0.529$), 0.5 or above is also sufficient for early stages of research[20] however interpretation should be done with caution. The third factor included the last eight questions about learning through TBL and/or teams and had factor loadings between 0.275 and 0.569. The Cronbach's Alpha of 0.761 indicated internal reliability for this factor.

Learning through own understanding

The results indicated that students' perceived that their understanding of course content increased with the practical application of it in a team (Q1*) as well as through teaching their

team members (Q2). Students felt that problem solving in a team was an effective way to practise what was learned (Q3). The majority of students claimed to perform better in assessments where TBL was used than with traditional lecture methods (Q4). Students used feedback regarding team performances to improve their learning and to help the team be more effective (Q5).

Learning from others

Learning from mistakes helped students to remember information better (Q6*). Students also learned new knowledge from fellow team members (Q7*). Assessments were in line with the learning outcomes set for the course (Q8*).

Learning through TBL and/or teams

TBL promoted students' achievement of the learning outcomes of the course (Q9*). Learning outcomes were achieved easier (Q10) and content was remembered better over a long period (Q14). Working in teams helped students to learn better (Q11), learn more (Q12) and understand course content better (Q13) than what they would have learning on their own. However, students felt that a traditional lecture should be presented before a TBL session (Q15). TBL did increased students' interest in the course (Q16*).

Correlation between factors and age

Spearman's rho did not indicate practically or statistically significant correlations between age and learning through own understanding ($r = 0.004$; $p = 0.955$), learning from others ($r = 0.141$; $p = 0.057$) and learning though TBL and/or teams ($r = 0.149$; $p = 0.045$).

Correlation between factors

Spearman's rho indicated practically visible, practically significant and statistically significant correlations between learning through own understanding and learning from others ($r = -0.418$; $p = 0.0001$), learning through own understanding and learning through TBL and/or teams ($r = 0.702$; $p = 0.0001$) and learning from others and learning through TBL and/or teams ($r = -0.472$; $p = 0.0001$).

Independent *t*-tests between factors and gender or ethnicity

Independent *t*-tests with Cohen's *d*-value indicated no practically or statistically significant differences between female and male students ($d<0.18$) or between white and other ethnic groups (African, Asian, Coloured, Indian and Korean) ($d<0.08$) for any of the factor. The Mann-Whitney test which tests for differences between two independent groups on a continuous measure also indicated no practically or statistically significant differences between the two ethnic groups for any factor ($d<0.02$, $p>0.781$).

Discussion

The purpose of this study was to identify whether TBL as a teaching strategy in an undergraduate pharmacy curriculum increased students' perception of their understanding of the theoretical work presented during the course. This study tested the perception of students regarding their learning and not whether these attributes were actually attained. This study formed part of a larger research project to develop guidelines for the implementation of TBL in undergraduate pharmacy education in South Africa. Since this was the first time that TBL

was implemented in pharmacy education at this university, there are no other data to compare these findings to.

Learning through own understanding

Students' perceived understanding of course content was increased due to its practical application. Deeper learning in TBL was achieved during the application exercise where students are required to apply course concepts to solve significant problems they are most likely to face in practice.[9] These exercises enhanced learning by forcing students to re-examine and, where needed, modify their assumptions and/or interpretations of their pre-class preparation. Students also acknowledged that teaching their team members confirmed their own understanding of difficult concepts. Students indicated that solving problems in a team was an effective way to practice what they have learned.

In assessments where students are required to reproduce knowledge, students indicated that they performed better in tests on material learnt through TBL than through traditional lecture methods. This was an easy comparison for students to make as they were exposed to TBL in one course and still continued with traditional lecture methods in the other four courses, all running simultaneously during the semester. This finding is in line with other studies that also found that students performed better in examinations when TBL was used.[16]

Students agreed that feedback regarding team performances helped the team be more effective. Immediate feedback is considered one of four essential elements in TBL. Feedback is provided to students after the tRAT and the team application exercise so that students can correct any misunderstandings immediately.

Learning from others

Students indicated that they learnt new knowledge from fellow team members. This could be either from the other students' more detailed study or course-related life experiences. Knowledge retention was also reinforced by learning from mistakes while working in a team. As mentioned before, feedback on the tRAT and the application exercise was provided directly afterwards, providing the opportunity for students to correct misunderstandings and misconceptions immediately.

Students perceived assessments to be fair as they were in line with the learning outcomes of the course. This finding is important to acknowledge as better grades due to TBL may be perceived by critics as easier assessments. The difference is that instead of covering theory in class and then exposing students to application in the assessment, application exercises in TBL are part of in-class activities.

Learning through TBL and/or teams

Students indicated that TBL not only promoted the achievement of learning outcomes set in the course, it also made it easier to achieve those outcomes. When designing a TBL course, the first set of decisions is to identify the instructional goals and learning outcomes. This is needed to determine which assigned reading is necessary for students to prepare sufficiently for the TBL session.[9] In fact, several studies concluded that setting learning objectives is the single most important aspect of helping students to do the assigned reading for their preparation.[12,16]

Students indicated that teams and team work helped them to learn more and to learn course content better that what they would have learnt on their own. Due to the lively discussions used in TBL during the tRAT as well as the application exercises, students are engaging with course content while answering questions.[7] It is expected of students to actively participate in sharing opinions and even make good, logical arguments to persuade others of their position. They indicated that team participation helped them to understand course content better than if they had been studying on their own. It has been shown that teams are able to accomplish more than the sum of individual members' contributions, the greatest difference between 'groups' and 'teams'.[21]

During learning, information stored in short-term memory decays very rapidly, for example when cramming before examinations. To be able to use information in future, it should be transferred to long-term memory and be retrievable when needed.[22] Students indicated that TBL helped them to remember course content better over a long period. Students reported a higher interest in the course which could possible explained by the bigger awareness of the application of course content from the application exercises.

TBL moved the lecturing of theoretical concepts out of the class room to pre-class preparations to use scheduled class time for the application of knowledge. However, almost 80% of students felt that it is necessary to have a traditional lecture before a TBL session on the same course content. This could be due to the feeling of uncertainty when students have to rely on their own preparation and indicate that they would like to clarify some uncertainty before the individual tests.

Correlations and independent *t*-test

There were no significant correlations between the age of the student and any of the three factors identified. There were also no significant differences between the responses of female and male students or between white students and those from other ethnic groups. However, there were significant correlations between the three factors indicating that when you learn through own understanding, you will most probably be able to learn from others and through TBL and/or the team.

Conclusion

This study aimed to investigate whether fourth-year pharmacy students experienced an increased understanding of theoretical work during the course. It is clear that students indicated that TBL helped them learn more than what they would have learnt on their own, increased their understanding of course concepts, enhanced their knowledge retention, improved their individual performance during assessments and enabled easier achievement of course outcomes. TBL provides pharmacy and other health profession education the opportunity to deepen students' learning by integrating and applying course content during real-life case studies. It would be interesting to investigate the effect of TBL in other pharmacy curriculums in Africa. Future studies could also test retention over a longer period of time to confirm deeper learning.

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CHAPTER 6

ARTICLE 5

The article was prepared according to the journal submission guidelines for the *South African Journal of Higher Education* (cf. Appendix F5-1) and submitted in November 2016 (cf. Appendix F5-2).

Does Team-based learning (TBL) develop essential generic skills in pharmacy students?

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Does team-based learning (TBL) develop essential generic skills in pharmacy students?

Abstract

In order to deliver graduates with the necessary qualities, skills and understanding to be employable, universities should do more than only teach disciplinary content. TBL is a small-group-based, active learning teaching strategy which supports the development of essential skills while mastering course content.

In this study, a questionnaire was used to collect biographical data. It consisted of 20 quantitative questions focusing on essential generic skills developed during the implementation of TBL in a fourth-year pharmacy course. Participation was voluntary and ethical approval was received from the faculty's ethics committee.

The results pointed out that pharmacy students developed essential generic skills such as team work, problem solving, interpersonal skills, time management, communication and adaptability when TBL was used as teaching strategy. The success of TBL is not dependent on age, gender or ethnicity, which makes it a valuable teaching strategy in South African higher education settings.

Keywords

Team-based learning, pharmacy education, higher education, South Africa, skills development, employability skills, graduate attributes

INTRODUCTION

Higher education institutions are under severe pressure to produce employable graduates (Bridgstock 2009, 31; Glover, Law and Youngman 2002, 293). Graduate attributes, according to Bowden et al. (cited by Barrie 2004, 263; Bridgstock 2009, 32), are the qualities, skills and understanding students should develop during their training. These attributes shape the contribution these students make as professionals in their careers and communities. However, it is not enough only to refer to graduateness as an indication of the level of knowledge, skills and understanding. A student needs to be employable. Employability is the process where students who have completed a degree are assimilated into employment (Glover, Law and Youngman 2002, 293). The debate on appropriate teaching and learning to prepare students to be employable is not new. Abraham Flexner (1910, 53) concluded more than a hundred years ago in the well-known Flexner report that passive lectures for medical students are ineffective. This report highlights many of the challenges that still face medical education today (Janssen et al. 2008, 63). Therefore, the nature of teaching and learning in higher education should address these challenges to ensure that students graduate with the needed skills for employment. Universities should do more than only teach disciplinary content (Green, Hammer and Star 2009, 18).

The South African Qualifications Authority (SAQA) issued level descriptors for the South African National Qualifications Framework (NQF) in 2012 (SAQA 2012b, 1). The purpose of this framework is to ensure coherence in learning achievement in the allocation of qualifications (SAQA 2012b, 3). The framework identifies 10 levels of qualifications with higher education training at levels 5 to 10 to ensure comparability of qualifications nationally and internationally. Undergraduate degrees are level 5 (first year) to 7 (third year), a professional or honors degree on level 8, a masters' degree on level 9 and a doctoral degree on level 10. In each of these level descriptors, a set of 10 categories is used to describe applied competencies (SAQA 2012b, 3). These competencies for the NQF level 8, which is appropriate for a fourth-year pharmacy student in South Africa, are as follows:

- Scope of knowledge – have an understanding of how to apply knowledge in particular contexts;
- Knowledge literacy – demonstrate the ability to interrogate multiple sources of knowledge in an area of specialisation;
- Method and procedure – apply appropriate standards to unfamiliar problems;

- Problem solving – demonstrate the ability to use a range of skills to address complex problems;
- Ethics and professional practice – address ethical issues based on critical reflection;
- Accessing, processing and managing information – the ability to critically review information gathered and synthesize data to develop creative responses;
- Producing and communicating of information – present and communicate academic, professional or occupational ideas to a range of audiences;
- Context and systems – able to operate effectively in a system;
- Management of learning – apply learning strategies to effectively address professional and ongoing learning needs; and
- Accountability – ability to take full responsibility for work, decision-making and use of resources, and full accountability for the decisions and actions of others where appropriate (SAQA 2012b, 10-11).

The NQF identified seven critical cross-field outcomes which are those generic outcomes that inform all teaching and learning. It should be incorporated in qualifications on the appropriate level on the SAQA level descriptors of the NQF (n.d., 1). Some of the critical outcomes adopted by SAQA are:

- Identifying problems and solving them using responsible decision making and critical thinking;
- Effectively working with others in a team;
- Self-management, including one's activities; and
- Communicating effectively using different skills in oral or written presentations.

In terms of pharmacy education, the World Health Organization (WHO 1997, 3) published a guideline document for a seven-star pharmacist. According to this document, a pharmacist has seven roles as part of its practice: caregiver, decision-maker, communicator, manager, life-long learner, teacher and leader. In South Africa, the South African Pharmacy Council (SAPC) is the statutory body of the pharmacy profession. It adopted an eight-star pharmacist as part of the Good Pharmacy Education Standards (SAPC 2014, 78), including the role of a researcher to the WHO's list. For every pharmacy curriculum implemented, the SAPC develop curriculum goals. The current curriculum, which was implemented in 2013, requires universities to deliver a pharmacist who can solve problems, apply knowledge and integrate knowledge from different fields of pharmacy.

Team-based learning (TBL) was first developed by Larry Michaelsen for his course in management (Parmelee 2008, 5). Over time, this active learning teaching strategy was included more and more in health professions education due to changing health care needs requiring professionals to have better team work skills (Parmelee 2008, 5). TBL is a small-group-based teaching strategy where students work in teams of between five and seven members. Passive, lecturer-based presentations of theory are moved out of scheduled classes to allow active student participation and engagement in application exercises. The primary learning objective of TBL is to provide students with the opportunity to practice problem solving using course concepts (Michaelsen and Sweet 2008a, 10). It does not only challenge students intellectually but also provides the opportunity to develop interpersonal and team work skills (Parmelee 2008, 6) as students are working together in teams to solve problems they might face in future. It constitutes a transformation in the way health professions education is conducted, supporting the values and competencies that prepare a student for a future as a professional (Parmelee 2008, 7). TBL may facilitate the development of several professional competencies such as communication, interpersonal skills, team work, giving and receiving peer feedback, knowledge acquisition and application of knowledge in case problems (Parmelee 2008, 7). Studies conducted in Iran and the United States concluded that TBL enables students to learn new skills such as team work and communication (Amini et al. 2011, 8; Elmore, Skelley and Woolley 2014, 491).

This research article reports on a part of a larger research project which aims to develop guidelines for TBL in an undergraduate pharmacy curriculum. The objective of this article is to determine whether TBL allows pharmacy students to develop essential generic skills as required for pharmacists on NQF level 8. This study is unique as it is the first reporting on TBL implementation in a South African undergraduate pharmacy curriculum as an active teaching strategy which promotes the development of skills together with deeper learning. The findings of this study not only indicate whether TBL did promote the development of essential generic skills, but also point out where it is lacking and where adjustments can be made to improve the impact of TBL in skills development and over all pharmacy pedagogy at a higher education level.

RESEARCH METHODOLOGY

Target and sample populations

TBL was implemented in a fourth-year pharmacy practice module at a South African university. The target population (N=200) consisted of all registered students for this module during the 2016 academic year. All students in the target population were invited to participate in the research. However, not all students present in class on the day that the data were collected participated or gave informed consent that their data may be used in the research, resulting in a sample population of 183 (91.5%) students who handed in completed questionnaires.

Data collection tool and pre-testing

For this study, a quantitative questionnaire was developed using current published literature on TBL. The questionnaire collected biographical data such as age, gender and ethnicity, as well as 20 quantitative questions focusing on generic skills development. The 20 Likert-type questions were answered using a 4-scale rating (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree) as recommended by Berk (2014, 67) for measuring teaching effectiveness. Participants were asked to indicate with a cross which option best describes their opinion for each of the 20 questions. Students could only select one option per question and were instructed to complete all the questions.

This newly-developed questionnaire was tested through an exploratory investigation to detect errors in content and/or clarity before it was utilised in the main investigation (Delport and Roestenburg 2011, 195). Cognitive interviews were conducted with first and second year postgraduate students, respectively one or two years older than the study population in most cases, to see whether these students understood all the questions in general, understood all the words or phrases used in the questions, could provide the relevant answers and had any additional advice or suggestions on the questions' format (Wills 2005, 35). To test content validity, experts in the field of health professions education and pharmacy were asked to each complete and review the questionnaire and give feedback on the clarity and distinctness of the questions, the time needed to complete the questionnaire, any biasness created by questions, and general suggestions and/or recommendations. After this feedback was incorporated into the questionnaire, it was sent to a statistician for a face validity evaluation.

Data collection and ethical considerations

Participants were informed upfront that the data would be collected during a scheduled class period for this specific pharmacy practice module. Due to the fact that data were collected anonymously, there was only that one opportunity to participate in the research, as it would not be possible to validate if a student who ask to participate in the research at a later stage did not already completed a questionnaire.

Students received an information leaflet prior to the class to provide them with sufficient time to think about and consider participation in this research study. The leaflet contained information regarding the purpose of the study, procedure of data collection, benefits and risks/discomforts, remuneration, access to data, funding, ethical approval and feedback on the findings. Students who agreed to participate gave written informed consent indicating their willingness to participate. No remuneration was offered to any participants and there was no cost involved to participate. However, as an incentive ten coffee vouchers from a local coffee shop to the value of R50 were handed out via a lucky draw from the informed consent forms. Participation in the research was entirely voluntary and students were free to decline to participate. Although students were free to withdraw from the study at any point, even if they did initially agree to participate, it had to be done before submitting the completed questionnaire as there was no way of tracing the anonymous questionnaire back to a student.

The research project was approved by two separate South African university's ethics committees prior to commencement of the research. The questionnaire, information leaflet, informed consent form and data collection procedures were reviewed. All research was conducted according to the South African Ethics in Health Research (RSA DoH, 2015) guidelines and principles of the International Declaration of Helsinki.

Data analysis

Data from the completed questionnaires were captured manually in a Microsoft Excel spreadsheet using the options 1 to 4 for each question to code the data. A random 10% data entry spot check was done to confirm accuracy, and data error identification and rectification measures were applied as part of an iterative process. Missing data or unanswered questions could not be followed up as questionnaires were completed anonymously and were therefore left as is.

The IBM SPSS Statistics version 23, release 23.0.0 (SPSS, 2016), was used to analyse the data.

RESULTS AND DISCUSSION

Biographical data

Question 1 of the questionnaire collected biographical data to compare the sample population with the target as well as the South African population. The sample population was representative of the target population in terms of gender, age and ethnicity as confirmed by the Pearsons chi-square test where the *p*-values > 0.05 (0.67, 0.91 and 0.79 respectively) indicate no statistically significant association. The sample population consisted mostly out of female students (80.3%), 22 years of age (63.9%) and white (90.7%), as indicated in Table 1.

Table 1: Biographical data of target and sample population

Gender	Target population		Sample population		Age in years (as on 31/12/2016)	Target population		Sample population	
	n	%	n	%		n	%	n	%
Male	41	20.5	34	18.6	21	1	0.5	0	0.0
Female	159	79.5	147	80.3	22	129	64.5	117	63.9
Unknown	0	0	2	1.1	23	45	22.5	44	24.0
Ethnic group	Target population		Sample population		24	16	8.0	16	8.7
					25	6	3.0	3	1.6
	n	%	n	%	26	1	0.5	0	0.0
White	183	91.5	166	90.7	27	1	0.5	1	0.6
Other	17	8.5	16	8.7	29	1	0.5	1	0.6
Unknown	0	0	1	0.6	Unknown	0	0	1	0.6

However, when this biographical data is compared with the South African population of pharmacy students, the majority of pharmacy students nationally are female (67%) and African (54%), Coloured (5%) or Asian (16%) (SAPC 2016b). A report by the Council of Higher Education (CHE 2013) on 2013 higher education data indicates that there was a 23% increase in enrollment in higher education institutions between 2008 and 2013 where 34% of all enrollment in 2013 were African students (n=689,503). This report states that a proportional analysis of the ethnic groups was conducted and indicated that a larger percentage of Africans only enroll after the age of 35 years, whereas white and Indian students normally enroll before the age of 24 years (CHE 2013). The sample population used in this study was majority female students, which is in line with the national statistics for pharmacy students, and the average age of the white ethnic majority is also in line with the CHE report.

Questionnaire data

The descriptive statistics for all 20 questions are indicated in Table 2.

Table 2: Results of the TBL questionnaire

Questions		Percentage (%)				Mean ± SD
		Strongly disagree	Disagree	Agree	Strongly agree	
Q1	Team-based learning aided in the development of my ability to work effectively in a team.	1.1	2.2	**54.6**	42.1	3.38 (0.588)
Q2	Team-based learning aided in the development of my ability to provide constructive feedback to team members.	1.6	4.4	**56.3**	37.7	3.30 (0.631)
Q3*	I have found that being on a team did not help me to become better at problem solving.	33.3	**56.3**	8.7	1.6	1.79 (0.666)
Q4*	Working on application exercises in class did not improve my ability to apply the information covered during that class session.	40.1	**51.6**	7.1	1.1	1.69 (0.651)
Q5	Team-based learning enhanced my decision-making skills.	2.2	15.8	**56.3**	25.7	3.05 (0.709)
Q6	Team-based learning helped in developing my critical thinking skills.	2.2	8.7	**61.7**	27.3	3.14 (0.656)
Q7	Team-based learning aided in the development of my ability to collaborate with my peers.	1.1	2.2	**62.8**	33.9	3.30 (0.565)
Q8	Working with a team has helped me to develop respect for others' opinions.	0.5	3.8	47.0	**48.6**	3.44 (0.598)
Q9	Team-based learning helped me develop my ability to work with culturally diverse team members.	1.6	9.3	**48.1**	41.0	3.28 (0.700)
Q10*	Team-based learning did not help me manage my time for learning.	18.6	**51.9**	23.5	6.0	2.17 (0.797)
Q11	Team-based learning helped me develop my cooperative learning skills (ability to learn with others).	1.6	13.1	**52.5**	32.8	3.16 (0.707)
Q12	Team-based learning developed my communication skills as I had to share my opinion with others.	2.2	7.7	**52.5**	37.7	3.26 (0.691)
Q13	Team-based learning developed my communication skills as I had to make a good, logical argument to persuade others at times.	2.2	6.0	**53.0**	38.8	3.28 (0.676)
Q14*	Team-based learning did not improve my ability to identify alternative ways to achieve goals.	28.4	**55.7**	12.6	3.3	1.91 (0.732)
Q15	Team-based learning improved my ability to cope with uncertainty.	4.4	16.4	**55.2**	24.0	2.99 (0.763)
Q16	Team-based learning improved my ability to adapt to change.	2.7	4.9	**62.6**	29.7	3.19 (0.649)
Q17	Team-based learning improved my ability to be more precise.	4.9	19.1	**53.6**	22.4	2.93 (0.782)
Q18	Team-based learning helped me to realise that I have responsibilities towards the team.	0.5	3.3	47.5	**48.6**	3.44 (0.589)
Q19	Team-based learning helped me to realise that I am accountable for my contribution towards the team.	0.6	2.8	46.4	**50.3**	3.46 (0.582)
Q20*	Team-based learning did not provide me the opportunity to learn more about myself.	23.0	**48.6**	21.9	6.6	2.12 (0.837)

*Questions stated negatively.

For each question, the frequency for each option selected between strongly disagree and strongly agree was indicated followed by the mean and standard deviation (SD) for each question. The exploratory factor analysis (EFA) indicated that all 20 questions could be grouped together to form one factor, namely development of skills, due to the factor loadings ranging between 0.565 and 0.828, which is higher than the guideline value of 0.3 (Field 2014, 681). The Cronbach's Alpha of 0.928 was higher than the guideline value of 0.8 and confirmed internal reliability (Pietersen & Maree 2016, 239). The discussion of the results was grouped according to the six skills targeted with TBL.

Team work skills

Students felt that TBL aided in the development of their ability to work effectively in a team (Q1) and to provide constructive feedback to team members (Q2). Students also indicated that TBL helped them to develop their ability to work with culturally diverse team members (Q9). It helped students to realise that they have a responsibility (Q18) and are accountable for their contribution (Q19) towards the team.

Both the SAQA level descriptors and NQF critical cross-field outcomes refer to a graduate as being able to work effectively with others in a team (SAQA 2012b, 11; NQF n.d., 1). In practice, pharmacists are part of the health care team working with doctors, medical specialists, pediatricians, nurses, etc. One of the competencies pharmacy students need to develop at university to be able to effectively contribute to the health care team is learning to work with others. Al-Meman, Al-Worafi and Saeed (2014, 60) concluded that in their study the implementation of TBL in a pharmacy practice module resulted in better team collaboration between students and contributed positively to the establishment of coherent teams. In another study by Elmore, Skelley and Woolley (2014, 492), they concluded that their adapted TBL strategy provided a valuable opportunity for student pharmacists to strengthen team work skills as it is also considered essential for a successful practicing pharmacist in Alabama, United States of America (USA).

Although several courses in the BPharm curriculum require students to work in groups, creating the perception of adherence to above-mentioned national guidelines, there are fundamental differences between group work and team work (Robbins, DeCenzo and Coulter 2015, 311). When students work in groups, they usually demonstrate neutral or even negative synergy, prefer individual accountability, only share information needed to reach the goal and do not use their skills to complement the team (Robbins, DeCenzo and Coulter 2015, 311).

However, when working in a team, members demonstrate positive attitudes, accept mutual accountability in the team and perform collectively. Unfortunately, many students disregard the importance of working in a team rather than a group due to the lack of exposure to formal, structured team work. TBL can thus be used to ensure proper training and exposure to team work rather than group work. In South Africa, it is not only important to work with others in a team, but also with culturally diverse members. Part of the TBL strategy is to purposefully divide students in teams that are as heterogenic as possible (Michaelsen and Sweet 2008a, 11). This learning environment provides students with the opportunity to interact with class mates they do not normally work with in a team, an essential contribution to the future work place.

Problem solving skills

Students believed that being on a team helped them to become better at problem solving (Q3*). Students pointed out that working on application exercises in class improved their ability to apply information covered during that class session (Q4*). Students felt that TBL also enhanced their decision-making (Q5) and critical thinking (Q6) skills.

It is expected of pharmacists to solve problems regarding patient's health, medication and wellbeing on a daily basis. Problem solving varies between a patient asking for medication for a runny nose, to chronic medication being out of stock and deciding on a suitable replacement for a patient, or managing patient allergies and medication contra-indications. It is required of pharmacists to apply the theoretical knowledge studied, either at university or as part of continuing professions education, to solve problems like these. It requires the pharmacists to make accurate and safe decisions (Thamby and Subramani 2014, 2) in the best interest of the patient and to evaluate each patient's profile critically to ensure optimal health. The incorporation of application exercises during TBL class time, and not just during tutorials where attendance is voluntary, force students to develop these skills.

Interpersonal skills

Students were of the opinion that TBL aided in the development of their ability to collaborate with their peers (Q7) and helped them develop cooperative learning skills (Q11) which is the ability to learn with others. While working in teams, students felt that it helped them to develop respect for other's opinions (Q8).

Pharmacists work with other health care professionals on a daily basis. They also learn from colleagues in the workplace, especially pharmacists who has been registered for a longer period. In South Africa, with its diverse cultural heritage, pharmacists will work with other pharmacy staff members from different ethnic groups (SAPC 2016b) who might have different views or opinions. It is in the best interest of the patient if these different role players have the ability to work together effectively to solve patients' health-related problems.

Time management skills

Students experienced TBL as helping them to manage their time for learning (Q10*). They also felt that TBL improved their ability to be more precise (Q17) and provided them with the opportunity to learn more about themselves (Q20*). Because TBL requires pre-class preparation from students, it needed additional time management from the student's side who has to plan for preparation time and study before each TBL class. It also requires students to be more precise as they write individual and team preparation tests before the lecturer explains any course concepts or ideas.

Communication skills

Because much discussion takes place during each TBL class, it is important to be able to communicate with team members. Students felt that TBL developed their communication skills as they had to share their opinions with others (Q12) and had to make a good, logical argument to persuade others at times (Q13).

Traditionally, the role of the pharmacist was more product-focused, whereas the current movement in the pharmacy professions is more patient-focused (Eksteen and Basson 2015, 43). Therefore, the current set of competence standards which forms the minimum requirement for an entry-level pharmacist to be registered as a pharmacist (SAPC 2016a, 42) mentions communication in six of the ten standards. Good communication skills are essential for pharmacists to ensure a provider-patient relationship and optimal health outcome (Boesen et al. 2009, 1). Communication skills are not only important for a good relationship with patients but also with other health care professionals and community members (Thamby and Subramani 2014, 2). Although the students in this study attended a semester course on communication for the pharmacist in their second year of study, TBL provided the opportunity to further practice and develop these skills in a different team-based setup.

Adaptability skills

According to the participants, TBL did improve their ability to identify alternative ways to achieve goals (Q14). They also felt that TBL improved their ability to cope with uncertainty (Q15) and being able to adapt to change (Q16).

Pharmacy is an ever-changing profession where medication that was freely available yesterday could be out of stock today, products that were on a medical aid formulary yesterday could be replaced by a cheaper generic today and a suitable treatment regime yesterday could not be suitable anymore today. Pharmacy students need to be exposed to these extremes to develop the skill of adaptability.

For this sample population, TBL was already a change as well as an uncertainty as they were used to traditional lectures. Secondly, they were required to prepare for class which they do not normally do. The distribution of participation marks was different, not being based on three or four assessments alone but on weekly individual and team readiness assurance tests. The goal for this course moved from memorizing content to the ability to apply it during applications exercises. Lastly, the content of assessments was not merely theoretical knowledge anymore but adheres to Bloom's taxonomy (NWU 2015:4) in terms of cognitive levels for a course on NQF level 8. All of these aspects exposed the students to realities which called for adaptability.

Correlations and independent *t*-tests

Spearman's rho did not indicate a practically or statistically significant correlation between age and the development of skills factor ($r = -0.001$; $p = 0.990$). Students' opinions regarding whether or not TBL aided with the development of skills were not influenced by their ages. Students in South Africa typically enter higher education at the age of 18 and will accordingly complete a four-year degree at the age of 22. However, due to reasons such as entering higher education at a later stage in live, transferring from another degree to pharmacy or failing one or more courses earlier in the curriculum which results in additional study years, there were several students in this study population older than 22 years.

The independent *t*-tests with Cohen's *d*-value also did not indicate practically or statistically significant differences between male and female students ($d = 0.35$) or between white students and students from other ethnicities ($d = 0.23$) such as African, Asian, Coloured, Indian and Korean. Therefore, TBL can be used to promote the development of essential

skills in health professions education in mixed gender and multicultural classes, which is the norm in South African educational environments.

RESEARCH FINDINGS, CONCLUSION AND IMPLICATION FOR HIGHER EDUCATION AND TRAINING

This study set out to determine whether TBL enables pharmacy students to develop essential generic skills, as required for pharmacists on NQF level 8. For higher education in South Africa, there are several frameworks and legislation available to guide university staff in the training of undergraduate students in terms of learning achievements. Not only do they identify the categories used to describe applied competencies, they are also further developed for each level in the NQF. Furthermore, specific to pharmacy education, there are both national and international guidelines to ensure proper training of pharmacists to ensure a well-rounded graduate.

The study showed that TBL not only ensured deeper learning of theoretical content but also exposed students to a variety of activities and interactions which provided the opportunity to develop and practice certain important skills. Team work as a skill to collaborate with others was developed as all activities in the course were conducted in a team format which caused students to work together with other team members whom they were not necessarily familiar with. All questions in the application exercises were case studies and based on contemporary problems students may face in future as health professionals, helping students to develop problem solving skills. Their collaboration in solving problems also developed their interpersonal skills as they had to work together to contribute to the team activities sufficiently and learn to collaborate with other team members respectfully. Since it was expected of students to come to class prepared to be tested in the first in-class activity, they had to develop time management skills to ensure enough time for preparation. Students had to discuss their opinions in a group and either be convinced by a fellow member or convince the team of their argument, which resulted in developing and practicing communication skills. Because TBL is different from traditional teaching methods, students had to learn to adapt to a new teaching strategy and its unfamiliar components. All of these skills are in line with required legislation in higher education (SAQA 2012b, 10-11; NQF n.d., 1; SAPC 2014, 78).

In light of the above findings, it is concerning how many courses still use traditional lecture methods, even with proof that these methods result in passive learners (Clark et al. 2008,

111), lower levels of knowledge retention (Deslauriers, Schelew and Wieman 2011, 864) and memorized course content most likely included in assessments (Marton and Säljö 1976, 117). It is important that university lectures include teaching strategies like TBL in training of health professionals.

This study shows that TBL fosters the development of essential generic skills that are included when referring to graduate attributes or employability skills. To develop graduates that have the necessary skills to effectively contribute to the health professions team, higher education needs to include active learning strategies in courses to ensure that university students' do benefit from lectures and not simply a theoretical lecture whose content can be studied alone as well. Students have a need for the development of interpersonal skills and the opportunity to work in heterogenic, interprofessional teams. It will obviously be more beneficial to students if these proper team work teaching strategies are implemented from the first year of study and not only in the final year.

Although the implementation of TBL contributed to skills development in pharmacy students, one semester out of eight is not enough. Students are not adequately exposed to sufficient opportunities to re-enforce these skills on a constant basis and in different situations and scenarios, a direct result of higher education curriculums that are not adequately designed and planned to include the development of skills and to build on previously developed skills. This lack of exposure will limit the success of TBL in the long run, resulting in pharmacy students not fully equipped to function effectively as pharmacists or as part of the health care team.

Evidence like that from this study and other published literature should be used to guide policies and legislation to ensure competent graduates in South Africa.

RECOMMENDATIONS

It is recommended that the findings of this study are used to address the lack of opportunities for skills development in the pharmacy curriculum. It is recommended that other pharmacy schools in South Africa also implement TBL as teaching strategy in their curriculums and to compare the impact of generic skills development in those contexts to this study. It would also be interesting to see whether other health curriculums experience the same level of skills development.

It could be of value to determine the impact of TBL on skills development as experienced by the employers of these final year students during their one-year compulsory internship following graduation.

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NQF *see* National Qualifications Framework.

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CHAPTER 7

CONTRIBUTION AND SIGNIFICANCE OF THE STUDY

7.1 INTRODUCTION

From the investigation and data presented in Chapter 2 to 6 in the form of five articles, conclusions were reached which enabled the researcher to answer the first five research questions (cf. 1.6). These conclusions together with the results from Question 2 (cf. Appendix A4-1) and 6 (cf. Appendix A4-2) of the questionnaire, available literature on TBL in undergraduate health professions education in higher education and the researcher's personal reflections and experiences were used to compile guidelines for TBL in an undergraduate pharmacy curriculum. These guidelines set the scene for the implementation of TBL in South African schools of pharmacy and in other health professions training departments.

The formulation of the guidelines is categorised according to the four essential principles and nine components of TBL as initially developed by Michaelson (cf. 1.2) (Michaelsen & Sweet 2008a:10). For each of the principles, the finding that resulted from this study is stated with reference to the section in this thesis where it was discussed in more depth and, if applicable, how it was reached. This chapter concludes with the final product developed through this study, namely the guidelines as indicated in Figure 7.7.

7.2 FORMULATION OF THE GUIDELINES

In this study, TBL was implemented in a fourth-year undergraduate management module in 2016. As no other published literature on TBL in pharmacy education in South Africa was available, the TBL format as developed by Michaelsen and Sweet (2008a:10) was followed and implemented although findings from published literature following this format was kept in mind.

7.2.1 General

The following general aspects should be followed when planning the implementation of TBL in an undergraduate pharmacy module:

7.2.1.1 *Essential principles and components*

It was evident from the literature review presented in Chapter 2 (cf. Article 1, Conclusions and recommendations) that it is critical that all four essential principles with the nine components resorting under these principles should be included in the teaching strategy in order to refer to it as TBL. Where one or more components were excluded in a study, the corresponding conclusions pointed out unfavourable results. The essential principles and components are listed in Table 7.1.

TABLE 7.1: THE FOUR ESSENTIAL PRINCIPLES AND NINE COMPONENTS OF TBL [Compiled by the researcher, Eksteen 2016]

FOUR ESSENTIAL PRINCIPLES	NINE COMPONENTS
Teams must be properly formed and managed.	Team formation Team size
Students must be accountable for the quality of their individual and team work.	Assigned reading RAT Peer assessment
Students must receive frequent and timely feedback.	Immediate feedback Appeals Session conclusion
Team assignments must promote both learning and team development.	Application exercise

7.2.1.2 *Time period*

For students to experience the benefits of TBL and for proper transformation from general group work to team work as intended, TBL should be implemented for a continuous, longer period of time and not in only one or two sessions. It is advised to implement TBL for the duration of the course/module, e.g. the whole semester, as motivated in Chapter 2 (cf. Article 1, Interpretation of results). However, from our experience, a minimum of eight consecutive TBL sessions should be presented.

7.2.1.3 *Session duration*

Sufficient time during scheduled classes should be available for all in-class activities. When time is limited, not much attention and detail can be spent on each component,

resulting in either a very small portion of work covered during a section or limiting the number of questions or exercises addressed. However, if TBL sessions are too long, e.g. five to seven continuous hours, students' concentration fades over time. Initial TBL contact sessions for this course were planned at five hours each, according to what the literature suggests (Michaelsen & Sweet 2008b:9).

Students commented that, according to their experiences during the semester (cf. Appendix A4-1), less time should be spent between components which should follow each other more quickly. The duration of all activities should be shorter than the scheduled three to five hour sessions.

From our experience, sessions of between two-and-a-half and three-and-a-half hours were found to be sufficient to include the RATs of 10 multiple-choice questions, appeals, immediate feedback, several application exercises and a session conclusion discussion. It might be needed to schedule two consecutive periods on the time table to stretch the contact time with students, or to utilise practical sessions, which are normally longer.

7.2.1.4 *Location*

The venue for TBL sessions should preferably have tables and chairs that can be rearranged to form round-table discussions for team work, accommodating the whole class. This is specifically needed so that all team members have eye contact and face-to-face interaction to ensure that they work together on the same assignment (Michaelsen & Sweet 2008c:37). Figure 7.1 illustrates the breakaway rooms where students did their application exercises.

FIGURE 7.1: VENUE FOR ROUND-TABLE DISCUSSIONS
[Images captured by the researcher, Eksteen 2016]

If some team members are unable to participate in the discussion because the whole team is sitting in the same row, the students on the end of the rows may feel left out. Their attention will probably drift away from the discussion and they will rather spend time on social media or texting on cell phones. Our findings suggest that one venue should preferably be used to accommodate all TBL activities from RATs to the application exercises and immediate feedback. If different venues are used for RATs (e.g. class room setting) and the application exercises (e.g. workshop setting), the moving between venues could be a wasteful effort for students (cf. Appendix A4-1). The acoustics of the venue should also be able to accommodate discussions of all students present, as too much noise may hinder learning.

7.2.1.5 *Year/level of implementation*

This study was implemented in a fourth-year module as this was the module lectured by the researcher. It was the first exposure the students had to formal team work, and they criticised the informal, unstructured group work that they were exposed to since their first year. If TBL was to be implemented in the curriculum from the first academic year (cf. Article 2, Discussion), group work may have been more valuable for student learning. We strongly suggest that, to nurture the right skills and competencies for future team work in the workplace, TBL should be fostered by including it or similar structured teaching strategies throughout the curriculum, starting as early as possible.

7.2.2 Introduction of TBL to students

It is important to keep the following in mind when introducing TBL to students for the first time:

7.2.2.1 *Introduction to students*

We found that an initial introductory session is needed to introduce students to TBL, especially if they were not exposed to these types of formal education strategies previously. It is important to include topics such as what TBL is, the purpose of TBL and the difference between group and team work. Students emphasised the need to understand the sequence of a TBL session (cf. Appendix A4-1) with reference to pre-class preparation and assigned reading, in-class activities including iRAT, tRAT, appeals, immediate feedback, application exercises and session conclusion, and the use of peer evaluation. Students will accept the change more easily if they understand the purpose and benefit of the method (cf. Article 2, Discussion).

7.2.2.2 *Familiarisation with TBL*

To further familiarise students with TBL, the first TBL session after the introductory session should be announced and used to practice the TBL sequence to familiarise students with it. Students follow the same sequence that will be used in every TBL session, but this session does not contribute towards course grades. In this way, students have a stress-free opportunity to overcome their resistance towards the change and eliminate the fear that uncertainty creates as indicated by the majority of students who acknowledged they had an initial negative perception of TBL after it was introduced but before they were exposed to it (cf. Article 3, Discussion).

7.2.2.3 *Determine participation mark composition*

It might be that the university has certain guidelines for the calculation of participation marks, such as the number of formal assessments allowed during a semester or the maximum percentage that particular aspects may contribute to the participation mark. The total number of TBL sessions, e.g. total number of iRATs, tRATs and peer assessments, was determined during preparation for this TBL module. Both the university guidelines and number of each TBL components that should contribute to the participation mark should be made available to the students and they should decide on the weight of each included aspect. It is important that they are satisfied with the weight of marks for individual work, e.g. iRAT and formal assessments versus marks for team work, e.g. tRAT.

What worked well during this study was to provide students with two suggestions for the calculation of the participation mark as a guideline for their thoughts, but it was emphasised that they may reject the suggestions and create their own composition. Components that should be included are iRAT, tRAT and attendance for each TBL session, two peer evaluations and the number of formal assessments as per university requirement, as illustrated in Table 7.2.

TABLE 7.2: PARTICIPATION MARK COMPOSITION
[Compiled by the researcher, Eksteen 2016]

MARKS DEPENDING ON INDIVIDUAL		MARKS DEPENDING ON TEAM	
Component	**Weight**	**Component**	**Weight**
iRAT	18% (2%/session x 9 session)	tRAT	18% (2%/session x 9 sessions)
Attendance	9% (1%/session x 9 sessions)	Peer evaluation	3% (first evaluation after first few weeks)
Formal assessments	45% (15%/assessment x 3 assessments)		7% (second evaluation at end of module)
Total	72%	Total	28%

However, it was clear from some comments by students (cf. Appendix A4-1) that they would prefer that the application exercise also contribute to the course grades as motivation to participate. If it is not included in the calculation of participation marks, it should be competition-based or contribute towards an award. These are examples of external motivation. In our experience, it is more important to stimulate internal motivation in students to take responsibility for their own learning and contributions.

7.2.3 Formation of teams

After introducing TBL (cf. 7.2.2) and highlighting the sequence, the formation of teams should be explained and conducted during the first introduction session.

7.2.3.1 *Number of students in a team*

Teams in this study had six members, with one team having five students (one student exited the module) and three teams with seven (resulting from total number of students enrolled). From the previous precise framework created by Michaelsen and Sweet

(2008a:10) stating that teams should consist of between five and seven students (cf. Article 1, Results), we propose that the specific module context should determine the suggested number of students in a team. If TBL is implemented in a major subject with specialised module content in later years of studies where students have no previous experience to formal team work, it is advisable to rather allocate seven students to a team. On the other hand, if TBL is implemented in a complimentary or entry-level module with less specialised module content in early years of study or with previous exposure to formal team work, teams of five should be sufficient. Although some students suggested bigger teams (cf. Appendix A4-1), in future for this module teams of five will be pursued due to the nature of the module.

7.2.3.2 *Team formation by the lecturer*

It is important to explain to the students that they will not form their own teams but that team formation will take place via a structured, transparent formation process. The benefit of team formation done this way should be clearly stated, and the disadvantage that will result when working with friends, as may happen when students form their own teams, should be highlighted.

To assist students with accepting this change, we explained to students that they should see the TBL sessions as going to work. They may still socialise with their friends before and after 'work', discuss their day at 'work' although they do not 'work with' their friends at the same 'workplace'. This helped students to distance their emotions and habitual preference to want to work with their friends as they were used to.

7.2.3.3 *Student characteristics considered for team formation*

Over and above the characteristics that will make it easier or more difficult for a student to succeed in a class consisting of teams (Michaelsen & Sweet 2008a:20), it is also important to take past and future characteristics needed into account. In this module, financial management was addressed. Thus, it was important to divide students who had accounting as a secondary school subject among the teams, as financial management was one of the nine study sections and they could provide information from their own knowledge and experience.

In South Africa, a multi-cultural workplace is a daily reality, thus a criterion to ensure mixed cultures in teams was important (cf. Article 2, Discussion). Although we did try to promote cultural diversity in each team, due to the smaller number of students from ethnic groups other than white (cf. Article 3, Results), there were not enough students to assign all TBL teams to represent two diverse ethnic groups. However, students from this study requested that there should be at least three different cultures represented in each team (cf. Appendix A4-1). We agree that it will definitely enhance the learning experience for students and that it should be followed if students' diversity and numbers allow. Students also requested that both genders should be represented in each team.

In this particular study, one of the criteria used to form teams was non-Afrikaans speaking or non-South African citizens. In some teams where an English-speaking student or students were included, the language became a barrier. Although teams were instructed to communicate in the language that will accommodate all team members, it did not always work that way. However, this can also be expected to happen in the workplace. Although this was a limitation, students still requested more diverse teams (cf. Appendix A4-1). We suggest that more guidance be given to students on how to manage the above-mentioned language barrier in teams.

7.2.3.4 *Process of team formation*

A unique method used to determine teams in this study was to hand out a piece of paper to each student and ask them to write their name and student number on it. As the characteristics are called out one by one, at the first applicable characteristic mentioned, the student brings the piece of paper to the lecturer. The lecturer then starts to stick the pieces of paper onto a list created specifically for team formation according to the number of students registered for this module, the number of members in each team and the number of teams resulting from it. In this case, 33 teams were created. Thus, after the first characteristic was called out, the names were stuck randomly from number 1 to 33 in the first column, then moved on to the second column. After all pieces of paper were attached to the list, the next characteristic was called out. This method prevented students from swopping with class mates before or after them in a line to be grouped with their friends. Figure 7.2 illustrates the process of team formation.

Team number	Team member 1	Team member 2	Team member 3	Team member 4	Team member 5	Team member 6	Team member 7
1	Student 1	34	67	100	133	166	199
2	2	35	68	101	134	167	200
3	3	36	69	102	135	168	201
4	4	37	70	103	136	169	
5	5	38	71	104	137	170	
6	6	39	72	105	138	171	
7	7	40	73	106	139	172	
8	8	41	74	107	140	173	
9	9	42	75	108	141	174	
10	10	43	76	109	142	175	
11	11	44	77	110	143	176	
12	12	45	78	111	144	177	
13	13	46	79	112	145	178	
14	14	47	80	113	146	179	
15	15	48	81	114	147	180	
16	16	49	82	115	148	181	
17	17	50	83	116	149	182	
18	18	51	84	117	150	183	
19	19	52	85	118	151	184	
20	20	53	86	119	152	185	
21	21	54	87	120	153	186	
22	22	55	88	121	154	187	
23	23	56	89	122	155	188	
24	24	57	90	123	156	189	
25	25	58	91	124	157	190	
26	26	59	92	125	158	191	
27	27	60	93	126	159	192[#]	
28	28	61	94	127	160	193	
29	29	62	95	128	161	194	
30	30	63	96	129	162	195	
31	31	64	97	130	163	196	
32	32	65	98	131	164	197	
33	33	66	99	132	165	198	

[#]Student exited module in week 3, resulting in the target population of 200.

FIGURE 7.2: PROCESS OF TEAM FORMATION
[Compiled by the researcher, Eksteen 2016]

7.2.3.5 *Meet and greet*

As soon as teams are determined, students should be allowed to gather in their teams to provide an opportunity for team members to meet and greet. Consider the inclusion of a structured team building exercise so that members get to know each other and foster a sense of companionship (cf Appendix A4-1).

7.2.3.6 *Fixed teams for the duration of TBL*

After the formation of teams, it should be emphasised that students will stay in their teams for the duration of TBL. No team switching requests should be considered as students could be protesting against certain team members purely out of the fear of uncertainty. To simulate the health profession team and as part of the development of

skills (cf. Article 5, Results and discussion), students should be confronted with working with unfamiliar peers and focus on the learning opportunity presented.

Although a few students suggested rotating teams to meet more people and learn from more students (cf. Appendix A4-1), this will interfere with the team formation stages. This suggestion do have some advantages, such as working with different team members during each session, but it will not foster the sense of team cohesiveness needed in TBL.

Teams should also not be changed by the lecturer during the duration of TBL. Teams will only become cohesive teams and fully benefit from TBL as time progresses.

7.2.4 Readiness Assurance Process (RAP)

The following guidelines should be followed during the RAP:

7.2.4.1 *Students' pre-class preparation*

Clear learning objectives guide students' preparation for TBL sessions. These objectives should include session outcomes, learning material needed as well as what to focus on (cf. Article 5, Discussion). Learning material should be available and easily accessible to students. The amount of assigned reading to prepare should be manageable and fair. The assigned reading in this module played an important role in contributing to students' learning, promotion of achievement of learning outcomes and preparation for assessments (cf. Appendix A4-2 & Article 4, Results). Figure 7.3 gives an example of the assigned reading and objectives used in this module.

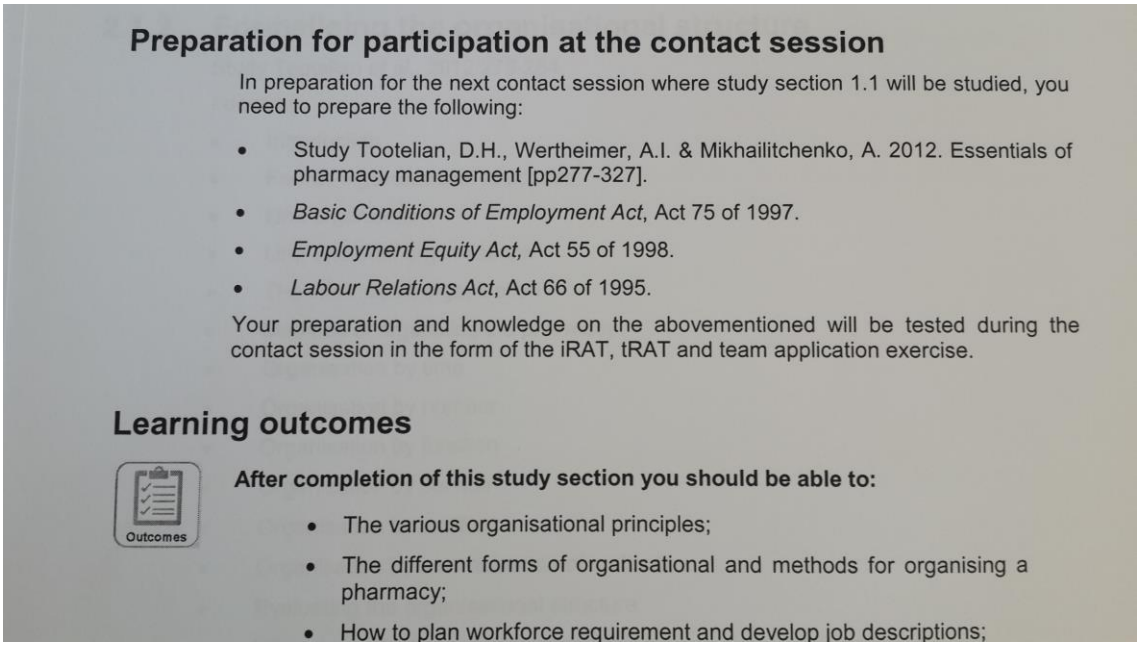


FIGURE 7.3: EXAMPLE OF ASSIGNED READING AND LEARNING OBJECTIVES (Eksteen 2016:2)

Although it is not recommended to have a lecture on the topic before the TBL session, certain students require the confirmation that a lecture provides (cf. Article 5, Discussion). As it was not requested by all students, a lecture session could be optional. We suggest that it should be presented as a question and answer session rather than a traditional lecture, because a lecture will shift the responsibility for preparation away from students. With a question and answer session, students still have to prepare. Some students preferred to have an opportunity to voice their uncertainty before the RATs, as was evident in the large number of students who suggested such a lecture should be included in future TBL sessions (cf. Appendix A4-1).

7.2.4.2 *Readiness Assurance Tests (RATs)*

The available time of a TBL session determines the number of questions included in the RATs. Questions focus on theoretical content from the assigned reading and should also align with learning objectives and session outcomes. This does not mean that questions should be obvious or easy. Each student should have their own iRAT test and multiple choice cards to hand in. The Immediate Feedback Assessment Tool (IF-AT) cards are effective to use during the tRAT. The team completes and hands in one IF-AT card per team. Figure 7.4 illustrates the multiple choice and IF-AT cards used for iRAT and tRAT respectively during this study.

FIGURE 7.4: MULTIPLE CHOICE CARDS FOR iRAT AND IF-AT CARDS FOR tRAT (Smit 2016)

7.2.4.3 *Appeals*

The use of appeals is beneficial to students' learning. However, the submitted appeals should be addressed in a timely fashion and the feedback should be given to all students in the class. The students in this study, however, suggested that appeals be excluded in future (cf. Appendix A4-1), and it did not motivate or contribute to learning for the majority of the students (cf. Appendix A4-2). To overcome this, we will in future give the necessary feedback on submitted appeals either just before the application exercise discussion when the lecturer had time to review the appeals while students were working on the application exercises or after the session in table format via email to all students. If students do not receive feedback on submitted appeals, they lose trust and interest in the appeals. Figure 7.5 illustrates the appeal form used in this study.

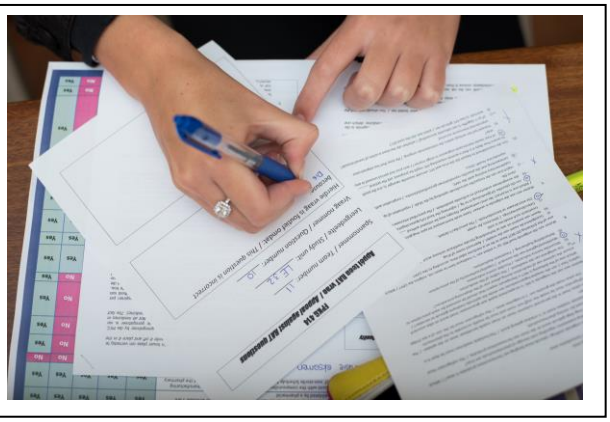


FIGURE 7.5: APPEAL FORM
[Compiled by the researcher, Eksteen 2016, image by Smit 2016]

7.2.4.4 *Immediate feedback and discussion on RAPs*

Sufficient time should be allocated to discuss each question included in the RAT. This is necessary as the questions included in the RAT are deliberately selected to form a basis for the application exercise that follows the RAP. Incorrect options should also be discussed to clarify why they are not the correct answer to the question.

7.2.5 Application exercise and conclusion

The following guidelines should be followed during the application exercise and session conclusion:

7.2.5.1 *Application exercise*

The four S's principle (cf. Article 1, Interpretation of results), namely significant problem, same problem, specific choice and simultaneous reporting, provides the basis for compiling application exercises. These exercises should not be a mere repetition of the theory (cf. Article 2, Discussion). Sufficient time should be available during the TBL session to allow for an adequate number of exercises. The typical questions included in the formal assessments should align with the questions included in the application exercises of the module to adhere to university standards. A fair number of exercises from a diverse selection of module content should be included (cf. Appendix A4-1). This promotes class attendance and participation as students experience the class as beneficial and worthwhile (cf. Article 3, Discussion).

Before students divide into their teams to work on the exercises, the lecturer should provide some guiding remarks to ensure that students are able to work on the questions and use the correct approach (cf. Appendix A4-1). Otherwise students miss some initial information and approach the question the wrong way resulting in wasted effort and demotivation. Each team member needs their own copy of the application exercise.

7.2.5.2 *Discussion and session conclusion*

Discussion and reasoning on each application exercise should be encouraged to enhance students' learning process. The lecturer's facilitation skills play a role in the success of the

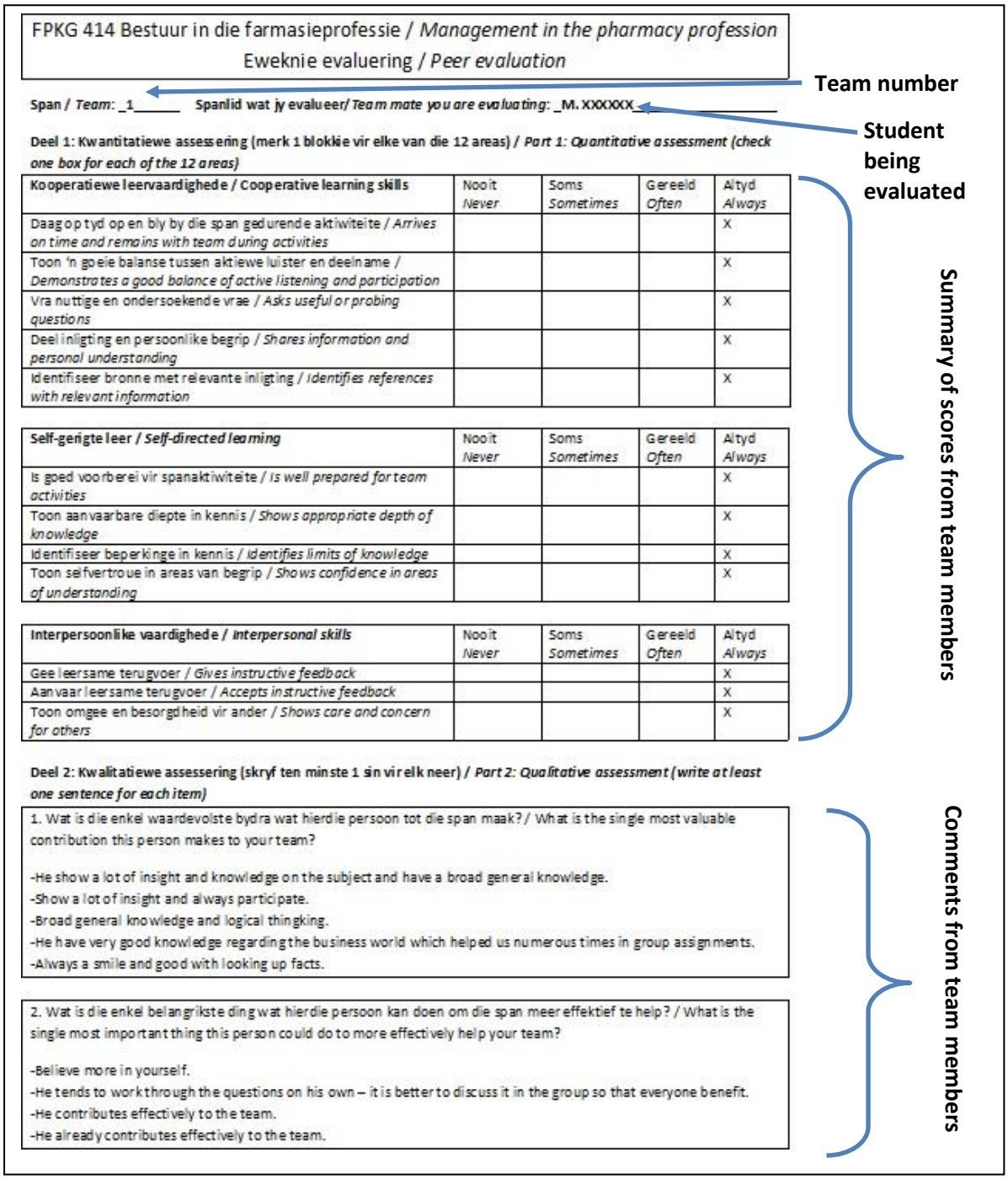
discussions. Although students prefer to avoid discussions and simply receive the correct answer (cf. Appendix A4-1), the value of the hidden learning opportunity during the discussions, should be highlighted. Some students may require that an additional session to further discuss and clarify the solutions of application exercises.

7.2.6 Peer evaluation

It is important that the evaluation criteria should focus on the required tasks and outcomes and not reflect on a student as person. Students are not used to evaluate their peers and it is something that they are not comfortable doing. Their previous experiences with group work and uneven distribution of workload resulted in uncomfortable situations (cf. Article 2, Results). Students may feel more uncomfortable if they have to do peer evaluations for the first time in TBL. They should therefore be prepared and orientated for peer evaluation. They should be guided through the questions; the intent is behind the selected questions; and the importance of an objective and honest evaluation. Figure 7.6 illustrates the summary of peer evaluation feedback to each team member.

The first peer evaluation is done only after a few TBL sessions has been held. Each member of the team should receive his or her peer evaluation feedback anonymously. This will increase students' commitment to provide an honest review if they know that their team member will not be able to trace it back to them. However, the lecturer will know students evaluated each other as students have to indicate their name and the name of the team member being evaluated on each evaluation form.

The second peer evaluation is done at the end of the module. Students can then evaluate their own development and progress during the module (cf. Article 3, Discussion). We found that the peer evaluation motivated students to prepare, attend and participate in class (cf. Appendix A4-2).



FPKG 414 Bestuur in die farmasieprofessie / *Management in the pharmacy profession*
Eweknie evaluering / *Peer evaluation*

Team number

Span / *Team*: _1_____ Spanlid wat jy evalueer/ *Team mate you are evaluating*: _M. XXXXXX_____

Student being evaluated

Deel 1: Kwantitatiewe assessering (merk 1 blokkie vir elke van die 12 areas) / *Part 1: Quantitative assessment (check one box for each of the 12 areas)*

Kooperatiewe leervaardighede / Cooperative learning skills	Nooit *Never*	Soms *Sometimes*	Gereeld *Often*	Altyd *Always*
Daag op tyd op en bly by die span gedurende aktiwiteite / *Arrives on time and remains with team during activities*				X
Toon 'n goeie balanse tussen aktiewe luister en deelname / *Demonstrates a good balance of active listening and participation*				X
Vra nuttige en ondersoekende vrae / *Asks useful or probing questions*				X
Deel inligting en persoonlike begrip / *Shares information and personal understanding*				X
Identifiseer bronne met relevante inligting / *Identifies references with relevant information*				X

Self-gerigte leer / *Self-directed learning*	Nooit *Never*	Soms *Sometimes*	Gereeld *Often*	Altyd *Always*
Is goed voorberei vir spanaktiwiteite / *Is well prepared for team activities*				X
Toon aanvaarbare diepte in kennis / *Shows appropriate depth of knowledge*				X
Identifiseer beperkinge in kennis / *Identifies limits of knowledge*				X
Toon selfvertroue in areas van begrip / *Shows confidence in areas of understanding*				X

Interpersoonlike vaardighede / *interpersonal skills*	Nooit *Never*	Soms *Sometimes*	Gereeld *Often*	Altyd *Always*
Gee leersame terugvoer / *Gives instructive feedback*				X
Aanvaar leersame terugvoer / *Accepts instructive feedback*				X
Toon omgee en besorgdheid vir ander / *Shows care and concern for others*				X

Summary of scores from team members

Deel 2: Kwalitatiewe assessering (skryf ten minste 1 sin vir elk neer) / *Part 2: Qualitative assessment (write at least one sentence for each item)*

1. Wat is die enkel waardevolste bydra wat hierdie persoon tot die span maak? / What is the single most valuable contribution this person makes to your team?

-He show a lot of insight and knowledge on the subject and have a broad general knowledge.
-Show a lot of insight and always participate.
-Broad general knowledge and logical thingking.
-He have very good knowledge regarding the business world which helped us numerous times in group assignments.
-Always a smile and good with looking up facts.

2. Wat is die enkel belangrikste ding wat hierdie persoon kan doen om die span meer effektief te help? / What is the single most important thing this person could do to more effectively help your team?

-Believe more in yourself.
-He tends to work through the questions on his own – it is better to discuss it in the group so that everyone benefit.
-He contributes effectively to the team.
-He already contributes effectively to the team.

Comments from team members

FIGURE 7.6: PEER EVALUATION SUMMARY FOR EACH STUDENT
[Compiled by the researcher, Eksteen 2016, based on Levine 2008:114]

7.3 GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM

In Table 7.3 all the important aspects discussed that form the foundation of the guidelines for TBL (cf. 7.2) are listed.

TABLE 7.3: IMPORTANT ASPECTS FORMING THE FOUNDATION OF THE GUIDELINES FOR TBL
[Compiled by the researcher, Eksteen 2016]

General:
Include all four essential principles with the nine components.
Implement TBL for the duration of the course/module, e.g. the semester (minimum of eight sessions).
TBL sessions should be between 2½ and 3½ hours in duration.
The venue should be suitable for round-table discussions for teams.
Implement TBL as early as possible in the curriculum (from the first year of study).
Introduction of TBL to students:
Introduce TBL principles and components to the students before implementing TBL.
Familiarise students with TBL by allowing a practice session which does not contribute to module grades (second TBL session).
Students should determine the composition of the participation mark in the module.
Formation of teams:
The number of students per team depends on the context of the specific module.
The lecturer should follow a formal, transparent team formation process.
Characteristics for team diversity include past and future characteristics.
Randomly allocate students to teams as each characteristic is called out one by one.
Include a team meet-and-greet to foster companionship.
Do not allow changes in teams after formation.
RAP:
Direct students' pre-class preparation with clear learning objectives and a manageable amount of assigned reading.
Student needs determine the inclusion of an optional lecture/question-and-answer session before the TBL session.
Ask theoretical-based questions to test preparation for application exercises.
Provide structured feedback on the outcome of appeals submitted.
Give immediate feedback on each question individually and discuss both the correct and incorrect options.
Application exercise and conclusion:
Follow the 4S's guidelines to compile several diverse exercises.
Ensure students have some roadmap/direction for approaching each question.
Encourage participation in discussions.
Peer evaluation:
Orientate students to provide objective and honest peer evaluations.

In Figure 7.7 the guidelines for TBL in undergraduate pharmacy curriculum is illustrated.

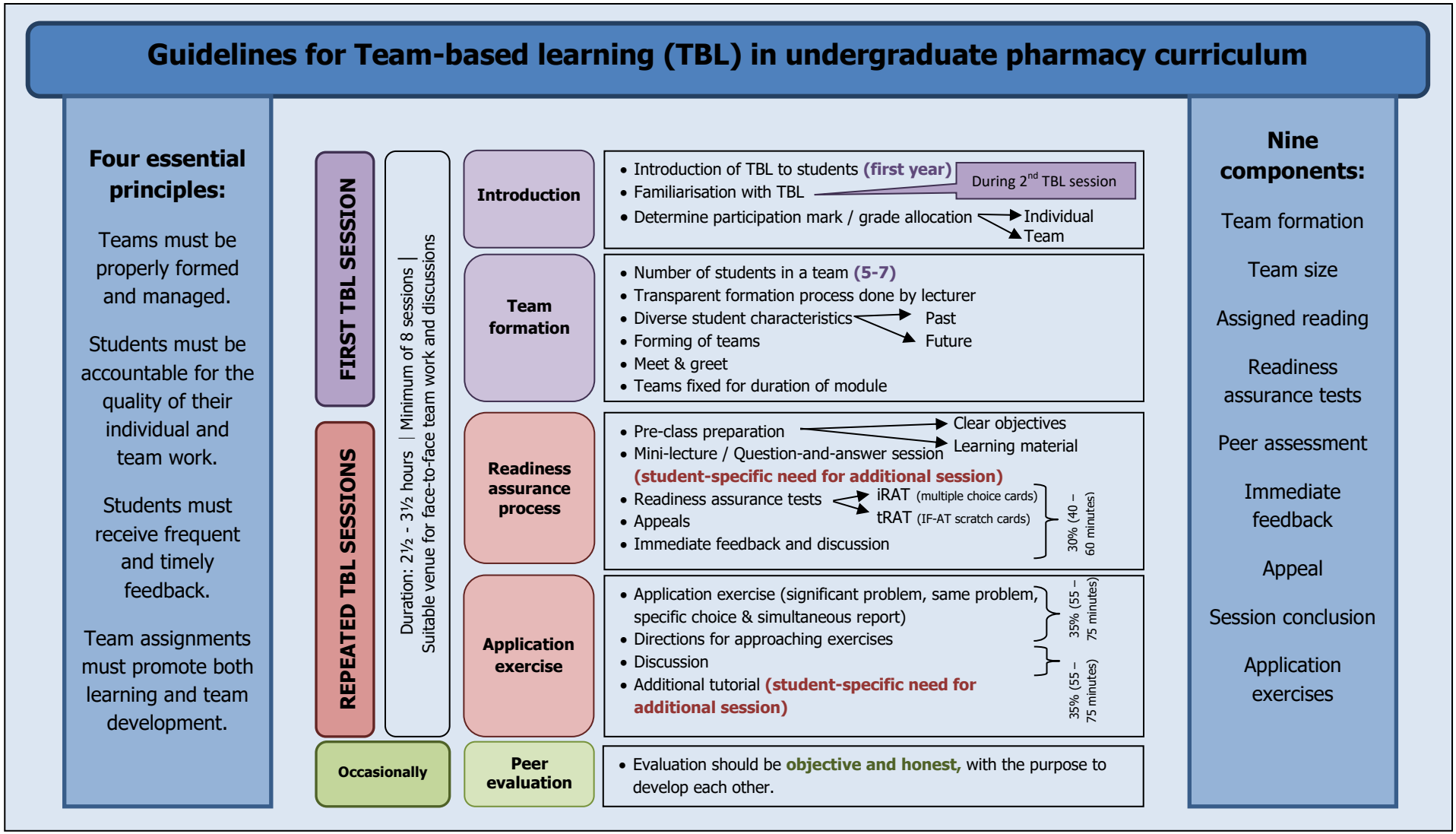


FIGURE 7.7: GUIDELINES FOR TBL IN UNDERGRADUATE PHARMACY EDUCATION
[Compiled by the researcher, Eksteen 2016]

7.4 CHAPTER SUMMARY

In this chapter, the contribution of the enhancement of knowledge in the field of TBL and HPE was explained. Conclusions were drawn from all literature reviewed, written narratives, focus group interviews, questionnaires and lecturer reflections in order to compile guidelines for the implementation of TBL in undergraduate pharmacy curriculum. Guiding principles as developed by Michaelsen (Michaelsen & Sweet 2008a:10) were used as a basis for the planning of TBL. However, the unique settings and challenges allowed for unique contributions to the knowledge around TBL already established.

In Chapter 8, **Conclusions, limitations and recommendations of the study**, evidence are provided for achieving all the research objectives as set out for this study (cf. 1.7). From these results, limitations identified during the execution of this study are presented. Certain recommendations were formulated which include future research resulting from this study.

CHAPTER 8

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

8.1 INTRODUCTION

The purpose of this in-depth study was to develop guidelines for TBL in an undergraduate pharmacy curriculum. These guidelines were compiled to provide higher education educators with the necessary tools for implementing TBL in undergraduate pharmacy modules in South Africa.

Throughout the BPharm curriculum it is expected of pharmacy students to work together, either during class assignments, research projects or practical sessions. Students view these collaborations predominantly as group work which neither provides the optimum level of learning nor develops team work skills. For students to work effectively as a team, certain factors should be addressed in the approach to team work to ensure that students master the theoretical content and also develop the ability to apply the content in real life scenarios while being part of a team.

The aim of this chapter is to provide a brief overview of the study and to present comments and some concluding thoughts on the final findings. The chapter commences with an overview of the study, followed by conclusions of the results presented in chapters 2 to 6 according to the research objectives mentioned in Chapter 1 (cf. 1.7). The chapter concludes with a short discussion on the limitations of the study, the contribution to knowledge and the significance of the study, recommendations on the way forward and a conclusive remark.

8.2 OVERVIEW OF THE STUDY

The research study was designed and conducted based on six specific research questions (cf. 1.6). These questions resulted from an identified gap in the current knowledge regarding TBL in undergraduate pharmacy education in South Africa. A solid foundation was laid with a conceptual framework engaging with the literature on TBL in undergraduate health professions education, followed by rigorous and appropriate research methodologies and high ethical standards in data collection and analysis, which

led to the presentation of results. By integrating the research findings with the theory, research questions were answered and conceptual conclusions were drawn. These results served as the foundation for the guidelines on how to implement TBL in undergraduate pharmacy education in South Africa to ensure that students benefit optimally from team learning.

In Chapter 1, **Orientation to the study**, the six research questions were presented (cf. 1.6). The research questions were formulated to guide the study and shaped the final outcome to reach the aim of the study. In 8.2.1 to 8.2.6 following, the research questions are reviewed and the main findings for each research question are given.

8.2.1 Research question 1

The first research question was stated as follows:

How can TBL, as a teaching strategy in higher education, be conceptualised and contextualised in this study?

The following objective was pursued:

To conceptualise and contextualise TBL as a teaching strategy in higher education via a literature study.

The first research question aimed to provide a comprehensive background to the study. Since this doctoral thesis is submitted in article format, it was decided to conduct a systematic review of the literature and present the findings in the first article (cf. Chapter 2). As requested for a systematic review, a very specific and strict protocol was first drafted and then followed, based on several published guidelines (cf. 1.9.1). One of the mandatory steps in a systematic review is that two researchers independently review the articles included for quality. Because the article forms part of a doctoral thesis, the systematic review was performed by the main researcher and the promoter conducted a quality check on only 5% and not on the total number of articles, as prescribed for a systematic review. The article title therefore refers to 'a review of the literature' and not to a 'systematic review' itself (**Best practice for implementation of team-based**

learning in undergraduate health science education in the 21st century: a review of the literature).

For the researcher, the main benefit of conducting this review was the systematic approach in which the literature was reviewed. Because there was a defined process and procedure, defined search terms and set databases, inclusion and exclusion criteria, and precise instructions on how to execute the search and select the relevant studies, it allowed the researcher to work in a structured way through all the steps set out (cf. Article 1, Figure 1). All articles included were examined according to study demographics (cf. Article 1, Table 1) and the four TBL essential principles (cf. Article 1, Table 2).

From the investigation (cf. Article 1, Interpretation of results), it was evident that when TBL is implemented in only some of the contact sessions scheduled for a module, the optimal outcome in terms of team cohesiveness cannot be reached because not enough time was spent together in teams to achieve the benefit of TBL. Sufficient time should be allocated on the time table to accommodate the TBL structure, as several activities (iRAT, tRAT, lecturer comments, application exercises, immediate feedback and discussions) are integral parts of TBL, and where some essential components of TBL were excluded in published literature, conclusions included limitations and shortcomings which can be traced back to the missing activity. No specific year of study was identified to be the best fit for implementation of TBL in the curriculum, although the majority of the studies reviewed were conducted in the first year. It was also found that TBL can easily be presented by a single instructor in a large group of students, overcoming the drawback of limited resources in higher education.

Although the formation of diverse teams might sound negligible, when teams are not formed according to specific pre-determined criteria, it might compromise or limit students' perception and satisfaction with TBL. Teams should consist of between five and seven students to prevent team failure due to undersized teams who do not have enough resources to be successful or due to social loafing in oversized teams. Students should remain in the same teams for the duration of the course to become cohesive enough to evolve into self-managed and truly effective learning units. The forming of potential subgroups in teams should be prevented as it limits team cohesiveness.

The single most important aspect to helping students do the assigned reading for their preparation is to provide clear learning objectives for the class and ensure a manageable amount of work. Because the RATs evaluate students' preparation in terms of foundational concepts and ideas needed for the application exercises, it should include a sufficient number of multiple-choice questions to achieve that purpose. Peer assessment should be included in the TBL activities during the course. Immediate feedback is the single most powerful tool to promote learning and cohesiveness in classroom learning teams and should take place after the RAT tests and again after the application exercise.

The appeal process allows students to conduct a focused restudy on incorrect questions in the RATs in an attempt to correct misunderstandings or point out inadequacies in assigned reading. To achieve higher-level application outcomes, immediate feedback after the application exercise challenges students on their reasons for choosing particular answers and being able to justify their decisions. Good application exercises should adhere to the four requirements (significant problem, same problem, specific choice and simultaneous reporting) and truly require team interaction.

This review article concluded that the basic principles of TBL remain essential and when any of the essential principles are not observed, the participants' experience of TBL is compromised and the teaching strategy should no longer be considered to be TBL.

8.2.2 Research question 2

The second research question was stated as follows:

What are pharmacy students' views of team work in the pharmacy profession before they are exposed to TBL?

The following objective was pursued:

To determine pharmacy students' views of team work in the pharmacy profession before they are exposed to TBL via written narratives and focus group interviews.

It was important to establish the students' current experiences of team work in the pharmacy profession before they were exposed to TBL as the data collected formed the

baseline from which the impact of TBL could be evaluated later. This portion of the research was conducted using an exploratory design, as described in Chapter 1 (cf. 1.8.2). Two qualitative research methods were used, namely written narratives (cf. 1.9.2) and focus group interviews (cf. 1.9.3).

The first research phase's data were not included in an article but were used to inform the second research phase. From the data, it was concluded that students understood the *importance* and *relevance* of team work in the pharmacy profession as the same concept, as many of the themes identified under the one was applicable to the other also. It was therefore decided to combine the theme *importance* with *relevance*. The two main themes that were identified from the qualitative data was (1) the importance or relevance of team work, and (2) students' experience of team work. Under the first main theme, importance or relevance, the sub-themes identified included: support/opinions/sharing of expertise, part of the health care team/functioning of the pharmacy as a unit, less mistakes, development as a pharmacist/individual roles/develop characteristics, productive/effective environment, real life, and other health professionals. Under the second main theme, experience, the sub-themes identified were: negative experiences, positive experiences, support and help, and development of characteristics. From the data of research phase one, three questions were formulated for further investigation in the focus group interviews (cf. 1.9.3.3).

The results from the second research phases were presented in Article 2 (**Undergraduate training for a health professions team: the voices of fourth-year pharmacy students**). The approach to this article was to highlight the value of student voices in health professions education in the context of teaching and learning innovation, such as TBL.

From the investigation (cf. Article 2, Discussion), the pharmacy students identified an extensive range of contributions that a pharmacist could make towards effective functioning in the health professions team, namely, providing patient advice, acting as safety net for prescribers; serving as a source of knowledge within a specific scope of practice; and maintaining good relationships with other health care providers. Secondly, a wide range of competencies were listed which include the ability to work with others, to respect others, communication skills, self-confidence, becoming a life-long learner, and patience. Students also pointed out that team work should be purposeful, well-structured

and implemented from the first year of study to avoid wasteful efforts of unstructured and ineffective group work. Team work should also focus on application of theoretical principles in real-life situations and problems. Further results pointed out that the compulsory practical experiences outside the university add value to the training of pharmacy students as future pharmacists and that students want to learn from other cultures and health professions, as it will inform their future interaction with their patients and their health team.

The results from the qualitative data indicated that lecturers are not always in synchrony with the reality and needs of students. These findings also pointed out that current teaching strategies, especially group work as it is currently used in classes, do not provide pharmacy students with all the competencies they will need to function effectively in the health professions team.

8.2.3 Research question 3

The third research question was stated as follows:

What are pharmacy students' learning experiences of the use of TBL in the management module of the BPharm curriculum after they were exposed to TBL?

The following objective was pursued:

To determine pharmacy students' learning experience of the use of TBL in the management module of the BPharm curriculum after they were exposed to TBL via a questionnaire.

To determine what pharmacy students' learning experiences were with TBL, the third question with 19 sub-questions was included in the questionnaire survey. These 19 sub-questions were grouped into six factors to determine whether students did have an initial negative perception of TBL, whether students normally prepare in advance for classes, external motivations for pre-class preparation, class attendance and participation, team work and experience of TBL. A direct comparison between the learning experience when TBL was used in the management module versus traditional lecture methods used in all the students' other modules during the semester was made.

The results from the first and third questionnaire questions were included in Chapter 4 (**Team-Based Learning Experiences of Fourth-Year Pharmacy Students in a South African University**).

From the biographical data collected in the first question of the questionnaire (cf. Article 3, Discussion), the majority of the pharmacy students who participated in this study were female, similar to the trend at other South African universities for pharmacy students and pharmacists. The majority of the pharmacy students at this institution were white, although the majority of pharmacy students in South Africa and students who enrol in higher education are black (African, Coloured and Indian). The majority of the students were 22 years of age, as expected in the fourth year of tertiary education in South Africa. However, a notable number of students were older than 22 years due to a number of reasons such as failing a course or two earlier in the curriculum which results in increased number of study years, transferring from another degree to pharmacy or starting with tertiary education at an age older than 18.

According to the data from the third question in the questionnaire which focused on their learning experiences with TBL, students' initial negative perception of TBL was due to previous negative experiences of group work and due to their uncertainty of the impact of change from the unknown or their unfamiliarity with the concept of TBL. In comparison with traditional lectures, TBL was found to make students' learning experiences more enjoyable, more valuable and a more worthwhile use of time. Students felt that more modules in the BPharm curriculum should use TBL as teaching strategy. Due to the lively discussions during class, students felt motivated and saw the benefit to prepare for class, something which they do not normally do in other modules in the curriculum.

Since TBL is such a structured teaching strategy where all events during class take place in team format, students who previously disregarded group work experienced being part of a team positively even if their contribution was being evaluated by all the members of the team. Because TBL made students aware of the applicability of theoretical module content to their future role as pharmacists with activities such as the application exercises which cannot be studied on their own or memorised from a memorandum, it made it more worthwhile for students to attend class and participate. Students also preferred to

work in multicultural and mixed gender teams as this is a South African reality in the workplace.

TBL was seen as an effective teaching strategy to simulate the reality of a health professions team and to act as preparation for entering such a team after graduation when they will be interns and required to work in a team. An increase in external motivation to prepare for class, class attendance and participation, or working in groups resulted in more positive experiences of TBL. Class attendance and participation influenced students' experience of working in teams as all team work was scheduled during class time, thus failure to attend or participate would result in team members having a negative experience.

Statistical analysis indicated that the older the student, the more positively they experienced TBL. Female students, although being more negative towards TBL after the lecturer introduced it but before they experienced it, enjoyed working in a team more. Students from other ethnicities than white also initially had a more negative perception of TBL despite the fact that they indicated that they generally prepare for all classes in advance. Students from other ethnicities were more likely to express low levels of enjoyment of team work compared to white students.

It is clear that TBL was well received by pharmacy students and that it overcame certain disadvantages of traditional lecturing methods. A big advantage was that students, maybe for the first time, enjoyed coming to class prepared and actively participated during scheduled classes. As concluded in Article 3 (cf. Chapter 2), it is recommended that TBL should replace informal and unstructured group work in health professions education to prepare and train health professionals according to what will be expected of them in the health profession team.

8.2.4 Research question 4

The fourth research question was stated as follows:

Does TBL as a teaching strategy in the management module of the BPharm curriculum increase pharmacy students' understanding of theoretical work (curriculum) presented in the module?

The following objective was pursued:

To identify via a questionnaire whether TBL as a teaching strategy in the management module of the BPharm curriculum increases pharmacy students' understanding of theoretical work (curriculum) presented in the module.

To measure whether pharmacy students perceived an increased understanding of theoretical work as presented in the management module, it was needed to determine whether deeper learning took place instead of surface learning. Deeper learning is important for pharmacy students as they need to retrieve, apply and integrate knowledge previously learnt in day-to-day health care scenarios. Unfortunately, traditional lecture methods allow the student to act more passively and, as a result, it leads to surface learning. From the data, questions were grouped according to the source of learning: through own understanding, from others, or through TBL and/or teams. The fourth question of the questionnaire aimed at determining students' perception of deeper learning and understanding of theoretical work.

The data collected from the fourth questionnaire question were included in Article 4 (**Promoting deeper learning in pharmacy education using team-based learning (TBL)**).

The practical application of module content, e.g. application exercises, was an essential and important aspect of TBL to ensure deeper learning of module content. Deeper learning took place in team work due to the opportunity to teach fellow team members and through problem solving of practical scenarios. Students learned from their fellow team members who might have done a more detailed study or had unique life experiences, and/or through mistakes with immediate corrective action. According to students, learning outcomes were more easily achieved due to TBL. More module content was studied than normal, and module content was studied better with longer knowledge retention and better understanding. However, the majority of students still requested a traditional lecture before the TBL class to ensure opportunity for clarification and questions before the RAP process starts.

The results proved that students perceived TBL to deepen their understanding of theoretical content. The structure of TBL focuses on achieving basic concepts and ideas

as well as the application thereof in case studies. Students also review the module content several times during the TBL session as part of pre-class preparation, iRAT, tRAT, appeals and during the application exercise. Immediate feedback is also provided on two occasions: after the RAP and again after the application exercise. This finding confirmed that each component of TBL contributes to the end result of deeper learning.

8.2.5 Research question 5

The fifth research question was stated as follows:

Does TBL allow students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, and precision, as required for pharmacists on a NQF level 8?

The following objective was pursued:

To determine via a questionnaire whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, and precision, as required for pharmacists on a NQF level 8.

Great pressure is placed on higher education institutions to deliver students with graduate attributes or employability skills to the workplace. In South Africa, sufficient legislation is in place to define the attributes such a candidate should have in terms of competencies and critical outcomes, depending on the qualification level, providing a universal framework for qualifications in the country. However, by only teaching discipline content, not all of these competencies are addressed. TBL is known for its ability to develop generic skills. These skills include team work, problem solving, interpersonal skills, time management, communication and adaptability skills. The fifth question of the questionnaire was addressed in the fifth article (**Does team-based learning (TBL) develop essential generic skills in pharmacy students?**) which focuses on the question whether TBL can develop essential generic skills in pharmacy students.

From this investigation, it was evident that TBL could aid in preparing pharmacy students to work in a health care team with culturally diverse team members and patients. TBL also improved students' ability to apply theoretical content in problem solving and the

associated decision-making and critical thinking. Furthermore, TBL provided students with the opportunity to work with classmates who are not necessarily their friends and to respect their opinions during discussions.

The change in teaching strategy and especially the compulsory pre-class preparation in TBL helped students to manage their time for learning better. TBL also developed students' communication skills in the sense that they have to be able to share their opinions with others during discussions, and where needed, they had to make good, logical arguments to persuade others of their understanding. There were several aspects of TBL which were new to pharmacy students in a class room context which developed their adaptability skills. The large number of traditional lecturer-centred courses in higher education is alarming as these teaching strategies do not develop graduate attributes or employability skills as effectively as active learning teaching strategies such as TBL.

The data from this question in the questionnaire indicated that TBL developed those essential generic skills that are in line with South African legislation in terms of the NQF level for pharmacy students, the critical cross field outcomes and the SAPC's eight-star pharmacist. Higher education institutions should therefore consider to include TBL in health professions education.

8.2.6 Research question 6

The sixth research question was stated as follows:

How can TBL be implemented in pharmacy education to enhance effective student learning?

The following objective was pursued:

To develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning.

A number of recommendations was made with regards to implementation of TBL in the undergraduate pharmacy curriculum to ensure that pharmacy students and educators benefit from the advantages that active learning demonstrates.

TBL should be introduced to students in the beginning of the semester to provide opportunity for students to familiarise themselves with the TBL sequence. Heterogeneous teams should be formed that have a diverse variety of members to enhance learning. All four essential principles and nine components of TBL should be adhered to for a successful outcome.

If TBL is implemented for the full duration of the module from the first year, sessions should be between two-and-a-half and three-and-a-half hours in duration and in a suitable venue which allow face-to-face discussions. In this environment, students have favourable learning experiences, learn module content more deeply and develop essential generic skills.

Figure 7.7 (cf. 7.3) provide the guidelines of how TBL can be implemented in undergraduate pharmacy curriculum to ensure its success.

8.3 CONCLUSION

No previous studies concerning TBL in undergraduate pharmacy education in South Africa were found. Research on the implementation of TBL with regards to students' learning experiences, possible deeper learning and generic skills development is limited. This study is based on the recognition and acknowledgement that the existing knowledge base on how to implement TBL in undergraduate pharmacy curricula in South Africa is limited.

To create and add new knowledge, an in-depth study on the way fourth-year pharmacy students at the School of Pharmacy, NWU experienced TBL as presented during the management module was conducted and guidelines based on these findings were developed to improve TBL implementation in undergraduate pharmacy education.

A combination of methods was used to generate data, and findings were interpreted to form the basis of the guidelines for TBL implementation. During the first research phase, written narratives on the importance, relevance and their personal experience of team work in the pharmacy profession were collected from all students registered for the management module and present on the particular day. The themes and topics were used to compile focus group interview questions, which formed the second research phase.

The students who were invited to participate in the focus group interviews were selected via a purposive sampling method where students indicated their willingness to participate. During these interviews, the discussions were focussed on how students see themselves contribute to the health professions team, what competencies they need to develop for that role and how university training can prepare them accordingly.

In the third research phase, the questionnaire survey was handed to all registered students in the management module present on the day of data collection. The questionnaire contained both quantitative and qualitative questions. A detailed description of the factual aspects was given in the five articles' separate results sections.

The scientific evidence resulting from the data interpretations were discussed in detail in the five articles. It was clear that students prefer a team building exercise after team formation to get to know their fellow team members better. An optional question-and-answer session should be organised for students who need some clarification on module content before the official TBL session. Feedback on appeals should be done in a more structured manner so that students see the benefit of this element in TBL. Although some students only want the correct answers to questions without discussion, they should be encouraged to participate and share their opinions. Some initial pointers on how to approach the application exercises will help students to get maximum value from it. For some students, an additional session after the formal TBL session may assist to restate some important information and content.

The theoretical perspectives, based on a thorough review of the literature with the influence of scientific contributions of other research, helped to develop a conceptual framework on which the research was based. At the conceptual level, it was evident that the four essential principles and nine components of TBL must be addressed for the teaching strategy to be defined as TBL.

TBL is grounded in the constructionist epistemology where the focus is on the person's interpretation of reality resulting from social interaction and interpersonal relationships. Therefore, it is of utmost importance to view the students as key role players. As such, they need to understand what their roles and responsibilities are to enable them to be active participants in the entire process. The valuable outcome and contribution of students to experience TBL was taken into account when the guidelines for

implementation of TBL in undergraduate pharmacy education were compiled to ensure its efficacy.

This study set out to determine whether TBL as a teaching strategy increased students' understanding of the theoretical work presented in the module, facilitated a deeper understanding of the linkage between module content and practice, and whether TBL allows students to develop generic skills. This in-depth study was the first step in the direction for the subsequent development of guidelines for the implementation of TBL in the undergraduate pharmacy curriculum.

The development of guidelines for the implementation of TBL in undergraduate pharmacy education is a valuable contribution. When implemented, these guidelines ensure that pharmacy students who are exposed to TBL during their undergraduate studies have an optimal learning experience, have an approach to learning that fosters deep learning and develop essential generic skills. These skills will enable them to contribute to the health professions team in the workplace as a valuable member of the team. The guidelines include evidence-based conclusions in the higher education environment and enable academic staff to optimise the teaching and learning of pharmacy students in South Africa. This study opens up new possibilities to deliver world-class pharmacists, as TBL was not previously implemented in pharmacy curriculums in South Africa. These guidelines can assist educators and trainers on how to optimally develop students by implementing TBL based on a South African target population.

8.4 LIMITATIONS OF THE STUDY

The researcher recognises the following limitations in the study:

Despite the inclusion of a systematic review to ensure a thorough review of current applicable literature (cf. 1.9.1), the promoters of this study had limited experience in supervising such a review process. The researcher therefore had to reach out to other experts in the supervision of systematic review methodology for assistance and guidance.

The uncertainty in South African higher education during a portion of this study due to the urge from university students for free tertiary education and the on-going "fees must fall" campaigns did impact on teaching and learning research in general. Although some

of the obvious issues such as disruption of classes or suspension of academic activities did not impact this study, the underlying impact of fear, stress and uncertainty under students could not be calculated and taken into considerations during this study.

With the publication of the Ethics in Health Research guidelines (RSA DoH 2015), it changed the landscape of health research for the better. Although it ensured higher standards of ethical research with associated better quality results, limited guidelines on how to achieve these standards were available in the beginning which resulted in several delays in ethical applications to be approved.

This study had clear research objectives (cf. 1.7) and defined research methodologies (cf. 1.8). However, the data collected during research phase three resulted in a number of research findings so comprehensive in quantity and quality that it resulted in three publishable articles instead of the one article as planned and needed. It was not achievable to discuss all the findings in full in the articles, and additional findings were therefore included in Chapter 7 (cf. Appendix A4-1 & Appendix A4-2).

The qualitative data collected during research phase one (written narratives) and two (focus group interviews) were sought to develop the baseline data for this study. Although the data is high in validity, it has lower reliability because the same questions in a different study population may result in different data. It is therefore not possible to generalise the data, but propositions were concluded to describe the current situation applicable to this study population before the implementation of TBL. The quantitative data resulting from research phase three (questionnaire) were collected to test the theory described during the qualitative data collection. Since it is highly reliable, it can be generalised that the conclusions drawn from the data will be applicable to similar populations if repeated in the same setup.

Not all students participated in the research. There were students who were unwilling to participate in the different research phases by not participating in the data collection or by not giving consent that their data may be included in the research project. The reason for this unwillingness is not clear. Although strict ethical guidelines and principles were followed to protect study participants from the identified risks associated with this study (cf. 1.11.5.2), the potential impact of these risks and the fear associated with them could have affected students' willingness to participate in the research.

The research was conducted as a case study in only one School of Pharmacy out of nine in South Africa. It also only included one population of students in one module of the BPharm curriculum in 2016. The demographical data shows that the population is not representative of the national demographics of pharmacy students in terms of distribution of ethnicity. This has implications for the generalisability of the study results.

Due to the ethical implication of the researcher also being the lecturer of the module where TBL was implemented, it prevented the researcher to collect any of the data herself or to conduct the focus group interviews. However, the assistance of another knowledgeable researcher in the study increased the quality. In hindsight, it would have been valuable to have another round of focus group discussions towards the end of the year to establish whether students did use the skills learnt during TBL in their new modules where it is requested to conduct a research project in a group.

8.5 RECOMMENDATIONS

The researcher was successful in addressing the research questions (cf. 1.6) and reaching the research objectives for this study. However, the researcher recognises the need for further research such as:

- Evaluating the influence and effect of TBL in the students who participated in this research at the end of their internship (2017) to determine the impact of TBL over time;
- Comparing the experiences of pharmacy students of different schools of pharmacy in South Africa when TBL is implemented simultaneously;
- Implementing these TBL guidelines in other modules covering different types of content and different year groups to ascertain whether the method has universal application;
- Investigating the possible implementation of these TBL guidelines in pharmacy education in Africa; and
- Using these guidelines to develop a comprehensive guide for TBL to direct interprofessional education in health science faculties.

Further research collaborations between the researcher and other academic staff involved in undergraduate pharmacy or health sciences education will address these recommendations.

8.6 CONCLUSIVE REMARK

The goal of effective implementation of TBL in undergraduate pharmacy curriculum should be to provide students with a favourable learning experience while mastering module content. It should also assist students in a deeper approach to learning and to interrogate and critique module content to synthesise their own understanding.

TBL allows students to develop essential generic skills needed for pharmacists to effectively contribute to the health professions team. This research assists the lecturer of undergraduate pharmacy students with an evidence-based guideline on the successful implementation of TBL with positive results. Academic staff can rely on these guidelines for proper team work and avoid wasteful efforts of group work that frustrates both student and lecturer.

The positive impact of TBL will not be limited to the educational and academic arena only, but on the long run these pharmacy students will become effective health professionals. Such professionals will make a difference through realising the desired outcomes in the pharmaceutical environment, the community and ultimately to the society as a whole.

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APPENDIX A1:

PHASE ONE: WRITTEN NARRATIVE TOPIC

PHASE ONE / FASE EEN:

WRITTEN NARRATIVE TOPIC / GESKREWE NARRATIEWE ONDERWERP

Write down what you think is (a) the importance, (b) the relevance and (c) your experience of team work within the pharmacy profession.

Skryf neer wat jy dink is (a) die belangrikheid, (b) die relevansie en (c) jou ervaring van spanwerk in die farmasieprofessie.

APPENDIX A2:

PHASE TWO: FOCUS GROUP INTERVIEW QUESTIONS

PHASE TWO / FASE TWEE:

FOCUS GROUP INTERVIEW QUESTIONS / FOKUS GROEP ONDERHOUD VRAE

Questions:

1. Describe how **you can contribute** to the effective functioning of the health professions team?
2. What **competencies do you need to develop** here at university to help you function in a health professions team?
3. How can **training** here at the university **prepare** you to function effectively in a health professions team?

Vrae:

1. Beskryf **hoe jy kan bydra** to die effektiewe funksionering van die gesondheidsprofessie span?
2. Watter **bevoegdhede het jy nodig om te ontwikkel** hier op universiteit om jou te help funksioneer in 'n gesondheidsprofessie span?
3. Hoe kan **opleiding** hier by die universiteit jou **voorberei** om effektief in 'n gesondheidsprofessie span te funksioneer?

APPENDIX A3-1:

PHASE THREE: IMPACT OF TEAM-BASED LEARNING QUESTIONNAIRE

(ENGLISH)

***Title of the research project*: Development of guidelines for Team-based learning in an undergraduate pharmacy curriculum: A case study**

Impact of Team-based learning Questionnaire

As registered student for the module FPKG 414, you are invited to complete this questionnaire regarding your experience of team-based learning as presented in this module in 2016.

Please complete the questionnaire after reading the information leaflet and giving written consent to participate in this research project. This questionnaire will take 20 minutes to complete.

Question 1: Biographic data

The purpose of this question is to **describe** the **study population** who participated in this phase of data collection. Complete the year in question 1.1 and make a cross in only one square for question 1.2 and 1.3.

1.1 In which year were you born? 1 9 ☐ ☐

1.2 What is your gender? M F

1.3 To which ethnic group do you belong?

African	Asian	Indian
Coloured	White	Other

Question 2: Personal opinion

The purpose of this question is to obtain your **personal opinion** on team-based learning.

2.1 Of everything that we did this semester in team-based learning, what do you think was the **single most valuable aspect**?

2.2 Of everything that we did this semester in team-based learning, what do you think is the **single most important aspect** that should be:

changed: _____

excluded: _____

included: _____

in team-based learning in future?

Question 3: Learning experience of team-based learning

The purpose of this question is to determine pharmacy students' **learning experience** with the use of team-based learning.

For each of the following questions, make a cross in the square that best describes **your opinion,** where 1 is **'strongly disagree'** and 4 **'strongly agree'**. You may only select one square per question. Please complete all the questions.

	Statement	Strongly disagree	Disagree	Agree	Strongly agree
3.1	I had a negative perception of team-based learning after the lecturer introduced it but before we practiced it for the first time.	1	2	3	4
3.2	I usually prepare in advance for class in most of my modules.	1	2	3	4
3.3	Team-based learning did not motivate me to prepare for this class.	1	2	3	4
3.4	Knowing I would discuss my opinions during class motivated me to review study material prior to class.	1	2	3	4
3.5	Team-based learning increased my class attendance compared to traditional lectures.	1	2	3	4
3.6	I am more likely to feel sleepy during traditional lectures than during classes using team-based learning activities.	1	2	3	4
3.7	Team-based learning increased my participation in the classroom.	1	2	3	4
3.8	I prefer to work in a multi-cultural team.	1	2	3	4
3.9	I prefer a mixed gender team.	1	2	3	4
3.10	I am positive about working with my peers in the classroom.	1	2	3	4
3.11	I work well as a participant in a team.	1	2	3	4
3.12	I contributed fully to my team's work in this module.	1	2	3	4
3.13	I enjoyed the use of peer evaluation as part of my team experience.	1	2	3	4
3.14	The team-based learning approach made my learning experience less enjoyable.	1	2	3	4
3.15	Team-based learning should be offered in more modules in the BPharm curriculum.	1	2	3	4
3.16	The time spent in traditional lectures was more worthwhile than time spent in team-based learning.	1	2	3	4
3.17	Team-based learning sessions were more valuable than traditional lectures.	1	2	3	4
3.18	Team-based learning did not motivate me to give my best in this module.	1	2	3	4
3.19	Team-based learning is an effective teaching strategy to simulate the reality of the health profession where one is required to work in a team.	1	2	3	4

Question 4: Understanding of module content

The purpose of this question is to identify whether team-based learning as a teaching strategy increases pharmacy students' **understanding of theoretical work** (curriculum).

For each of the following questions, make a cross in the square that best describes **your opinion,** where 1 is **'strongly disagree'** and 4 **'strongly agree'**. You may only select one square per question. Please complete all the questions.

	Statement	Strongly disagree	Disagree	Agree	Strongly agree
4.1	Team-based learning did not promote my achievement of the learning outcomes.	1	2	3	4
4.2	Learning outcomes set in this module were achieved easier due to the team-based learning approach.	1	2	3	4
4.3	Teams helped me learn module content better compared to studying alone.	1	2	3	4
4.4	Teamwork helped me to learn more than what I would have learned on my own.	1	2	3	4
4.5	Team participation helped me to understand module content better than what I would have understood it on my own.	1	2	3	4
4.6	My understanding of the module content did not increase with the practical application of it in a team.	1	2	3	4
4.7	Team-based learning helped me to remember the content better over a long period.	1	2	3	4
4.8	Learning from mistakes while working in a team did not help me to remember information better.	1	2	3	4
4.9	I did not learn any new knowledge from fellow team members.	1	2	3	4
4.10	Teaching my team members confirmed my own understanding of difficult concepts.	1	2	3	4
4.11	Solving problems in a team is an effective way to practice what I have learned.	1	2	3	4
4.12	Assessments for this module were not in line with the learning outcomes.	1	2	3	4
4.13	I performed better in assessments where team-based learning was used to cover the material than assessments where only traditional lectures were used.	1	2	3	4
4.14	We used feedback regarding team performances to help the team be more effective.	1	2	3	4
4.15	It is necessary to have a traditional lecture before a team-based learning session on the same module content.	1	2	3	4
4.16	Team-based learning did not increase my interest in the module.	1	2	3	4

Question 5: Development of skills

The purpose of this question is to determine whether team-based learning allows pharmacy students to develop **generic skills**, as required for pharmacists on NQF level 8 (fourth year level).

For each of the following questions, make a cross in the square that best describes **your opinion,** where 1 is **'strongly disagree'** and 4 **'strongly agree'**. You may only select one square per question. Please complete all the questions.

	Statement	Strongly disagree	Disagree	Agree	Strongly agree
5.1	Team-based learning aided in the development of my ability to work effectively in a team.	1	2	3	4
5.2	Team-based learning aided in the development of my ability to provide constructive feedback to team members.	1	2	3	4
5.3	I have found that being on a team did not help me to become better at problem solving.	1	2	3	4
5.4	Working on application exercises in class did not improve my ability to apply the information covered during that class session.	1	2	3	4
5.5	Team-based learning enhanced my decision-making skills.	1	2	3	4
5.6	Team-based learning helped in developing my critical thinking skills.	1	2	3	4
5.7	Team-based learning aided in the development of my ability to collaborate with my peers.	1	2	3	4
5.8	Working with a team has helped me to develop respect for others' opinions.	1	2	3	4
5.9	Team-based learning helped me develop my ability to work with culturally diverse team members.	1	2	3	4
5.10	Team-based learning did not help me manage my time for learning.	1	2	3	4
5.11	Team-based learning helped me develop my cooperative learning skills (ability to learn with others).	1	2	3	4
5.12	Team-based learning developed my communication skills as I had to share my opinion with others.	1	2	3	4
5.13	Team-based learning developed my communication skills as I had to make a good, logical argument to persuade others at times.	1	2	3	4
5.14	Team-based learning did not improve my ability to identify alternative ways to achieve goals.	1	2	3	4
5.15	Team-based learning improved my ability to cope with uncertainty.	1	2	3	4
5.16	Team-based learning improved my ability to adapt to change.	1	2	3	4
5.17	Team-based learning improved my ability to be more precise.	1	2	3	4
5.18	Team-based learning helped me to realise that I have responsibilities towards the team.	1	2	3	4
5.19	Team-based learning helped me to realise that I am accountable for my contribution towards the team.				
5.20	Team-based learning did not provide me the opportunity to learn more about myself.	1	2	3	4

Question 6: Components of team-based learning

The purpose of this question is to determine which **components of team-based learning** were the most valuable to you during this semester.

For each of the following questions, make a cross in the square(s) that best describes **your opinion**. You may select more than one square for each question.

Please complete for each statement.

Statement **Which component(s)...**		**Heterogeneous teams** *(teams with different genders and races)*	**Team size** *(between 5 and 7 members)*	**Assigned reading** *(study guide, text book and slides for preparation)*	**iRAT** *(Individual Readiness Assurance Test)*	**tRAT** *(Team Readiness Assurance Test)*	**Appeal process**	**Application exercise**	**Immediate feedback** *(discussion of application exercise)*	**Peer evaluation**
6.1	...motivated you to prepare for class?	1	2	3	4	5	6	7	8	9
6.2	...motivated you to attend class?	1	2	3	4	5	6	7	8	9
6.3	...increased your participation in the classroom?	1	2	3	4	5	6	7	8	9
6.4	...contributed to your learning in this module?	1	2	3	4	5	6	7	8	9
6.5	...contributed to making your learning experience more enjoyable?	1	2	3	4	5	6	7	8	9
6.6	...were most valuable?	1	2	3	4	5	6	7	8	9
6.7	...promoted the achievement of learning outcomes in this module?	1	2	3	4	5	6	7	8	9
6.8	...helped you to remember the content better over a long period?	1	2	3	4	5	6	7	8	9
6.9	...prepared you for the assessments?	1	2	3	4	5	6	7	8	9

End of questionnaire – thank you for your time and effort

APPENDIX A3-2:

PHASE THREE: IMPACT OF TEAM-BASED LEARNING QUESTIONNAIRE (AFRIKAANS)

<u>Titel van die navorsingsprojek</u>: Ontwikkeling van riglyne vir spangebaseerde leer in 'n voorgraadse farmasie-kurrikulum: 'n Gevallestudie

Impak van Spangebaseerde leer Vraelys

<u>As geregistreerde student vir die module FPKG 414</u>, word jy uitgenooi om hierdie vraelys te voltooi rakende jou ervaring van spangebaseerde leer soos in hierdie module aangebied in 2016.

Voltooi asseblief die vraelys nadat jy die inligtingstuk gelees en ingeligte toestemming verleen het om aan hierdie navorsingsprojek deel te neem. Hierdie vraelys sal 20 minute neem om te voltooi.

<u>Vraag 1: Biografiese data</u>

Die doel van hierdie vraag is om die **<u>studiepopulasie</u>** wat aan hierdie fase van dataversameling deelneem te **<u>beskryf</u>**. Voltooi die jaartal by vraag 1.1 en trek 'n kruisie in slegs een blokkie by vraag 1.2 en 1.3.

1.1 In watter jaar is jy gebore? [1] [9] [ ] [ ]

1.2 Wat is jou geslag? [M] [V]

1.3 Aan watter etniese groep behoort jy?

Afrikaan	Asiër	Indiër
Kleurling	Blank	Ander

<u>Vraag 2: Persoonlike mening</u>

Die doel van hierdie vraag is om jou **<u>persoonlike mening</u>** oor spangebaseerde leer in te win.

2.1 Van alles wat ons hierdie semester in spangebaseerde leer gedoen het, wat dink jy was die **<u>enkel waardevolste aspek</u>**?

2.2 Van alles wat ons hierdie semester in spangebaseerde leer gedoen het, wat dink jy is die **<u>enkel belangrikste aspek</u>** wat moet:

verander: _____

uitgelaat: _____

bygevoeg: _____

word in spangebaseerde leer in die toekoms?

Vraag 3: Leerervaring van spangebaseerde leer

Die doel van hierdie vraag is om farmasiestudente se **leerervaring** van spangebaseerde leer te bepaal.

By elk van die volgende vrae, trek ’n kruisie in die blokkie wat **jou eie mening** die beste beskryf, waar 1 ***‘stem glad nie saam nie’*** en 4 ***‘stem definitief saam’*** is. Jy mag slegs een blokkie per vraag kies. Voltooi asb. al die vrae.

	Stelling	Stem glad nie saam nie	Stem nie saam nie	Stem saam	Stem definitief saam
3.1	Ek het ‘n negatiewe persepsie van spangebaseerde leer gehad nadat die dosent dit bekend gestel het maar voordat ons dit die eerste keer geoefen het.	1	2	3	4
3.2	Ek berei gewoonlik vooraf voor vir klas in die meeste van my modules.	1	2	3	4
3.3	Spangebaseerde leer het my nie gemotiveer om voor te berei vir hierdie klas nie.	1	2	3	4
3.4	Die wete dat ek my menings in die klas gaan bespreek, het my gemotiveer om studiemateriaal voor klas te hersien.	1	2	3	4
3.5	Spangebaseerde leer het my klasbywoning verhoog in vergelyking met tradisionele lesings.	1	2	3	4
3.6	Ek is meer geneig om slaperig te voel gedurende tradisionele lesings as in klasse waar spangebaseerde leer aktiwiteite gebruik word.	1	2	3	4
3.7	Spangebaseerde leer het my deelname in die klaskamer verhoog.	1	2	3	4
3.8	Ek verkies om in ‘n gemende-kultuur span te werk.	1	2	3	4
3.9	Ek verkies ‘n gemengde-geslag span.	1	2	3	4
3.10	Ek is positief oor samewerking met klasgenote.	1	2	3	4
3.11	Ek werk goed as ’n deelnemer in ’n span.	1	2	3	4
3.12	Ek het ten volle bygedra tot my span se werk in hierdie module.	1	2	3	4
3.13	Ek het die gebruik van eweknie-evaluering as deel van my spanervaring geniet.	1	2	3	4
3.14	Die spangebaseerde leer aanslag het my leerervaring minder aangenaam gemaak.	1	2	3	4
3.15	Spangebaseerde leer moet in meer modules in die BPharm-kurrikulum aangebied word.	1	2	3	4
3.16	Die tyd spandeer in tradisionele lesings was meer die moeite werd as wat tyd aan spangebaseerde leer sou wees.	1	2	3	4
3.17	Spangebaseerde leersessies was meer waardevol as tradisionele lesings.	1	2	3	4
3.18	Spangebaseerde leer het my nie gemotiveer om my bes te doen in hierdie module nie.	1	2	3	4
3.19	Spangebaseerde leer is ‘n effektiewe onderrigstrategie wat die werklikheid van die gesondheidsprofessie naboots waar daar vereis word om in ‘n span te werk.	1	2	3	4

Vraag 4: Begrip van module-inhoud

Die doel van hierdie vraag is om te identifiseer of spangebaseerde leer as 'n onderrigstrategie farmasiestudente se **begrip van teoriese werk** (die kurrikulum) verbeter.

By elk van die volgende vrae, trek 'n kruisie in die blokkie wat **jou eie mening** die beste beskryf, waar 1 ***'stem glad nie saam nie'*** en 4 ***'stem definitief saam'*** is. Jy mag slegs een blokkie per vraag kies. Voltooi asb. al die vrae.

	Stelling	Stem glad nie saam nie	Stem nie saam nie	Stem saam	Stem definitief saam
4.1	Spangebaseerde leer het nie my bereiking van leeruitkomstes bevorder nie.	1	2	3	4
4.2	Leeruitkomstes vir hierdie module was makliker om te bereik weens die aanslag van spangebaseerde leer.	1	2	3	4
4.3	Spanne het my gehelp om module-inhoud beter te leer in vergelyking om alleen te studeer.	1	2	3	4
4.4	Spanwerk het gehelp om meer te leer as wat ek op my eie sou leer.	1	2	3	4
4.5	Spandeelname het gehelp dat ek werk beter verstaan as wat ek op my eie sou.	1	2	3	4
4.6	My begrip van die module-inhoud het nie verbeter met die praktiese toepassing daarvan in 'n span nie.	1	2	3	4
4.7	Spangebaseerde leer het my gehelp om die inhoud beter te onthou oor 'n lang tydperk.	1	2	3	4
4.8	Die leer uit foute wat ons in die span gemaak het, het my nie gehelp om die inligting beter te onthou nie.	1	2	3	4
4.9	Ek het geen nuwe kennis van mede-spanlede geleer nie.	1	2	3	4
4.10	Deur my spanlede te leer, het my eie begrip van moeilike konsepte bevestig.	1	2	3	4
4.11	Om probleme in 'n span op te los is 'n effektiewe manier om wat ek geleer het te oefen.	1	2	3	4
4.12	Assessering in hierdie module was nie belyn met die leeruitkomstes nie.	1	2	3	4
4.13	Ek het beter presteer in assesserings waar spangebaseerde leer gebruik is om die materiaal te behandel as assesserings waar slegs tradisionele lesings gebruik is.	1	2	3	4
4.14	Ons het terugvoer oor spanprestasie gebruik om die span te help om meer effektief te wees.	1	2	3	4
4.15	Dit is nodig om 'n tradisionele lesing voor 'n spangebaseerde leersessie oor dieselfde module-inhoud te hê.	1	2	3	4
4.16	Spangebaseerde leer het nie my belangstelling in die module verhoog nie.	1	2	3	4

Vraag 5: Ontwikkeling van vaardighede

Die doel van hierdie vraag is om te bepaal of spangebaseerde leer farmasiestudente toelaat om **generiese vaardighede** te ontwikkel, soos vereis vir aptekers op NKR-vlak 8 (vierdejaarsvlak).

By elk van die volgende vrae, trek 'n kruisie in die blokkie wat **jou eie mening** die beste beskryf, waar 1 ***'stem glad nie saam nie'*** en 4 ***'stem definitief saam'*** is. Jy mag slegs een blokkie per vraag merk. Voltooi asb. al die vrae.

	Stelling	Stem glad nie saam nie	Stem nie saam nie	Stem saam	Stem definitief saam
5.1	Spangebaseerde leer het bygedra tot die ontwikkeling van my vermoë om effektief in 'n span te werk.	1	2	3	4
5.2	Spangebaseerde leer het bygedra tot die ontwikkeling van my vermoë om konstruktiewe terugvoer aan spanlede te gee.	1	2	3	4
5.3	Ek het gevind dat om deel van 'n span te wees my nie gehelp het om te verbeter in probleemoplossing nie.	1	2	3	4
5.4	Werk aan toepassingsoefeninge in klas het nie my vermoë verbeter om inligting wat in daardie klassessie bespreek is toe te pas nie.	1	2	3	4
5.5	Spangebaseerde leer het my besluitnemingsvaardighede verbeter.	1	2	3	4
5.6	Spangebaseerde leer het gehelp om my kritiese-denkvaardighede te ontwikkel.	1	2	3	4
5.7	Spangebaseerde leer het bygedra tot die ontwikkeling van my vermoë om met my eweknieë saam te werk.	1	2	3	4
5.8	Om saam met 'n span te werk het my gehelp om respek vir ander se menings te ontwikkel.	1	2	3	4
5.9	Spangebaseerde leer het my vermoë verbeter om met kultureel diverse spanlede saam te werk.	1	2	3	4
5.10	Spangebaseerde leer het my nie gehelp om my tyd vir leer te bestuur nie.	1	2	3	4
5.11	Spangebaseerde leer het my gehelp om my samewerkende leervaardighede (vermoë om saam met ander te leer) te ontwikkel.	1	2	3	4
5.12	Spangebaseerde leer het my kommunikasievaardighede ontwikkel aangesien ek my mening met ander moes deel.	1	2	3	4
5.13	Spangebaseerde leer het my kommunikasievaardighede ontwikkel aangesien ek met tye 'n goeie, logiese redenasie moes gebruik om ander te oorreed.	1	2	3	4
5.14	Spangebaseerde leer het nie my vermoë verbeter om alternatiewe maniere te vind om doelwitte te bereik nie.	1	2	3	4
5.15	Spangebaseerde leer het my vermoë verbeter om onsekerheid te hanteer.	1	2	3	4
5.16	Spangebaseerde leer het my vermoë verbeter om aan te pas by verandering.	1	2	3	4
5.17	Spangebaseerde leer het my vermoë verbeter om meer presies te wees.	1	2	3	4
5.18	Spangebaseerde leer het gehelp om te besef dat ek verantwoordelikhede teenoor die span het.	1	2	3	4
5.19	Spangebaseerde leer het my gehelp om te besef ek is aanspreeklik vir my bydrae tot die span.				
5.20	Spangebaseerde leer het my nie gehelp om meer van myself te leer nie.	1	2	3	4

Vraag 6: Komponente van spangebaseerde leer

Die doel van hierdie vraag is om te bepaal watter **komponente van spangebaseerde leer** vir jou die waardevolste was gedurende hierdie semester.

By elk van die volgende vrae, trek ’n kruisie in die blokkie(s) wat **jou eie mening** die beste beskryf. Jy mag meer as een blokke per vraag merk. Voltooi asb. vir elke stelling.

Stelling **Watter komponent(e)...**		**Heterogene spanne** (*spanne met verskillende geslagte en rasse)*	**Spangrootte** (tussen 5 en 7 lede)	**Voorgeskrewe leeswerk** *(studiegids, handboek en skyfies ter voorbereiding)*	**iRAT** *(Individuele Gereedheidversekerings-toets)*	**tRAT** *(Span Gereedheidversekerings-toets)*	**Appèlproses**	**Toepassingsoefening**	**Onmiddelike terugvoer** *(bespreking van toepassingsoefening)*	**Eweknie-evaluering**
6.1	...het jou gemotiveer om voor te berei vir klas?	1	2	3	4	5	6	7	8	9
6.2	...het jou gemotiveer om klas by te woon?	1	2	3	4	5	6	7	8	9
6.3	...het jou deelname in klas vermeerder?	1	2	3	4	5	6	7	8	9
6.4	...het bygedra tot jou leer in hierdie module?	1	2	3	4	5	6	7	8	9
6.5	...het bygedra om jou leerervaring meer aangenaam te maak?	1	2	3	4	5	6	7	8	9
6.6	...was die waardevolste?	1	2	3	4	5	6	7	8	9
6.7	...bevorder die bereik van leeruitkomstes in hierdie module?	1	2	3	4	5	6	7	8	9
6.8	...het gehelp dat jy die inhoud beter onthou oor ‘n lang periode?	1	2	3	4	5	6	7	8	9
6.9	...het jou voorberei op die assesserings?	1	2	3	4	5	6	7	8	9

Einde van vraelys – dankie vir jou tyd en moeite

APPENDIX A4-1:

RESULTS OF QUESTION 2 OF THE QUESTIONNAIRE

Question 2: Personal opinion

Question 2.1: Of everything that we did this semester in team-based learning, what do you think was the single most valuable aspect?

Themes	Categories	Sub-categories
TBL components	Team formation	Composition of teams (heterogeneous, multi-cultural, mixed gender)
		New diverse (unknown) teams with members not previously worked before, out of comfort zone.
	Assigned reading	Pre-class preparation provides overview of content that will be discussed during class.
	RAT	Preparation tests (iRAT and tRAT) in order to test preparation and knowledge prior to application exercises.
		Repetition of information – iRAT, tRAT, discussion, appeal, immediate feedback.
	Application exercise	Discussion of answers and see how others interpret content.
		Knowledge retention
		Better understanding of content of class prior to assessments.
Development of skills	Interpersonal skills	Made new friends.
		Learned how to work with others.
		Different ways of thinking due to diverse personalities or cultures.
		Learn to respect other's opinions.
		Every person is entitled to have their own opinion.
		Learn to accommodate others in a team.
	Communication	General communication in teams.
		Communication with others by discussion the work.
		Listening to others' reasoning.
	Self-confidence	Confidence in own pre-class preparation and to study independently.
		Confidence in my opinion and understanding of the content during discussions.
	Team work	Reflection of the reality of the health care team in the workplace.
		Working in multi-cultural or diverse teams.
		General team work.
		Learning from or with others in a team.
		Collaboration between team members.
	Trust	Learning to trust team members.
	Problem-solving	Solving problems as a team.
		Development of critical thinking when addressing problems.
	Application of course content	Application of theoretical principles in scenarios.
		Understanding theoretical content better.
Management module	Formal assessments	Assessments are easier because learning during class was more effective.

Question 2.2: Of everything that we did this semester in team-based learning, what do you think is the single most important aspect that should be… in team-based learning in future?

…changed…

Themes	Categories	Sub-categories
TBL components	Team formation	Number of members in team.
		More than two cultures in a team (more diverse in terms of culture).
		Mixed-gender in all teams.
		Language barrier when students with different mother tung languages are in a team.
	RAT	
	Application exercise	Feedback on debatable issues done properly.
		Application exercise should be park of grading.
		Spent less time between exercises.
		Better time management of the duration of the class.
		Shorter duration of activities.
		More free-flowing sequence.
		More/additional exercises on difficult work.
		Less printing of tests and exercises – rather make available electronical.
		More practical approach to exercises, more information on practical application in profession,
	Peer evaluation	Format of peer evaluations.
		Incorporate team-based point system.
Venue	Layout	Seat allocation sometimes inconvenient.
		Should not be to noise and allow team discussions.
	Moving between class room and breakaway rooms	Rather start in the breakaway rooms with RATs.
		Moving between venues is time consuming/waste of time.
Attitude	More positive	
	Better communication	
Lecture/ discussion	Before RAT	Prior to RATs to ensure proper understanding of concepts.
	After TBL	Better discussion.

Question 2.2 continues

…excluded…

Themes	Categories	Sub-categories
TBL components	RAT	iRAT
		tRAT
	Appeal	
	Application exercise	Unnecessary exercises not part of course content/not covered in course content.
		Unnecessary course content.
		Too many exercises.
		Limit unnecessary use of paper.
	Immediate feedback	Too long discussions. Rather provide answers to questions and those who have questions/concerns can discuss afterwards.
	Peer evaluation	Eliminate the inclusion of negative comments.
		Only 1 evaluation instead of 2.
Attitude	Erase negative attitudes	
	Language barrier	
Venue	Moving between class room and breakaway rooms	

…included…

Themes	Categories	Sub-categories
TBL components	Team formation	Bigger teams.
		Appoint a leader.
		Change teams during semester to meet more people.
		More diversity in teams in terms of culture and gender.
		Team-building exercises in first session to meet team members.
		Introduction session to discuss process and sequence.
	Assigned reading	Team should study together.
	RAT	Should be written after application exercises.
		Should be allowed to use references during tRAT.
	Application exercise	Accommodate different languages.
		Should be competition-based or include an award.
		Exercises should be more pharmacy related, relevant and more focussed.
		There should be individual exercises for preparation.
		Exercises should have more practical examples.
		Use less paper.
	Immediate feedback	More discussions during feedback.
		More discussion after RAT.
Lecture/ discussion	Before RAT	Lecture before tests to ensure proper understanding.
		More videos and visual learning material.
	After RAT	After RAT but before application exercise.
	After TBL	After TBL session to summarise content and recap.

APPENDIX A4-2:

RESULTS OF QUESTION 6 OF THE QUESTIONNAIRE

Question 6: Components of team-based learning

Statement **Which component(s)...**		**Heterogeneous teams** *(teams with different genders and races)*	**Team size** *(between 5 and 7 members)*	**Assigned reading** (*study guide, text book and slides for preparation)*	**iRAT** *(Individual Readiness Assurance Test)*	**tRAT** *(Team Readiness Assurance Test)*	**Appeal process**	**Application exercise**	**Immediate feedback** *(discussion of application exercise)*	**Peer evaluation**
6.1	...motivated you to prepare for class?	10.4	16.9	20.2	91.3	74.9	4.9	43.7	12.0	29.5
6.2	...motivated you to attend class?	16.4	23.0	8.2	89.6	78.1	5.5	72.7	34.4	49.2
6.3	...increased your participation in the classroom?	20.8	26.2	13.7	60.7	71.6	8.7	70.5	26.8	39.9
6.4	...contributed to your learning in this module?	21.3	16.9	51.9	74.9	71.0	8.7	73.8	41.5	17.5
6.5	...contributed to making your learning experience more enjoyable?	50.8	63.4	14.2	19.7	31.1	9.3	44.8	35.0	11.5
6.6	...were most valuable?	17.5	14.2	10.4	44.8	44.3	3.3	66.7	41.5	10.9
6.7	...promoted the achievement of learning outcomes in this module?	9.3	13.1	50.3	75.4	68.9	3.8	79.2	46.4	9.8
6.8	...helped you to remember the content better over a long period?	12.0	10.9	21.9	59.0	62.8	4.9	83.6	48.1	4.4
6.9	...prepared you for the assessments?	4.4	4.4	51.4	82.5	70.5	3.8	79.2	41.5	4.4

[1]Values indicated for each component indicates the percentages of students who selected the component. Students were allowed to select more than one component for each question.

APPENDIX B1:

LETTER TO REQUEST PERMISSION TO EXECUTE STUDY

(Date to be inserted)
(Name)
(Faculty or Department)
Potchefstroom campus, North-West University

APPLICATION FOR PERMISSION TO CONDUCT RESEARCH ON TEAM-BASED LEARNING (TBL) IN A MANAGEMENT MODULE (FPKG 414) IN THE BPHARM CURRICULUM IN THE FACULTY OF HEALTH SCIENCES AT THE POTCHEFSTROOM CAMPUS OF THE NORTH-WEST UNIVERSITY IN 2016

Dear (insert name)

I am enrolled for a PhD degree in Health Professions Education in the Faculty of Health Sciences at the University of the Free State (student number 2013205899). The title of my research is **DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY.**

My promoters are:

Promoter: Dr S.B. Swart
Division Health Sciences Education
Faculty of Health Sciences
University of the Free State, South Africa

Co-promoter: Dr G.M. Reitsma
Health Professions Education
Faculty of Health Sciences
North-West University, South Africa

The **problem** to be addressed is to determine how BPharm students at the School of Pharmacy, Faculty of Health Sciences, Potchefstroom campus, North-West University experience TBL as taught in the management module FPKG 414.

The overall **goal** of this study is to investigate pharmacy students' learning experiences regarding the use of TBL in a management module in the BPharm curriculum. This investigation will determinee whether TBL as a teaching strategy increases students' understanding of the theoretical work presented in the module, facilitates a deeper understanding of the linkage between module content and practice, and whether TBL allows students to develop generic skills such as time management, team work, communications, change, innovation, problem solving and precision, as required for pharmacists on a NQF level 8.

The **aim** of the study is to develop guidelines on how to effectively implement TBL in an undergraduate pharmacy curriculum to enhance student learning.

To achieve the aim and answer the research questions of the study, the following **objectives** will be pursued:

1. To conceptualise and contextualise TBL as a teaching strategy in higher education via a literature study.
2. To determine pharmacy students' views of team work in the pharmacy profession before they are exposed to TBL via written narratives.
3. To determine pharmacy students' learning experience of the use of TBL in the management module of the BPharm curriculum after they were exposed to TBL via a questionnaire.
4. To identify via a questionnaire whether TBL as a teaching strategy in the management module of the BPharm curriculum increases pharmacy students' understanding of theoretical work (curriculum) presented in the module.
5. To determine via a questionnaire whether TBL allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, precision, as required for pharmacists on a NQF level 8.
6. To develop guidelines on how to effectively implement TBL in pharmacy education to enhance student learning.

The **method** to be followed will commence with a comprehensive literature study that will investigate issues within teaching and learning with specific reference to TBL. At the beginning of the semester, students will then be invited to write narratives regarding their experience of team work in the pharmacy profession. This will be followed up with focus group interviews with a sample of students from the target population. After exposure to

TBL, questionnaires will be given to all students to identify their learning experience of TBL in the management module to identify whether TBL increased their understanding of theoretical work as well as whether TBL allowed students to develop generic skills.

I hereby apply to conduct research as approved by the Ethics Committee (Faculty of Health Sciences, UFS) on team-based learning in the Faculty of Health Sciences at the Potchefstroom campus of the North-West University.

Yours faithfully

Ms M.J. Eksteen (MPharm)
Senior Lecturer: Department of Pharmacy Practice
School of Pharmacy, Faculty of Health Sciences
Building G23 room 214, Potchefstroom campus
North-West University
Tel. (018) 299-1021

APPENDIX B2-1:

PERMISSION FROM FACULTY MANAGEMENT (NWU) TO EXECUTE STUDY

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Faculty of Health Sciences
Tel: 018 299 2224
Fax: 018 299 4014
Email: awie.kotze@nwu.ac.za

4 May 2015

Dear Ms Eksteen

RE: APPLICATION FOR PERMISSION TO CONDUCT RESEARCH ON TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM IN THE FACULTY OF HEALTH SCIENCES AT THE POTCHEFSTROOM CAMPUS OF THE NORTH-WEST UNIVERSITY IN 2016

I have received your letter dated 30 April 2015. I hereby grant you approval to conduct the abovementioned study as described in the research protocol and as approved by the Ethics Committee (UFS) and the Health Research Ethics Committee (NWU).

Kind regards

Prof AF Kotzé

Dean: Faculty of Health Sciences

APPENDIX B2-2:

PERMISSION FROM CAMPUS REGISTRAR (NWU) TO EXECUTE THE STUDY

NORTH-WEST UNIVERSITY ®
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Campus Registrar
Tel: 018 299-2604
Fax: 0872315284
Email: Frans.DuPreez@nwu.ac.za

7 May 2015

Dear Ms Eksteen

APPLICATION FOR PERMISSION TO CONDUCT RESEARCH ON TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM IN THE FACULTY OF HEALTH SCIENCES AT THE POTCHEFSTROOM CAMPUS OF THE NORTH-WEST UNIVERSITY IN 2016

Your letter dated 30 April 2015 refers. You may continue to conduct the abovementioned study as described in the research protocol and as approved by the Ethics Committee (UFS) and the Health Research Ethics Committee (NWU).

Yours sincerely

FJ du Preez

Campus Registrar

Original details: FJ du Preez(11058617) P:\Letter m eksteen

7 May 2015

APPENDIX B2-3:

PERMISSION FROM DEAN OF STUDENTS (NWU) TO EXECUTE STUDY

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOMKAMPUS

Privaat sak X6001, Potchefstroom
Suid-Afrika, 2520

Tel: +2718 299-1111/2222
Web: http://www.nwu.ac.za

Dekaan : Studentesake
Tel: +27180 299 2831
Faks: +27180 299 2833
E-pos: rikus.fick@nwu.ac.za

3 Augustus 2015

LECTORI SALUTEM

DEKAAN STUDENTESAKE SE TOESTEMMING VIR PhD-STUDIE WAARBY STUDENTE BETROKKE IS

Hiermee gee ek, ondergetekende, in my hoedanigheid as Dekaan Studentesake kennis dat ek insae gehad het in die voorlegging van die PhD-studie van mej M Eksteen met die onderwerp "Development of Guidelines for Team-based learning (TBL) in an undergraduate pharmacy curriculum: a case study."

Ek het ook voorts insae gehad in die toestemmingsbrief van die betrokke Etiekkomitee.

Hiermee gee ek my instemming dat hierdie studie, wat ook die deelname van studente behels, kan voortgaan.

Die uwe

Vriendelike groete

Prof P H Fick
Dekaan:Studentesake

APPENDIX C1-1:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMATION LEAFLET FOR STUDENTS (ENGLISH)

PERMISSION TO BE A RESEARCH PARTICIPANT:
INFORMATION LEAFLET FOR STUDENTS

TITLE OF THE RESEARCH PROJECT: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

REFERENCE NUMBERS: ECUFS NR: 107/2015
NWU HREC NR: NWU-00182-15-S1

PRINCIPAL INVESTIGATOR: MS MARIET EKSTEEN
ADDRESS: Office 214, Building G23, Potchefstroom campus, NWU
CONTACT NUMBER: (018) 299-1021

I am a senior lecturer in the Department of Pharmacy Practice from the Faculty of Health Sciences, NWU, doing research on teaching and learning in health professions education. I would like to invite you to give permission and participate in my study that explores team-based learning as a teaching and learning method in an undergraduate pharmacy curriculum. This research will form part of my PhD degree at the University of the Free State (student number: 2013205899).

Please take some time to read the information presented here, which explains the details of this project. Feel free to ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved.

Your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

To follow is information about the study so that you can make an informed decision.

1. PURPOSE OF THE STUDY

The purpose of this study is to develop guidelines for team-based learning in an undergraduate pharmacy curriculum. I would like to use this information to modify and adapt team-based learning to enhance effective student learning to prepare pharmacy students for the world of work. This study will be conducted in the School of Pharmacy, Faculty of Health Sciences, Potchefstroom campus, North-West University and will involve a mixed method research approach which will include written narratives, focus group interviews and questionnaires. Experienced health researchers trained in the difference data collection techniques are part of this research project. The following objectives will be pursued:

- To conceptualise and contextualise team-based learning as a teaching strategy in higher education via a literature study.
- To determine pharmacy students' views of team work in the pharmacy profession before they are exposed to team-based learning via written narratives and focus group interviews.
- To determine pharmacy students' learning experience of the use of team-based learning in the management module of the BPharm curriculum after they were exposed to team-based learning via a questionnaire.
- To identify via a questionnaire whether team-based learning as a teaching strategy in the management module of the BPharm curriculum increases pharmacy students' understanding of theoretical work (curriculum) presented in the module.
- To determine via a questionnaire whether team-based learning allows students to develop generic skills such as time management, team work, communication, change, innovation, problem solving, and precision, as required for pharmacists on a NQF level 8.
- To develop guidelines on how to effectively implement team-based learning in pharmacy education to enhance student learning.

2. INFORMATION ABOUT THE RESEARCHERS

The lecturer of the module FPKG 414 is the main researcher. Ms Mariet Eksteen has an MPharm and is an experienced lecturer in Pharmacy Practice. She can be contacted at (018) 299-1021 or mariet.eksteen@nwu.ac.za.

The promoter of this PhD degree is Dr Sonet Swart who is a Lecturer in the Division Health Sciences Education, Faculty of Health Sciences at the University of the Free State. She can be contacted at (051) 401-7769 or krugersb@ufs.ac.za.

The main researcher will be assisted by an experienced educational researcher, Dr Gerda Reitsma, who has a PhD in Teaching and Learning and who is also the co-promoter of this PhD degree. She can be contacted at (018) 285 2381 or gerda.reitsma@nwu.ac.za.

3. ELIGIBILITY

You are invited to participate in this research project because you are a fourth/final year student in FPKG 414 (Management in the pharmacy profession), the module in which team-based learning is implemented in 2016. You are included in this research because you have registered for module FPKG 414 in the first semester of 2016. You will be excluded from this research if you are not a registered student for the module FPKG 414 in 2016.

4. PROCEDURE AND INFORMATION

This research will be performed during the teaching of the module FPKG 414 in 2016. If you agree to participate in the research, you will be requested to provide additional information, as described below. The research will entail the following:

- Phase 1: Writing of one anonymous narratives (writing your own story) regarding (a) the importance, (b) the relevance and (c) your experience of team work within the pharmacy profession at the beginning of the semester. This will take place only once in February 2016 and will take about 10 minutes of your time during a scheduled class period.
- Phase 2: If selected, participation in focus group interviews regarding the data obtained from the narratives in the beginning of the semester. You will only have to participate in one focus group interview in February 2016 which will take about 45 to 60 minutes of your time. It will be scheduled outside of scheduled class time but in a time that is convenient for you.
- Phase 3: Completion of a validated questionnaire to determine your experience of team-based learning at the end of the semester. This will take place only once in May 2016 and will take about 20 minutes of your time during a scheduled class period.

5. BENEFITS

By participating in this research, you will be exposed to a teaching strategy that has been proven to have a positive effect on learning. You will also have the opportunity to directly tell the lecturer (via the different data collection instruments and not in person) about your experience of team-based learning. Your skills in working in diverse teams will be

enhanced during the semester and this will increase your personal competitive advantage when entering industry. By participating in this research you contribute to the development of guidelines on how to effectively implement team-based learning in pharmacy education to enhance student learning.

6. RISKS/DISCOMFORTS

The risks in this study are minimal. You may experience some feelings of discomfort and insecurity participating in the data collection processes, as this may not be familiar to you. No additional time will be requested from you for phase one (written narratives) or phase three (questionnaire), as this data will be collected during scheduled class time. If you are selected to participate in phase two (focus group interviews), additional time (about one hour) will be needed from you to participate as this will be scheduled outside of scheduled class time. In order to address these discomforts, the research process will be explained in detail before each phase of data collection.

You may also feel exposed in the class room context when data gathering of phase one and three takes place. Although participation may not be totally anonymous, all data collected will be anonymous and the researcher, who is also the lecturer will have no means of identifying who participated in the research and who did not. The lecturer will also not be present during any data collection phase thus, if you do not want to participate in a phase(s), you may leave the class room. Should leaving the class room make you feel uncomfortable, you may pretend to participate and hand in a blank page or questionnaire. There will be no means of identifying you afterwards.

You may feel uncomfortable writing the written narrative in your own handwriting as you may feel that the lecturer can trace the handwriting to exam papers when marking assessments. To protect your anonymity, the lecturer will not handle the written narratives before July 2016, when the module FPKG 414 is concluded. The mediator (Mr Willem Basson) will collect the data during the class time and hand it over to the co-promoter (Dr Gerda Reitsma) who will keep it in a save place and not present it to the lecturer. Therefore the lecturer cannot identify any student based on their hand writing.

If selected to participate in the focus group interviews, you may feel discomfort in expressing your opinions and experiences in the presence of other students. You may also feel discomfort knowing that the focus group interviews will be audio- and video recorded. Complete anonymity cannot be ensured during the focus group interviews as you will be

engaging in conversations with other participants, but the data will be anonymous and handled confidentially. The audio- and video recordings will be used to ease the transcribing process where after, it will be deleted.

There is no risk of being discriminated against if you decide to withdraw from this project. All data will be collected anonymously and there is no way to identify the student after the data is collected. Your name will never be made known and the information that you provide will only be known by researchers and possibly ethics officials. Your answers will be coded and stored safely by locking it up in cupboards in the Department of Pharmacy Practice and storing it on a computer that is password protected. After seven years all of this data will be destroyed. As soon as data has been transcribed it will be deleted from the records.

The lecturer for FPKG 414 will never be present or facilitating any of the three data collecting procedures, therefore no student will be penalised or discriminated against for not participating in the research project. Should you have the need for further discussion after participating in any of the research phases, an opportunity will be arranged for you to discuss any discomforts with a member of the research team.

The benefits of this study outweighs' the risks.

7. COSTS AND PAYMENT

There will be no cost to you for participating in the research. You will receive no payment as a result of your participation in this study. If a particular focus group interview is scheduled during the lunch hour, a light snack will be served. Dietary request in terms of culture, religion and allergies will be catered to. As an incentive for motivation for participation in completion of the questionnaire, ten gift vouchers of the value of R50 each will be selected via a lucky draw from the completed informed consent forms.

8. ACCESS TO DATA

Anonymity will be ensured during the research process by not collecting any personal data from participants in phase one and three of the study. During phase two, focus group interviews will only be partially anonymous as participants will interact and engaging in conversations with other participants, but the data will be handled anonymous. During the focus group interviews, an experienced researcher who is not familiar with the participants will act as the facilitator. Afterwards, a transcriber will

transcribe the data and code all participants so that when the researcher, who is also the lecturer of the module, receives the data, there is no means to identify who said what during the sessions. Reporting of findings will be anonymous.

Confidentiality will be ensured by keeping all electronic data (transcribed focus group interviews and electronic data) on the researcher's password protected computer to which only the researcher has access. Hard copies of the narratives and questionnaires will be kept in a locked cabinet in the co-promoters office until July 2016 where after it will be kept in a locked cabinet in the researcher's office until the project has been completed. These documents will then be moved to a locked cabinet in the department of Pharmacy Practice, School of Pharmacy, NWU to which only the secretary of the department has a key. The researcher, promoter and co-promoter will have access to all data collected. The transcriber will have access to the data from the focus group interviews while transcribing the interviews from the video- and audio recordings where after she will present the data to the researcher and delete all copies of the recordings and data. The statistician will also have access to the quantitative data as she has to analyse it but it will be provided to her by the researcher via password protected file in an email and the password sent via other method e.g. SMS. All original data collected (narratives and questionnaires) will always stay on the NWU Potchefstroom campus in the above-mentioned place. All parties mentioned above will sign confidentiality agreements.

All data will be kept for seven years and then destroyed in the presence of a member of the ethics committee.

9. QUESTIONS AND/OR UNLIKELY EVENT OF SOME FORM OF DISCOMFORT

You are welcome to ask any questions to a member of the research team before you decide to give permission. Should you have the need for further discussions after any of the data collection phases, an opportunity will be arranged for you to discuss your discomforts or concerns. You are also welcome to contact the Health Science Research Ethics Committee of the Faculty of Health Sciences, University of the Free State, if you have any questions concerning your permission at (051) 405 2812. You can also contact the Health Research Ethics Committee via Mrs Carolien van Zyl at (018) 299-2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher. You will receive a copy of this information leaflet and consent form for your own records.

10. FUNDING

This research study is partly sponsored by the NWU Scholarship of Teaching and Learning (SoTL) Fund.

11. ETHICAL APPROVAL

The research has been approved by the Health Science Research Ethics Committee of the Faculty of Health Sciences of the University of the Free State (ECUFS Nr: 107/2015) and the Health Research Ethics Committee of the Faculty of Health Sciences at the North-West University (NWU HREC Nr: NWU-00182-15-S1). The research will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki and the National Health Research Ethics Council (NHREC). It might be necessary for the research ethics committee members or relevant authorities to inspect the research records.

12. FEEDBACK OF FINDINGS

The findings of the research will be available in 2017. The findings will be shared with you by email.

Should you be willing to participate, please complete the accompanying consent form and return it to me as soon as possible. Thank you for taking time to read this communication. I will appreciate your contribution to the project.

Sincerely,

Ms M.J. Eksteen
PhD candidate
Senior Lecturer: Department of Pharmacy Practice
School of Pharmacy, Faculty of Health Sciences, North-West University, Potchefstroom campus

APPENDIX C1-2:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMATION LEAFLET FOR STUDENTS (AFRIKAANS)

TOESTEMMING OM 'N NAVORSINGSDEELNEMER TE WEES:
INLIGTINGSTUK VIR STUDENTE

TITEL VAN DIE NAVORSINGSPROJEK: ONTWIKKELING VAN RIGLYNE VIR SPANGEBASEERDE LEER IN 'N VOORGRAADSE FARMASIE KURRIKULUM: 'N GEVALLESTUDIE [Development of guidelines for Team-based learning in an undergraduate pharmacy curriculum: a case study.]

VERWYSINGSNOMMERS: ECUFS No: 107/2015
NWU HREC No: NWU-00182-15-S1

HOOFNAVORSER: ME MARIET EKSTEEN
ADRES: Kantoor 214, Gebou G23, Potchefstroomkampus, NWU
KONTAKNOMMER: (018) 299-1021

Ek is 'n senior dosent in die Departement Farmasiepraktyk van die Fakulteit Gesondheidswetenskappe, NWU, wat navorsing doen oor onderrig en leer in gesondheidsberoepe-onderwys. Ek wil jou graag uitnooi om toestemming te gee om deel te neem aan my studie wat spangebaseerde leer as 'n onderrig-en-leermetode in 'n voorgraadse farmasie kurrikulum ondersoek. Hierdie navorsing vorm deel van my PhD-graad aan die Universiteit van die Vrystaat (studentenommer: 2013205899).

Lees asseblief onderstaande inligting wat die besonderhede van hierdie projek verduidelik. Vra die navorser gerus enige vrae oor enige deel van die projek wat jy nie ten volle verstaan nie. Dit is belangrik dat jy ten volle tevrede is dat jy duidelik verstaan wat hierdie navorsing behels en hoe jy betrokke kan wees.

Jou deelname is heeltemal vrywillig en jy is vry om deelname te weier. Indien jy nee sê, sal dit jou geensins negatief beïnvloed nie. Dit staan jou vry om ter enige tyd van die studie te onttrek, selfs al het jy toestemming gegee om deel te neem.

Hier volg inligting rondom die studie sodat jy 'n ingeligte besluit kan neem.

1. DOEL VAN DIE STUDIE

Die doel van die studie is om riglyne te ontwikkel vir spangebaseerde leer in 'n voorgradse farmasie kurrikulum. Ek sal graag hierdie inligting wil gebruik om spangebaseerde leer te verander en aan te pas om effektiewe studenteleer te verbeter ten einde studente voor te berei vir die werksomgewing. Hierdie studie sal plaasvind in die Skool vir Farmasie, Fakulteit Gesondheidswetenskappe, Potchefstroomkampus, Noordwes Universiteit en bevat 'n gemende-metode navorsingsaanslag wat geskrewe narratiewe, fokusgroep onderhoude en vraelyste insluit. Ervare gesondheidsnavorsers wat opgelei is in die verskillende dataversamelingstegnieke is deel van die navorsingspan. Die volgende doelwitte sal nagestreef word:

- Om spangebaseerde leer as 'n onderrig strategie in hoër onderwys te konseptualiseer en kontektualiseer deur middel van 'n litteratuurstudie.
- Om sieninge van farmasiestudente rakende spanwerk in die farmasieprofessie te bepaal voor blootstelling aan spangebaseerde leer deur middel van geskrewe narratiewe en fokusgroep onderhoude.
- Om farmasiestudente se leerervarings van spangebaseerde leer in 'n bestuursmodule in die BPharm-kurrikulum na blootstelling aan spangebaseerde leer te bepaal deur middel van 'n vraelys.
- Om deur middel van 'n vraelys te identifiseer of spangebaseerde leer as 'n onderrigstrategie in die bestuursmodule van die BPharm kurrikulum farmasiestudente se begrip van teoretiese werk (kurrikulum) soos aangebied in hierdie module verhoog.
- Om te bepaal of spangebaseerde leer studente toelaat om generiese vaardighede soos tydsbestuur, spanwerk, kommunikasie, verandering, innovasie, probleemoplossing, en presisie te ontwikkel, soos vereis vir aptekers op 'n NKR vlak 8, deur middel van 'n vraelys.
- Om riglyne te ontwikkel vir die effektiewe implementering van spangebaseerde leer in farmasieonderrig ten einde studente leer te bevorder.

2. INLIGTING OOR DIE NAVORSERS

Die dosent vir die module FPKG 414 is die hoofnavorser. Me Mariet Eksteen het 'n MPharm en is 'n ervare dosent in Farmasiepraktyk. Sy kan gekontak word by (018) 299-1021 of mariet.eksteen@nwu.ac.za.

Die promoter van hierdie PhD-graad is Dr Sonet Swart, 'n dosent in die afdeling Gesondheidswetenskappe-Onderrig, Fakulteit Gesondheidswetenskappe aan die

Universiteit van die Vrystaat. Sy kan gekontak word by (051) 401-7769 of krugersb@ufs.ac.za.

Die hoofnavorser sal bygestaan word deur 'n ervare opvoedkundige navorser, Dr Gerda Reitsma, wat 'n PhD in Onderrig en Leer het en as mede-promoter vir hierdie PhD-studie optree. Sy kan gekontak word by (018) 285 2381 of gerda.reitsma@nwu.ac.za.

3. GESKIKTHEID

Jy word uitgenooi om deel te neem aan hierdie navorsingsprojek want jy is 'n vierde-/ finalejaarstudent in FPKG 414 (Bestuur vir die farmasieprofessie), die module waarin spangebaseerde leer in 2016 geïmplementeer word. Jy is ingesluit in hierdie navorsing omdat jy geregistreer het vir module FPKG 414 in die eerste semester van 2016. Jy sal uitgesluit word van hierdie navorsing indien jy nie 'n geregistreerde student vir die module FPKG 414 in 2016 is nie.

4. PROSEDURE EN INLIGTING

Die navorsing sal gedurende die onderrig van die module FPKG 414 plaasvind. Indien jy instem om aan die navorsing deel te neem, sal jy versoek word om die addisionele inligting soos hieronder uiteengesit te verskaf. Die navorsing behels die volgende:

- Fase 1: Skryf van een anonieme narratief (skryf jou eie storie) aan die begin van die semester rakende (a) die belangrikheid, (b) die toepaslikheid en (c) jou ervaring van spanwerk in die farmasie professie. Hierdie aktiwiteit sal eenmalig plaasvind gedurende Februarie 2016 en sal ongeveer 10 minute van jou tyd gedurende 'n geskeduleerde klasperiode neem.
- Fase 2: Indien geselekteer, deelname aan fokusgroep onderhoude aan die begin van die semester rakende die data uit die narratiewe. Jy sal net aan een fokusgroep onderhoud moet deelneem gedurende Februarie 2016 wat ongeveer 45 tot 60 minute van jou tyd sal neem. Die fokusgroep onderhoud sal buite geskeduleerde klastyd plaasvind op 'n tyd wat vir jou gerieflik is.
- Fase 3: Voltooiing van 'n gevalideerde vraelys aan die einde van die semester om jou ervaring van spangebaseerde leer te bepaal. Hierdie aktiwiteit sal eenmalig plaasvind gedurende Mei 2016 en sal ongeveer 20 minute van jou tyd gedurende 'n geskeduleerde klasperiode neem.

5. VOORDELE

Deur deel te neem aan hierdie navorsing, word jy blootgestel aan 'n onderrigstrategie wat 'n positiewe effek op leer het. Jy sal ook die geleentheid hê om direkte terugvoer aan die

dosent te gee (via die verskillende data versamelingsinstrumente en nie in persoon nie) oor jou ervaring van spangebaseerde leer. Jou vaardigheid om in diverse spanne saam te werk sal bevorder word gedurende hierdie semester en dit sal jou 'n persoonlike kompeterende voordeel gee wanneer jy die industrie betree. Deur jou deelname sal jy bydra dat daar vanuit hierdie navorsing riglyne ontwikkel kan word vir die effektiewe implementering van spangebaseerde leer in farmasieonderrig ten einde studenteleer te bevorder.

6. RISIKO'S/ONGEMAK

Die risiko's in hierdie studie is minimaal. Jy mag tot 'n mate ongemak en onsekerheid ervaar wanneer jy deelneem aan die data-insamelingsprosesse aangesien dit vir jou onbekend mag wees. Geen addisionele tyd sal van jou verwag word tydens fase een (geskrewe narratiewe) of fase drie (vraelys) van hierdie navorsingsprojek nie aangesien die data gedurende geskeduleerde klastyd versamel sal word. Indien jy geselekteer word om deel te neem aan fase twee (fokusgroep onderhoude), sal addisionele tyd (omtrent een uur) benodig word vir deelname aangesien dit buite geskeduleerde klastyd sal geskied. Om enige ongemak te verminder sal die navorsingsproses breedvoerig bespreek word voor elke fase van data-insameling.

Jy mag kwesbaar voel in die klaskamer wanneer data vir fase een en drie versamel word. Alhoewel deelname nie volkome anoniem is nie sal alle data wat versamel is, anoniem wees en sal die navorser, wat ook die dosent is, nie kan bepaal wie het deelgeneem en wie nie. Die dosent sal ook nie teenwoordig wees tydens die dataversamelingsfase nie dus mag jy die klaskamer verlaat indien jy nie wil deelneem nie. Indien jy ongemaklik voel deur die klaskamer te verlaat mag jy voorgee om deel te neem en 'n blanko papier of vraelys in te handig. Daar is geen manier hoe jy agterna geidentifiseer kan word nie.

Jy mag ongemaklik voel om die geskrewe narratief in jou eie handskrif te skryf omdat jy voel die dosent jou handskrif kan erken wanneer vraestelle gemerk word. Om jou anonimiteit te beskerm sal die dosent nie die geskrewe narratiewe hanteer voor Julie 2016, wanneer FPKG 414 afgehandel is nie. Die bemiddelaar (Mnr Willem Basson) sal die data versamel gedurende klastyd en dit dan oorhandig aan die mede-promoter (Dr Gerda Reitsma) wat dit dan sal stoor op 'n veilige plek en dit nie aan die dosent openbaar nie. Dus kan die dosent geen student identifiseer volgens handskrif nie.

Indien jy geselekteer word om deel te neem aan die fokusgroep onderhoude, mag dit dalk vir jou ongemaklik wees om jou mening en ervarings in die teenwoordigheid van ander studente te deel. Jy mag ook ongemaklik voel dat die fokusgroep onderhoude op band en video geneem word. Volledige anonimiteit kan nie verseker word geduringe fokusgroep onderhoude nie aangesien jy deel van gesprekke met ander deelnemers gaan wees, maar die data sal anoniem wees en konfidensieel hanteer word. Die band en video opnames word gebruik om die transkriberingsproses te vergemaklik, waarna die opnames uitgevee sal word.

Daar is geen risiko van diskriminasie indien jy besluit om van hierdie projek te onttrek nie. Alle data wat ingesamel word, is anoniem en daar is geen manier om die student te identifiseer nadat die data ingesamel is nie. Jou naam sal nooit genoem word nie en alle inligting wat jy weergee sal slegs bekend wees aan die navorsers en moontlik die etiese beamptes. Jou antwoorde sal gekodeer word en in 'n geslote kas in die departement Farmasiepraktyk veilig toegesluit word. Data wat op 'n rekenaar gestoor word, sal met 'n wagwoord beskerm word en alle data sal na sewe jaar vernietig word. Sodra data getranskribeer is, sal die opnames uitgevee word.

Die dosent vir FPKG 414 sal nooit teenwoordig wees of enige van die drie data-insamelingsprosedures fasiliteer nie. Dus kan geen student gepenaliseer of teen gediskrimineer word indien hy/sy nie deelneem aan die navorsingsprojek nie. Sou jy die behoefte hê vir verdere gesprekke na deelname in enige van die navorsingsfases, sal 'n geleentheid geskeduleer word waar jy jou ongemak kan bespreek met 'n lid van die navorsingspan.

Die voordele van hierdie studie oorskry die risiko's.

7. ONKOSTE EN VERGOEDING

Daar is geen onkoste vir jou om aan hierdie navorsing deel te neem nie. Jy sal geen vergoeding ontvang vir jou deelname in hierdie studie nie. Indien 'n fokusgroep onderhoud gedurende die etensuur geskeduleer word, sal 'n ligte maaltyd voorsien word. Dieetvoorkeure in terme van kultuur, geloof en allergië sal in ag geneem word. As motivering vir deelname tot die invul van die vraelys, sal tien geskenkbewyse met die waarde van R50 elk deur middel van 'n gelukkige trekking gedoen word vanuit die ingeligte toestemmingsvorms.

8. TOEGANG TOT DATA

Anonimiteit sal verseker word tydens die dataversamelingsproses deur geen persoonlike data van deelnemers in fase een en drie van hierdie studie te versamel nie. Gedurende fase twee, fokusgroep onderhoude sal slegs gedeeltelik anoniem wees aangesien deelnemers interaksie sal hê en sal deelneem in gesprekke met ander deelnemers, maar die data sal anoniem hanteer word. Gedurende die fokusgroep onderhoude sal 'n ervare navorser wat nie vertroud is met die deelnemers nie, optree as die fasiliteerder. Agterna sal 'n transkribeerder die data transkribeer en alle deelnemers kodeer sodat wanneer die navorser, wat ook die dosent van hierdie module is, die data ontvang, sy geensins die deelnemers kan identifiseer nie. Verslagdoening oor die resultate sal anoniem wees.

Vertroulikheid van data kan verseker word deur alle elektroniese data (getranskribeerde fokusgroep onderhoude en elektroniese data) op die navorser se wagwoord-beskermed rekenaar te stoor en waarna net die navorser toegang het. Hardekopië van die narratiewe en vraelyste sal in 'n toesluit kabinet in die mede-promoter se kantoor gestoor word tot Julie 2016 waarna dit na 'n toesluit kabinet in die navorser se kantoor verskuif sal word totdat die projek voltooi is. Daarna sal hierdie dokumente na 'n toesluit kabinet in die departmenet Farmasiepraktyk, Skool vir Farmasie, NWU geskuif word waarvoor slegs die sekretaresse van die departement 'n sleutel gesit. Die navorser, promoter en mede-promoter sal toegang tot die data hê. Die transkribeerder sal toegang tot die data van die fokusgroep onderhoude hê tydens die transkribering van die onderhoude vanaf die video- en klankopnames waarna sy die data aan die navorser sal oorhandig en alle kopië van die opnames sal vernietig. Die statikus sal ook toegang hê tot die kwantitatiewe data aangesien sy dit moet analiseer. Sy sal dit vanaf die navorser ontvang via 'n wagwoord-beskermende leêr in 'n epos en die wagwoord sal deur middel van 'n ander metode bv. SMS aan haar gestuur word. All oorspronklike datastelle (narratiewe en vraelyste) sal altyd op die NWU Potchefstroomkampus bly in bogenoemde plekke. All betrokke partye soos hierbo uiteengesit het konfidentialiteitsooreenkomstes geteken.

Die data sal vir sewe jaar gebêre word waarna dit vernietig sal word in die teenwoordigheid van 'n lid van die etiekkomitee.

9. VRAE EN DIE ONWAARSKYNLIKE GEVAL VAN MOONTLIKE ONGEMAK

Jy is welkom om enige vrae aan 'n lid van die navorsingspan te vra voordat jy besluit om toestemming te gee. Indien jy die behoefte het vir verdere besprekings na enige van die dataversamelingsfases, sal 'n geleentheid vir jou gereel word om jou besware of ongemak

te bespreek. Jy is welkom om die Gesondheidswetenskap Navorsing Etiekkomitee van die Fakulteit Gesondheidswetenskappe, Universiteit van die Vrystaat by (051) 405-2812 te skakel indien jy enige navrae het rakende jou toestemming. Jy kan ook die Gesondheidsnavorsing Etiekkomitee via Mev Carolien van Zyl kontak by (018) 299-2089; carolien.vanzyl@nwu.ac.za indien jy enige besware of klagtes het wat nie bevredigend aangespreek is deur die navorser nie. Jy sal 'n afskrif van hierdie inligtingstuk en toestemmingsvorm ontvang vir jou eie rekords.

10. BEFONDSING

Hierdie navorsing word gedeeltelik befonds deur die NWU Akademieskap vir Onderrig en Leer Fonds.

11. ETIESE GOEDKEURING

Die navorsing is goedgekeur deur die Gesondheidswetenskap Navorsing Etiekkomitee van die Fakulteit van Gesondheidswetenskappe van die Universiteit van die Vrystaat (ECUFS no: 107/2015) en die Gesondheidsnavorsing Etiekkomitee van die Noordwes-Universiteit (NWU HREC no: NWU-00182-15-S1). Die navorsing sal uitgevoer word in ooreenstemming met die etiese riglyne en beginsels van die Internasionale Verklaring van Helsinki en die Nasionale Gesondheidsnavorsingsetiekraad. Dit mag dalk nodig wees vir lede van die etiekkommitee of relevante gesaghebbendes om navorsingsrekords te inspekteer.

12. TERUGVOER OOR BEVINDINGE

Die bevindinge van die navorsing sal in 2017 beskikbaar wees. Die bevindinge sal met jou gedeel word deur e-pos.

Indien jy gewillig is om deel te neem, vul asseblief die aangehegte toestemmingsvorm in en besorg dit so gou moontlik terug aan my. Dankie dat jy die tyd geneem het om hierdie inligtingstuk deur te lees. Ek waardeer jou bydrae tot hierdie navorsingsprojek.

Die uwe

Me. M.J. Eksteen
PhD kanidaat, Senior Lektor: Departement Farmasiepraktyk
Skool vir Farmasie, Fakulteit Gesondheidswetenskappe, Noordwes-Universiteit,
Potchefstroomkampus

APPENDIX C2-1:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMED CONSENT FORM FOR STUDENTS IN RESEARCH PHASE ONE AND TWO (ENGLISH)

PERMISSION TO BE A RESEARCH PARTICIPANT:
INFORMED CONSENT FORM FOR STUDENTS

TITLE OF THE RESEARCH PROJECT: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

REFERENCE NUMBERS: ECUFS NR: 107/2015
NWU HREC NR: NWU-00182-15-S1

If you are willing to participate as a student in this research, please complete this form after you have read through the information leaflet. Please return this form the following day (or as soon as possible after) to the independent person, Mrs Adèle Naudé (either in class, or at her office – Building G23, Room 211). If you are willing to participate, please complete and mark the relevant boxes with an X.

I, _____ (full name), understand the purpose of the research and my role in the research, and hereby consent to participate in this research phase (mark where applicable):

Research phases	**X**
Phase 1: Write anonymous **narratives (write my own story)** regarding (a) the importance, (b) the relevance and (c) my experience of team work within the pharmacy profession at the beginning of the semester	
Phase 2: Participate in **focus group interviews** regarding the data obtained from the narratives in the beginning of the semester or the questionnaires at the end of the semester	

My particulars are as follows:

Title: _____ Surname: _____

Full name(s): _____

Postal address: _____

_____

Email address: _____

Cellular number: _____

I agree to take part in the research phase(s) indicated above. The relevant research techniques and the reason for my participation has been explained to me. I understand that the data gathered will be used for research purposes. I understand that all information that I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports or research findings or to any other party.

Consent	**X**
I have read this information and consent form and it is written in a language with which I am fluent and confortable.	
I hereby willingly give my permission to participate in the above-mentioned study.	
I am not in any way forced to participate and I understand that I can stop at any time should I feel uncomfortable during the study without any consequences. I may be asked to leave the study before it has finished if the researcher feels it is in my best interest or if I do not follow the study plan as agreed to.	
I understand that the focus group interviews are audio- and video recorded to ease the transcribing process and that it will be deleted after the transcribing process is completed.	
I understand that my name and answers will not be made public.	
I understand the benefit as well as possible risks of participation.	
I have had a chance to ask questions and all my questions have been adequately answered. Should I need more information, the researchers are available to assist me.	

Signed at (place) _____ on (date) _____

_____ _____

Signature of participant Signature of witness

DECLARATION BY INDEPENDENT PERSON OBTAINING CONSENT

I _____ (full name) declare that:

- I explained the information in this document to _____.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____

_____ _____

Signature of independent person **Signature of witness**

DECLARATION BY RESEARCHER

I _____ (full name) declare that:

- I explained the information in this document to _____.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____

_____ _____

Signature of researcher **Signature of witness**

APPENDIX C2-2:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMED CONSENT FORM FOR STUDENTS IN RESEARCH PHASE ONE AND TWO (AFRIKAANS)

TOESTEMMING OM 'N NAVORSINGSDEELNEMER TE WEES:
INGELIGTE TOESTEMMINGSVORM VIR STUDENTE

TITEL VAN DIE NAVORSINGSPROJEK: ONTWIKKELING VAN RIGLYNE VIR SPANGEBASEERDE LEER IN 'N VOORGRAADSE FARMASIE KURRIKULUM: 'N GEVALLESTUDIE [Development of guidelines for Team-based learning in an undergraduate pharmacy curriculum: a case study.]

VERWYSINGSNOMMERS: ECUFS No: 107/2015
NWU HREC No: NWU-00182-15-S1

Indien jy bereid is om aan hierdie navorsing deel te neem as 'n student, vul asseblief hierdie toestemmingsvorm in nadat jy die inligtingstuk gelees het. Handig hierdie vorm die volgende dag (of so gou moontlik) in by die onafhanklike persoon, Me. Adèle Naudé (in die klas óf in haar kantoor - gebou G23, kamer 211). Indien jy bereid is om deel te neem, voltooi asb. en merk die toepaslike boksies met 'n X.

Ek, _____ (volle name), verstaan die doel van die navorsing en my rol in die navorsing, en gee hiermee my toestemming om deel te neem aan hierdie navorsingsfase (merk waar toepaslik):

Navorsingsfases	**X**
Fase 1: Skryf van anonieme **narratiewe (skryf jou eie storie)** rakende (a) die belangrikheid, (b) die toepaslikheid en (c) my ervaring van spanwerk in die farmasie professie aan die begin van die semester	
Fase 2: Indien geselekteer, deel te neem aan **fokusgroep onderhoude** rakende die data uit die narratiewe aan die begin van die semester of die vraelys aan die einde van die semester	

My inligting is as volg:

Titel:_____Van: _____

Volle name: _____

Posadres: _____

_____

E-posadres: _____

Selfoonnommer: _____

Ek stem in om deel te neem aan die navorsingsfase(s) soos bo aangedui. Die proses is aan my verduidelik asook die rede vir my deelname. Ek verstaan dat die ingesamelde data vir navorsing gebruik sal word. Ek verstaan dat alle inligting wat ek verskaf konfidensieel is en dat geen inligting wat kan lei tot identifisering van individue ingesluit sal word in verslae of navorsingsbevindinge of aan enige ander party verskaf sal word nie.

Toestemming	**X**
Ek het hierdie inligting en toestemmingsvorm gelees in dit is geskryf in 'n taal waarin ek vlot is en waarmee ek gemaklik is.	
Hiermee gee ek vrywilliglik my toestemming om aan bogenoemde studie deel te neem.	
Ek is geensins geforseer om deel te neem nie en ek verstaan dat ek enige tyd mag stop indien ek ongemaklik voel sonder enige nagevolge. Ek mag gevra word om die studie te verlaat voordat dit voltooi is indien die navorser voel dit is in my beste belang of indien ek nie die studieplan volg soos ooreengekom nie.	
Ek verstaan dat die fokusgroep onderhoude op band en video geneem word om die transkriberingsproses te vergemaklik en dat dit uitgevee sal word sodra die transkriberingsproses voltooi is.	
Ek verstaan dat my naam en antwoorde nie publiek gemaak sal word nie.	
Ek verstaan die voordele en moontlike nadele in deelname.	
Ek het die kans gehad om vrae te vra en al my vrae was genoegsaam beantwoord. Indien ek meer inligting nodig het is die navorser beskikbaar om my te help.	

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van deelnemer Handtekening van getuie

VERKLARING DEUR ONAFHANKLIKE PERSOON

Ek, _____ (volle name), verklaar:

- Ek het die inligting in hierdie dokument verduidelik aan _____.
- Ek het hom/haar aangemoedig om vrae te vra en dit genoegsaam beantwoord.
- Ek is tevrede dat hy/sy alle aspekte van die navorsing, soos hierbo bespreek, genoegsaam verstaan.
- Ek het 'n tolk gebruik/nie gebruik nie.

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van onafhanklike persoon **Handtekening van getuie**

VERKLARING DEUR NAVORSER

Ek, _____ (volle name), verklaar:

- Ek het die inligting in hierdie dokument verduidelik aan _____.
- Ek het hom/haar aangemoedig om vrae te vra en dit genoegsaam beantwoord.
- Ek is tevrede dat hy/sy alle aspekte van die navorsing, soos hierbo bespreek, genoegsaam verstaan.
- Ek het 'n tolk gebruik/nie gebruik nie.

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van navorser **Handtekening van getuie**

APPENDIX C3-1:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMED CONSENT FORM FOR STUDENTS IN RESEARCH PHASE THREE (ENGLISH)

PERMISSION TO BE A RESEARCH PARTICIPANT:
INFORMED CONSENT FORM FOR STUDENTS

TITLE OF THE RESEARCH PROJECT: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

REFERENCE NUMBERS: ECUFS NR: 107/2015
NWU HREC NR: NWU-00182-15-S1

If you are willing to participate as a student in this research, please complete this form after you have read through the information leaflet. Please return this form the following day (or as soon as possible after) to the independent person, Mrs Adèle Naudé (either in class, or at her office – Building G23, Room 211). If you are willing to participate, please complete and mark the relevant boxes with an X.

I, _____ (full name), understand the purpose of the research and my role in the research, and hereby consent to participate in this research phase (mark where applicable):

Research phases	**X**
Phase 3: Complete a validated **questionnaire** to determine my experience of team-based learning at the end of the semester. This will take 20 minutes to complete.	

My particulars are as follows:

Title: _____ Surname: _____

Full name(s): _____

Postal address: _____

_____

Email address: _____

Cellular number: _____

I agree to take part in the research phase(s) indicated above. The relevant research techniques and the reason for my participation has been explained to me. I understand that the data gathered will be used for research purposes. I understand that all information that I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports or research findings or to any other party.

Consent	**X**
I have read this information and consent form and it is written in a language with which I am fluent and confortable.	
I hereby willingly give my permission to participate in the above-mentioned study.	
I am not in any way forced to participate and I understand that I can stop at any time should I feel uncomfortable during the study without any consequences. I may be asked to leave the study before it has finished if the researcher feels it is in my best interest or if I do not follow the study plan as agreed to.	
I understand that the focus group interviews are audio- and video recorded to ease the transcribing process and that it will be deleted after the transcribing process is completed.	
I understand that my name and answers will not be made public.	
I understand the benefit as well as possible risks of participation.	
I have had a chance to ask questions and all my questions have been adequately answered. Should I need more information, the researchers are available to assist me.	

Signed at (place) _____ on (date) _____

_____ _____

Signature of participant Signature of witness

DECLARATION BY INDEPENDENT PERSON OBTAINING CONSENT

I _____ (full name) declare that:

- I explained the information in this document to _____.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____

_____ _____

Signature of independent person **Signature of witness**

DECLARATION BY RESEARCHER

I _____ (full name) declare that:

- I explained the information in this document to _____.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use an interpreter.

Signed at (place) _____ on (date) _____

_____ _____

Signature of researcher **Signature of witness**

APPENDIX C3-2:

PERMISSION TO BE A RESEARCH PARTICIPANT: INFORMED CONSENT FORM FOR STUDENTS IN RESEARCH PHASE THREE (AFRIKAANS)

TOESTEMMING OM 'N NAVORSINGSDEELNEMER TE WEES:
INGELIGTE TOESTEMMINGSVORM VIR STUDENTE

TITEL VAN DIE NAVORSINGSPROJEK: ONTWIKKELING VAN RIGLYNE VIR SPANGEBASEERDE LEER IN 'N VOORGRAADSE FARMASIE KURRIKULUM: 'N GEVALLESTUDIE [Development of guidelines for Team-based learning in an undergraduate pharmacy curriculum: a case study.]

VERWYSINGSNOMMERS: ECUFS No: 107/2015
NWU HREC No: NWU-00182-15-S1

Indien jy bereid is om aan hierdie navorsing deel te neem as 'n student, vul asseblief hierdie toestemmingsvorm in nadat jy die inligtingstuk gelees het. Handig hierdie vorm die volgende dag (of so gou moontlik) in by die onafhanklike persoon, Me. Adèle Naudé (in die klas óf in haar kantoor - gebou G23, kamer 211). Indien jy bereid is om deel te neem, voltooi asb. en merk die toepaslike boksies met 'n X.

Ek, _____ (volle name), verstaan die doel van die navorsing en my rol in die navorsing, en gee hiermee my toestemming om deel te neem aan hierdie navorsingsfase (merk waar toepaslik):

Navorsingsfases	**X**
Fase 3: Invul van 'n gevalideerde **vraelys** om my ervaring van spangebaseerde leer te bepaal, aan die einde van die semester. Dit sal 20 minute neem om te voltooi.	

My inligting is as volg:

Titel: _____ Van: _____

Volle name: _____

Posadres: _____

_____

E-posadres: _____

Selfoonnommer: _____

Ek stem in om deel te neem aan die navorsingsfase(s) soos bo aangedui. Die proses is aan my verduidelik asook die rede vir my deelname. Ek verstaan dat die ingesamelde data vir navorsing gebruik sal word. Ek verstaan dat alle inligting wat ek verskaf konfidensieel is en dat geen inligting

wat kan lei tot identifisering van individue ingesluit sal word in verslae of navorsingsbevindinge of aan enige ander party verskaf sal word nie.

Toestemming	**X**
Ek het hierdie inligting en toestemmingsvorm gelees in dit is geskryf in 'n taal waarin ek vlot is en waarmee ek gemaklik is.	
Hiermee gee ek vrywilliglik my toestemming om aan bogenoemde studie deel te neem.	
Ek is geensins geforseer om deel te neem nie en ek verstaan dat ek enige tyd mag stop indien ek ongemaklik voel sonder enige nagevolge. Ek mag gevra word om die studie te verlaat voordat dit voltooi is indien die navorser voel dit is in my beste belang of indien ek nie die studieplan volg soos ooreengekom nie.	
Ek verstaan dat die fokusgroep onderhoude op band en video geneem word om die transkriberingsproses te vergemaklik en dat dit uitgevee sal word sodra die transkriberingsproses voltooi is.	
Ek verstaan dat my naam en antwoorde nie publiek gemaak sal word nie.	
Ek verstaan die voordele en moontlike nadele in deelname.	
Ek het die kans gehad om vrae te vra en al my vrae was genoegsaam beantwoord. Indien ek meer inligting nodig het is die navorser beskikbaar om my te help.	

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van deelnemer Handtekening van getuie

VERKLARING DEUR ONAFHANKLIKE PERSOON

Ek, _____ (volle name), verklaar:

- Ek het die inligting in hierdie dokument verduidelik aan _____.
- Ek het hom/haar aangemoedig om vrae te vra en dit genoegsaam beantwoord.
- Ek is tevrede dat hy/sy alle aspekte van die navorsing, soos hierbo bespreek, genoegsaam verstaan.
- Ek het 'n tolk gebruik/nie gebruik nie.

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van onafhanklike persoon **Handtekening van getuie**

VERKLARING DEUR NAVORSER

Ek, _____ (volle name), verklaar:

- Ek het die inligting in hierdie dokument verduidelik aan _____.
- Ek het hom/haar aangemoedig om vrae te vra en dit genoegsaam beantwoord.
- Ek is tevrede dat hy/sy alle aspekte van die navorsing, soos hierbo bespreek, genoegsaam verstaan.
- Ek het 'n tolk gebruik/nie gebruik nie.

Geteken te (plek) _____ op (datum) _____

_____ _____

Handtekening van navorser **Handtekening van getuie**

APPENDIX D1-1:

ETHICAL APPROVAL FROM HSREC FOR STUDY

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

04 June 2015

MS M EKSTEEN
DEPARTMENT OF PHARMACY PRACTICE
NWU

Dear Ms M Eksteen

ECUFS NR 107/2015 **DEPARTMENT OF PHARMACY PRACTICE**

PROJECT TITLE: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

1. You are hereby kindly informed that, at the meeting held on 02 June 2015, the Ethics Committee approved the above project.

2. Any amendment, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

3. A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.

4. Kindly use the ECUFS NR as reference in correspondence to the Ethics Committee Secretariat.

5. The Ethics Committee 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).

Yours faithfully

.....
DR SM LE GRANGE
CHAIR: ETHICS COMMITTEE

Dr SB Kruger

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 D1-2:

ETHICAL APPROVAL FROM HSREC FOR UPDATED PROTOCOL

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

16 October 2015

MS M EKSTEEN
C/O DR SB KRUGER
DIVISION HEALTH SCIENCES EDUCATION
FACULTY OF HEALTH SCIENCES
BLOCK A: 125A
UFS

Send per email: Mariet.Eksteen@nwu.ac.za

Dear Ms Eksteen

ECUFS NR 107/2015
MS M EKSTEEN
DEPARTMENT OF PHARMACY PRACTICE, NORTH WEST UNIVERSITY
PROJECT TITLE: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

1. You are hereby kindly informed that, at the meeting held on 15 October 2015, the Ethics Committee approved the following:

   - *Re-submission of protocol with amendments as suggested by the HREC of the Faculty of Health Sciences, Potchefstroom campus, North-West University*

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 Ethics Committee for approval.

4. A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.

5. Kindly use the ECUFS NR as reference in correspondence to the Ethics Committee Secretariat.

6. The Ethics Committee 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 Ethics Committee of the Faculty of Health Sciences.

Yours faithfully

.....
DR SM LE GRANGE
CHAIR: ETHICS COMMITTEE

cc Ms MJ Eksteen – Potchefstroom Campus, North-West University
Dr GM Reitsma – Potchefstroom Campus, North-West University

APPENDIX D1-3:

ETHICAL APPROVAL FROM HSREC FOR PHASE THREE QUESTIONNAIRE

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

20 April 2016

MS M EKSTEEN
DEPARTMENT OF PHARMACY PRACTICE
NORTH WEST UNIVERSITY
Send per email: Mariet.Eksteen@nwu.ac.za

Dear Ms Eksteen

ECUFS NR 107/2015
PROJECT TITLE: DEVELOPMENT OF GUIDELINES FOR TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

1. You are hereby kindly informed that, at the meeting held on 19 April 2016, the Health Sciences Research Ethics Committee (HSREC) took note with approval of the following:

   - *Resubmission of questionnaires*
   - *Amendment to protocol*
   - *Revised information leaflets*
   - *Notification of new biostatician*

2. 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

APPENDIX D2-1:

ETHICAL APPROVAL FROM HREC FOR STUDY AND PHASE ONE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Ethics Office
Tel: 018-299 2092
Fax: 018-299 2088
Email: Minrie.Greeff@nwu.ac.za

19 September 2015

Dr GM Reitsma
AUTHeR

Dear Dr Reitsma

HREC APPROVAL OF YOUR APPLICATION

Ethics number: NWU-00182-15-S1

Kindly use the ethics reference number provided above in all correspondence or documents submitted to the Health Research Ethics Committee (HREC) secretariat.

Project title: Development of guidelines for Team-Based Learning (TBL) in an undergraduate pharmacy curriculum: a case study

Project leader/supervisor: Dr GM Reitsma

Student: MJ Eksteen

Application type: Full Single

Risk level descriptor: Minimal

You are kindly informed that at the meeting held on 15/07/2015 of the HREC, Faculty of Health Sciences, the aforementioned was approved.

The period of approval for this project is from 19/09/2015 to 31/12/2017.

After ethical review:

Translation of the informed consent document to the language's applicable to the study participants should be submitted to the HREC (if applicable).

The HREC requires immediate reporting of any aspects that warrants a change of ethical approval. Any amendments, extensions or other modifications to the protocol or other associated documentation must be submitted to the HREC prior to implementing these changes. Any adverse/unexpected/unforeseen events or incidents must be reported on either an adverse event report form or incident report form.

A progress report should be submitted within one year of approval of this study and before the year has expired, to ensure timely renewal of the study. A final report must be provided at completion of the study or the HREC must be notified if the study is temporarily suspended or terminated. The progress report template is obtainable from Carolien van Zyl at

Carolien.VanZyl@nwu.ac.za.. Annually a number of projects may be randomly selected for an external audit.

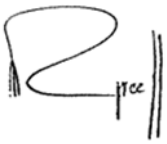
Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.

Please note that for any research at governmental or private institutions, permission must still be obtained from relevant authorities and provided to the HREC. Ethics approval is required BEFORE approval can be obtained from these authorities.

The HREC complies with the South African National Health Act 61 (2003), the regulations on Research with Human Participants of 2014 of the Department of Health and Principles, the Declaration of Helsinki, 2013, the Belmont Report and the Ethics in Health Research: Principles, Structures and Processes (SANS document).

We wish you the best as you conduct your research. If you have any questions or need further assistance, please contact the Ethics Office at Carolien.VanZy@nwu.ac.za or 018 299 2089.

Yours sincerely



Prof Minrie Greeff
HREC Chairperson

Current details: (13210572) C:\Users\13210572\Documents\HREC\HREC - Applications\2015 Applications\Applications 06 - 15 July 2015\NWU-00182-15-S1 (GM Reitsma-MJ Eksteen)\NWU-00182-15-S1 (GM Reitsma-MJ Eksteen) - AL\NWU-00182-15-S1 (GM Reitsma-MJ Eksteen) - AL.docm
19 September 2015

File reference: 9.1.5.3

APPENDIX D2-2:

ETHICAL APPROVAL FROM HREC FOR PHASE TWO

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X05, Noordbrug
South Africa 2522

Tel: 018 299-2000
Fax: 018 299-2999
Web: http://www.nwu.ac.za

Ethics Office
Tel: 018-285 2291
Email: Wayne.Towers@nwu.ac.za

17 February 2016

Dr GM Reitsma
Faculty of Health Sciences

Dear Dr Reitsma

APPROVAL OF FOCUS GROUP INTERVIEW SCHEDULE: ETHICS APPLICATION: NWU-00182-15-A1 (GM REITSMA-MJ EKSTEEN)

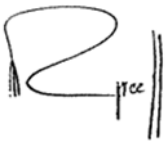
DEVELOPMENT OF GUIDLINES FOR TEAM-BASED LEARNING (TBL) IN AN UNDERGRADUATE PHARMACY CURRICULUM: A CASE STUDY

Thank you for submitting your Phase 2 Focus Group Interview Schedule to the HREC. The 3 questions have been evaluated and approved by the committee. The committee has however requested the following changes:

1. Throughout the protocol, you have changed the tenses of various sections from future tense to past tense. This should not be the case and you must change it back to future tense. The protocol acts as a document according to which you are working not indicating what you have done. If you want to change anything from the approved methodology, change it in the protocol and indicate it with track changes or highlight it in yellow and get HREC permission for it before you implement it.
2. Your planned focus group sizes are too large. Rather go for 8 participants at a time as you will lose some of the voices with a larger group (gives you at least four). The big question however remains whether you are going to reach saturation. If not, more focus groups will have to be done.

Yours sincerely

Dr Wayne Towers
HREC Chairperson



Prof Minrie Greeff
Ethics Office Head

Original details: (12686417) C:\Users\13210572\Documents\HREC\HREC - Applications\2016 Applications\Applications 02 - 10 March 2016\NWU-00182-15-A1 (GM Reitsma-MJ Eksteen)\NWU-00182-15-A1 (GM Reitsma-MJ Eksteen) - AL\NWU-00182-15-A1 (GM Reitsma-MJ Eksteen) - AL.docm
17 February 2016

File reference: 9.1.5.3

APPENDIX D2-3:

ETHICAL APPROVAL FROM HREC FOR REQUEST FOR AN EMENDMENT

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Ethics Office
Tel: 018-285 2291

Email: Wayne.Tovers@nwu.ac.za

11 April 2016

Dr GM Reitsma
Pharmacy Practice

Dear Dr Reitsma

HREC APPROVAL OF A REQUEST FOR AN AMENDMENT

Ethics number: NWU-00182-15-A1

Kindly use the ethics reference number provided above in all correspondence or documents submitted to the Health Research Ethics Committee (HREC) secretariat.

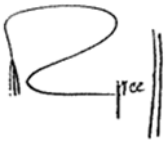
Project title: Development of guidelines for Team-Based Learning (TBL) in an undergraduate Pharmacy curriculum: A case study

Project leader/supervisor: Dr GM Reitsma

Student: Ms M Eksteen

The request to review the remuneration of students in phase 3 to include “ten gift vouchers for the value of R50.00 each via a lucky draw from the completed informed consent forms” is granted.

Yours sincerely



Dr Wayne Towers
HREC Chairperson

Prof Minrie Greeff
Ethics Office Head

Current details: (13210572) C:\Users\13210572\Documents\HREC\HREC - Applications\2016 Applications\Applications 03 - 12 April 2016\NWU-00182-15-A1 (GM Reitsma-M Eksteen)\NWU-00182-15-A1 (GM Reitsma-M Eksteen) - AL\NWU-00182-15-A1 (GM Reitsma-M Eksteen) - AL.docm
11 April 2016

File reference: 9.1.5.3

APPENDIX D2-4:

ETHICAL APPROVAL FROM HREC FOR PHASE THREE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Ethics Office
Tel: 018-285 2291

Email: Wayne.Tovers@nwu.ac.za

23 May 2016

Dr GM Reitsma
Pharmacy Practice

Dear Dr Reitsma

HREC APPROVAL OF THE 3RD PHASE

Ethics number: NWU-00182-15-A1

Kindly use the ethics reference number provided above in all correspondence or documents submitted to the Health Research Ethics Committee (HREC) secretariat.

Project title: Development of guidelines for team-based learning (TBL) in an undergraduate pharmacy curriculum: A case study

Project leader/supervisor: Dr GM Reitsma

Student: M Eksteen

As per the conditions set out in the approval of your study entitled "Development of guidelines for Team-Based Learning (TBL) in an undergraduate Pharmacy curriculum: A case study", the amendments to phase 3 of the study have been received and reviewed by the Health Research Ethics Committee and have been approved.

Please inform us immediately if there are any further amendments required to your study.

We wish you the best as you conduct your research. If you have any questions or need further assistance, please contact the Ethics Office at Ethics-HRECApply@nwu.ac.za or 018 299 1206.

Yours sincerely

Dr Wayne Towers
HREC Chairperson

Prof Minrie Greeff
Ethics Office Head

APPENDIX E1-1:

ABSTRACT ACCEPTED FOR PODIUM PRESENTATION PRESENTED AT THE 76TH INTERNATIONAL CONGRESS OF FIP, 28 AUGUST – 1 SEPTEMBER 2016, BUENOS AIRES, ARGENTINA

Educational strategies to prepare pharmacists, future pharmacists and technicians along with other healthcare professionals for high-performing teams

Mariet J Eksteen[1,2], Sonet B Swart[2] & Gerda M Reitsma[3]

[1]Senior Lecturer, School of Pharmacy, North-West University (Potchefstroom campus), South Africa
[2]Division: Health Science Education, Faculty of Health Sciences, University of the Free State (Bloemfontein campus), South Africa
[3]Teaching and Learning, Faculty of Health Sciences, North-West University (Potchefstroom campus), South Africa

Keywords: Team-based learning, active learning, teaching strategies, educational strategies, team work

Current educational strategies used in some higher/tertiary education institutions which are teacher centred and disciplined based do not develop skills such as teamwork and problem solving that are important for the workplace.

Team-based learning (TBL) is a small-group-based instructional strategy developed in the late 1970s by Larry Michaelsen for teaching a business course to a large class of students, but has since been rapidly employed in other disciplines. The purpose of TBL is to provide an environment where students can work in teams, experiencing the reality and benefits of functioning as part of a team.

TBL involves a three-phase process. During the pre-class preparation, reading assignments are selected (textbooks and assignments) and teams are formed. Teams consist of five to seven students and remain intact for the whole semester. Teams should be heterogeneous in terms of skills and ability in order to promote the development of students. Phase two consists of assessment of students' preparedness through individual and team tests. In the third phase, course concepts are applied in activities designed to enhance student understanding of the course content and to increase team cohesion and the development of skills.

TBL is relevant to the teaching and learning of pharmacists because: pharmacists are part of the healthcare team and thus prior training to develop teamwork is relevant;

pharmacists constantly interact with colleagues and other health care providers, thus teamwork and problem solving are relevant; and pharmacists need to apply theoretical knowledge to day-to-day scenarios about patient health, thus TBL could assist in integrating theoretical knowledge (the curriculum) with practice.

Because of learner engagement in the course and in the teams, multiple learning outcomes including depth of knowledge, cognitive structures, problem-solving skills, team communication skills and leadership skills occur in TBL.

APPENDIX E1-2:

ABSTRACT ACCEPTED FOR PODIUM PRESENTATION PRESENTED AT THE 10TH ANNUAL TEACHING AND LEARNING IN HIGHER EDUCATION CONFERENCE, 20-22 SEPTEMBER 2016, DURBAN, SOUTH AFRICA

Team-based learning: A responsive and innovative educational strategy to prepare pharmacy students for the health professions team

Mariet J Eksteen[1,2], Sonet B Swart[2] & Gerda M Reitsma[3]

[1]Senior Lecturer, School of Pharmacy, North-West University (Potchefstroom campus), South Africa
[2]Division: Health Science Education, Faculty of Health Sciences, University of the Free State (Bloemfontein campus), South Africa
[3]Teaching and Learning, Faculty of Health Sciences, North-West University (Potchefstroom campus), South Africa

Corresponding author: Mariet.Eksteen@nwu.ac.za

Keywords: active learning, educational strategies, teaching strategies, team-based learning, team work

Current educational strategies used in some higher education institutions which are teacher centred and disciplined based do not develop skills such as teamwork and problem solving that are important for the workplace. Health care educators are aware of the limitations of didactic methods for developing critical thinking skills in students. Research on newer approaches grounded in constructivist principles are showing promise in teaching effectiveness.

Team-based learning (TBL) is a small-group-based instructional strategy developed in the late 1970s by Larry Michaelsen for teaching a business course to a large class of students, but has since been rapidly employed in other disciplines. The purpose of TBL is to provide an environment where students can work in teams, experiencing the reality and benefits of functioning as part of a team. As a result of the sequence and structure of TBL, high levels of group cohesiveness and trust are developed among students.

This presentation will explain the three-phase theoretical process of TBL. During the pre-class preparation, reading assignments are selected (textbooks and assignments) and teams are formed. Teams consist of five to seven students and remain intact for the whole semester or course. Teams should be heterogeneous in terms of skills and ability in order to promote the development of students. Phase two consists of assessment of

students' preparedness through individual and team tests. In the third phase, course concepts are applied in activities designed to enhance student understanding of the course content, to increase team cohesion and the development of skills.

This presentation will include a selection of high quality research studies published in various health professions and countries, to highlight empirical evidence found when implementing TBL in higher education. Multiple learning outcomes occur in TBL, including enhancing students' understanding of and participation in the problem-solving process, require students to exercise professionalism and communication skills, allows students to apply therapeutic principles, contributes positively to workgroup emotional intelligence, improve student performance, increase student engagement and satisfaction, promote teamwork, improved and deeper learning, promote self-development, and ensures better retention of learning.

By the end of this presentation, the audience will have a broad understanding of how to prepare and conduct TBL in their classroom in order to move form passive teaching to active student development and learning. TBL provide students with valuable learning experiences that support their learning, assist in developing new language for talking about their learning and provide the opportunity to reflect on the goals and purposes of their education.

APPENDIX F1-1:

JOURNAL SUBMISSION GUIDELINES: *ALTER*NATION JOURNAL

Date: 24 November, 2016

RE: Invitation to Submit a Manuscript for a Special Edition of *ALTER*NATION

The Guest Editors of the journal, ***ALTER*NATION,** invite you to submit a manuscript towards a Volume entitled:

The Scholarship of Teaching & Learning: Advancing Teaching Innovation and Research Excellence in Higher Education

Manuscripts should be aligned to the theme, and could include the following foci:

Thematic Tracks

- Continental and global perspectives on curriculum reform in higher education
- Funding higher education – new challenges, opportunities and prospects
- Collaborative quality enhancement for systemic change in Higher Education: prospects and possibilities
- Institutional research: building an evidence-based culture in higher education
- The intellectualisation of African languages in Higher Education through the SOTL
- Researching teaching & learning technologies which promote the scholarship of teaching & learning
- Responsive and innovative pedagogies in Higher Education
- Re-envisioning SoTL for the student-centred research university
- Alternative paradigms, and emerging directions in the scholarship of teaching and learning in Higher Education
- Indigenous Knowledge and Indigenous Knowledge Systems as pathways to integrating Higher Education research and curricula development in a global era

Please Note:

1. The Final Date for submission of manuscripts for the peer-review process is **31st January, 2017**
2. Manuscripts MUST comply with the attached Guidelines for Contributors. Manuscripts that do not comply with the guidelines will be excluded from the peer-review process
3. Only **complete** manuscripts of between 6000 to 8000 words, free of grammatical errors, will be accepted for the peer-review process
4. Accepted papers will be subject to DOUBLE BLIND REVIEW. The review process takes between 10 to 12 months to complete. Authors will be informed of the editors' final decision on receipt of all the reviewers' reports. The Editor in Chief will make the final decision to accept papers for publication
5. If accepted for publication, authors will be required to submit a formal letter of declaration from a language editor that accepted manuscripts have been subject to a professional language edit
6. **The SAPSE Condition applies:** "At least 75% of contributions published in the journal must emanate from multiple institutions" DHET (Research Outputs Policy, 2015)

Submit manuscripts with the title line: **2016 Alternation Special Edition** to:
Email: utloreviews@ukzn.ac.za
Tel: 031 260 3002

Issued on behalf of the Editorial Committee

Dr Rubby Dhunpath
Director of Teaching & Learning and Conference Chair

Editorial committee for the 2016 Special Edition:

1. Dr Rubby Dhunpath Dhunpath@ukzn.ac.za; Tel: 031-260 2622
2. Prof Nyna Amin: Amin@ukzn.ac.za Tel. 031-260 7255
3. Dr Langa Khumalo: Khumalol@ukzn.ac.za Tel: 031-260 3589

_ALTER_NATION Journal

http://alternation.ukzn.ac.za/

Guidelines for Contributors

1. Submission of original scholarly work

Submissions must accompany a letter confirming that the article is the product of original scholarly work which has not been published before or is not under consideration for publication elsewhere.

Papers are considered for the peer-review process provided that:

- The manuscript conforms to the Alternation guidelines for contributors and the publication manual for referencing
- The author has secured the permission of all named co-authors, and agreement has been reached on the order of the names for publication
- The author has secured all permissions for the reproduction of original or derived material from a copyright source
- The language and content of papers is non-sexist.

Each paper is subject to DOUBLE BLIND REVIEW. The review process takes between 10 to 12 months to complete. Authors will be informed of the editor's final decision on receipt of all the reviewer's reports.

2. _Alternation_ guidelines for manuscript submission: See also: _alternation_.ukzn.ac.za

- Contributors must submit the manuscript in Word for Windows or ASCII. If accepted for publication, 10 original off-print copies of the article will be returned to the author after publication.
- Manuscripts must be submitted in English (UK). If quotations from other languages appear in the manuscript, place the original in a footnote and a dynamic-equivalent translation in the body of the text or both in the text.
- Manuscripts should range between 5000-8000 words (including the Abstract and References). Book reviews should be between 500-1000 words.
- An **abstract** of 150-200 words in length, must include the statement of objective or problem, method, results and conclusions.
- A list of at least six **keywords** for abstracting and indexing services must be included
- The final version should be supplied with short biographical **details of each author** on the **first** title page, as well as the name, mailing address, telephone and facsimile numbers, e-mail address, and affiliation and country of each corresponding author at the time of the work for reprint requests. Type only the title and remove other obvious indications of author identity on the **second** title page.
- *Maps*, *diagrams* and *posters* must be presented in print-ready form. Clear black and white photos (postcard size) may also be submitted.
- Use footnotes sparingly. In order to enhance the value of the interaction between notes and text, we use footnotes and not endnotes.
- Except for bibliographical references, abbreviations must include fullstops. The abbreviations (e.a.) = 'emphasis added'; (e.i.o.) = 'emphasis in original'; (i.a.) or [.....] = 'insertion added' may be used.
- The full bibliographical details of sources are provided only once at the end of the manuscript under References. References in the body of the manuscript should follow the following convention: Dlodlo (1994:14) argues.... or at the end of a reference/ quotation: ..... (Dlodlo 1994:14).

- The full name or initials of authors as it appears in the source must be used in the References section.
- Review articles and book reviews must include a title as well as the following information concerning the book reviewed: title, author, place of publication, publisher, date of publication, number of pages and the ISBN number.

3. Format for the references List:

Head, Bessie 1974. *A Question of Power.* Oxford: Heinemann Educational Publishers.

Mhlophe, Gcina 1990. Nokulunga's Wedding. In Van Niekerk, Annemarié (ed): *Raising the Blinds. A Century of South African Women's Stories.* Parklands: Ad Donker.

Mngadi, Sikhumbuzo 1994. 'Popular Memory' and Social Change in South African Historical Drama of the Seventies in English: The Case of Credo Mutwa's *Unosimela*. *Alter*nation 1,1:37-41.

Fanon, Frantz 1986. *Black Skin, White Masks.* Markmann, Charles Lam (trans). London: Pluto Press.

4. Language editing:

If accepted for publication, authors will be required to have the manuscript edited by a professional language editor. The covering letter of declaration from the language editor, which must accompany your final submission, must indicate that the manuscript has been satisfactorily edited and meets the expected requirements of Alternation. The letter must include the name, qualifications, address and telephone number of the person who completed your language editing.

To enhance clarity or conformity with the journal style, the editors reserve the right to make editorial changes in any manuscript accepted for publication.

5. Some content guidelines (adapted from the Academy of Science, South Africa):

• This is a special issue. Please ensure that your paper engages with the core themes.

• Your work should be located in the existing matrix of knowledge, in the relevant area/s and/or discourses.

• Your key conceptual insights and/or reported findings should be original in the sense that they are the first formal report of such findings and/or insights.

• This principle assumes that writers of manuscripts containing new findings and/or insights will be familiar with the relevant existing literature and not knowingly suppress related findings and/or insights that have been published.

• The relevant literature must be appropriately and fairly cited eg., refer to the first report of a finding or conceptual insight rather than a later elaboration.

• Reports must refer in sufficient detail to the methods and materials used in the study to permit later replication by other scholars.

• Integrity of reporting requires that data is used with integrity and that fabricated data are not presented.

• Any statistical treatment of data must be thorough and the conclusions reasonable.

• Do not present data, graphs or figures that have already been published elsewhere, and guard against inconsistent data sets, or plagiarism.

- Avoid the use of acronyms and abbreviations unless these are internationally acceptable. Where acronyms must be used, please provide the full version + acronym on first usage.

6. General Guidelines

1. Articles that report empirical results should comply with the logic of scientific discovery. This entails that they should have at least the following sections (which may very well have more imaginative headings): (a) A **statement of problem/s** section. (b) A **research methodology** section. In the case of articles based on quantitative analysis, the author must briefly explain how s/he identified a representative sample of respondents, or of interviewees (in the case of interviews) from among the target population, and how s/he collected, and analysed the data. Did the researcher use a technique of convenience sampling, or did s/he use some form of random sampling? (c) A **literature review** section. In the case of articles that are based on qualitative analysis, the author should make a critical comparative analysis of existing frameworks or models, or should use the principles of logic to derive and propose her/his own model. (d) A **results** section. (d) An **interpretation of results** section, and (e) A **conclusions and recommendations** section.

2. Position papers: Position papers should take provocative positions on contentious issues within particular policy frameworks in order to stimulate debate about crucial aspects in a discipline. They should be written lucidly and display erudition regarding the issues under consideration.

3. What counts as evidence: In any article there are three sources of evidence:
    a. Primary data that the author has collected.
    b. Interpretation of secondary data that are already in the public domain, which was previously collected and analysed by other researchers, and which the author is subjecting to critical analysis and/ or different interpretive or analytical approaches. This could also entail a critical comparison of different sets of data.
    c. A critical analysis of conclusions of other authors regarding data, frameworks or models in the public domain.
    d. Statements that rely on the standing/ prestige of a writer in her/his scientific community do not count as evidence. They are merely unsubstantiated assertions.

4. It is not good practice to introduce new references in the results and conclusion sections of an article. The introduction of new references should be limited to the problem statement,

5. research design and literature review sections of an article, or used in discussion and interpretation sections as necessary.

6. The use of the abbreviation *et al*.
    a. When a writer cites more than three authors in the body of an article s/he may use *et al*. (or "and others") as an abbreviation, but must credit all authors in full in the bibliographical information under **References** at the end of the article.
    b. Note that *al*. takes a full stop because it is an abbreviation in Latin.
    c. Words and phrases borrowed from Greek and Latin are usually italicized unless they have become part of everyday usage, such as the adverb "etc." (etcetera) and "e.g." (exempli gratia).

7. Inclusive language.
    Alternation has a gender inclusive language policy and authors should follow recognised protocols in this regard, e.g. 'man' = human being, people, humanity, etc.; manpower = human resources, etc.

APPENDIX F1-2:

PROOF OF SUBMISSION OF ARTICLE 1 TO AN ACCREDITED, ACADEMIC JOURNAL

Mariet Eksteen - Your submission to Alternation special issue

From: Julia Preece <Preecej@ukzn.ac.za>
To: "mariet.eksteen@nwu.ac.za" <mariet.eksteen@nwu.ac.za>, "mariet.eksteen@g...
Date: 2017/01/05 09:23 AM
Subject: Your submission to Alternation special issue

Dear Mariet
Greetings. This email serves to confirm receipt of your submission to Utlo reviews. We will be looking at all submissions towards the end of January/early february and will either contact you with an editorial rejection or will send the manuscript out for review, which will take some time. if you do not hear from us by mid February we will have decided to send the manuscript out for review.
Kind regards
Julia (UTLO reviews coordinator)

Honorary Professor of Adult Education
University of KwaZulu-Natal
Professor of Adult Education
Durban University of Technology
P/Bag X01
Scottsville
Pietermartizburg 3209
South Africa
Te: +27 033 260 5981

APPENDIX F2-1:

JOURNAL SUBMISSION GUIDELINES: CURRENTS IN PHARMACY TEACHING AND LEARNING

Author Guidelines – Original Research Articles
[Also applies to *Research Notes*]

Original Research Article and *Research Notes* Content Guidelines:

Original Research Articles and *Research Notes* are both hypothesis-driven inquiries with the purpose of contributing to generalizable knowledge (i.e., builds on prior knowledge) about teaching, learning, or education in pharmacy. The primary difference between these two article types is that studies described in *Research Notes* exhibit notable issues related to validity and/or generalizability that limit the extent to which the findings contribute to the literature. Authors are strongly encouraged to submit manuscripts that represent a pilot study of a larger research project as a *Research Note*.

Clear and direct communication of the scientific process is a vital guiding principle for both *Original Research* and *Research Notes*. An important part of research is the potential for replication by others, which is very difficult if the study methods and procedures are poorly described. Many of these reporting guidelines can be found online at the EQUATOR Network clearinghouse (http://www.equator-network.org). Authors are encouraged to use subheadings throughout their manuscript, especially with their Methods and Results. *Original Research Articles* and *Research Notes* include the following components: [NOTE: bolded headers below must be used as the article section headers].

Introduction

- Provide a context or background for your study (that is, the nature of the problem and its significance—its relevance to readers)
- Cite only directly pertinent references
- Do not report any data or conclusions from this investigation
- Explicitly state the specific purpose of your investigation; this purpose may be presented as research question(s) or research objectives(s), or in the form of appropriately-worded research hypotheses
- This section should be written in the past tense

Methods

- The Methods section should be clear about how and why a study was done in this particular way
- All study methods and procedures should be described in sufficient detail to allow others to reproduce the results
- When human subjects are involved, the Methods section *must* include a statement indicating that the responsible ethics review body approved the investigation or exempted it from the need for review; this statement or a statement (with verification) that ethics review was not needed is required before any submission will be considered for peer review; place this statement at or near the beginning of this section
- Consider the following subheadings to organize content and help the reader: Context (or setting), design, sample (or population), instrument (and/or outcomes), statistical analysis
- Clearly describe the selection of your study sample, including eligibility, inclusion/exclusion criteria and a description of your source population
- If appropriate, communicate any reporting guidelines that you used
- For study variables and measurement approaches
    - Variables being examined in your study should be clearly described, as well as the methods by which they are measured (e.g., student empathy was measured with the Kiersma-Chen Empathy Scale)
    - References to established methods (e.g., previously developed measurement instruments) should be provided when appropriate
    - Brief descriptions for methods that have been published but are less well known should be provided to aid the reader in understanding their meaning and appropriateness
    - Development of new methods or substantial modification of existing methods should be described along with the reasons for using them

    - Give readers an overview of where your test content information came from—this is your content evidence of measurement validity
    - Provide sufficient detail to allow readers to understand how learners took your assessments (i.e., multiple-choice, constructed response, observer/rater scoring of global rating scale or checklist)—this is your response format evidence of measurement validity
    - If survey instruments are used, the items must be provided in either tabular form with results or as the actual survey instrument as this information is necessary for the peer review process and is helpful to readers
    - For situations where there are compelling reasons (e.g., copyright issues), the actual survey items will not be published
- For quantitative research
    - Clearly state the study design employed using commonly accepted study design terminology
    - Clearly describe any comparisons being made between groups or across time
    - Describe your statistical methods with enough detail to enable a knowledgeable reader with access to your original data to judge its appropriateness for your study and to verify your reported results
    - Provide references if you use study designs or analytical techniques that are unique, new, innovative, or otherwise relatively unfamiliar to the general reader; keep in mind that a brief description may be helpful in addition to a reference
    - Define statistical terms, abbreviations, and most symbols—refer to AMA Manual of Style (http://www.amamanualofstyle.com/) for additional information
    - All statistical analyses should be related to the stated research objectives; any post hoc analyses or unspecified subgroup analyses should be clearly distinguished from those specified by your research objectives
    - Provide a clear rationale for any analyses that are exploratory in nature (e.g., what factors are related to student success on APPEs?) including support from prior literature and/or existing theory
- For qualitative research
    - Address issues related to design, credibility, dependability, transparency, triangulation, transferability, and authenticity; these all are important
    - Describe your specific qualitative approach and research design used, including the context of your study and researcher characteristics that may influence your results
    - Clearly describe sampling, data collection including instruments, data analysis, coding, software/equipment (giving the manufacturer's name and location in parentheses), and procedures in sufficient detail to allow a knowledgeable reader to verify the quality of your work
    - Discuss techniques used to enhance the trustworthiness and credibility of your data analysis (e.g., member checking, audit trails) where appropriate
- This section should be written in the past tense

Results

- See and follow General Author Guidelines for details on reporting quantitative and/or qualitative results
- Results should be presented in logical sequence in the text, tables, and figures
- The text, figures, and tables *should not* be duplicative, rather they should be used as complementary approaches to present findings; emphasize or summarize only the most important observations in the text
- Provide results on all primary and, if applicable, secondary outcomes identified in the Methods section
- All results should be reported in this section; do not report any new data in the discussion
- If educational or psychological testing was used, you must report your sample's psychometric reliability as essential evidence for measurement validity
- Report the absolute numbers from which any percentages (or other derivatives) were calculated

- Specify the statistical significance (p-value) attached to them, if appropriate; however, also report the effect-size as evidence for practical/educational significance
- Avoid nontechnical uses of technical terms in measurement and statistics, such as “random” (which implies a randomizing device), “normal,” “significant,” “correlations,” “reliable,” “valid,” or “sample”
- This section should be written in the past tense

Discussion

- A brief summary (i.e., a few sentences) of the most major main findings may be useful to begin the Discussion section; for *Research Notes*, this summary may not be warranted
- Do not repeat, in detail, data or other information given in other parts of the manuscript, such as in the Introduction or the Results section; similarly, new findings should not be included in the Discussion section
- Situate the results of your investigation with the literature
- Emphasize innovative and important aspects of the study in the context of the totality of the best available evidence in the literature
- Provide possible mechanisms or explanations for your study’s findings
- Clearly state limitations of your study, including its implications for teaching practice *and* for future research
- Keep in mind that limitations may arise from a variety of sources including, but not limited to, the study sample, study design, measurement/psychometric methods, and the quality of collected data
- This section should be written in the present tense

Conclusions

- Provide conclusions *only* for the stated objective(s) of your study
- Avoid unqualified statements and conclusions not adequately supported by your data
- In particular, distinguish between statistical and practical/educational significance
- When warranted, explicitly state new hypotheses for future consideration

Original Research Article and *Research Note* Format Guidelines:

- 5000 word limit for *Original Research Articles*
- 3000 word limit for *Research Notes*
- Restrict tables and figures to those needed to explain assertions in the paper and to assess supporting data
- Use graphs and tables as appropriate to best present the study results; however, do not duplicate data reporting in graphs, tables, and text
- Supplementary materials and technical details can be placed in an appendix where they will be accessible but will not interrupt flow of the text

Author Guidance modified from:
International Committee of Medical Journal Editors. Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals. Available: http://www.icmje.org/recommendations/browse/manuscript-preparation/preparing-for-submission.html#three, accessed December 17, 2015.

O’Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for Reporting Qualitative Research. *Acad Med*. 2014;89(9):1245-1251.

APPENDIX F2-2:

PROOF OF SUBMISSION OF ARTICLE 2 TO AN ACCREDITED, ACADEMIC JOURNAL

Submission CPTL_2016_188 received by Currents in Pharmacy Teaching and Learning

Inbox x

Currents in Pharmacy Teaching and Learning 8/20/16
EviseSupport@elsevier.com via amazonses.com
to me

This message was sent automatically. Please do not reply.

Ref: CPTL_2016_188
Title: Undergraduate training for a health professions team: the voices of fourth-year pharmacy students
Journal: Currents in Pharmacy Teaching and Learning

Dear Ms. Eksteen,

Thank you for submitting your manuscript for consideration for publication in Currents in Pharmacy Teaching and Learning. Your submission was received in good order.

To track the status of your manuscript, please log into
EVISE® at: http://www.evise.com/evise/faces/pages/navigation/NavController.jspx?JRNL_ACR=CPTL and locate your submission under the header 'My Submissions with Journal' on your 'My Author Tasks' view.

Thank you for submitting your work to this journal.

Kind regards,

Currents in Pharmacy Teaching and Learning

Have questions or need assistance?
For further assistance, please visit our Customer Support site. Here you can search for solutions on a range of topics, find answers to frequently asked questions, and learn more about EVISE® via interactive tutorials. You can also talk 24/5 to our customer support team by phone and 24/7 by live chat and email.

APPENDIX F3-1:

JOURNAL SUBMISSION GUIDELINES: THE AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

AJPE AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

AUTHOR INSTRUCTIONS

Introduction

The *Journal* is devoted to providing a forum for communication of relevant information for pharmacy and interprofessional educators and all others interested in the advancement of pharmacy education. To be considered for publication, manuscripts must relate to pharmacy education and provide useful information for the national or international audience of the Journal. If a submission has only local or regional relevance, its usefulness to the majority of readers is limited and, thus, will not be accepted. To ensure that only accurate and substantive articles are included, all manuscripts undergo a blinded peer review process and editorial approval prior to acceptance.

Research Standards

For all manuscripts reporting on research involving human subjects, the author must upload to Editorial Manager all relevant institutional review board (IRB) letters, which should indicate the research has been reviewed and approved by the appropriate human research or ethics review committee, or that it has been exempted from such review. For research that has undergone such review and approval, a statement to that effect also should be included in the manuscript methods section. All survey research must meet criteria established by the Journal's Editorial Board. Please refer to the following publications for guidelines:

- Persky AM, Romanelli F. Insights, pearls, and guidance on successfully producing and publishing educational research. Am J Pharm Educ. 2016;80(5):Article 75. http://www.ajpe.org/doi/full/10.5688/ajpe80575
- Draugalis JR, Plaza CM. Best practices for survey research reports revisited: implications of target population, probability sampling, and response rate. Am J Pharm Educ. 2009;73(8):Article 142. http://www.ajpe.org/doi/full/10.5688/aj7308142
- Draugalis JR, Coons SJ, Plaza CM. Best practices for survey research reports: a synopsis for authors and reviewers. Am J Pharm Educ. 2008;72(1):Article 11. http://www.ajpe.org/doi/full/10.5688/aj720111
- Fincham JE. Response rates and responsiveness for surveys, standards, and the Journal. Am J Pharm Educ. 2008;72(3):Article 43. http://www.ajpe.org/doi/full/10.5688/aj720243
- Anderson C. Presenting and evaluating qualitative research. Am J Pharm Educ. 2010;74(8):Article 141. http://www.ajpe.org/doi/full/10.5688/aj7408141

Stylistic Considerations

Style specifications for the Journal must be followed. Below are general guidelines for manuscript format and style. If in doubt about style, authors should refer to the American Medical Association (AMA) Manual of Style or consult a recent issue of the Journal.

Text. Manuscripts must be double spaced, Times New Roman 11 font, with noncontinuous line numbering and no page breaks. The text should be scholarly, readable, clear, and concise. Standard nomenclature should be used. Unfamiliar terms and acronyms should be defined at first mention. Ad hoc abbreviations should be avoided. Manuscripts that were prepared for oral presentation must be rewritten for print. Excessively long introduction or discussion sections in research papers are discouraged.

Word Style. Consult a current edition of Webster's dictionary for guidance on spelling, compounding, and word separation. Foreign words, not in general use, should be italicized. For

proper use of chemical and biochemical terms, mathematical equations, mathematical expressions, special symbols, subscripts, superscripts, or Greek letters, please refer to the AMA Manual of Style.
Capitalization. When the word "journal" is capitalized and italicized as Journal, it can refer only to the American Journal of Pharmaceutical Education. In scientific writing, always capitalize the following: major words in titles and headings of manuscripts, designators for tables, figures, and appendices (eg, Appendix 1), eponyms (but not the noun that follows them, eg, Gram stain, Babinski sign), names of tests (eg, Beck Depression Inventory), genus names of organisms (but not the name of species, varieties or subspecies), acts of legislation (eg, Medicare), awards (eg, Nobel Prize), proprietary names (eg, Xerox copier), the title of a person when followed by the person's name (eg, Chair John W. Jones), official names of organizations and institutions (eg, Centers for Disease Control and Prevention), geographic places (eg, United States of America), sociocultural designations (eg, Republicans, French people), and historical events (eg, Vietnam War).
Abbreviations. In instances where repeated use of an organization or chemical name would become awkward, an official or accepted abbreviation may be substituted. The abbreviation should be placed in parentheses immediately following the first use of the name in the main body of the text.

- Abbreviations of common pharmaceutical associations or organizations do not require periods or spaces between letters (eg, AMA). Abbreviations of "eg," and "ie," and "et al" should not be separated by periods.
- The names of US states and countries should be spelled out when they stand alone (eg, "…pharmacists throughout the United States..."). Do not use postal abbreviations for states in the text. The abbreviation "US" may be used as a modifier only when it directly precedes the word it modifies (eg, US health policies). Otherwise, it should be spelled out. The names of all other cities, states, provinces, and countries should be spelled out when they occur within the text of the article. Refer to the AMA Manual of Style for additional rules regarding abbreviations.
- Abbreviations deemed "dangerous" or "forbidden" by the Joint Commission and/or the Institute for Safe Medication Practices should be avoided (eg, QD, SC, SQ). http://www.jointcommission.org/assets/1/18/dnu_list.pdf

Numbers. Numbers 0-9 should be written out in general. In statistical text, Arabic numeral can be used if appropriate. Arabic numerals should also be used with designators (eg, week 1, cohort 2). Numbers 10 and up should be written as Arabic numerals (unless they occur at the beginning of a sentence, in which case the number should be spelled out). A number containing a decimal must be styled as an Arabic number. All fractions must be written as decimal equivalents.
Measurements. The metric system will be used for all measurements; however, conventional units should be used instead of SI units. Do not use periods when abbreviating units of measure.
Reference numbers. Reference numbers cited in the text of an article should be superscript Arabic numerals placed at the end of the sentence, outside the final period or other punctuation. Reference citations should be numbered according to their order of appearance in the manuscript. Subsequent citations to the same reference must be indicated by the same number originally assigned to that reference. Do not place parentheses around reference numbers cited in text.

Manuscript Categories

Reviews. Reviews are comprehensive, well-referenced descriptive papers on teaching or research topics directly related to entry-level and graduate or postgraduate education and training or skill development. Reviews should be systematic, include all relevant data, and should not be overly

influenced by the opinions and biases of the authors. The Reviews section includes papers on the history of pharmacy education. These manuscripts should not exceed 25 double-spaced pages for all components.

Research Articles. Research articles describe experimental or observational investigations that used formal methods for data collection and reporting of results of studies directly related to pharmacy education. This category also includes novel methods for professional and graduate student instruction (lectures, laboratories, practice experiences, or courses), or informational manuscripts on programmatic and curriculum development (formerly the Instructional Design and Assessment category). These manuscripts should not exceed 25 double-spaced pages for all components.

Briefs. Research Briefs are small scale studies or pilot works of interest to others with limited outcomes data. Education Briefs describe new and creative approaches to teaching and learning, curriculum, or evaluation that are of interest to others in the field, with limited assessment measures or outcomes data. The concept should be timely and significant. Peer review and IRB approval are required for both categories of briefs. Briefs should not exceed 4 double-spaced pages for all components.

Commentaries. These manuscripts are descriptive and intended to stimulate reflection and dialogue about issues in pharmacy education (includes previous categories of Statements, Special Articles, and Viewpoints). Manuscripts in this category are subject to peer and/or editorial review. Authors may request editorial consideration of a proposed commentary by submitting to the Journal editor for approval a one paragraph brief describing the proposed paper. Contact the editorial offices of AJPE for more information. Commentaries can vary in length from 3-12 double-spaced pages and must be properly cited.

Letters to the Editor. Letters to the Editor serve as a forum for the expression of ideas or for commenting on matters of interest relevant to previously published articles in the Journal. It is also an avenue for critiquing or expanding on the information presented in a previously published manuscript. Authors are required to identify themselves. The Editor reserves the right to reject, shorten, excerpt, or edit letters for publication.

Manuscript Organization

When submitting a manuscript in Editorial Manager, the manuscript document (a Microsoft Word file) should be arranged in the following order starting with a new page for each section: title page, abstract, text, references, tables, figures, and appendices. Editorial Manager allows authors to upload files with tables, figures, and appendices separately if that is more convenient. This is highly recommended for image files (ie, figures). This arrangement does not apply to Letters and invited commentaries.

Title Page. The title page should include the following information: author names, credentials, title, institution, e-mail, phone number, keywords (up to 5), total number of manuscript pages, total number of tables, and total number of figures. Please include any financial disclosures (if none, specify none), and any conflicts (if none, specify none).

Abstract. For Research articles, the abstract should include a brief statement (1-3 sentences) for each of the following sections: Objective, Methods, Results, and Conclusions. Abstract headers should match manuscript headers, with one subheading maximum allowed per section. For Reviews and Briefs, the abstract should include a statement for each of the following sections: Objectives, Findings, and Summary. Abstracts for these manuscripts must not exceed 250 words. For

commentaries, authors should include an unstructured abstract in paragraph form that does not exceed 150 words. Abstracts are not required for Commentaries or Letters to the Editor.

Manuscript Headings. These should mirror abstract headings, with the addition of Introduction and Discussion sections and one allowable subheading per section.

Page Numbering. Beginning with the title page, manuscripts should include page numbering in the upper right hand corner.

Main Body of Text.

- *Introduction*: should provide the context for the article, the objective of the study, and should state the hypothesis or research question, how and why the hypothesis was developed, and why it is important. It should generally not exceed 2 to 3 paragraphs
- *Methods*: should include: (1) study design or type of analysis and dates/period of study; (2) details of sample (eg, participants and setting from which they were drawn, inclusion/exclusion criteria); (3) outcome measures or observations; and (4) statistical analysis. Methods sections should be written in the past tense voice.
- *Results*: should be specific and relevant to the research hypothesis. Characteristics of the study participants should be followed by presentation of results. This section should NOT include implications or weaknesses of the study, but should include validation measures if conducted as part of the study. Results should not discuss the rationale for the statistical procedures used. Data in tables and figures should NOT be duplicated in the text. For a detailed description of data presentation, see Appendix 1 below.
- *Discussion*: should be a formal consideration and critical examination of the study. The research question or hypothesis should be addressed. Results should be compared or contrasted to those of other studies. Limitations and generalizability of the results should be discussed, as well as mention of unexpected findings with suggested explanations. Type of future studies needed, if appropriate, should be mentioned.
- *Conclusions*: should include only conclusions directly supported by results, taking into account limitations. Include implications but avoid speculation and overgeneralization. Indicate whether additional study is required before the information should be used. Give equal emphasis to positive and negative findings of equal merit.
- *General*: subheadings are acceptable in Commentaries and Reviews but should be avoided in Research papers.
- *Acknowledgments*: If listed, acknowledgments should appear after the conclusion or summary of the manuscript and explicitly state what the person being acknowledged has contributed to the manuscript. Funding/support and any other disclosures should also be included in this section.

References. The Journal follows the AMA Manual of Style for references. Whenever appropriate, authors should include citations relevant to the topic of the manuscript that appear in education-focused journals as well as other health professions-based publications. Excessive over-citation of articles from the Journal or reiterations of well-established historic literature should be avoided. Studies mentioned in text should be referred to with author(s)' names (eg, "Smith and colleague's study/review"), not with phrases such as "A recent study/review."

Examples of references:

- *Journal articles*. Stratton TP, Cochran GA. A rural geriatric experience. Am J Pharm Educ. 1990;62:151-155.

- *Book*. Martin AN. Physical Pharmacy. 4th ed. Philadelphia, PA: Lea & Febiger; 1993:268;270-273.
- *Chapter in a book*. Lyon RA, Titeler M. Pharmacology and biochemistry of the 5-HT2 receptor. In: Sanders-Bush E, ed. The Serotonin Receptors. Clifton, NJ: Humana Press;1989:59-88.
- *Thesis or dissertation*. Thorn MD. A Comparative Review of the Statistical and Research Quality of the Medical and Pharmacy Literature [masters thesis]. Chapel Hill: University of North Carolina, 1982.
- *Online material*. Healthy People 2010, Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services. http://health.gov/healthypeople. Accessed May 25, 2010.
- *Unpublished works*. (References to unpublished material, such as articles or abstracts presented at professional meetings but not published)
    - Material presented at a meeting but not yet published. Hughes J, Cleven AJ, Millard ME, Doyle IC, Fuentes, D, Ross J. A formalized advising process to improve students' connectedness during APPEs. Poster presented at: Annual Meeting of the American Association of Colleges of Pharmacy; July 2016; Anaheim, CA.
    - Article in press. Adamcik B, Hurley S, Erramouspe J. Assessment of pharmacy students' critical thinking and problem-solving abilities. Am J Pharm Educ. In press.
    - Article not yet accepted for publication. Manuscripts submitted to a publisher or journal but not accepted for publication cannot be included in the reference section. Information attributed to such a source must be included in the text following this example: "Similar results were achieved in a study of attrition rates in two Southeastern colleges of pharmacy (P.T. Jones, unpublished data, month 2009)."

Tables and Figures

Tables. Tables should not duplicate information provided in the text. Instead, tables should provide additional information that illustrates or expands on a specific point the author wishes to make. Each table should include a title descriptive enough to make the table self-explanatory (ie, stand alone). Tables should not break across pages but please avoid using page breaks. Tables should be numbered using Arabic numbers following the order to which they are referred in the text. Tables should be created using Microsoft Word table formatting tools and should be in Times New Roman, 10-point type, with footnotes in 9-point type (do NOT use the tab key to form rows and columns of data as tab information is lost when the document is processed by the publisher). See Appendix 2 below for an example of table formatting style.

Figures. Figures should be numbered using Arabic numbers, based on the order in which they are presented in the text. Figures must be legible to readers. Large and/or high-resolution graphic image files, saved as TIFFS, should be uploaded to Editorial Manager as separate files from the manuscript text (Word file). For more detailed figure guidelines, see Appendix 3 below.

Manuscript Submission

Please submit your manuscript using AJPE's Editorial Manager online tracking system at http://ajpe.edmgr.com. Log in using your username and password and then follow the step-by-step on-screen instructions for uploading your files. If you do not know your username and password or need to

have an account created for you, please send an e-mail to ajpe@ajpe.org and a member of the editorial staff will respond as quickly as possible.

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Copy Editing Stage. Prior to publication, all manuscripts are copy edited for organization, style, and clarity. The corresponding author receives the copy edited version and is encouraged to review the paper to ensure the editing has not changed intended meaning. While minor rewording and/or alternate rewording is acceptable, all AJPE style and formatting changes made to the manuscript must be retained.

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Appendix I. STANDARDIZATION OF STATISTICAL REPORTING

Numeric Values

Numbers should be rounded to reflect the precision of the instrument or measurement. Numbers that result from calculations, such as means and standard deviations, should be expressed to no more than 1 significant digit beyond the accuracy of the instrument. Thus, the mean (SD) of a quiz grade of individuals quizzes on a scale accurate to 1 point should be expressed as 62.5.

***p* Values**

When possible, report the actual *p* value (*p*=0.074) versus a threshold (eg, *p*<0.01). Very large and very small *p* values should always be expressed as *p*>.99 and *p*<.001, respectively. *P* values should be expressed to 2 digits to the right of the decimal point (regardless of whether the *p* value is significant), unless *p*<0.01, in which case the *p* value should be expressed to 3 digits to the right of the decimal point. One exception to this rule is when rounding *p* from 3 digits to 2 digits would result in *p* appearing nonsignificant, such as *p*=.046. In this case, expressing the *p* value to 3 places may be preferred by the author. The smallest *p* value that should be expressed is *p*<0.001, since additional zeros do not convey useful information. When any *p* value is expressed, it should be clear to the reader what parameters and groups were compared, what statistical test was performed, and whether the test was **1-tailed** or **2-tailed** (if these distinctions are relevant for the statistical test). Because the *p* value represents the result of a statistical test and not the strength of the association or the clinical importance of the result, *p* values should be referred to simply as significant or not significant; terms such as *highly significant* and *very highly significant* should be avoided.

Statistics

The Results section should include the number of individuals or other data units initially eligible for study, the number at its inception, and the number who were excluded, dropped out, or were lost to follow-up at each point in the study. Authors should provide descriptive statistics about the sample and, if appropriate, the individual subgroups. Primary outcome measures should be discussed after the study population is described, followed by secondary outcome measures. If one statistical test has been used throughout the manuscript, the test should be clearly stated in the Methods section. If more than one statistical test has been used, the statistical tests performed should be discussed in the Methods section and the specific test used reported along with the corresponding results.

Mean and **Standard Deviation** are most clearly presented in parentheses:
The sample as a whole was relatively young (*M*=19.2, *SD*=3.4).
The average age of students was 19.2 years (*SD*=3.4).
In tables/figures mean and SD should be presented as: mean (SD); so, using the above example: 19.2 (3.4)

Percentages are also most clearly displayed in parentheses with **no decimal places**:
Nearly half (49%) of the sample was married.

Chi-square statistics are reported, the Pearson chi-square value (rounded to two decimal places), and the significance level:
The percentage of participants that were married did not differ by gender, (c^2=0.89, *p*=0.35).

***t* Tests** are reported like chi-squares. Following that, report the *t* statistic (rounded to two decimal places) and the significance level. There was a significant effect for gender *(p*<0.001) with men receiving higher scores than women (85% vs 72%).

ANOVAs – Analysis of Variance
Both one-way and two-way are reported like the *t* test:
There was a significant main effect for treatment (*p*=0.02), and a significant interaction (*p*=0.04).

Correlations
Are reported with the significance level:
The two variables were strongly correlated, *r*=0.49, *p*<0.01.

Regression
Results are often best presented in a table. Results section, you should at least present the unstandardized or standardized slope (beta), whichever is more interpretable given the data, along with the *t* test and the corresponding significance level. It is also customary to report the percentage of variance explained along with the corresponding *F* test. "Social support significantly predicted depression scores, □□=-.34, *p*<.001. Social support also explained a significant proportion of variance in depression scores, R^2=.12, *p*<.001."

Tables
Are useful if you find that a paragraph has almost as many numbers as words. If you do use a table, do **not** also report the same information in the text. It's either one or the other.

Effect sizes
Are useful to term practical significant (eg, treatment effect such as Cohen's D, regression coefficient, odds ratio). Deviations above the average performance in the "lecture" course); the question then becomes,

Significant Digits
For numerical issues, please report numbers according to or in close proximity to significant digit rules.

Appendix 2. Table Formatting

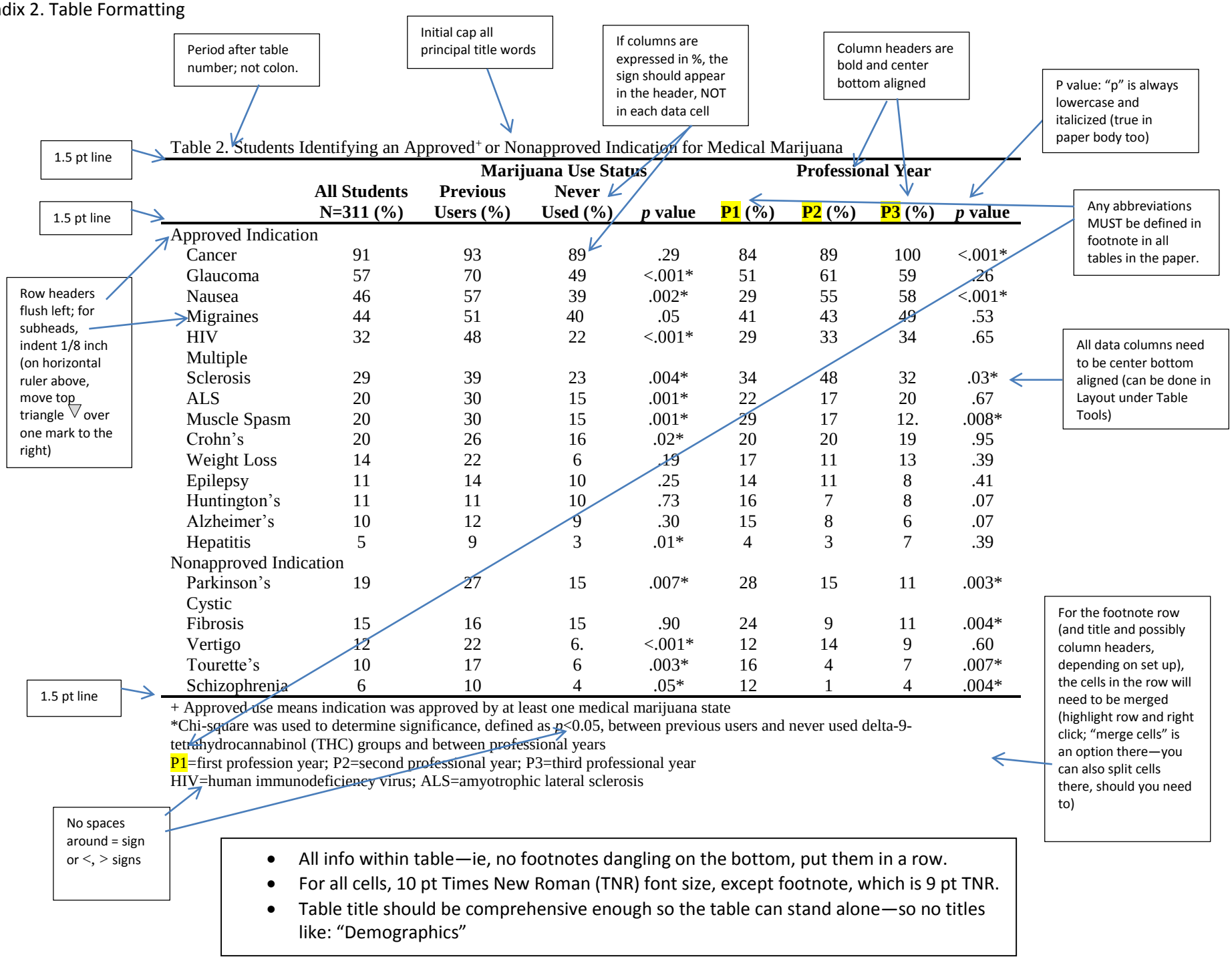

Table 2. Students Identifying an Approved+ or Nonapproved Indication for Medical Marijuana

		Marijuana Use Status			Professional Year			
	All Students N=311 (%)	Previous Users (%)	Never Used (%)	*p* value	P1 (%)	P2 (%)	P3 (%)	*p* value
Approved Indication								
Cancer	91	93	89	.29	84	89	100	<.001*
Glaucoma	57	70	49	<.001*	51	61	59	.26
Nausea	46	57	39	.002*	29	55	58	<.001*
Migraines	44	51	40	.05	41	43	49	.53
HIV	32	48	22	<.001*	29	33	34	.65
Multiple Sclerosis	29	39	23	.004*	34	48	32	.03*
ALS	20	30	15	.001*	22	17	20	.67
Muscle Spasm	20	30	15	.001*	29	17	12.	.008*
Crohn's	20	26	16	.02*	20	20	19	.95
Weight Loss	14	22	6	.19	17	11	13	.39
Epilepsy	11	14	10	.25	14	11	8	.41
Huntington's	11	11	10	.73	16	7	8	.07
Alzheimer's	10	12	9	.30	15	8	6	.07
Hepatitis	5	9	3	.01*	4	3	7	.39
Nonapproved Indication								
Parkinson's	19	27	15	.007*	28	15	11	.003*
Cystic Fibrosis	15	16	15	.90	24	9	11	.004*
Vertigo	12	22	6.	<.001*	12	14	9	.60
Tourette's	10	17	6	.003*	16	4	7	.007*
Schizophrenia	6	10	4	.05*	12	1	4	.004*

+ Approved use means indication was approved by at least one medical marijuana state
*Chi-square was used to determine significance, defined as $p<0.05$, between previous users and never used delta-9-tetrahydrocannabinol (THC) groups and between professional years
P1=first profession year; P2=second professional year; P3=third professional year
HIV=human immunodeficiency virus; ALS=amyotrophic lateral sclerosis

- All info within table—ie, no footnotes dangling on the bottom, put them in a row.
- For all cells, 10 pt Times New Roman (TNR) font size, except footnote, which is 9 pt TNR.
- Table title should be comprehensive enough so the table can stand alone—so no titles like: "Demographics"

Appendix 2. Table Formatting (cont.)

Initial cap all words in column and row headers, but not in subheads

Table 3. Mean Differences of Total and Subscales of the Jefferson Scale of Empathy-Health Profession Student Version (JSE-HPS) According to Demographic Factors and Pharmacy School Type (N=447)

	JSE-HPS							
	Perspective Taking		Compassionate Care		Standing in Patient's Shoes		Total	
	M (SD)	*F*	M (SD)	*F*	M (SD)	*F*	M (SD)	*F*
Gender								
Male (n=81)	50.3 (6.23)	3.58	23.3 (3.25)	0.07	7.9 (2.46)	0.01	81.5 (9.23)	1.89
Female (n=366)	48.9 (5.89)		23.3 (2.83)		7.8 (2.22)		80.0 (8.48)	
Year of study								
2nd (n=214)	48.89 (5.83)	1.79	23.4 (2.76)	0.43	8.0 (2.24)	3.45	80.2 (8.21)	0.05
3rd (n=233)	49.65 (6.09)		23.2 (3.04)		7.6 (2.27)		80.4 (9.01)	
University								
A (n=67)	46.8 (5.60)		22.3 (2.55)		8.0 (2.07)		77.1 (7.53)	
B (n=66)	49.1 (6.47)	4.13[b]	23.7 (2.83)	3.62[b]	7.6 (2.26)	0.42	80.3 (8.69)	3.60[b]
C (n=111)	49.1 (6.27)		22.9 (3.26)		7.8 (2.43)		79.8 (9.39)	
D (n=79)	50.1 (5.92)		23.3 (2.81)		7.7 (2.15)		81.1 (8.84)	
E (n=124)	50.1 (5.31)		23.8 (2.73)		7.9 (2.29)		81.8 (7.91)	
Coeducation								
Women's (n=203)	50.1 (5.54)	9.10[b]	23.6 (2.76)	5.74[a]	7.8 (2.23)	0.00	81.6 (8.27)	8.40[b]
Coeducational (n=244)	48.4 (6.21)		23.0 (2.99)		7.8 (2.29)		79.2 (8.78)	
School type								
National (n= 133)	47.9 (6.13)	9.04[b]	23.0 (2.77)	1.50	7.8 (2.17)	0.00	78.7 (8.25)	6.20[a]
Private (n =314)	49.7 (5.82)		23.4 (2.96)		7.8 (2.30)		80.9 (8.71)	
Graduate school (n=84)	48.6 (5.75)		22.6 (3.20)		7.7 (2.33)		78.9 (8.39)	
Future career preference								
Hospital (n=142)	49.2 (6.20)		23.4 (2.66)		7.7 (2.16)		80.3 (8.57)	
Community pharmacy (n=57)	49.6 (6.60)	0.48	23.4 (3.04)	1.18	8.0 (2.27)	0.66	81.1 (9.28)	0.66
Government service (n=60)	50.0 (5.33)		23.6 (2.66)		7.5 (2.31)		81.1 (7.78)	
Pharmaceutical industry (n=54)	49. (5.53)		23.3 (2.73)		8.1 (2.39)		80.6 (8.44)	
Others[c] (n=50)	48.8 (5.97)		23.5 (3.32)		8.1 (2.25)		80.3 (9.64)	

[a] $p<0.05$, [*b] $p<0.01$, [c] Others includes patent attorney, lawyers, entering medical school, etc.

Add a .5 line under a merged column header that applies to multiple columns if it helps with legibility

For mean and standard deviation (SD), AJPE style is this format: mean (SD), NOT mean ± SD

Sometimes, a value is an average so will need to be center center aligned for a group of rows

Ensure significant digits are rounded appropriately

Appendix III. AJPE FIGURE INSTRUCTIONS FOR AUTHORS

- Figures should contain a title and, if applicable, a legend and a key
  - Title: a succinct clause or phrase that identifies the specific topic of the figure or describes what the data show (10 pt TNR, principal words capitalized)
  - Legend: contains information that identifies and describes the figure, and it should provide sufficient detail to make the figure "stand-alone" (ie, comprehensible without reference to the text) (9 pt TNR, sentence-style capitalization)
  - Key: provides additional info to interpret the data; identifies and defines markers, shading, etc (san serif font consistent with the rest of the figure, sentence-style capitalization)
- Text within the figure should be in a san-serif font such as Arial
- Axis labels should have principal words capitalized; nonaxis text should be capitalized sentence-style
- Abbreviations should be consistent with those used in text and defined in the title, legend, or key
- For graphs, do NOT include horizontal lines above the x axis and do NOT include a box around the figure
- Numbers with more than 4 digits are separated with spaces, NOT commas (ie, 300 000, instead of 300,000)
- Canvas size of figure should be at least 5" wide
- All figures should be in gray scale (or black and white), submitted electronically as high resolution (at least 300 dpi) TIFF files.
  - Note: clear, sharp images are essential for accurate reproduction—while dust and scratches can usually be removed, if the details are blurred in the original, they will be blurred in reproduction.
- Original image files for figures are preferred; if a previously published figure of any kind is necessary, the author MUST obtain and submit written permission from the copyright holder to use the figure; the original source MUST be acknowledged in the figure legend.

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- ☐ Should not exceed 25 double-spaced pages for all components or as indicated in the instructions to authors; pages should be numbered at the bottom
- ☐ Must be submitted as a Microsoft Word document—PDFs are not acceptable
- ☐ Times New Roman, 11pt, flush left, noncontinuous line numbering, no page breaks

Article Categories

Please ensure that your manuscript fits into one of the following article categories:

Reviews

- ☐ Comprehensive, well-referenced descriptive papers on teaching or research topics related to entry-level and graduate or postgraduate education and training or skill development
- ☐ Papers on the history of pharmacy education
- ☐ Systematic, with all relevant data, not overly influenced by authors' opinions/biases
- ☐ Should not exceed 25 double-spaced pages for all components

Research Articles

- ☐ experimental/observational investigations using formal methods for data collection and reporting of results
- ☐ Can also present novel methods for professional/graduate student instruction or information on programmatic and curriculum development (formerly Instructional Design and Assessment)
- ☐ IRB approval/exemption included when appropriate
- ☐ Should not exceed 25 double-spaced pages for all components

Briefs

- ☐ Research Briefs: small scale studies/pilot works with limited outcomes data
- ☐ Education Briefs: new and creative approaches to teaching and learning, curriculum, or evaluation, with limited assessment measures or outcomes data
- ☐ Timely and significant
- ☐ IRB approval required for both categories
- ☐ Should not exceed 4 double-spaced pages for all components

Commentaries

- ☐ Descriptive, intended to stimulate reflection/dialogue about issues in pharmacy education (includes previous categories of Statements, Special Articles, and Viewpoints)
- ☐ Subject to peer and/or editorial review
- ☐ Properly cited
- ☐ Can vary in length from 3-12 double-spaced pages

Letters to the Editor

- ☐ Express ideas, comments, or critiques on matters of interest relevant to previously published articles in the Journal
- ☐ Authors must be identified

AJPE AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

IRB/Ethics Committee Approval

- ☐ Institutional review board (IRB) or ethics committee letters must be included with manuscript
- ☐ Statement of IRB approval must be included in the methods section of the manuscript.

Reporting Data (follow guidelines for statistics)

Numeric Values

- ☐ Should be rounded to reflect the precision of the instrument or measurement
- ☐ Numbers that result from calculations, such as means and standard deviations, should be expressed to no more than one significant digit beyond accuracy of instrument

P Values

- ☐ When possible, report the actual *p* value (p=0.074) vs a threshold (eg, p<0.01)
- ☐ Very large and very small *p* values should always be expressed as p>0.99 and p<0.001, respectively

Tables, Appendices, Figure Legends

- ☐ Create tables using Microsoft Word table tools; follow guidelines for table formatting
- ☐ Use Times New Roman, 10pt., single-spaced for tables, appendices, and figure legends
- ☐ Footnotes are 9pt
- ☐ Capitalize all significant words in the titles

Manuscript Organization

Title page

- ☐ Concise working title
- ☐ Name of each author, academic degree, academic/professional affiliation and city and state where located
- ☐ Corresponding author: mailing address, telephone number, facsimile number (optional), and e-mail address

Abstract

- ☐ 150 words maximum
- ☐ Structured abstracts should contain appropriate headings (refer to Author Instructions)

Keywords

- ☐ 3-5 words keywords for the manuscript, each separated by a comma

Acknowledgments and Disclosures

- ☐ Funding/support and any other disclosures should be included in this section
- ☐ Appears after Conclusions section.

References

- ☐ References should be numbered consecutively in the order in which the referenced publication is referred to in the manuscript
- ☐ Studies mentioned in text should be referred to with author(s)' names (eg, "Smith and colleague's study/review"), not with phrases such as "A recent study/review…"
- ☐ Refer to Author Instructions for specific reference formatting

Figures

- ☐ Black-and-white jpegs or tiffs; high resolution; follow guidelines for figures
- ☐ Submitted as separate files (not embedded in manuscript)

APPENDIX F3-2:

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Date: 2017/01/10 01:00 PM
Subject: Your Submission - [EMID:0341aaa992002b25]

Ref.: Ms. No. ajpe6167R1
Team-Based Learning Experiences of Fourth-Year Pharmacy Students in a South African University
American Journal of Pharmaceutical Education

Dear Dr. Eksteen,

Thank you for submitting your revised manuscript, Team-Based Learning Experiences of Fourth-Year Pharmacy Students in a South African University. You have satisfactorily addressed the reviewers' comments and concerns and I am pleased to accept your manuscript for publication in an upcoming issue of the American Journal of Pharmaceutical Education.
Your manuscript will be copyedited in the next few months and returned to you for approval of the changes. After the copyediting process is complete, you will have the opportunity to view electronic "galley proofs" of the formatted article before it is published online. We will notify you by e-mail when the article is ready for your final approval.

Thank you for your contribution to AJPE.

Sincerely,

Claire Anderson, BPharm, PhD
Associate Editor
American Journal of Pharmaceutical Education

APPENDIX F4-1:

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AJHPE African Journal of Health Professions Education

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Named authors must consent to publication. Authorship should be based on: (*i*) substantial contribution to conceptualisation, design, analysis and interpretation of data; (*ii*) drafting or critical revision of important scientific content; or (*iii*) approval of the version to be published. These conditions must all be met for an individual to be included as an author (uniform requirements for manuscripts submitted to biomedical journals; refer to www.icmje.org)

If authors' names are added or deleted after submission of an article, or the order of the names is changed, all authors must agree to this in writing.

Please note that co-authors will be requested to verify their contribution upon submission. Non-verification may lead to delays in the processing of submissions.

Conflicts of interest

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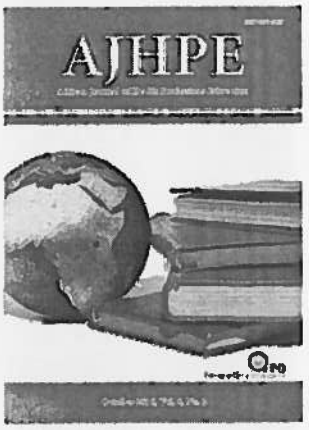

CURRENT ISSUE
Vol. 8 No. 2

KEYWORDS
Clinical education
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the paper, and any association with a product or subject that may constitute a real, perceived or potential conflict of interest. If you are unsure whether a specific relationship constitutes a conflict, please contact the editorial team for advice. If a conflict remains undisclosed and is later brought to the attention of the editorial team, it will be considered a serious issue prompting an investigation with the possibility of retraction.

Research ethics committee approval

Authors must provide evidence of Research Ethics Committee approval of the research where relevant. Ensure the correct, full ethics committee name and reference number is included in the manuscript.

If the study was carried out using data from provincial healthcare facilities, or required active data collection through facility visits or staff interviews, approval should be sought from the relevant provincial authorities. For South African authors, please refer to the guidelines for submission to the National Health Research Database. Research involving human subjects must be conducted according to the principles outlined in the Declaration of Helsinki. Please refer to the National Department of Health's guideline on Ethics in Health research: principles, processes and structures to ensure that the appropriate requirements for conducting research have been met, and that the HPCSA's General Ethical Guidelines for Health Researchers have been adhered to.

Protection of rights to privacy

Research Participants

Information that would enable identification of individual research participants should not be published in written descriptions, photographs, radiographs and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) has given informed written consent for publication and distribution. We further recommend that the published article is disseminated not only to the involved researchers but also to the patients/participants from whom the data was drawn. Refer to Protection of Research Participants. The signed consent form should be submitted with the manuscript to enable verification by the editorial team.

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Use of racial or ethnicity classifications in research is fraught with problems. If you choose to use a research design that involves classification of participants based on race or ethnicity, or discuss issues with reference to such classifications, please ensure that you include a detailed rationale for doing so, ensure that the categories you describe are carefully defined, and that socioeconomic, cultural and lifestyle variables that may underlie perceived racial disparities are appropriately controlled for. Please also clearly specify whether race or ethnicity is classified as reported by the patient (self-identifying) or as perceived by the investigators. Please note thatit is not appropriate to use self-reported or investigator-assigned racial or ethnic categories for genetic studies.

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Preparing an article for anonymous review

To ensure a fair and unbiased review process, all submissions are to include an anonymised version of the manuscript. The exceptions to this requirement are Correspondence, Book reviews and Obituary submissions.

Submitting a manuscript that needs additional blinding can slow down your review process, so please be sure to follow these simple guidelines as much as possible:

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- Please remove title page, acknowledgements, contact details, funding grants to a named person, and any running headers of author names.
- Mask self-citations by referring to your own work in third person.

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Submitted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction prior to being sent for review, which will delay publication.

General:

- Manuscripts must be written in UK English (this includes spelling).
- The manuscript must be in Microsoft Word or RTF document format. Text must be 1.5 line spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes). Pages and lines should be numbered consecutively.
- Please make your article concise, even if it is below the word limit.
- Qualifications, ***full*** affiliation (department, school/faculty, institution, city, country) and contact details of ALL authors must be provided in the manuscript and in the online submission process.
- Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.
- Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160.
- Quotes should be placed in single quotation marks: i.e. The respondent stated: '...'
- Round brackets (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.

If you wish material to be in a box, simply indicate this in the text. You may use the table format –this is the *only* exception. Please DO NOT use fill, format lines and so on.

Preparation notes by article type

Research

Guideline word limit: 3 000 words (excluding abstract and bibliography)

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Where appropriate, sample size calculations should be included to demonstrate that the study is not underpowered. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

- May include up to 6 illustrations or tables.
- A max of 20 - 25 references

Structured abstract

- This should be no more than 250 words, with the following recommended headings:
  - **Background:** why the study is being done and how it relates to other published work.
  - **Objectives:** what the study intends to find out
  - **Methods:** must include study design, number of participants, description of the research tools/instruments, any specific analyses that were done on the data.
  - **Results:** first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.
  - **Conclusion:** must be supported by the data, include recommendations for further study/actions.
  - Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors. It should be able to be intelligible to the reader without referral to the main body of the article.
  - Do not include any references in the abstracts.

Here is an example of a good abstract.

***Scientific letters*/ short reports**

These are shorter length, scholarly research articles of no more than 1500 words. Single-institution, and/or studies with sample sizes <100 are better submitted as short reports.

Guideline word limit: 1500 words

- Abstract: Structured, of about 250 words, with the following recommended headings: Background, Objectives, Methods, Results, and Conclusion.
- May include only one illustration or table
- A maximum of 8 references

Forum articles

Are personal opinion pieces that address an area in health professions education that would be of interest to the readership. Forum pieces while reflecting the authors personal views, should be scholarly, and arguments well-supported.

- They should not exceed 1000 words
- Up to 5 references are allowed.

Short communications

Are very brief articles that share work in progress, lessons learnt or innovations in medical education.

- They should be no more than 500 words in length
- A maximum of 3 references, and 1 table or figure.
- Short Communications should be structured under the following headings: Why was the idea necessary (Problem), What was tried (Approach) and What were the lessons learnt (Outcomes).

Correspondence (Letters to the Editor)

Guideline word limit: 400 words

Letters to the editor should relate either to a paper or article published by the AJHPE or to a topical issue of particular relevance to the journal's readership

- May include only one illustration or table
- Must include a correspondence address.

Obituaries

Guideline word limit: 400 words

Should be offered within the first year of the practitioner's death, and may be accompanied by a photograph.

Illustrations/photos/scans

- If illustrations submitted have been published elsewhere, the author(s) should provide evidence of consent to republication obtained from the copyright holder.
- Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'.
- Each figure must have a caption/legend: Fig. 1. Description (any abbreviations in full).
- All images must be of high enough resolution/quality for print.
- All illustrations (graphs, diagrams, charts, etc.) must be in PDF form.
- Ensure all graph axes are labelled appropriately, with a heading/description and units (as necessary) indicated. Do not include decimal places if not necessary e.g. 0; 1.0; 2.0; 3.0; 4.0 etc.
- Each image must be attached individually as a 'supplementary file' upon submission (not solely embedded in the accompanying manuscript) and named Fig. 1, Fig. 2, etc.

Tables

- Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged.
- Large tables will generally not be accepted for publication in their entirety. Please consider shortening and using the text to highlight specific important sections, or offer a large table as an addendum to the publication, but available in full on request from the author.
- Embed/include each table in the manuscript Word file - do not provide separately as supplementary files.
- Number each table in Arabic numerals (Table 1, Table 2, etc.) consecutively as they are referred to in the text.

- Tables must be cell-based (i.e. not constructed with text boxes or tabs) and editable.
- Ensure each table has a concise title and column headings, and include units where necessary.
- Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

Do not: Use [Enter] within a row to make 'new rows':

Rather:

Each row of data must have its own proper row:

Do not: use separate columns for *n* and %:

Rather:

Combine into one column, *n* (%):

Do not: have overlapping categories, e.g.:

Rather:

Use <> symbols or numbers that don't overlap:

References

NB: *Only complete, correctly formatted reference lists in Vancouver style will be accepted. If reference manager software is used, the reference list and citations*

accepted. A reference manager software is used, the references list and citations *in text are to be unformatted to plain text before submitting..*

- Authors must verify references from original sources.
- Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,[2] and others.[3,4-6]
- All references should be listed at the end of the article in numerical order of appearance in the Vancouver style (not alphabetical order).
- Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus.
- Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al.
- Volume and issue numbers should be given.
- First and last page, in full, should be given e.g.: 1215-1217 **not** 1215-17.
- Wherever possible, references must be accompanied by a digital object identifier (DOI) link). Authors are encouraged to use the DOI lookup service offered by CrossRef:
    - On the Crossref homepage, paste the article title into the 'Metadata search' box.
    - Look for the correct, matching article in the list of results.
    - Click Actions > Cite
    - Alongside 'url =' copy the URL between { }.
    - Provide as follows, e.g.: http://dx.doi.org/10.7196/07294.937.98x

Some examples:

- *Journal references:* Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. Stat Med 1998;289(1):350-355. DOI:10.1000/hgjr.182
- *Book references:* Jeffcoate N. Principles of Gynaecology. 4th ed. London: Butterworth, 1975:96-101.
- *Chapter/section in a book:* Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974:457-472.
- *Internet references:* World Health Organization. The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. Geneva: WHO, 2002. http://www.who.int/whr/2002 (accessed 16 January 2010).
- Legal references
- Government Gazettes:

National Department of Health, South Africa. National Policy for Health Act, 1990 (Act No. 116 of 1990). Free primary health care services. Government Gazette No. 17507:1514. 1996.

In this example, 17507 is the Gazette Number. This is followed by :1514 - this is the notice number in this Gazette.

- Provincial Gazettes:

Gauteng Province, South Africa; Department of Agriculture, Conservation, Environment and Land Affairs. Publication of the Gauteng health care waste management draft regulations. Gauteng Provincial Gazette No. 373:3003, 2003.

- Acts:

South Africa. National Health Act No. 61 of 2003.

- Regulations to an Act:

South Africa. National Health Act of 2003. Regulations: Rendering of clinical forensic medicine services. Government Gazette No. 35099, 2012. (Published under Government Notice R176).

- Bills:

South Africa. Traditional Health Practitioners Bill, No. B66B-2003, 2006.

- Green/white papers:

South Africa. Department of Health Green Paper: National Health Insurance in South Africa. 2011.

- Case law:

Rex v Jopp and Another 1949 (4) SA 11 (N)

Rex v Jopp and Another: Name of the parties concerned

1949: Date of decision (or when the case was heard)

(4): Volume number

SA: SA Law Reports

11: Page or section number

(N): In this case Natal - where the case was heard. Similarly, (C) woud indicate Cape, (G) Gauteng, and so on.

NOTE: no . after the v

- *Other references (e.g. reports) should follow the same format:* Author(s). Title. Publisher place: Publisher name, year; pages.
- Cited manuscripts that have been accepted but not yet published can be

included as references followed by '(in press)'.
- Unpublished observations and personal communications in the text must **not** appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

From submission to acceptance

Submission and peer-review

To submit an article:

- Please ensure that you have prepared your manuscript in line with the AJHPE requirements.
- All submissions should be submitted via Editorial Manager
- The following are required for your submission to be complete:
  - Anonymous manuscript (unless otherwise stated)
  - Author Agreement form
  - Manuscript
  - Any supplementary files: figures, datasets, patient consent form, permissions for published images, etc.
  - Once the submission has been successfully processed on Editorial Manager, it will undergo a technical check by the Editorial Office before it will be assigned to an editor who will handle the review process. If the author guidelines have not been appropriately followed, the manuscript may be sent back to the author for correcting.

Peer Review Process

All manuscripts are reviewed initially by the Editor-in-Chief and only those that meet the scientific and editorial standards of the journal, and fit within the aims and scope of the journal, will be sent for external peer review. Each manuscript is reviewed by two reviewers selected on the basis of their expertise in the field. A double blind review process is followed at AJHPE.

Authors are expected to receive feedback from reviewers and an editorial decision within approximately 6 weeks of submission. The time period of the entire review process may vary however depending upon the quality of the manuscript submitted, reviewers' responses and the time taken by the authors to submit the revised manuscript.

Manuscripts from review may be accepted, rejected or returned to the author for revision or resubmission for review. Authors will be directed to submit revised manuscripts within two months of receiving the editor's decision, and are requested to submit a point by point response to the reviewers' comments. Manuscripts which authors are requested to revise and resubmit will be sent for a second round of peer review, often to the original set of reviewers. All final decisions on a manuscript are at the Editor's discretion.

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Production process

The following process should usually take between 4 - 6 weeks:

1. An accepted manuscript is passed to a Managing Editor to assign to a copyeditor (CE).
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3. If the CE has an author queries, he/she will contact the corresponding author and send them the copyedited Word doc, asking them to solve the queries by means of track changes or comment boxes.
4. The authors are typically asked to respond within 1-3 days. Any comments/changes must be clearly indicated e.g. by means of track changes. Do not work in the original manuscript - work in the copyedited file sent to you and make your changes clear.
5. The CE will finalise the article and then it will be typeset.
6. Once typeset, the CE will send a PDF of the file to the authors to complete their final check, while simultaneously sending to the 2nd-eye proofreader.
7. The authors are typically asked to complete their final check and sign-off within 1-2 days. No major additional changes can be accommodated at this point.
8. The CE implements the authors' and proofreader's mark-ups, finalises the file, and prepares it for the upcoming issue.

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Errata and retractions

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7. Where possible, references are accompanied by a digital object identifier (DOI) and PubMed ID (PMID)/PubMed Central ID (PMCID).
8. An abstract has been included where applicable.
9. The research was approved by a Research Ethics Committee (if applicable)
10. Any conflict of interest (or competing interests) is indicated by the author(s).

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APPENDIX F4-2:

PROOF OF SUBMISSION OF ARTICLE 4 TO AN ACCREDITED, ACADEMIC JOURNAL

From: "Professor Vanessa Burch" <vanessa.burch@uct.ac.za>
To: "Margaritha Johanna Eksteen" <mariet.eksteen@nwu.ac.za>
Date: 2016/10/03 10:54 AM
Subject: [AJHPE] Submission Acknowledgement

Margaritha Johanna Eksteen:

Thank you for submitting the manuscript, "Promoting deeper learning in pharmacy education using team-based learning (TBL)" to African Journal of Health Professions Education. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Manuscript URL:
http://www.ajhpe.org.za/index.php/ajhpe/author/submission/878
Username: mariet_84

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Professor Vanessa Burch
African Journal of Health Professions Education

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EMAIL sajhe@sun.ac.za

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2. The submission file is in a Microsoft Word 2007 or later file format. (Submissions not conforming to the journal's style will be rejected)
3. Where available, URLs for the references have been provided.
4. The text is 1.5-spaced; uses a 12-point font; employs italics, rather than underlining (except with URL addresses); and all illustrations, figures, and tables are placed in the article text and clearly marked. The article should be between 5500 and 7500 words in length. References: The Chicago Manual of Style author-date system is used. That is, references are cited in the text by the author(s) name(s), the year of publication and the page numbers(s) in brackets, for example, (Apollonia 1973, 370), as a key to the full list of all references that appears at the end of the article. The list of references should include every work cited in the text. Ensure that dates, spelling and titles used in the test are accurate and consistent with those listed in the references. **Please take note that quotes must be done with double quoatation mark - as Turnitin picks this up as plagiarism.**
5. The instructions in **Ensuring a Blind Review** have been followed, and all author details have been removed from the initial review copy.
6. The article has been professionally edited and a letter from the editor will be attached to it (step 4 of submission process - Uploading Supplementary Files)

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ISSN: 1753-5913

APPENDIX F5-2:

PROOF OF SUBMISSION OF ARTICLE 5 TO AN ACCREDITED, ACADEMIC JOURNAL

From: "Editorial Team" <sajhe@sun.ac.za>
To: "Ms Mariet Eksteen" <mariet.eksteen@nwu.ac.za>
Date: 2016/11/23 03:30 PM
Subject: [SAJHE] Submission Acknowledgement

Ms Mariet Eksteen:

Thank you for submitting the manuscript, "Does team-based learning (TBL) develop essential generic skills in pharmacy students?" to SAJHE. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Manuscript URL:
http://www.journals.ac.za/index.php/sajhe/author/submission/1332
Username: mariet_84

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Editorial Team
SAJHE

APPENDIX G:
VERIFICATION OF LANGUAGE EDITING

Elzet Kirsten Blaauw

Translating & editing – English/Afrikaans

e: elzetkirsten@gmail.com c: 072 7972952

23 De Zuide Werf
Ringwood Drive
Parklands
7441

23 December 2016

To Whom It Might Concern

CONFIRMATION OF LANGUAGE EDITING

I hereby confirm that I, Elzet Blaauw, have edited the thesis *Development of guidelines for team-based learning in an undergraduate pharmacy curriculum: a case study* to be submitted in fulfilment of the requirements for the degree Philosophiae Doctor in Health Professions Education (PhD HPE) by MJ Eksteen.

The sections included in the edit are the following:

- Declaration, Acknowledgements, List of Definitions and Terminology, Summary
- Chapter 1, 7 and 8
- Articles 1, 3, 4 and 5
- Translation of Summary into the Afrikaans “Opsomming”

References were edited throughout but were not reviewed as a completed reference list. I edited some documents included as annexures and assisted with translation as they were developed. The annexures included are as they have been used and have not been language edited again.

In addition to changes made as part of editing, some suggestions for reformulation were suggested. All changes were done with Microsoft Word track changes and can be made available upon request.

I confirm that I am a professional language practitioner. I have obtained an MPhil degree in Translation and Editing (cum laude, 2012) from Stellenbosch University and I have four years’ experience editing academic research documents.

Please do not hesitate to contact me with any further queries.

Kind regards

Elzet Blaauw

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30 November 2016

TO WHOM IT MAY CONCERN

LANGUAGE EDITING OF MANUSCRIPT

I hereby confirm that the article, *Undergraduate training for a health professions team: the voice of fourth-year pharmacy students,* written by Mariet Eksteen, was edited by me as the medical writer in the Faculty of Health Sciences, University of the Free State, with regard to language (grammar, syntax and spelling) and technically with regard to style and formatting.

For any further enquiries, please contact me at struwigmc@ufs.ac.za.

Sincerely

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Faculty of Health Sciences
UFS

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