CONCEPTUALISATION AND USE OF EDUCATIONAL TECHNOLOGY IN THE TEACHING AND LEARNING OF GRADE 7 GEOGRAPHY IN SOME PRIMARY SCHOOLS IN MANGAUNG

by

NOBALINDI ELSIE MBAZA

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SUPERVISOR: DR M G MAHLOMAHOLO

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Doing research can be a rather lonesome and demanding exercise.

Looking back to the beginning of this study, I cannot but acknowledge that it has been a journey too tedious to walk alone.

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DECLARATION

Conceptualisation and Use of Educational Technology by some Grade 7 Geography Teachers in Mangaung is my own work and all sources I have used or quoted have been indicated and acknowledged by means of complete references.

N. E. MBAZA

JANUARY 2001

SUMMARY

This study investigates *conceptualisation and use of educational technology* by teachers in some primary schools in Mangaung. Situated within educational discourses about knowledge and pedagogy, the central aim is to examine the discursive positions from which the respondent teachers construct the concept of educational technology. Their classroom practices are then examined to investigate how their *conceptualisation of (educational technology)* translates into practice.

The investigation differs from the belief that associates educational technology with specific electric and electronic gadgets such as overhead-projectors, television sets, computers and so on. The concept of educational technology is not about equipment. It is a whole approach to teaching and learning inextricably bound with the epistemology and pedagogical assumptions encoded in the education system. The researcher investigates whether a teacher who conceptualises educational technology as artefacts and one who conceptualises it as a process will approach classroom teaching differently.

To conduct this investigation this researcher conducted interviews and classroom observations with two teachers who conceptualise technology differently, namely as artefacts and as a process or 'know how'.

The findings indicate that the teacher who conceptualises *educational technology* as artefacts follows a rigid teacher-centred approach in her teaching. The teacher who conceptualises educational technology as a process reveals an emergent learner centred approach in his teaching.

Based on the findings of the literature reviewed, as well as the qualitative investigation, this study concludes that the concept of educational technology as a 'product', is incompatible with the position of Curriculum 2005 on knowledge as well as the role of the teacher.

The literature reviewed indicates that even when information technologies are used in classroom based teaching and learning, the teachers need the skills and flexibility compatible with a social constructivist teaching environment. The *conceptualisation of educational technology* as a process

seems more compatible with the expectations of Curriculum 2005 from teachers than when the concept is associated with specific artefacts.

Based on the above findings this study recommends that programs, prepared to assist in-service teachers with the implementation of Curriculum 2005, need to consider educational technology as an educational concept and a process rather than artefacts. In line with the stance taken by Curriculum 2005 to affirm the teacher, pre-service teacher training should also incorporate this holistic concept of educational technology.

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CHAPTER 1

ORIENTATION

The introduction of curriculum 2005 (C2005) and outcomes-based education underpinned by a social constructivist philosophy is one move in which the South African Government shows its commitment to democracy and the empowerment of all its citizens. This move is accompanied by an emphasis on the power and role of technology to enhance the economy and the delivery of education. There is evidence that technology offers a positive contribution to teaching and learning. However, it seems technology does not mean the same thing to all people in all contexts. This lack of consensus regarding the definition of the concept *'technology'* leads to further confusion about what *educational technology* means. When these concepts are used in education, it is important to understand how teachers interpret them. Such knowledge will help those who have the task of training teachers, pre-service or in-service, to understand why teachers approach their work in particular ways. Teachers also need to continually reflect on the concepts that shape their field and how these inform their professional practice.

Based on the above concerns, this study investigates whether differences exist in teachers' conceptualisation of educational technology. It further investigates whether this diversity translates into varied operationalisations in the actual practice of teaching and learning.

To systematise this investigation, the study gives an exposition of at least two seemingly contestational definitions of educational technology, namely as a process on the one hand and as artefacts on the other. The reasons that led to this investigation are also discussed as background. Furthermore, the value and significance of the study for knowledge production, the research community, practising teachers and learners are also elaborated.

The focus of the study is clearly mapped out on the basis of the delineation of the research and by stating the major grand tour question. The subsequent section then reviews the literature that responds to the mentioned question. Other purposes of the literature review are to clearly describe the units of analysis and to determine what the most current and related research states with regard to the research question. This is done by developing useful ***constructs*** to be operationalised in the collection of empirical data. Methods for data collection and analysis as well as interpretation are also discussed. Lastly, a summary of conclusions is made to integrate the conceptualisation to the operationalisation sections.

1.1 BACKGROUND TO THE STUDY

While it is not unusual for countries to entrust curricula with the responsibility for societal change, it is important to note that the curriculum is not an independent entity from the community it serves. As Grundy (1987) argued, the curriculum does not refer to an abstract concept or entity but to the practices of people involved in education. In other words, placing hopes in a curriculum is mandating the people involved in education to act in certain ways towards the fulfilment of certain societal goals. Teachers as facilitators of learning are at the centre of this mandate, as they have to implement the curriculum.

The implementation of the new curriculum (C2005) and outcomes-based education (OBE) has, since the beginning of 1998, been a challenge to teachers at the General Education and Training phase (GET). Grade seven teachers had to implement the new curriculum since the beginning of 2000.

The introduction of this new curriculum is accompanied by an emphasis on the teaching and learning of science, mathematics and technology among all racial groups. This includes Blacks who have, to a great extent, been excluded from these fields in the past. With this, technology has been introduced as a learning area in the General Education and Training phase.

Technology as a learning area is not based on the common sense understanding, which tends to focus on electronic artefacts such as televisions and computers. The definition of technology given in the policy document is a comprehensive and inclusive one:

> Technology is the use of knowledge, skills and resources to meet human needs and wants, to recognise and solve problems, by investigating, developing and evaluating products, processes and systems (Department of education, 1997 p.64).

According to the above document a bookshelf made by a learner is as much technology as a computer. Although this is not different from the definition given by other authorities such as the Encyclopaedia Britannica (1997), it was still a departure from the popular meaning of technology. As has been the case in other parts of the world, such paradigm shifts in a curriculum present new challenge to teachers, and South African teachers are no exception. This challenge has summoned higher learning institutions, particularly teacher training faculties, to engage in

projects and programs aimed at supporting teachers and learning facilitators to cope with these changes.

Conversations with teachers who participated in the science, mathematics and technology support workshops offered at the Bloemfontein Campus of Vista University indicated that some teachers found the manner in which technology was conceptualised in the curriculum to be different from what was familiar to them. According to their knowledge the concept was generally associated with sophisticated electronic and electrically operated media such as television sets, video recorders and computers and other information technology gadgets. One teacher expressed confusion that the workshops held a different view of technology from what he learnt at his former university. In his B.Ed. studies, he specialised in educational technology, but his understanding was that technology referred to sophisticated electronic artefacts and that educational technology was about using these artefacts, particularly computers or information technologies, in completing educational tasks.

Visits to selected schools revealed similar conceptions. For instance one teacher emphatically stated that 'we are traditional here, there is no technology, we use traditional ways. We chalk and talk'. The same teacher indicated that it was no use making traditional teaching aids because learners were used to 'high tech' equipment, such as television, at their homes. This observation concurred with other records which indicate that when teachers are faced with difficult situations they tend to revert to traditional modes of teaching like 'chalk and talk'. This was, however, not the only opinion.

A fellow teacher related extensive use of 'low tech' equipment such as chalkboards as well as other equipment that he and his learners made for detecting wind direction and other geographical features. The same teacher indicated that he often took the learners outside the classroom to observe environmental features that form part of the curriculum in order to help learners understand the work. These interactions suggested a question as to how the manner in which teachers conceptualised technology would relate to their teaching practices. The question arose as to whether teachers who conceptualised educational technology differently would also follow different classroom interaction patterns. Furthermore, would a teacher who conceptualised educational technology as a process be more or less innovative in teaching than one who conceptualised it as an artefact?

1.2 STATEMENT OF THE PROBLEM

Technology is conceptualised differently and its role in contact education delivery is not clear. There is a tendency to equate the concept 'technology' with the communication media. Educational technology is therefore defined as the use of these artefacts for instructional purposes. Leedham defined educational technology as:

> the use of modern methods such as films, projected visuals, television, photographs, printed matter et cetera which are media through which messages are carried across in teaching and learning. (1972 p.7).

While teacher trainers emphasize that media do not teach, the tendency to equate educational technology with media remains rather confusing to educators.

The above situation is further compounded by the tendency to refer to technology in terms of 'high' versus 'low' tech or 'old' against 'new' technology when referring to the use of technology in education (TELISA 1997). The problem is that encoded within these references, there are value judgements which hold that technology is about being modern, progressive, and better, while other means of doing things are referred to as traditional or backward. The absence of these gadgets is almost equal to the absence of education (Rowntree 1982). It is as if there is a linear development in which the latest communication artefacts become the very definition of educational technology.

These technologies are sometimes even compared with human teachers and found more efficient (Nickson 1970; Self 1985). For example, expert systems are defined as capable of doing tasks which if done by humans would be considered intelligent or expert.

This view has been challenged by others who claim that education is not just communication and that educational technology should be concerned with learning rather than teaching (Heinich, Molenda & Russell 1989; Rowntree, 1982). Others have raised concerns that the media cannot teach humans(Noble, 1996; Thompson, Simonson & Hargrave 1992). Yet others have argued that humans handle various forms of knowledge and all cannot be reduced to objective, quantifiable chunks for machine handling (Streibel, 1986). All these arguments have supported the view that

educational technology is a 'process' aimed at solving educational problems at all levels.

Thus, educational technology is therefore understood in various ways. In its broadest sense it includes all the arrangements entered into to promote education, from the educational bureaucratic organisations, to curricular decisions and to the learning process by teachers and learners (Thomas & Koyabashi, 1987). In a similar sense but focussing on a lesser scope it is viewed as instructional technology and is mainly concerned with all the arrangements entered into to make learning effective at the level of curriculum delivery. In this sense educational technology is referred to as technology of education. This differentiates itself from technology in education which focusses on media or artefacts as discussed above (Ellington, Perceival & Race 1993).

This contestation is evident in the initial attempts to define educational technology in 1967 and it is still a continuing debate among practitioners of educational technology (Kozma, 2000; Richey, 2000). Two early definitions of educational technology are quoted below to capture the contest of interests which surfaced from the onset:

> In its more familiar sense it means the media born of the communication revolution which can be used for instructional purposes alongside the teacher, textbook, and blackboard.(Reiser & Ely, 1997 p.66).

In this definition educational technology is equated with media. The committee that formulated it in 1967 made it clear that the definition considered the pieces that make up instructional technology. namely, television, films, overhead projectors, computers and other items of software and hardware. The same committee formulated a second and broader definition which was meant to accommodate the argument which we already mentioned, namely that educational technology was a process rather than artefacts. This definition was reported thus:

> The second and less familiar definition of instructional technology goes beyond any particular medium or device. In this sense, instructional technology becomes more than a sum of its parts. It is a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives, based on research in
>
> human learning and communication and employing a combination of human and non

human resources to bring about more effective instruction (Reiser & Ely, 1997 p.66).

It is not the intention of this study to follow the history of development of the field of educational technology but it is useful to note that promises of instant solutions embedded in technological products cannot always be kept. Butcher (1997), Coombs (1985), Noble (1996) among others, have cautioned that many times governments and education departmental officials are lured by eloquent vendors who present their products as the instant solution to whatever educational problems there may be. This marketing is associated with some myths which can be detrimental to the mentality of the teachers. Among the myths propagated by the marketing strategists of technological artefacts, be it software or programs, is the hope that technology can compensate for good teaching or replace the human teacher.

This view also emphasises the linear development of technology and its impact on society. It is as if catching up with technological developments is the main aim of education or schooling. As Coombs (1985) and Rowntree (1982) observed, it is as if there was no education or education had no technologies until the past few decades. Rowntree (1982) further argues that even if there was no more electricity we would still need a technology of education. To sum up, the understanding of educational technology as educational medium has been attacked on various grounds and those concerned with education have argued for the conceptualisation of educational technology as a process.

The 'process' concept has been strengthened by its compatibility with the developments in learning which are also the guiding principles of C2005. According to Samuels (1998), the important commodities of the 21st century will not be products, but rather knowledge and innovation. Life-long learning and teamwork, a workforce capable of dealing with current technologies and with the study skills necessary to quickly adapt to new ones rather than acquisition of fixed knowledge, seem to be the goals of education (Dryden & Vos (1994; Samuels, 1998). Learning should be focussed on the development of life-long skills such as communication, thinking, learning, setting goals, planning and adaptability. The development of these skills calls for more than just the teaching of specific content, but rather for the teaching of systematic thinking and problem solving.

Educational technology as a process is not about the rejection of certain media for others but the

argument is that facilitating learning is the core business of educational technology. The process therefore should begin with the correct or acceptable pedagogy and integrate relevant and suitable media for the aim of assisting learners towards attaining their learning goals and outcomes. In contact education, particularly at the school level, the learning facilitator is expected to be resourceful and direct the learning activities without dominating. In fact it seems that even in situations where learners are using advanced information technologies it is not the technology that teaches, but these artefacts are seen as powerful media or tools in the hands of a capable learning facilitator (Clouse & Alexander, 1997; McDonald & Ingvarson, 1997).

In their study of the incorporation of information technology in classroom learning and teaching, Clouse & Alexander (1997) observed that for facilitators to be able to incorporate information technology successfully, they need to reflect on and re-evaluate their students' learning. These authors further observed that for teachers to be able to incorporate information technology successfully they needed to undertake a number of shifts in their professional practice. The observation was that teachers needed to shift from whole class instruction to group instruction, from lecture and recitation to coaching, from working with better students to working with weaker students, from assessment based on products to assessment of progress and effort, from competitive to cooperative social structures, from all students learning the same things at the same time to different students learning different things and a shift from the primacy of verbal thinking to the integration of verbal and visual thinking.

From the above observations it can be deduced that educational technology is not 'media' but is a systematic process integrating knowledge and available resources to make learning more effective. However as discussed there is a tendency to focus on specific media and as shown in the findings of this study (Chapter 4) and supported by Samuel, Naidoo & Suranski (1992), this tendency can be found limiting to teachers who do not have the sophisticated media by which educational technology is conceptualised.

The fact that this tendency continues, even though research has shown that media do not teach (Thompson, Simonson & Hargrave, 1992), raises the question about who it is that defines educational technology and what it is that guides its definition. Of importance in this study is what teachers understand educational technology to be. In other words what informs their conceptualisation of educational technology? Furthermore, how useful is their conceptualisation of educational technology in assisting them to fulfil their role as learning facilitators in the

context of C2005? These questions animate the purpose of the investigation of this study.

1.3 PURPOSE OF THIS STUDY

In an attempt to address the above-mentioned problem this study poses the question as to how do teachers in historically disadvantaged schools construct meaning about technology. Are there diverse meanings assigned to the concept technology among theses teachers? How are the diversified understandings revealed in practice? What factors play a role in meaning construction concerning technology?

The purpose of this study is to investigate, describe and analyse the current situation concerning the conceptualisation and use of educational technology by Grade 7 geography teachers from schools in Mangaung through a qualitative study. The literature reviewed in this study exposes some of the myths associated with educational technology with the hope of making it accessible to the learning facilitators. In other words, the concepts *educational technology* and *technology* per se need not be a mystery which belongs only to specialists, and entangled with specific gadgets.

It is deemed important for teachers to have an apt understanding of the meanings of the key concepts embedded in the curriculum documents, as these determine their actions. If technology has a role to play as partner in facilitating educational delivery, it is important for teachers to have a clear concept of its role and how it relates to their activities. A qualitative approach is used to allow the respondents to voice conceptions themselves. The study is only a vehicle to make there conceptions public. The study believes that in the process of speaking about their experience the respondents also reflect on their practices and that reflection can work towards clarity of their profession.

1.4 SIGNIFICANCE OF THIS STUDY

These expectations have serious implications for teacher-trainers. The authors Clouse & Alexander (1997) emphatically note that, as information technologies permit learners to have more control over their learning, teachers will need to "know more and not less, in order to assist learners in their effort to learn constructively".

The above arguments affirm the teacher's and facilitator's position within the classroom. The perspective adopted by the South African education system positions the teacher and facilitator as the 'backstage director' of educational and learning opportunities as well as a leader in a community of collaborative knowledge inquiry. The teacher and facilitator must be able to organise a conducive atmosphere for learning in which learners' identities and confidence are protected and multiple intelligence are nurtured.

Some studies conducted in the field of educational technology in South Africa have focussed almost exclusively on educational technology media as apparatus, resulting in knowledge about lack of resources (Bogatsu, 1990). Another study that looked at the concept of educational technology (Govender, 1999) does not go into the same depth to indicate how respondents conceptualise educational technology. It only reports, as has also been observed in this study, that South African teachers are not familiar with the concept or do not know educational technology.

This study purports to be different from the above because its focus is on the concept and how it relates to the teachers' profession rather than on equipment. Unlike Govender's (1999) study, this study focusses on the voices and practices of a specific group of teachers who are automatically excluded from participating in questions of educational technology by their poverty and lack of resources.

It is based on the belief that humans in their interactions with their environment are not passive. Apple (1999) observes that teachers are not just receptacles of ideology. They interpret 'texts' and react in different ways. Teachers in such a position have a positive contribution to make and this can help elucidate some of the unclear areas. Both pre-service and in-service program designers could operate from an informed position in designing programs for the empowerment of the said teachers.

It is further hoped that the study will encourage the respondents to reflect on the factors that influence their practices and interpretations of their professional role. By reflecting on their knowledge construction in this area teachers will be able to take responsibility for their actions as they render the service in the best possible way.

The Department of Education (DoE) can also be encouraged to value those strengths that teachers possess and encourage them further to participate in a positive way towards the improvement of education in this country. This approach is found necessary and appropriate based on the same principle propagated by CURRICULUM 2005 about learners' performance (DoE 1997). This study departs from the assumption that by directing focus on what teachers do well their self esteem can be boosted and their performance can follow suit.

1.5 LITERATURE REVIEW

The first step in responding to the question addressed by this study was a review of related literature. The first part of the literature review draws from different theorists to establish the framework which guides this study. Secondly, a review of related literature is undertaken to define conceptualisation as the key concept in the study. Conceptualisation of educational technology is discussed to investigate and expose the differences in its meaning and how these are constructed. For purposes of clarity and manageability the study focussed on two positions, namely educational technology as product versus as a process. Another purpose of the literature review was to develop operational constructs which would enable the researcher to access relevant empirical data. This also informs the choice of an appropriate approach and method for data collection and analysis. Related research was finally reviewed to find out what other research recently dealt with the same issues as this study.

1.5.1 The theoretical framework

This study operates from the premise that concepts such as 'educational technology' are not pre-given and fixed. The conceptualisation of educational technology as discussed in this study does not refer to an ideal to which people should aspire. It is constructed in the process of education and its identity is developed in the process of its definition. The same act that defines a concept, reifies it, demarcating its boundaries by excluding certain meanings and including others. These boundaries determine people's positions in relation to the specific concept or process being defined. By accepting the definition, it can be identified who can participate freely and who is not supposed to. The position from which this study argues, holds that the meaning of concepts such as educational technology and technology are fluid and mobile. If they are attached to a single specific idea, it is because they have been arrested through specific discursive practices associated with particular interest groups to serve preconceived purposes.

1.5.2 Formulating the theoretical framework

The main contributions to the theoretical framework are drawn from Habermas, Foucault, Althusser and Vygotsky. The theory of cognitive interests and knowledge constitution propounded by Habermas (1972) provides the over-arching framework within which this study is designed. The contribution Habermas makes to this study is the emphasis on meaning being socially constructed (Grundy 1987). The emphasis on language as a medium that is used to codify meanings can also be used for self-reflection. The technical interests tend to close avenues of communication by technologising language and making knowledge fixed and unquestionable. Habermas (Wuthnow, Hunter, Bergensen & Kurzwei (1984) argues for an emancipatory approach, characterised by open communication also referred to as the "public sphere".

Althusser's contribution to making meaning is the understanding of how a person's consciousness is formed through ideology. In his writing on ideology and ideological state apparatus, Althusser (1970) shows how peoples' beliefs and meanings are constructed through ideological state apparatuses. Some of these include the school, the church and other structures such as the family, the law, the system of party politics, trade unions, communications and culture (Althusser 1970; Sarup 1996). He goes on to show how people live out the ideologies that form their consciousness in ritual and other rites (1970). The usefulness of this theory in this study is that it can explain how teachers live out their beliefs and the meanings they hold about reality and about themselves. Althusser (1970) notes that "ideology interpellates subjects by forming a distorted or false consciousness".

1.5.3 Related literature

Initial research in educational technology has been mainly media comparison (Thompson, Simonson & Hargrave 1992). It is from 1983 when Clark (1983) emphatically initiated the debate that ***media*** do not teach. The role of media was only as delivery vehicles which did not have real impact in learning. Most research, however, has been on programming.

A perusal of international literature on educational technology reveals competing views regarding the understanding of technology in education (Thompson, Simonson & Hargrave, 1992). In this regard Mackay, Young and Beynon (1991 p.3) caution that technology should be read as a 'text'

and should not be divorced from the social context from which it originates. Owens and Waxman (1995) also observe that:

> There is evidence that some students are likely to become victims of differential access to technology based upon the location of the schools which they attend (p.84).

From the above observation it seems that interpretations as well as use of technology in education cannot be divorced from issues of power and affluence in society.

Studies of educational technology in South Africa have addressed themselves almost exclusively to issues of equipment (Bogatsu, 1990) and the role of the media teacher (Job,1993). Even the most recent study conducted on South African teachers' understanding of the concept 'educational technology' does not give any qualitative understanding of teacher actions to substantiate the conclusion that teachers do not understand the concept (Govender, 1999).

Debates about technology and educational technology as such are not only about artefacts. They cannot be divorced from issues of what constitutes knowledge, how knowledge is produced or manufactured or constructed, and who qualifies to disseminate knowledge or to facilitate learning in the context of this study. Hence Mackay *et al.* (1991) appeals to Apple to argue that when technology is brought to education it needs to respond to the educational context. Technology does not exist as a neutral entity without a context characterised by socio-economic as well as cultural aspects. In recognition of the complex nature of educational technology this study seeks to employ a research methodology which allows the nature of the problem to be revealed in its complexity. Such methodology is found in qualitative research.

1.6 RESEARCH DESIGN AND METHODOLOGY

This study will be qualitative in nature. The researcher is not interested in statistics but in the process through which the participants create meaning. Quantitative research is not used because the intention is to listen to the researched; for their interpretation. This study is not concerned with cause and effect relations. It is not about testing hypotheses because human nature is fluid and meaning is too complex to be reduced and captured by prediction seeking to formulate universal laws. The study is about meaning and its construction and not about the empiricist's concern with quantification. It focuses on peoples' understanding and actions and it does not wish

to reduce all to outward observed behaviour only. This research is not neutral for it is based on the belief that humans are not fixed objects. They are dynamic and they have the potential and ability to interact with their environment in many ways. With this background the researcher chooses methods that will maximise the richness of data gathered from the participants and intends to use words to explore rather than dictate.

1.6.1 Paradigm

This study is couched in an emancipatory approach or critical theory. A phenomenological approach to this study would be useful in understanding the situation as it is interpreted by the participants. The possibility of tensions between the conceptualisation and operationalisation suggests the need for an approach which goes beyond mere interpretation opening ground for the interrogation of such tensions in order to unveil the powers that are responsible for these tensions. Such a framework is found in a critical approach which allows the researcher and the researched to interrogate issues of marginalisation and exclusion even in the use of language. Language and the use of certain concepts can be interpreted for either the empowerment or disempowerment of certain categories of participants.

1.6.2 The Respondents

The respondents in this study were two Grade 7 teachers, one male and one female from two different schools. The respondents were selected purposefully based on the research question and their willingness to participate when requested. The schools were also within convenient distance from the researcher. Although learners are seen as important role players in their own learning process the teachers are still the main organisers of all the learning opportunities in the classroom situation, hence the latter and not the former were chosen. As elaborated in chapter three the study focusses on two respondents. The main interest of the study is not in the quantity of but the quality of understanding.

1.6.3 Research instruments and data gathering

The researcher is the main instrument for data gathering. Data is collected through naturalistic observation of classroom interaction, as well as unstructured qualitative interviews. The respondents are interviewed to investigate the presence of the two contestational positions in

discourses of educational technology that seem to influence classroom practice. The respondents' classroom practices are observed to see whether there is compatibility between what teachers say about educational technology and what they do by way of classroom action. Data consisted of tape recordings of interviews as well as video-recordings of lessons observed. These were transcribed into 'text' for analysis.

1.7 DATA ANALYSIS AND REPORTING FINDINGS

The data collected through interviews was analysed through Textually Oriented Discourse Analysis (Fairclough 1992). The main focus was on extracting the respondents' meaning of educational technology. Having established congruency between the conceptualisation of educational technology as a process and the social constructivist approach theory underpinning Curriculum 2005 (chapter 2), the study used an instrument developed by the Bloemfontein Sub-faculty of Education for the assessment of outcomes-based education oriented lessons. This instrument was adapted for use as a guiding standard to classify the lesson for learner or teacher-centeredness.

1.8 DEFINITION OF TERMS

Some of the concepts used in this study are defined below.

1.8.1 Educational technology

There is no agreement regarding the definition of the concept *educational technology* in the literature (see chapter 2). Educational technology is generally understood as the broad field concerned with the process of designing, planning and implementation of various strategies to bring about effective learning and teaching among learners (Ellington, Perceival and Race, 1993; Thompson, Hargraves and Simonson, 1992). This study looks at educational technology as an educational concept rather than a field. The concept, situated within educational discourse, does not refer to a specific object or class of objects. It is about ways and means to make education possible. It is inextricably related to beliefs about learning, knowledge and how it can be disseminated; and about how people teach- why they do it the way they do. In this way the teacher in the classroom is as much an educational technologist as the specialist (educational technologist) who designs a video recorded lesson for television broadcast, a computer-based

lesson or text based materials for learners and so on. All of these are in the business of devising ways and means to assist the learner to make sense of the learning material. They contribute theories and assumptions about the learners' future, learning abilities and strategies as well as the nature of knowledge. These are not all static immutable facts, but change from time to time as determined by curriculum developers. At the classroom level, the teacher uses the knowledge of the learners, the learning content as well the theories concerning effective learning to design, plan and to decide on the actions as well as integration of relevant media in order to maximise the learning process.

1.8.2 Programmers

The term programmers as used in this study refers to developers of educational programs such as video or audio-recorded, computer-based, multimedia and text-based learning programs and resources to assist learners and teachers in the process of education.

1.8.3 Technology

The concept "technology" is used in different ways but its meaning can be explained as 'the way of doing things'(Encyclopaedia Britannica, 1997). It does not refer to a specific thing or idea and can be associated with the process by which things are done. For example there are concepts such as petrol technologies, information technologies, Internet technologies and so on. As understood in this study technology refers to the use if available knowledge and resources to design solutions to problems (see chapter 2).

1.8.4 Media

Media refers to the tools (including language) used to accomplish something, especially communication. This refers to any item or piece of equipment which the teacher selects to use to improve the effectiveness of the learning process in the didactic situation. In the literature the concept is sometimes used to include the teacher. Its use in this study is restricted to those things that the teacher incorporates in the didactic situation for the sole purpose of improving the effectiveness of the learning process.

1.8.5 Learning facilitator

The terms learning facilitator and teacher are used interchangeably. However, in the light of the new curriculum, "learning facilitator" is associated with the change of focus from teaching (as transmission of knowledge) to learning.

1.9 FINDINGS

As elaborated in chapters 4 and 5 of this study the differences in the conceptualisation of educational technology reflected in the literature do exist among teachers. The views the respondents have about educational technology reflect the positions identified in the literature . The teacher who conceptualises educational technology as a 'thing' is limited by that view from valuing other forms of media. On the other hand the teacher who conceptualises educational technology as a 'process' is more flexible in his approach to teaching. It seems that the teacher who sees educational technology as a 'process' is in a better position to operate in the context of curriculum 2005 and its learner centred approach rather than the teacher whose conceptualisation of educational technology is fixed on specific gadgets.

The view of educational technology as products is more compatible with the traditional positivistic views of knowledge and learning while the understanding of educational technology as a 'process' seems more compatible with the learner-centred, constructivist approach advocated in Curriculum 2005. The former focusses on objects and thus sees learning in terms of rigid pre-specified content while the latter focusses on people and content is learnt in context.

1.10 LIMITATIONS

Chapter 5 contains a discussion of study's limitations. The main limitation is that it attempted to deal with a very complex issue in a limited space (dissertation). The result is that it has only scratched the surface in dealing with the complexity of issues surrounding *conceptualisation of educational technology* in a rush to relate it to teacher practice. Further, the researcher is aware that the findings reported here present an interpretation. Just as the respondents interpret their circumstances, the researcher also interprets their interpretations. Thus, the study does not present absolute truths. However this and many studies which look at reality as interpreted by those who

live it have to be done and this study also presents a 'truth' for those who live it. In this way this study has probably raised more questions than it has answered.

The strength of this study lies mainly in the depth of understanding which will be attained by stating the experiences and interpretations of the participants. This study does not look for absolute truths. In interpreting the situation it takes cognisance of the fluidity of humans and the circumstances within which they operate. The study therefore cannot be generalised to other sites with different participants. The purposive sampling coupled with the fact that the researcher is the main instrument in the study further limits the possibility of generalisation. This study only looked at two respondents situated in a specific context. Should another researcher attempt to do the same study he may have a different interpretation. However as indicated in the findings the evidence is kept for reference (see Chapter 5).

1.11 PROPOSED STRUCTURE

This study is structured as follows;

Chapter 1: Orientation

This chapter gives an overview of the study. It gives a brief introduction to the context which gave rise to the investigation, the background to the study as well as the problem statement. Chapter 1 gives a summary of the theoretical framework and the discussion of major concepts as discussed in Chapter 2. The methodology followed in the investigation is briefly introduced as well as how the data will be analysed in Chapter 4. Finally, a discussion of the findings and the conclusions of the study are briefly summarised in Chapter 5.

Chapter 2: Theoretical exposition and refinement of operational concepts

The literature review in Chapter 2 discusses the theoretical framework within which the conceptualisation of educational technology is discussed in this study. Conceptualisation is discussed as the process through which people make sense of reality. Conceptualisation of educational technology is further discussed by contrasting two views of it: as a 'product' and as a 'process'. The 'process' concept is congruent with the social constructivist theory which informs Curriculum 2005, hence this study. Constructs operationalised to access data and

information from the classroom observation and interview transcripts are also developed after attempting to formulate a theoretical response to the research question.

Chapter 3: Research design and methodology

Chapter 3 discusses the methodology followed in gathering useful data for the study. It begins by discussing and justifying the paradigm within which the study is couched. The three major approaches are discussed indicating why the emancipatory approach is preferred to, the positivist and phenomenological approaches. The procedures followed in the choice of respondents as well as the gathering of data are discussed.

Chapter 4: Findings and interpretation

This chapter discusses the analysis and interpretation of data gathered through interviews and classroom observations. Discourse analyses is briefly discussed to indicate why it was chosen. The chapter then reports on the findings based on the interpretation of the data collected through interviews. These findings are integrated with those from the analysis of data gathered through classroom observations. Finally, the chapter infers that how a teacher conceptualises what educational technology is relates positively with how she or he conducts his or her class.

Chapter 5: Conclusion and recommendations.

Chapter 5 reflects on the whole study by first summarising the background and findings of the study in relation to the research question. The chapter then discusses the findings from the literature and compares them with those from the empirical investigation. It concludes by making recommendations and suggestions for further research.

CHAPTER 2

THEORETICAL EXPOSITION AND REFINEMENT OF OPERATIONAL CONCEPTS

This is a study about the '*conceptualisation of educational technology*' and not about educational media. A vast body of literature already exists on teaching skills as well as the use of various items deemed relevant to the field of educational technology (Ellington, Perceival & Race, 1993; Heinrich, Molenda & Russel 1989; Jenkins, 1981). Conceptualisation as referred to in this study is about the construction of meaning, about how people make sense of reality and how they assign meaning to an idea. Through the use of concepts people develop and participate in discourse formations which further determine how they act in particular situations as well as how they react towards aspects of their environment (Althusser, 1970; Foucault, 1980; McLaren, 1989). This study believes that educational technology is about epistemology and pedagogy rather than equipment.

The question this study explores is: how do teachers, particularly in historically disadvantaged schools, make sense of the concept of educational technology? In the final analysis it is the interest of the study to understand what discourses inform the construction of meaning of educational technology among these teachers and how these meanings become manifest in their classroom practices.

In this chapter, conceptualisation is defined and discussed as the central concept of the study. Two seemingly opposed views of conceptualisation will be discussed. In one view concepts are portrayed as fixed structures with fixed meanings. This view is discussed first and its strengths and weaknesses as a means of looking at the world are explored and contested particularly within the context of this study. Concepts in this study are understood as human constructs whose meaning is intricately linked to the context in which they are constituted and hence inform practices.

The first section of this chapter discusses conceptualisation within the theoretical framework which guides this study in responding to the research question. Conceptualisation is further discussed in relation to the concept educational technology as the key factor in the study. The argument pursued here is one that relates conceptualisation of educational technology to broader

educational discourses situated within relations of power and knowledge. Discourse about educational technology is reviewed to examine how the field of educational technology has been constituted historically. The diversity of meanings attached to the concept of educational technology is related to the discourses operating in the field of education whose legitimation can be traced to voices outside the educational system. To systematise the research the study focusses on two seemingly extreme views of educational technology, namely as products and as processes.

2.1 DEFINITION AND DISCUSSION OF *CONCEPTUALISATION*

Conceptualisation in this study is about meaning construction. It is a productive process in which people make sense of the world. To clarify the position held by this study the difference is drawn between conceptualisation as representation and conceptualisation as an active process in which meaning is produced rather than reproduced (this study holds the latter view). To enter into such a discussion, it might be necessary to begin with a brief discussion of concepts as the building blocks of meaning.

2.1.1 Defining Concept

The Oxford Advanced Learner's Dictionary defines a concept as "the idea underlying something". Lacey (1996) is in agreement with the above that concepts refer to generalised ideas about aspects of reality. To have an idea of something is to be able to think about the specific item or process whether it is present or absent at a particular moment. Mouton & Marais (1990 p.58) define concepts as "the most basic building linguistic constructions by means of which people order and categorise reality". They further refer to concepts as the primary instruments which people employ in coming to grips with their experiences. "Concepts" as symbols of meaning should not be understood to mean that there is a direct relationship between the word/concept and the item or idea which it symbolises. This argument warrants further deliberation as it introduces an important aspect of the argument pursued in this study.

The view of generalised concepts associated with correspondence theory has long been questioned (Hamlyn, 1970) and experience has indicated that the relationship between concepts as symbols and the items they symbolise is a complex one, for meaning does not necessarily reside in words (Gee, 1990). There seems to be no intrinsic relationship between the word and

the item it refers to (referent), but the meaning words carry is a result of negotiation between speech communities and the contexts in which they are required to serve specific needs and purposes (Graddol, Cheshire & Swann, 1987; Gee 1990).

The contention held above then is that concepts are not fixed pre-given entities, but they are human constructs whose meaning is assigned and agreed upon in specific contexts before they become general. This view is elaborated on in the next paragraphs as conceptualisation is defined and discussed to construct a theoretical framework for this study. The purpose is to map out how individuals' understanding is linked to general meanings which are treated as natural consensus or common sense.

2.1.2 Towards a definition of *conceptualisation* as meaning construction

Communication among people is made possible by a set of shared meanings. The words on this page mean nothing to a someone who has not been initiated to language and words, in particular, as embodiments of meaning. The fact that the symbols on this page make sense to anyone who reads it involves a myriad of assumptions about the symbols, the writer and the subject of discussion. That people do not normally stop and ask one another what they are talking about indicates that they do not only know words and sounds but share the meanings embodied in them (Gee, 1990; Graddol *et al.* 1987; Hamlyn, 1970). When people agree on the meaning of a concept it is because of agreed conventions, shared by the specific language users, without which communication would not be possible.

The relationship between concepts as symbols and the items they symbolise is a complex one, for meaning does not reside in words. The argument being pursued in this study is one that asserts that there is no intrinsic relationship between the word and the item it symbolises but that meaning is assigned and negotiated within contexts to serve the purpose of the speech community (Gee, 1990; Graddol *et al.*, 1987). Although meaning is expressed in various ways such as artistic work and musical expressions, language seems to play an important role in meaning construction and in the development of people's consciousness. This study turns to Vygotsky (1986) for a contribution in understanding conceptualisation.

2.1.2.1 *Conceptualisation* as a socio-cultural process

In everyday life, concepts are also used to refer to abstract ideas or mental pictures in a person's mind (Magill, 1996). This study is grounded on the premise that conceptualisation as meaning construction is not an individual process. Individual understandings are linked to other meanings which are treated as natural consensus or common sense. Vygotsky (1986, p.98) observes that " a concept is not an isolated, ossified, and changeless formation, but an active part of an intellectual cause, a specific use of words as functional tools". The claim that this author makes is that higher human mental functioning has a social origin. People's consciousness, or awareness, has both genetic and historical aspects, and the personal understanding or intra-mental understanding of reality is preceded by the social (Wertsch, 1985; Wertsch & Tona, 1995). Language plays an important role in the process of meaning construction for it is the medium through which people describe and formulate knowledge. The concepts used to define the world do not only refer to but also create reality. The same act in which entities are, also constitutes them, for it tells what they are and what they are not (Foucault, 1984; Henriques, Hollway, Unwin, Venn & Walkerdine, 1984). Vygotsky (1986) emphasises the relationship between language and thought in understanding how people make sense of the world-hence the importance of concepts in this study.

Conceptualisation involves categorising and classifying things according to shared relationships and features. In this study *conceptualisation* is inextricably linked to knowledge construction. Knowledge is constructed within particular contexts for specific purposes. People's conceptualisation is thus about knowledge formations and claims that people hold about reality. How people conceive words to mean certain things needs to be considered within the contexts in which they operate. The context is composed, among others, of people and their positions, consisting of things such as their occupation, socioeconomic position and the power invested in the discourses to which they belong. In other words, concepts are defined by theories (Magill 1996) and conceptuality is a discursive practice in which some knowledge of certain groups is accepted as truth at the expense of others (Mc Laren,1989). Concepts constitute, and are constituted by, discourses outside, where their meaning can only be maintained ideologically through discursive and non-discursive practices. This study is thus concerned with the generation of meaning about educational technology among teachers in real life contexts. The following subheadings elaborate the position mapped out above clearly.

2.1.2.2 *Conceptualisation* and meaning construction.

Conceptualisation as meaning construction is not abstracted or detached from a person's consciousness of the self and one's position theoretically, ideologically and materially. It is a process caught up in a web of theories and ideologies and it is not fixed, not absolute. This study draws from a number of theoretical positions, particularly those referred to as post-structural thinking in formulating a theoretical framework which will serve as a lens in the definition and discussion of educational technology. The belief held in this study is that educational technology is not a pre-given entity, existing independently and prior to the phenomenon of education, but it is constructed within contexts informed by theories, ideologies, and material conditions, in response to perceived needs and purposes to be served by education.

Conceptualisation basically involves two processes, namely connotation and denotation. Connotation refers to the association that words have for people. Denotation refers to the set of phenomena, events, entities, characteristics, behaviour or processes which exist in reality and are included when we use the concept. *Conceptualisation* as used in this study refers to the process through which people assign and attribute meaning to words, or in other words 'what people mean or intend when using a concept, as well as how people determine what phenomena, events etc. are included when a concept is used. When meaning is assigned to a word, it informs the users of the word about what is to be included and what is excluded when the word is used. Thus the concepts we learn as human beings constitute our knowledge about the world. That knowledge, according to Romm (in Snyman, 1993) is not constituted arbitrarily, without interests, but it consists of constructions made on the basis of a particular interest. He further argues that even what poses as objective universal knowledge is not value-free and that a "reconsideration" of the aims and objectives underlying the constitution of knowledge "can yield knowledge of a different kind" (p.33). One of the people who have made a substantial contribution to this view of conceptualisation is Habermas (1972).

2.1.2.3 *Conceptualisation* and knowledge construction

Habermas (1972) discusses three fundamental human interests which influence knowledge construction, namely technical, practical and emancipator interests. According to this theory, technical interest is associated with the need of humans to control their environment. This is manifest in the endeavour to technologise language into fixed, decontextualised concepts which

have meaning in and of themselves. Technology, for instance, may be conceptualised as the latest inventions in electronic machinery. Educational technology is then taken to mean the use of the latest electronic communications inventions in teaching and learning (Leedham, 1972). Absence of these would be interpreted as the absence of educational technology. Concepts in this view represent the ideal meaning as in the Platonic ideal form (Lacey). Conceptualisation is thus aimed at the attainment of the ideal meaning.

There is a view which sees concepts as human constructions whose meaning cannot be fully understood without reference to the contexts where they are used. Gee (1990) contributes to the contention that words do not have meaning in and of themselves apart from other words when he makes the observation that words have meaning only relative to choices, guesses and assumptions about contexts. Asserting this view, this author further makes the following statement:

> "Assumptions are things (mental things, actually socio-mental things) that people do, so words don't mean, people do "but like guns, people can hurt people with words- guns and words are instruments by means of which people carry their goals and intentions" (Gee, 1990, p.84).

In the same line of thought, Magill (1988) refers to concepts as dummy expressions or variables whose meanings are assignable in the context of a theory and cannot be ascertained. From these arguments the idea of concepts as self-contained entities with fixed meanings seems unattainable. However, in everyday life these generalised meanings do exist and they are used in spite of the diversified meanings that each concept can convey. To examine this phenomenon, this study evokes Michael Foucault as one of the people who have spent time trying to explain how discourses are constituted and constitute truth claims about the world.

2.1.2.4 *Conceptualisation* in relation to Michel Foucault and regimes of truth

Foucault is one of the theorists who spends time examining the relationship between power and knowledge in society (Bohman, 1990; Cherryholmes, 1988; Kenway, 1990; Smart, 1980;). Among the issues tackled in Foucault's writing (see Cherryholmes, 1988) is the question of how fixed meanings are developed and sustained in spite of the fact that words and concepts do not have pre-given meanings. Foucault (in Cherryholmes, 1988) interrogates the stability of texts/

discourses set on fixed meanings in structuralism and asserts that they are productions of power acting in historical space and time.

The crucial contribution Foucault makes in the theoretical framework of this study and in educational thinking as such, relates to the conceptualisation of power. Power, according to Foucault, is not a fixed entity which resides in the hands of certain individuals who 'have it' while others do not. It is relational and it permeates every sector of society as a system in which those who exercise it contribute as much as those upon whom it is exercised. To clarify this point, Bohman, (1990) quotes Foucault thus:

> One doesn't have here a power which is wholly in the hands of one person who can exercise it alone and totally over others. It's a machine in which everyone is caught, those who exercise power just as much as those over whom it is exercised.

This is a departure from classical Marxism which defined power structurally, between the economic classes. The concept of power is prominently associated with Marxist discourse where it is used with reference to relations of exploitation between those who possess economic wealth against those who do not have. In this instance power may be viewed from one angle as either physical or economic exploitation which operates through violence or dictatorial authority. Although this view cannot be dismissed as irrelevant to this study, greater interest is appropriated to Foucault's view of power as a strategy which works not only from above but from all sides, "from above and from below" (Mc Laren1989; Smart, 1988). To understand how this power operates in the interest of this study it is necessary to view Foucault's conceptualisation of power together with two concepts namely, ideology and hegemony, as explicated in the neo-Marxist thinking of Gramsci (in Mouffe, 1979) and further developed by Althusser (1971).

To understand the importance of this reconceptualisation of power and its implications for this study it is necessary to refer to Gransci (in Mouffe, 1979; Kenway, 1990) who posit a non-economic theory of domination through the concept of hegemony. Hegemony is a theory of nonviolence, although implicit structural societal domination makes way for the understanding of the working of power in the process of meaning construction. A question which still arises is what form does this power then take if it not a structural force.

To answer this question Foucault, (Mc Laren, 1989) refers to discourse (a family of concepts)

and discursive practices as rules which govern the production of "truth" or knowledge, particularly among social and political institutions such as schools and penal institutions. To elaborate, McLaren (1989) refers to dominant discourses (those produced by the dominant culture) as the main forms of constraint on what is said and believed to be true and that which determines people's understanding and actions within institutions at a given historical period.

In order to understand how this power works it is necessary to understand the nature of discourse. This study does not offer the scope for elaborate discussions on the nature of discourse (see Duncan (1993) Fairclough (1989 and 1992), Gee (1990) and Macdonell (1987). Of importance in the understanding of the relationship between conceptualisation and practice as dealt with in this study is the fact that discourses are ideological (Gee, 1990), hence conceptualisation is informative to practice. The argument being posited here is that it is important to understand the teachers' conceptualisation of educational technology as their understanding of this concept (like other crucial concepts in their profession) has a formative relationship with the manner in which they practice their profession. This claim is supported by the understanding of discourse and therefore concepts not as neutral representations of reality in language. Looking at discourse, then, is considering language in its social context. This is the way in which this study looks at conceptualisation. It is informed by the understanding that when teachers take up their profession, they are subjected to years of training underpinned by particular epistemological and pedagogical assumptions. These provide a context within which teachers interpret their profession and act out their responsibilities. This argument is supported by Gee (1990) who observes that 'a discourse is a sort of identikit which comes complete with the appropriate costume and instructions on how to act, talk, and often write, so as to take on a particular social role that others will recognise' (p.142). In this way teachers are expected to render their practice according to the training received. However, educational discourses are monolithic and teachers' practices are sometimes scrutinised unfairly on the basis of new discourses without considering the contextual and conceptual constraints affecting their adaptation to new situations. This study therefore wishes to examine how teachers conceptualise educational technology.

2.1.2.5 Summarising and contextualising the discussion of *'conceptualisation'* in this

study.

The preceding section introduced the theoretical framework which also informs the discussion of educational technology. From the above discussion the understanding of conceptualisation as used in this study has been discussed and explained as a process of meaning construction. The main point made above is that conceptual meanings are not naturally fixed structures. They are constructed. The process that defines a concept also creates its meaning for, it prescribes how the concept is to be understood by those who use it. For example when people talk about a concept such as 'technology' or "educational technology" they do not describe a fixed idea, for that does not exist as such. The meaning ascribed to a concept reflects the beliefs, the purpose, the context and the position of those who define it. However this meaning continues to evolve in the interest of those whose social position allows them to be in control.

In other words the meaning which becomes accepted as common sense gains its status by suppressing others and appealing to those who have influence either because of economical or political authority. Hence the claim that meaning is a process caught up in a web of social, cultural, political, economic and ideological contexts. Who decides and how the decisions are made is a process decided in these societal contexts. It is this lens that guides the exploration and interpretation of the understanding of the concept of "educational technology" in this study.

2.2 THE CONCEPT OF EDUCATIONAL TECHNOLOGY.

Since educational technology is already accepted as a discipline, it is important to begin this discussion of conceptualisation of educational technology by reiterating the point that the main interest of this study is in the meaning of educational technology and not the field of educational technology per se. The field may only be touched upon as far as it illuminates the discussion of the concept.

The argument pursued here is that concepts such as technology and educational technology do not exist prior to the situation or to education. Educational technology does not have an existence outside and prior to the phenomenon of education, but arises to serve the interests of education and those who make decisions about education. It is in this sense that Habermas' theory of cognitive interests become an important lens through which to examine educational technology.

Educational technology is generally conceptualised in at least two ways, namely as 'technology in education' and as 'technology of education' (Ellington, Perceival & Reis, 1993; Spencer 1988). Technology in education is mainly concerned with the use of specific equipment or hardware, the products of technology, as Heinich et al (1989) refer to them, in the process of education (Thompson et al, 1992). Technology of education projects a broad view which sees educational technology as the whole process of education, including people, media, theories of learning and how these work together as a system (Ellington et al, 1992; Rowntree 1982; Thomas & Koyabashi 1987). Although the former view has received serious criticism over the years (Reiser & Ely, 1997) it has continued to dominate the discourses on educational technology.

2.2.1 Educational technology as a product

Discussions on 'educational technology' tend to be associated with the use of specific gadgets such as televisions, computers and so on (HSRC, 1981; TELISA, 1997) or educational programs designed to work with these kinds of hardware, such as video programs, CD ROMS and other ready made teaching and learning packages (Ashman and Conway, 1993; Heinich et al, 1989). This is the view that this study refers to as 'educational technology as a product'. Its focus is on artefacts, on new technologies (Butcher, 1997) and how educators should take advantage of these to enhance the efficiency of educational delivery. It is based on claims that these technologies can provide effective solutions to educational problems and that they can even compensate for the inadequacies of the teaching corps.

This view of educational technology can be traced back to the ideas of behaviourist psychologists such as Pavlov and Skinner (in Fry 1963, Spencer 1988, and Thompson et al 1992) and Thorndike(in Richmond, 1970) It was Thorndike who, as early as 1912, initiated the idea of a book that could be arranged in such a way that a learner could only see the next page if he/she had worked on the preceding one (Richmond 1970). This idea was to be picked up by Skinner (Spencer, 1988, and Fry, 1973) who ushered its materiality in the invention of the teaching machine and programmed learning. The mechanistic, technicist interest characteristic of positivism can be detected in Skinners argument that

> Once we have accepted the possibility and necessity of mechanical help in the classroom, the economic problem can easily be surmounted. There is no reason why the school room

should be any less mechanised than, for example, the kitchen. A country which annually produces millions of refrigerators, dishwashers, automatic washing machines, automatic clothes driers, and automatic garbage disposers can certainly afford the equipment necessary to educate its citizens to high standards of competence in the most effective way (Richmond, 1970, p.75).

From the above statement the interests which animated the early developments of what was to be known of educational technology are apparent. Education, as indicated was expected to increase its effectiveness, through mechanisation, by taking advantage of the tools made available by the 'technological' developments in society at large. In this regard, Skinner (in Richmond, 1970) further argued that this mechanistic development of education was inevitable and exciting and its adoption increased its effectiveness. His famous argument for this development as captured by Richmond (1970) was as follows:

> We are on the threshold of an exciting and revolutionary period, in which the scientific study of man will be put to work in man's best interests. Education must play its part. It must accept the fact that a sweeping revision of educational practices is possible and inevitable. When it has done this, we may look forward to a school system which is aware of the nature of its tasks, secure in its methods, and generously supported by informed and effective citizens whom education itself will create (p. 75).

Apparent in the above statement is the positivist claim of inevitability of the scientific stage, a stage of certainty which would enable the school (factory) to perform its task of creating (manufacturing) 'informed and effective' citizens (products) with ever increasing efficiency (Freire, 1973). This view, situated in the behaviourist psychology tradition, laid the basis for most of the research and practice of educational practices of the twentieth century (Thompson et al., 1992).

2.2.2 Some criticisms of educational technology as a product

As discussed above, educational technology as a product is seemingly based on a view of technology as products or artefacts (Heinich et al, 1989) rather than processes with histories and a sociology (Heinich et al, 1989; Mackay and Beynon, 1991). Day (1998), Noble (1991) as well as TELISA (1997) emphasise the fact that technology (as artefacts) reflect a development of the

human mind rather than the opposite. People design tools for particular purposes according to their needs and available resources. However, advocates of educational technology tend to emphasize the efficiency of the equipment as if technology has a life of its own exerting a determined effect on society. It is associated with progress and modernity and so on, as if there is a linear development in which others move on while others are left behind (Young, 1992). Technology remains the domain of those who have access to the specific artefacts, excluding those who do not.

This conceptualisation of educational technology tends to favour the interests of those who specialise in the development of educational materials, particularly in programming and the development of software such as video discs and computerised educational packages for self instruction. Its success is based on the understanding that particular sequences of learning accompanied by visual or audio-visual materials enhances the memorisation of the learning content (Spencer, 1988). Emphasis is on the efficiency of machines such as overhead projectors, television, tape slide projectors, computers and so on, with the accompanying software. This conceptualisation has certain implications for classroom-based learning and teachers.

2.2.3 Educational technology in relation to classroom-based learning and teachers

According to the above understanding of educational technology, there is a clear demarcation between educational technologists and teachers. Educational technologists are experts who offer specialised service as designers of teaching and learning programs, as well as consultants for and advisers to teachers and learners (Kozma, 2000; Rowntree, 1982). Teachers and learners are viewed in marketing terms as clients and consumers for the products developed by the former (Kozma, 2000; Noble, 1991; and Richey, 2000). As educational technology is conceptualised in this manner, a dividing wall develops between 'high tech' and 'low tech' with some schools.

A comparison is made between human teachers and the machines which are often portrayed as more efficient, leaving teachers threatened with replacement by the former (Nickson, 1970 and Streibel, 1986). This is particularly true of teachers from historically deprived environments which do not have access to these sophisticated materials.

In the light of the above observation arguments have been presented that South African needs to mobilise all resources whether 'high' or 'low', 'old' or 'new' technologies to meet the crisis in

education (TELISA, 1997). The argument sounds convincing considering that the education system should be adapted to meet global as well as local challenges. The problem that surfaces however, is whether some should be educated for global competitiveness while others are prepared for local service. If that is the solution the question still to be addressed is whether people will have a choice to be global or local citizens or whether that will be determined by economic means and status and access to educational opportunities. Those who have pondered issues of educational technology from a critical angle have raised different questions. Some have observed that educational technology focusses on 'how to' rather than 'why' questions (Apple, 1982; Rowntree, 1982). Streibel (1986) emphasized the tendency of the use of computers in education to focus on specific forms of knowledge to the exclusion of others. What became clear in the arguments of these scholars is that educational technology as artefacts can only be sustained by a specific understanding of knowledge as well as the education process. This study therefore, proposes to examine a different view of educational technology - as a process.

2.2.4 Educational technology as a process

Educational technology as a 'process' seems to support a different understanding of the world/reality in general as well as the reality of education, knowledge, teachers and learners and the whole process of educating from those held by behaviourists as discussed above (Heinrich *et al.*, 1989; Jonassen 1995; Rowntree, 1982). It seems compatible with the emancipatory paradigm aimed at empowerment (see chapter 3), rather than the technicist empirical paradigm, whose aim is to control and domesticate (Habermas, 1972; Streibel, 1988). The underlying assumptions on which the conceptualisations of educational technology as a 'process' are based will be briefly discussed towards developing an operational definition of educational technology as a process. Furthermore, the manner in which these assumptions inform classroom practices will be explored.

2.2.5 Views about knowledge

The understanding of 'knowledge' as a body of significant content that could be prescribed on the curriculum for learners to be exposed to has been shaken by many challenges. One of these challenges, particularly from those who embraced critical theory, also referred to as the sociology of knowledge, argues that knowledge is the result of a social construction of reality and that what is referred to as objective knowledge can be traced to historical and social processes of

meaning-making, language making and symbol system making (Streibel, 1988). This discussion need not be elaborated on here as it has been discussed already in this chapter (see par. 2.2). Of importance here is Streibel's (1988, p.139) observation that "there are many types of knowledge besides discrete, objective knowledge" and that what is referred to as objective knowledge is interconnected with various other forms of knowledge such as tacit knowledge, ambiguous knowledge, problematic knowledge, experiential knowledge, and knowledge of individual differences. All these types of knowledge are not captured and/or representable in machines. Educational technology as a 'product' tends to focus on specific forms of knowledge with emphasis on predictability and control, hence the emphasis on quantifiable observable processes and results. However, critical scholars such as Apple (1979) and Freire (1973) argued that human education should not be modelled after the industrial assembly line which, according to Freire, require people to behave mechanically, separating the whole into small disconnected steps. The argument advanced by these authors, as this study wants to argue, is that schooling and education, as such a process of 'meaning making', and cannot be captured adequately in purely empiricist technical terms. This is the view that, according to the author, affirms the teacher as the authority over machinery. The human being is paramount and the emphasis is on the learner.

If the learner is the focus of the learning process as claimed above, then it is important to understand who the learner is and the kind of needs he/she brings to learning situations. Of great importance in this exercise is the understanding that every learner is unique and that the education process, unlike the industrial assembly line, is not aimed at the efficient production of an identical product (Streibel, 1988). Learners come to the learning situation with different backgrounds (historical, social and economical), as well as different potentials, but all can learn (Spady, 1999). All should be given the opportunity to develop according to their uniqueness and potential. This understanding of the learner as well as the understanding of knowledge discussed above has serious implications for the teacher, and his or her role in the educational situation becomes more complex.

2.2.6 The teacher's role in the teaching/learning environment

The teacher as a transmitter of decontextualised content knowledge is threatened by the development of technological artefacts such as textbooks, televisions, computers and multimedia, which has sometimes been claimed to be able to do the same job even better (Fry, 1963; Mackay &Young, 1991). However, this view of the teacher is very limited and it has been questioned in

the same manner as its empiricist/technicist view of learning. In fact, even when technology is viewed as artefacts/gadgets or products, it is important to note that the teacher in that instance is not the machine but the programmer. What the learner receives, therefore, is based on the programmer's assumptions about the learner and the learning process. The process somehow excludes not only the learner's unique understanding and beliefs, but also the teacher's, in order to fulfill unidimensional goals, captured in pre-specified objectives. The teacher, it has been argued, has to fulfil more purposes than just the transmission of lifeless decontextualised knowledge and his or her role cannot be reduced to that of a machine (Streibel, 1988). Some of these roles are discussed below.

According to Dryden & Vos (1994), the best teachers play their role in the teaching/learning environment as activators, facilitators, coaches, motivators and orchestrators. They reach out to learners as holistic beings whose involvement in learning includes not only cognitive, but also effective and psychomotor aspects. In fact, teachers need to nurture various types of intelligence in learners and for this purpose they should not separate the conception from execution of learning (Apple, 1982). This understanding requires that the learning environment be tailored to maintain a balance between the uniqueness of the individual with the 'uniformity' of belonging to a culture and society with others. The teacher in these situations, as stated by Streibel (1988), is "a central agent in a dialectical community of learning and one who forms a triatic relationship with the learner and the subject matter".

The above understanding of the nature of knowledge and education as well as the roles of the learner and the teacher have significant implications for the understanding of educational technology held in this study. Instead of trying to give a simple definition for a complex phenomenon whose definition has become an age-old struggle (Reiser & Ely, 1997; Thomas & Koyabashi, 1987), this study discusses educational technology in terms of characteristic aspects that can be identified as constitutive aspects of educational technology as a process. The technology of education as a process is characterised by the understanding that education is not just communication and that it is not just about the transmission of knowledge from the teacher to the learner. Educational technology is a process of educational problem-solving (Rowntree, 1982), which has the learner and the learning process at the centre. In fact, Rowntree (1982) places so much emphasis on this point that he states that "we (educators) certainly cannot facilitate the student's attainment of his purposes without opening ourselves to his perceptions, his experience, his point of view" (p.28). This statement is a departure from the traditional

understanding of educational technology with its emphasis on teaching, to a focus on the learner and the learning process as propounded by OBE and the country's emphasis on learner recognition. Learner-centeredness is a characterising feature of educational technology as a 'process'. This is further attested to by Heinrich *et al.* (1989, p.24), who also observes that a common feature of technology of instruction as a systematic arrangement of teaching-learning events is the focus on the learner and on "scientific principles of human learning".

Educational technology as a process operates on all levels of education ranging from the national level, where decisions must be made regarding curricula, to the classroom level, where the teacher must decide what kind of knowledge the learners must be exposed to and how that will be accomplished.

In other words, the teacher makes technological decisions as he/she tries to respond to the question as to how he/she will facilitate the learning process or how she or he will assist the learners in attaining their learning goals in relation to his/her subject or learning area. While the understanding of educational technology may prompt the question "How should I teach?", to the teacher's mind, the same situation will prompt the question, "What arrangements can I make to assist the learners to pursue their learning goals meaningfully?" Another question would be 'Have my learners learnt what they have to learn?" The first approach emphasises the role of the teacher as the transmitter of content, while the second approach (process approach) lays emphasis on the process and outcomes to be attained by the learners.

Understanding educational technology as a 'process' challenges the teacher as a learning facilitator to organise learning activities with a clear purpose as to how activities, tools, and events link together with theories about learning to form a holistic approach to make learning successful (Rowntree, 1982). Some authors have emphasised the fact that educational technology should be grounded in a sound pedagogical position, integrate media meaningfully and be manageable (Heinrich *et al.*, 1989). Attention should be paid to all of these elements for learning to be meaningful.

Another factor, emphasised by Dryden and Vos (1994), is the consideration of the learners' emotional state. These authors argue that emotion is the gateway to learning and emphasise that a person's emotional state is affected by communication skills, relationship skills and motivation, and that self esteem aspects are vital to learning. Any technology of instruction/education needs

to take these into consideration as failure to address them may result in failure in the other tasks of learning.

If educational technology must assist learners to develop in society, for themselves and for responsible lifelong learning, it must be aimed at developing learners' practical skills such as creative problem-solving, critical thinking, leadership skills, global perspective and the confidence to play their full role in determining the future of society, as well as the ability to plan their own lives (Ashman & Conway, 1993; Dryden & Vos 1994). Learners should be assisted to organise their work and to plan and execute plans in their learning, for these are skills they will need throughout their lives. The value of educational technology as a 'process' lives in its flexibility and its determination to equip learners with the skills to think and reflect on their thinking and their thought processes. Its emphasis is on developing human beings who can set goals, plan how to reach them and evaluate their actions as well as their goals (Ashman & Conway, 1993; Rowntree, 1982). Such educational technology is supported and supports a constructivist view of learning.

This view of educational technology is teacher-friendly, because it calls for teachers to not look to specific hardware and pre-prepared or ready-made programmes in order to organise learning. Teachers can use a variety of sources and encourage learners to use a variety of information sources to learn. If the teacher values the learners and follows this approach as a model and assists the learners to develop problem-solving and critical thinking skills, using a variety of resources and media, the learners are in a better position to learn and understand the content associated with the various learning areas. In fact, according to Ashman & Conway (1993) as well as Dryden & and Vos (1994), the acquisition of these learning skills and their application is a 'bridge' to all content learning, for once learners understand how they think and how to plan and execute their problem-solving skills to learning, it is easier to learn the content. Of great importance is that these skills are needed throughout their lives, and they can be applied to any situation.

The congruency between the understanding of educational technology as a process and the constructivist philosophy underlying the Curriculum 2005, is the basis of this study. This study proposes that there seems to be a relationship between the understanding of educational technology as a process and the expected shift in teaching practices from teacher-centeredness to learner-centeredness.

2.3 COGNITIVE EDUCATION AS A CONTEXT FOR EDUCATIONAL TECHNOLOGY

Having questioned behaviourism as a basis for schooling, many countries have turned to cognitive education (Ashman & Conway, 1993, 1997). South Africa's introduction of Curriculum 2005, based on OBE, has been understood as a shift from the traditional 'jug and mug' didactical approach to learning towards a cognitive approach. It is therefore important for this study to briefly examine the claims of cognitive education, as it is believed that any discussion about educational technology reflects assumptions about knowledge and what learning is about (Rowntree, 1982; Toffler 1974). The next section therefore briefly examines the claims of cognitive education.

Cognitive education has been defined broadly as the application of cognitive theory and methods to education (Ashman & Conway, 1997). It is also viewed as teaching for understanding and teaching that helps learners process information in meaningful ways which help them become independent learners (Naudé & van der Westhuizen, 1996) Its emphasis is on learning as a process which involves elements of cognition namely perception, attention and memory, reasoning, language and emotion (Naude & van der Westhuizen, 1996; Ashman & Conway, 1997), as well as meta cognitive processes. Advocates of cognitive education also argue that learning is not similar to downloading information from one mind to another or from a literary source to a learner's mind (Garrison, 1998). It requires critical information processing, hence the emphasis on problem solving. Learning is about creating meaning, and the context in which it takes place is an important aspect of the learning process.

This shift in educational discourse has brought challenges to educational technologists and teachers as well. In order to appreciate the challenges facing these groups it is necessary to understand the assumptions made by proponents of cognitive education as the departure from behaviourist learning theories . Among the two theorists who were mainly responsible for this shift, namely Piaget (in Spencer, 1988) and Vygotsky (in Wretch, 1985), the latter is the one to whom this study pays more attention. This is justified by the fact that Vygotsky's (in Lee & Smarigorinsky, 2000) theory has had more influence in the understanding of education held in this study. His is also one of the prominent underlying theories informing the new curriculum (Curriculum 2005) in South Africa (Steyn & Wilkinson, 1998; Jansen & Christie, 1999). This theory is not discussed in detail, but the assumptions it makes about learning are briefly

discussed. While Piaget (in Spencer, 1988) argued for a constructivist view of learning, Vygotsky (in Spencer, 1988) went further in emphasising the socio-cultural nature of learning, resulting in a social constructivist view of education and learning. Unlike other constructivist views, particularly influenced by Piaget (in Goodman & Brophy, 1996) which tend to postulate learning as a solitary activity of meaning construction, social constructivists view learning as a social activity and thus emphasise the following as characteristic of meaningful learning (Jonassen, 1995; Jonassen & Murphy, 1999; Wells, 2000).

2.3.1 Learning as an interactive process

According to the social constructivists, learning is an active process in which learners are engaged in mindful processing of information. Learners do not learn by passively assimilating instructional context. They learn as they interact with their environment, which consists of people, things and ideas (Rowntree, 1982 p.99). The learners are responsible for the results. Therefore, activities or experiences in which learners are involved must be organised in such a manner that they arouse the interest of the learners, engage their feelings and values as well as their cognition (Wells, 2000). Also, activity does not just refer to physical action or mechanically carrying out the teacher's instructions, but includes authentic engagement in problem-solving.

If learning is accepted as active participation on the part of the learner, then educational technology as the 'know how' of education should provide learners with a focus on stimulating action and getting the learners to consider different approaches and to interrogate tentative answers before they come to a conclusion. It cannot be prescriptive, but it should provide learners with environments and the scope to build on their experiences. It is in such questions, where both the product and process are important, that the learners are believed to be engaged in meaningful learning activities. Such understanding of active learning is linked to another important characteristic aspect emphasised by social constructivist theorists namely that learning is constructive.

2.3.2 Learning as a constructive process

As indicated above, learning is an active process. This argument further characterises learning as a constructive process of meaning making. The meaning that learners ultimately own are not direct copies of the information taught to them. It is a dialogic process characterised by

transactions, artistic transformations and the creative activity of meaning making. This process is captured by Garrison (1998) who argues that teaching (creating meaning) cannot be equated to a process of downloading information into students' central processors (in computer terms). The point here is that what people learn and finally claim to know results from a process of meaning construction. It is not a direct replication of what is communicated by the other person.

Educational technology therefore is not a specific product or artefact. It is a set of arrangements meant to assist learners to engage in a process of meaning construction. Such a process needs to take care of the learner's knowledge system. Any technology of education needs to be built into the learner's existing knowledge base. The teacher has to understand and appreciate his or her formative role considering the learner's entire background as a point of departure.

2.3.3 Learning as a collaborative process

In the light of social constructive theory learners construct meaning in collaboration with others. They do not work in competition with each other, but rather in co-operative and collaborative partnerships and learning groups. The classroom is viewed as a collaborative community (Wells, 2000; Jonassen, 1995) consisting of a community of participants who strive towards shared goals. The collaborative nature of learning calls for educational technologies which allow learners to work together sharing ideas and exploiting each other's skills and supporting one another in the co-construction of meaning. Powerful communication technologies such as the Internet offer learners opportunities to chat with others on a global scale. At a local or classroom level learner groups have become a powerful means of letting learners collaborate with others in live debates and group discussions of issues and concepts. Thus the teacher as a facilitator of learning organises activities as opportunities for learners to collaborate in the co-construction of meaning. The teacher who understands this will organise activities which will allow learners to work together and exploit each other's skills and provide support for one another. Such an environment will, among other things, support the self-esteem of learners and provide a comfortable atmosphere for the negotiation of ideas. Such a teacher also understands that learning is inherently dialogic and conversational.

2.3.4 Learning is conversational

Since learning is collaborative, it is believed that learners benefit most by being members of knowledge building communities both in class and outside school (Jonassen 1995). This poses a different challenge from the traditional view of learners as quiet, disciplined, passive recipients of teachers' knowledge. Any educational technology needs to provide learners with opportunities and tools to engage in knowledge construction dialogues. The learning environment must allow learners to comfortably articulate their views and negotiate with others in the process of learning. This aspect is directly related to the collaborative nature of the learning process. Related to this is the aspect of the intentionality of the learning process.

2.3.5 Learning as intentional

An educational technology approach will make sure learners develop a personal interest and purpose for their learning. A personally relevant atmosphere for learning will be created . This calls for a genuine interest in and understanding of the learners as persons who have social and cultural interests. Learning should be seen as an intentional activity in which learners, young or old engage in order to fulfil certain goals. It is generally observed that if people do not know why they have to engage in an activity they may not achieve well. Learning activities should engage learners in activities that have real purpose and meaning. This aspect lays more emphasis on the fact that people do not learn disinterestedly as 'mind in bodies' (Garrison 1998). Learning is a purposeful activity which involves the whole person, including the development of consciousness. The teacher who understands the intentionality of learning will be careful in creating an atmosphere which ensures the attainability of outcomes. This is also accompanied by an understanding of learning as a contextual process.

2.3.6 Learning as contextualised

If learning is an intentional activity expecting learners to memorise decontextualised facts may be calling for a difficult if not futile exercise. A consideration of context, however, is not to be understood as physical environment. The context in this case may mean different things, including a person's social, economic and cultural background as well as all his/her beliefs in relation to the learning experience. Wells (2000, p.61) asserts that "activities are situated and unique". Learning activities should therefore be situated in a meaningful context to enable the

learners to construct meaning. The opposite will call for rote learning. While artefacts can be used to stimulate discussion, bringing in ready made artefacts for learners to watch passively may serve the same purpose as learning by rote.

2.3.7 Learning as a reflective process

Learning as a meta-cognitive activity requires learners to have the opportunity to articulate what they know. In this process the learners engage in internal negotiation with their existing knowledge structures. In this way the learners have the opportunity to question their understanding and confirm their beliefs. It is through this process that learners can claim ownership of meaning. The teacher who understands educational technology as a process will be able to assist learners through mediation strategies to attain understanding of their own thought processes. This is an important role for the teacher as a learning facilitator and it is on this approach that the teachers's role should be built or based. One of the questions posed by educational technology regarding this aspect of learning is whether learners can break down and rebuild a model, for example. In other words, does the process allow them to dismantle the product in order to see how they arrived at the end?

2.3.8 About learning outcomes

According to Wells (2000) and Rowntree (1982) the teacher who understands educational technology as a process will not only look for attainment of pre-specified learning objectives. Wells (2000, p.61) observes that outcomes are both aimed for and emergent. While a teacher comes to class with planned learning activities towards particular outcomes, he/she is aware that all outcomes cannot be planned for in advance. The class is open to emergent outcomes as learners are engaged in the learning process. Learning is also accepted as a life-long process.

2.4.1 Conceptualisation of educational technology - a summary

In concluding this discussion of the conceptualisation of educational technology, the view of educational technology held in this study is summarised by first reflecting on what this study postulates as educational technology. A brief discussion of the role of teachers as educational technologists follows.

From the above discussion this study has aligned itself with the understanding of educational technology as a 'process'. The argument presented here is that educational technology can neither be too material or context-bound nor too general. It is not a 'thing' to be sought from a teacher's shelves or classroom cupboards (Grundy, 1987). To think about educational technology is to think about the whole 'process' of education and the assumptions underpinning it. It is not to think about an abstract concept for which people can strive to reach the ideal. It is informed by the beliefs and practices associated with the education and socialisation in a particular society. Artefacts have their role, but they do not define educational technologies as such. They provide extended possibilities of exploration within a specific world view. Educational technology as a process operates at all levels of education, that is from the national levels, where decisions must be made regarding curricula, to the classroom level, where the teacher must decide what kinds of knowledge the learners must be exposed to and how that will be accomplished.

At the national levels, curricula may be shaped based on the assumptions about the kinds of jobs or the kinds of citizens people are expected to do or become. Whatever the assumptions are, they determine the kind of infrastructure, the kind of teachers and the kind of teaching and learning procedures deemed appropriate. At the classroom level (which is the focus of this study) educational technology is understood as a process for which various aspects (media, classroom practice and so on) need to be given attention in a balanced way. This position is inextricably bound to the views held about knowledge and individuals as well as the material conditions of the teaching/learning environments, hence the importance of the teachers' conceptualisation of educational technology. As argued also by Jonassen (1995) educational technology is more than hardware, meaning that technology consists of designs that engage learners, cognitive learning strategies, critical thinking skills, and replicable, applicable techniques.

2.4.2 Teachers as educational technologists

As argued in this study, educational technology is not about artefact, rather about an approach to teaching and learning. It can be further proposed that teachers at the classroom level are technologists. They are constantly involved in decision making based on their learners and what they have to learn. These decisions are informed by their understanding of and their beliefs about the learning process, their role and the role of their learners in this process, as well as the resources they have assist them in their task. The belief held here is that if teachers view

knowledge as fixed structures and educational technology as specific artefacts, they may find it difficult to implement constructivist learner-centred modes of teaching.

2.5 CONCLUSION

This chapter reviewed literature to define conceptualisation of educational technology as understood in this study. Educational technology was discussed within the framework which informs this investigation. The manner educational technology is classified as product or process is rather simplistic, but it was found useful to handle the complexity of the concept. The argument held here is that educational technology as product is inadequate to serve the interests of educators. Tying educational technology down to specific objects can only serve to mystify the concept.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Chapter two focussed on the theoretical aspects of the study. As discussed in chapters 1 and 2, this study is concerned with conceptualisation, which is about meaning construction. This chapter begins with a discussion of the paradigm within which the study is located. In order to explain and to justify the choice of the emancipator paradigm the positivist and the phenomenological paradigms are briefly discussed and their shortcomings in dealing with conceptualisation of educational technology as envisaged in this study are highlighted. Thereafter the emancipator paradigm is discussed, indicating why it was found useful in this study. This chapter further presents a brief critique of the discourse analytic procedures used in this study. The methodology followed in the empirical investigation is further explained.

In discussing the methodology this chapter discusses how data was gathered and analysed. The number of respondents who participated in providing the data for this study will be elaborated on and the procedures followed in selecting them explained. The context where they come from as well as the setting in which the research takes place will be briefly described. This discussion is important for this study because the respondents are presented as people in their own right. They do not present a sample to be generalised as representative of some large population. As people, each one is unique; they talk (as shown in the interviews), they act and interact (as shown in classroom observations) and each one interprets his or her environment and reacts in particular ways. They are participating in the creation of the history of their schools.

The techniques and strategies used to collect and analyse the data will be discussed as well as the role of the researcher as the main 'instrument' of data gathering. The following subsection of this chapter elaborates on each of these points. Practical procedures followed in gaining access to the respondents, interviewing them and collating all relevant information gathered will also be discussed.

3.1 APPROACHES TO RESEARCH IN EDUCATION

Since Kuhn (1970) presented his critique of logical positivism and introduced the notion of a paradigm, it is important for the researcher to explain the paradigm which guides the research

undertaken in order to lay bare the assumptions and presuppositions which inform the study (Mouton, 1993). The paradigm (as the framework couching the world view adopted by the researcher) determines the meanings of concepts, the nature of reality and how it should be studied. The choice of a paradigm therefore guides the choice of research approach, hence methodology. The position from which this study operates is one that holds that research is not neutral (Lather, 1986; Foucault, 1980; Reason, 1994), but that it is based on certain assumptions about the world and human beings and that these assumptions inform the methods for data collection and interpretation.

The educational researcher has a choice among many approaches which can be classified within the following three main categories: positivism - also known as logical positivism or the technicist or empirical approach; interpretative approach - also referred to as the hermeneutic or phenomenological approach, and the emancipatory or critical theoretical paradigms. The three paradigms are discussed below as a way of indicating how these would respond to the question posed in this study and thus justify the choice of the approach used. Positivism is the first to be discussed.

3.1.1 Positivistic research paradigm

Research in education has been traditionally guided by positivism which is based on the rationalistic empiricist philosophy that originated with Aristotle, Francis Bacon, John Locke, Auguste Comte, and Immanuel Kant (Mertens, 1998; Stumpf, 1998). The positivistic paradigm is based on the view that as in the natural sciences, the study of social issues or human reality is a study of an objective, fixed reality, a world of objects governed by natural laws of cause and effect (Guba, 1990; Reason, 1994). This view further determines the objectives of social science, even educational research.

Social science research informed by positivism is aimed at discovering the ***true*** nature of reality, or absolute truth absent phenomena which can be verified through observation and a logical reasoning irrespective of context or researchers. Research within this paradigm is about producing valid and reliable explanations which indicate cause and effect relationships among phenomena (Macmillan & Shumacher, 1993). This explanation is needed as a basis for prediction which will enable human beings to control and subdue the environment for their own security and interests. Quantification, objectivity and the control of variables, are important aspects of

research in this paradigm since the purpose is to produce results that can be generalised over similar groups or populations. To maintain objectivity the researcher is expected to exercise caution to maintain neutrality which means value-free observation and separation from the object of study (Reason, 1994).

Reactions to positivism as a research paradigm to study human beings have shown serious skepticism if not outright rejection. The success of positivism in studying human and social reality seems to rest on a reductionist view of reality and human beings (Reason, 1994). While the reality of physical science consists of fixed 'objects', one of the objections directed to positivism is that the social world is a complex world of actors and co-actors whose reality is constantly in a state of flux and cannot be reduced to general laws of cause and effect (Smaling, 1995; Rossman & Rallis, 1998). The emphasis on reason as the sole mode of knowing has been questioned by observations that there are many types of knowledge besides discrete, objective knowledge (Streibel, 1986; Greene, 1982). The inevitability of the positive stage postulated by Comte has been questioned and the inability of positivist research to explain unquantifiable human issues of meaning (for example perception, motivation, and so on) has made people turn to metaphysical and theological sources which seem to offer better explanations.

Human access to objective facts and absolute truth has been problematised by claims that reality exists as it is interpreted, constructed and reconstructed by those who act on, within and around it (Gary, 1998; Reason, 1994; Smaling, 1995). There are no objective facts outside organising theoretical frameworks which categorise and interpret events and actions in the human world. A strong but a valid critique of positivism in this regard is that given by Heron and Reason (1997, p.2) who claim that:

> The problem of the positivist mind is that it cannot acknowledge the framing paradigm it has created. It confuses the given cosmos with the world view it has generated to shape the given. It cannot see the ground on which it stands to frame its world. It is its own creation. It thus tends towards immodesty, intolerance and the oppression of scientism.

In the light of these criticisms both the claim of universal facts and the detached observer or scientists seem problematic. The maintenance of absolute, universal reality is viewed as ideologically and politically concealing. The implications of these findings for this study are discussed next.

3.1.1.1 Positivism and this study

As indicated in the previous chapters, this study is not about a search for absolute truths because they do not exist (Lather, 1986). As revealed in the historical background this approach is based on the study of physical objects. Educational technology as investigated study is not a fixed object and it does not have a fixed meaning. On the contrary it is a socially constructed subject whose meaning is determined in its use by the participants (Richmond, 1970).

This study is about meaning construction which cannot be generalised among humans because everyone interprets reality in a unique way (Apple, 1999). It is not aimed at prediction and the formulation of general laws (Reason, 1994). On the contrary, its aim is to understand peoples' interpretation (Creswell, 1998). It believes that people do not have access to reality, except as mediated by their existential subjectiveness as informed by their historical, cultural, and economic circumstances (van Manen, 1990).

The respondents' conceptualisation is not to be studied in a laboratory, but at the natural setting where the respondents live their experiences and the researcher does not want to treat them as detached objects as positivism would claim. The respondents are respected for their humanness rather than treated as objects. Further, the researcher does not purport to pose as neutral because even the choice of the topic is influenced by practical interests in the subject as related to the specific setting and a particular group of respondents. Even if the researcher purported to be neutral, it would not be 'true' but it would just be refusing to declare subjectivity, for even in natural sciences people study certain phenomena for specific reasons and interests informed by a particular world view (Reason, 1994). Given these factors which make positivism unsuitable as an approach to this study, phenomenology would be the next option.

3.1.2 Phenomenological approach

While the phenomenological approach provides a better framework to study human science than positivism, it has its own problems and it has been the subject of many attacks (Goodman, 1992; Sarup, 1978). One of the main attacks against phenomenology is that its objective is just to understand reality as it is. This is not practical because it does not change people's circumstances (Mouton,1993). Phenomenology tends to focus on the awareness of the researched as individualistic or group perceptions as if these have an exclusive objective or scientific existence (van Manen, 1990). It also tends to share the apolitical stance of positivists which does not interrogate reified common sense understandings which sustain the status quo,

hence the observation by Goodman that:

> the phenomenologist approach does not encourage questions of why certain meanings, rather than others, dominate within a given milieu or the extent to which interpreted meanings of the actors are socially regulated by underlying structures and ideologies (1992, p.121).

This paradigm gives both language and the researcher a privileged position from which the researcher can 'truthfully and scientifically' interpret reality by applying specific measures and bracketing his own presuppositions (van Manen,1990). Individual awareness or consciousness needs to be studied within the contexts in which it occurs, for, although human beings are not to be understood as helpless victims of ideology, their interpretation of the world cannot be completely divorced from the context within which they operate and the ideologies within which they explain their existence. Rabinow & Dreyfus (Goodman, 1992, p.121) challenged the apolitical stance taken by phenomenologists and observed that:

> As long as the interpretative science continues to search for a deep truth, that is, to practice a hermeneutics of suspicion ...while insisting that the truths they uncover lie outside the sphere of power, these sciences seem fated to contribute to the strategies of power. They claim a privileged externality, but they actually are part of the deployment of power.

Through the above observation, the phenomenological approach is challenged in at least three aspects. Firstly, the preoccupation with an external world which is seen as the subjective construction of the participants or respondents. Secondly, it gives language a privileged position as a 'neutral tool' of understanding the world. The power of language to construct reality from specific positions is underestimated (Goodman, 1992). Thirdly, it gives the researcher a privileged, detached position from which to tell what constitutes the real without contaminating it with his or her presuppositions. In this view the phenomenologist is not immune to the criticism levelled against the detached, objective observer in empirical sciences. The implications of the phenomenological approach for this study is the subject of the next paragraph.

3.1.2.1 Phenomenology in this study

The phenomenological approach offers an appropriate context to study the conceptualisation of educational technology as interpreted by respondents. It is a powerful tool to provide depth of understanding of the phenomenon. However, the aim of this study is not to look for essentials or to describe educational technology as it is for it does not exist as such. Educational technology

as studied here is not only a socially constructed reality but it is a discursive practice caught up in a web of societal and power relations (details discussed in Chapter 2). The apolitical stance it takes towards language is a serious limitation in this study since the subject of investigation calls for interrogation of 'reified' meanings and not essentialist understanding.

As this study is concerned with conceptualisation, phenomenology does provide approach that recognises the political and ideological embeddedness of the process. In the light of these shortcomings some have called for a research tradition which goes beyond interpretation to being critical, enlightening and emancipatory (Carr & Kemmis, 1986; Popkewitz, 1990). According to these authors the emancipatory paradigm, discussed below, promises to attend to these concerns.

3.1.3 The emancipatory paradigm

3.1.3.1 Historical Background

The emancipatory paradigm includes a broad group of researchers including critical theorists, participatory action researchers, Marxists, feminists, ethnic minorities, and persons with disabilities (Mertens, 1998, p.15). The history of the emancipatory interest or critical theory is generally traced back to the thinking of German scholars also referred to as the Frankfurt School in the 1920's (Creswell, 1998). This paradigm was born out of a dissatisfaction with dominant research paradigms and practices, particularly with the observation that theories which were presented as neutral had hidden power relations and perspectives on knowledge. This represented the position of the dominant groups. Seeing that classical Marxism had also not solved societal problems, scholars such as Horkheimer (in Mouton, 1993) sought to develop a critical theory that connects theory and practice in addressing the problems of society.

While the phenomenological and the emancipatory paradigm share the same views regarding the nature of reality and human beings, advocates of the critical theoretical or emancipatory paradigm argue that phenomenologists tend to aim at an 'objectivity' which does not interrogate power relationships in issues of understanding and knowledge claims (Lather, 1986). The tendency to see meanings as individual or local constructions or interpretations without interrogating their social nature or origins makes research a futile exercise and does little to transform people's living conditions (Goodman, 1992). They argue that research should be relevant to the social life of people and aim at transforming their circumstances (Creswell, 1998). In the light of this,

critical emancipatory research is aimed at exposing the ideological embeddedness of knowledge and at disrupting patterns of power which hold together the status quo (Reason, 1994). Its purpose is to transform and to heal the world and restoring human dignity by creating awareness of the ideological patterns which determine people's lives.

Although the emancipatory approach represents a diversity of adherents, Mertens (1998, p.18) observes that it is distinguished by its specific agenda which places central importance on the lives and experiences of the diverse groups that, traditionally, have been marginalised on the basis of gender, race and so on. It also analyses how and why inequities based on gender, race, or ethnicity, and disability are reflected in asymmetrical power relationships. It further examines how results of social inquiry on inequities are linked to political and social action and it uses an emancipatory theory to develop the program theory and the research approach.

3.1.3.2 Objectives

Research, according to this paradigm, is about the critical evaluation of existing reality "via an ideological critique" in terms of its role in perpetuating oppressive social structures and policies (Mertens, 1998). This paradigm is aimed at producing knowledge which encourages the attitude and spirit of self reflection among participants (Lather, 1986). Researchers need to engage in research aimed to benefit not only in terms of knowledge production, but in terms of empowering the participants who are members of the marginalised and excluded groups. If the purpose of positivistic research is to explain or predict in order to control human behaviour, emancipatory research wants to restore freedom and agency to human beings, in other words, emancipate them. The aim is to encourage a deeper understanding of the various forces at play in determining their lives through empirically grounded theoretical knowledge (Lather,1986; Carr & Kemmis,1986). The main orientation of this paradigm is towards the eradication of false consciousness. It aims at the production of knowledge to emancipate and empower participants to engage in autonomous action arising out of authentic critical insight into the social construction of 'reality'(Grundy,1987). To fulfil these objectives research takes a different format.

3.1.3.3 Format

Emancipatory researchers employ diverse methodological approaches to deal with their questions. They use both quantitative methods and qualitative methods. They engage in interactive relationships with respondents either as participants or as partners in research. Integration between research and practice and between theory and practice is considered ideal. The tendency is towards qualitative research methods and when quantitative methods are used they are not used in the rigid positivistic orientation. Quantification is not done for the sake of quantifying and labelling in order to generate rules or laws but as a means to explore and to systematise in order to analyse and interpret in the context of power relations within the context of the phenomenon.

Qualitative research can be implemented as observation, participation, action research or case studies, amongst others. A characteristic feature is the emphasis on the inclusion of diverse voices from the marginalised in the research. The researcher is not a detached observer or an expert but a facilitator of a process in which stakeholders reflect on and take action to transform their living conditions.

3.1.3.4 Steps

Research is done in three stages and each one is very important and serves a specific purpose towards the emancipation of the respondents/participants. The first stage is the interpretative stage in which the researcher and respondents reflect dialogically on the existing problem. This is followed by analysis of the nature of the problem in which possibilities to address existing challenges are explored and a plan of action drawn up to try and solve the problem. An educative stage follows in which the stakeholders take action to transform their situation while the researcher provides whatever means in his or her power to facilitate the process. This is not a linear but, a cyclic process in which steps are repeated with continuous evaluation.

3.1.3.5 Critique

The emancipatory paradigm is attacked by advocates of the dominant research paradigms on the claim that it is not objective. The question of value-free, objectivity has however been questioned even within positivism. The criteria set for developing a hypothesis indicates that the objectivity claimed by positivists is itself paradigmatic (Reason, 1994). Even the claim of an objective, detached, presuppositionless observation has been problematised (see paragraph 3.1.2.5 above).

In the light of these challenges critical emancipatory researchers apply more rigorous procedures in their studies (Duncan,1993) and they examine and explain their biases. Furthermore they use extensive empirical evidence from the participants in their claims. They do not attempt to pose as producing neutral universal knowledge claims. Self-disclosure is a pre-requisite in conducting and reporting critical research (Lather, 1986).

3.1.3.6 Contextualisation

Of the three major approaches discussed in this study the emancipatory approach is found to be the most appropriate to handle this investigation. It provides a suitable context to handle the research question as well as the nature of the subject (educational technology as a socially constructed reality). This study aims to go beyond the description of educational technology as interpreted by teachers from disadvantaged communities, and to probe for the underlying theories which inform these conceptions. The discursive practices which produce educational technology as a subject (Henriques et al, 1984) are to be interrogated to expose their oppressive or liberating nature to teachers. Among the three, this paradigm was deemed to be the most suitable for the purposes of this study. The following sub-headings explain briefly how the emancipatory paradigm becomes suitable to serve the purposes of this study.

This paradigm recognises a multiplicity of meanings as a socially constructed process and thus is able to accept and tolerate the understanding of the conceptualisation of educational technology as a multiplicity of interpretations occurring in space, time and history. The focus of this study is on quality and not quantity, and depth rather than breadth of information. It therefore allows the researcher to work with few participants. It has been observed that in qualitative studies the use of vast numbers of respondents may not necessarily alter the quality of information but rather add to the researcher's job by making the data analysis more labourious and time-consuming (Duncan,1993; Mahlomaholo,1998).

3.1.3.6.1 Nature of reality

This paradigm recognises a multiplicity of meanings and the socially constructed nature of

reality (Creswell, 1998). It is therefore able to handle the understanding of the conceptualisation of educational technology as a multiplicity of interpretations occurring in space, time and history. The understanding that language is not neutral (Goodman, 1992) and the purpose to demystify issues and transform people's circumstances advocated by proponents of critical theory (Lather, 1986) enables this study to investigate the discourses which define educational technology. While positivism would want to treat educational technology as a fixed, decontextualised reality, phenomenology would also want to essentialise it or see it as a subjective reality which exists only in the minds of the respondents. The emancipatory approach allows it to be studied within its context as a function of discourse.

3.1.3.6.2 The relationship between the researcher and respondents

In this study the researcher is not a detached, disinterested observer as positivism would claim for purposes of objectivity. The researcher, a black teacher herself sharing the respondents' background, cannot claim to be a neutral observer who is detached from the process, although she is the main instrument of data gathering, analysis and interpretation. She went through the same schooling system and continues to serve the same community as a member of an education faculty involved in both pre-service and in-service teacher training. She has vested interests in the empowerment of the teachers who have a responsibility to assist learners develop the best for themselves and for the success of this country.

To investigate the teachers' conceptualisation of educational technology the researcher had to reach out to the respondents in person and get to know them in the schools where they operate and understand the socio-cultural processes involved in their understanding of themselves, their role and the struggles they have to face in their everyday profession. Objectivity in this case differs from the positivistic claims. The researcher is called to maintain objectivity by keeping a balance between what Smaling (1995) refers to as open heartedness and open mindedness. This calls for rigorous reflection by all. For example the respondents, as two different persons, in this study had their unique peculiarities in relating to the researcher during the course of the study.

It would be expected that on the basis of gender, relating with Lerato would be easier than with Themba, the researcher being a woman. However as might be detected (see par.3.2.1) the reality is the opposite. Themba was the more open and relaxed in the interactions. To Lerato the researcher remained a professional. Although accepted in a kind and friendly manner the distance

was felt throughout. She was friendly and open but not as relaxed as Themba. In an attempt to understand her better the researcher visited her at home to understand her sphere of operation and her professional responsibility.

3.1.3.6.3 Values in research

The critical emancipatory paradigm does not shy away from the fact that research is value laden (Reason, 1994). It actually forces the researcher to acknowledge his or her values and biases. Critical theoretical researchers are sometimes referred to as "ideological" researchers (Guba, 1990). However supporters of emancipatory research (Lather, 1986; Smaling, 1995; Duncan 1993 and Mahlomaholo 1998) argue that no research is neutral, hence the assertion by Smaling (1995) that the researcher needs to acknowledge and manage subjectivity rather than deny it. Research among humans is always an interpretation, and critical researchers are expected to openly discuss the values and biases that colour their interpretation as well as that of their respondents. This study therefore elaborates on the context and the person of the respondents. Their gender, background and beliefs are discussed as part of who they are (see paragraph 3.2.1).

3.1.3.6.4 Rhetoric or language of research

Critical emancipatory research pays particular attention to literary expression. Language represents the voice of the researcher as well as the researched and their beliefs. They use language persuasively and they may use first person narrative. To study the conceptualisation of educational technology, this study aimed to investigate meaning construction concerning first-hand experience through the use of language.

3.2 DATA GATHERING PROCEDURES

Classroom observations as well as participant interviews constituted the primary means of collecting useful and relevant data for this study. Once the respondents agreed to participate in the study, requests were made to observe and make video-recordings of their classroom teaching. Besides notes recorded during and after informal meetings, the data was collected through one video-recorded lesson and one recorded interview with each of the participating teachers . The interviews were done at the teachers' offices immediately after the classroom recording. The lesson recordings were done in the teachers' usual classes at their schools with lessons of their

choice. They did not prepare a special lesson and the study was meant to be as minimally disruptive to the teachers' program as possible. Details of respondents and their participation are given below.

3.2.1 Respondents

The respondents in this study are two teachers. For the purposes of this study the two will be described separately and within their school contexts. For ease of communication and for ethical reasons they, as well as their schools, are given pseudonyms. They are named Lerato and Themba and their schools Khanya and Thembisa primary schools, respectively. They were identified after a pilot study which consisted of informal visits to different schools in the area. Their slightly different but interesting circumstances and manner of teaching promised to respond to the needs of this study. The schools are not far from the researcher's place of work and that made it possible to visit the schools whenever possible.

3.2.2 Information about Lerato and her school

Lerato is a female teacher in her early thirties. She and her eight year old son live with her parents in another section of the township. A third born child after two elder brothers, followed by one younger sister, she had a comfortable and protected childhood. Although Lerato is a friendly person she would not talk about herself. Meeting her in her home made it apparent that she was warm and relaxed, and serious about her teaching profession. Lerato always was a striking example of responsibility and duty.

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Lerato obtained her school education at the local schools and she completed a Primary Teaching Diploma in 1992. The year 2000 is her seventh year at Khanya Primary School. Her experience in teaching at the school ranges from Grade 4 for the first two years to teaching Geography, History and Afrikaans in Grades 6 and 7 for the subsequent three years (1996 - 1999). Currently, she teaches Grade 7 Geography, Afrikaans, life orientation and arts and culture learning areas. Her school principal presents her as a 'very responsible, conscientious and diligent teacher'. She has the respect of her learners and colleagues.

Khanya is a well established primary school in Mangaung. The school is not equipped with sophisticated electrically operated or electronic equipment to use as teaching and learning media.

Besides a supply of textbooks from the government's Department of Education, teachers have to improvise to support their teaching.

3.2.3 Lerato in the Geography classroom

The Grade 7 class that Lerato teaches consists of a large group of 44 learners. For some lessons the partition which divides the two Grade 7 classrooms is opened and she teaches one large group of about 88 learners at the same time. The learners sit in small groups of about six with their textbooks on their desks. She confesses that while the groups are small, they are too many for one teacher to manage simultaneously. Learners come to the geography class with textbooks and atlases. They also have dictionaries to check for words they do not understand from the lesson. The learners follow in their textbooks as the teacher asks questions and explains concepts during the lesson. Towards the end of the lesson the learners are given a task to work on in their groups. The task consists of examples of posters provided in the textbooks for learners to work on and report back to the class.

3.2.4 Themba and his school

Themba is a male teacher in his late thirties. He came to Bloemfontein in 1996 and has been teaching at Thembisa Primary School since he arrived in January of that year. Before he came to Bloemfontein, he taught at different grades at various primary schools in the Eastern Cape. A conversation with him soon reveals deep Christian beliefs in a life coloured with varied experiences of poverty and determination. However, his life story is told with a great sense of humour.

One of seven children, Themba had left school after finishing Grade 11 (previously Std 9) to spend a year in the mines to earn money to pay for his matric studies (books and fees) and to support his parents in preparing for his rite of initiation into manhood. In 1982 he finished matric and had to look for a job the following year. His father offered to assist him through teacher training. He completed his Primary Teaching Diploma (PTD) at the end of 1986. After teaching in his home area from 1987 to 1995 he wanted to experience working in other places. Consequently, he started teaching at Thembisa Primary school in 1996.

When he arrived at this school Themba taught geography and Xhosa and he introduced

agriculture as a new subject at the school. The problem in teaching agriculture was how to handle practical periods in which learners would be expected to do gardening as prescribed. During these practical periods he decided to engage the learners in cleaning activities around the school grounds. His sense of humour again surfaces when he tells of how the principal began to appreciate his abilities and respect him for being practical because the school ground had never been appreciated and cared for in the way he did.

Initially Themba was reluctant to participate in the interview alone arguing that his head of department was the more appropriate candidate who had more expertise and held a higher position. The initial conversations were held with both, and both their classrooms were observed, but it was apparent from these that the two teachers had different orientations to life in general and that their classroom patterns were different. Themba was identified as the more appropriate candidate for the purposes of this study and he was selected for further participation.

His questioning attitude indicated that Themba was not one to work with strangers. To obtain his participation, it seemed, one had to be a human being he could relate to. It was only after informal conversations he came to know the researcher as another Christian and teacher that he seemed comfortable to participate in having his classroom teaching observed and allowing recorded interviews.

3.2.5 Themba in the geography classroom

The Grade 7 class in which Themba was observed was composed of forty learners. They were arranged into groups of about six learners each. Although the learners had textbooks they did not use them during the lesson. Themba led the lesson following an outline he brought to class with him. The classroom interaction shifted alternately between teacher- led and learner group discussions. The discussion started with learners working in groups. Afterwards the group representatives had to report to the whole class. The reports laid the basis for a teacher-led discussion of the work for the day. The teacher also had a map and some flash cards which were used as prompts for discussion.

3.2.6 Interviews

As this study is concerned with meaning construction, qualitative techniques were found more satisfactory in handling the practical component of the study. Observations and interviews were used as the main data gathering techniques complemented by the researcher's notes.

Interviews provide one of the most often used techniques in qualitative research. Marshal and Rossman (1995, p.80) define interviews as conversations with the purpose of obtaining certain information. As this study was concerned with meanings held by people, interviews were found very useful because they provided the researcher with an opportunity to personally interact with the respondents, listen to them, and seek clarity immediately whenever the need was felt. Although it was possible to administer the interviews telephonically or even in a group, this study gave preference to individual, face-to-face interviews. The free attitude interview technique as advocated by Meulenberg-Buskens (1997) was used as a tool for accessing useful data from the respondents. The next paragraph elaborates on the practical procedures used in conducting the empirical investigation .

3.2.6.1 Conducting the interviews

The classroom observations with each of the respondents were immediately followed by the qualitative interviews. The focus of the interviews was on how the interviwees conceptualised educational technology, or what educational technology meant to them. It was also the purpose of the interview to establish whether the respondent would consciously relate his or her classroom practice to the understanding he held about educational technology. Having established rapport with the respondent the researcher asked the broad question as to what the respondent understood educational technology to be. Both Lerato and Themba agreed to have the interviews recorded.

The video and audio recordings collected in the field were transcribed into written texts to be analysed with the use of Textually Oriented Discourse Analysis technique, developed by Fairclough (1992) as a guide. The technique was found appropriate for this study since it focusses on the extraction of meaning. The details of the analysis are discussed in chapter 4 of this study.

3.3 ANALYSIS AND INTERPRETATION OF INTERVIEWS

The data collected through interviews were transcribed and then analysed as 'text' in order to extract the meanings constructed by the two teachers about educational technology. This study is interested in determining whether the respondents conceptualise educational technology as a 'product', or 'as a process'. Each teacher's conceptualisation of educational technology was then juxtaposed to his or her classroom teaching to see whether the difference in conceptualisation was also manifest in classroom interaction patterns.

The data was analysed through Textually Oriented Discourse Analysis as propounded by Fairclough (1992). This technique was found useful in interpreting the respondents' discourses. The speakers' words are read as a 'text' which is further interrogated to expose the underlying ideology. Foucault (1980) calls this 'the regime of truth' to which the texts belong. The respondents' words reflect their beliefs about or understanding of educational technology (see detailed discussion in chapter 2). When read as 'text' these beliefs can be traced to the discursive practices operational in their construction which further mirror the social processes creating the 'speaking subject'. 'Text' does not exist in isolation but as a function of social structural and socio-political processes operating in the wider societal context (Fairclough, 1992).

The main question that the respondents were expected to answer in these interviews was what they understood educational technology to be. The response to this question revealed their understanding of technology in the context of their teaching. The report compares and contrasts the respondents' 'texts' and the findings are then compared with the trends observed in the classroom interaction. This comparison should indicate how the classroom interaction patterns of the respondent teachers relate to their conceptualisation of educational technology as interpreted through the interviews. The following are the themes which came through in the conversation with the respondents as they responded to the question.

3.4 ANALYSIS OF DATA ON CLASSROOM OBSERVATIONS

The lessons were the teachers' own as they had them in their daily teaching schedule. Although all Grade 7 classes in the Province handle similar themes and programmes, the teachers have a choice in scheduling lessons and themes. Attempts to have the same lesson taught were not successful and this was not considered a serious problem since the study had no aim of applying control or manipulating the teachers' actions in any way. The aim, on the contrary, was to understand the lessons in their naturalistic setting, uncontaminated by the researcher's intervention

(for a detailed discussion of using naturalistic setting as a powerful point of departure in qualitative research, see Creswell 1998; Guba & Lincoln, 1984; Smaling 1995). The belief held is that both lessons could be handled in a manner which could indicate whether the focus is on learners and learning or the memorisation of the lesson content.

As discussed in Chapter 2, and in the previous section, this study looked at two ways in which educational technology is conceptualised; in one it is conceptualised as a 'product' and in the other it is conceptualised as a 'process', 'know how', or an approach to teaching and learning. It was further argued that whereas educational technology as a 'process' focusses on the learner and scientific views about learning, educational technology as a 'product' tends to focus on the teacher and teaching.

In line with the developments in theories of learning, educational technology can also be referred to as 'a process'. This supports the qualities of meaningful learning referred to, among others, by Jonassen (1995). According to this author, in the context of social constructivist theory (the theoretical basis of Curriculum 2005), learning is active, constructive, collaborative, intentional, conversational, contextualised and reflective. The view of educational technology held in this study is therefore the one which sees educational technology as a teacher-friendly process which operates in classrooms, rather than exclusively in laboratories (Ashman & and Conway, 1993). Teachers are seen as technologists who must adapt their knowledge of learning theories to suit the situation in which they operate.

As technologists in their classrooms, teachers will constantly operate in a research mode. They seek to know their learners and the knowledge systems within which they operate. Theories of learning are used as a guide but not as a failsafe 'recipe' for teaching. Teachers constantly revise their strategies and draw on all available resources to assist their learners towards attaining their learning goals. In the final analysis, educational technology is not something to be bought and installed in classrooms. Instead, it consists of actions by people, which are aimed at facilitating learning.

The analysis in this study does not use all the aspects of the Lesson Assessment Grid (LAG), as would be the case in evaluating lessons presented by student teachers in practice. However, it is found to be a useful guideline to delineate the manner in which the lesson is presented. This will indicate whether educational technology is understood as a 'thing' or a 'process', by observing

how learner-centred/teacher-centred the lesson seems to be.

As discussed in Chapter 2 (see par. 2.3.4), the lesson conducted by a teacher who understands educational technology as a' process' will be more learner-centred in his approach to the classroom, whereas the teacher who understands educational technology as a 'thing' will focus more on the content. The point of departure for the teacher who understands educational technology as a process is the learner. The whole learning process is organised around the question, 'how can I help my learners to learn meaningfully?' The lesson is organised with a clear

plan of action in which learners are assisted to take an active part in the attainment of their learning goals.

Such a teacher plays has a classroom role of facilitator, coach, activator, motivator and orchestrator (Chapter 2). That teacher is able to nurture various types of intelligences in learners. He/she is able to move freely between direct teaching and other learner-centred strategies as is suitable for learning. Media will be used with a clear purpose based on how it contributes to the learning process.

3.4.1 In search of a 'yard stick': The Lesson Assessment Grid (LAG)

To systematise the analysis of the classroom data, the Lesson Assessment Grid (App.3), developed by the Bloemfontein Sub-faculty of Education, was used. Curriculum changes, particularly those that bring along a shift in theoretical underpinnings about human learning, pose a number of challenges to teacher training institutions, especially as far as the new mode of teaching, which is compatible with constructivist principles, is concerned. This grid was designed to meet such challenges. The researcher was part of the team that worked on this instrument captures the description of the process that gave birth to this grid (Mahlomaholo, in press 2001).

> This Lesson Assessment Grid (LAG) resulted from extensive and intensive research processes aimed at aligning teaching and learning with the new pedagogy of OBE. It also involved extensive negotiations around issues of theory and practice of this new pedagogy.

Having established the congruence between the understanding of educational technology as a 'process' and the basic assumptions of C2005 and OBE as introduced in the South African

Education system, this grid was found useful for purposes of analysing the data on classroom observation.

3.4.2 Analysing data in the context of the Lesson Assessment Grid (LAG)

Although the grid uses ten detailed categories for guiding and evaluating lessons by student teachers, this study did not use all of the categories in the same manner. Some aspects such as learning unit outcomes and learning unit planning was not closely interrogated since the teachers in this research did not submit lesson plans to the researcher. These categories could be followed broadly as the lessons progressed. The analysis focussed on broad categories which could reveal the teachers' understanding of their roles and that of their learners, the nature of knowledge and their understanding of the characteristics of learning in a social constructivist environment as mentioned in chapter 2 and summarised in this chapter (See par. 4.2 above). The question addressed here was whether differences in the conceptualisation of educational technology (found in the literature and revealed in the analysis of the interviews) translated into differences in practices. Another issue was whether understanding education technology as a 'process' was more compatible with constructivist views of learning in practice as alluded to in the theory (see Chapter 2). The other aspects of the grid were condensed in the following manner:

The focus on issues surrounding the learners' role, self-esteem and knowledge which are treated in both categories (2) and (7) in the grid, have been collapsed under the sub-topic '**Creating a conducive learning environment.**' The analysis that relates to the facilitator's role is treated under a separate subheading, namely '**Facilitator's role**. The focus is on aspects such as clarity and effectiveness of communication between the teacher and the learners, as well as among learners themselves. Aspects such as the manner in which the teacher assists learners to attain new knowledge and how the teacher intervenes to clarify concepts and so on are also looked at in this section. Furthermore, the facilitator's enthusiasm and skill at directing classroom activities from the 'back of the stage', as well as his or her efforts to challenge the learners and keep their attention by varying activities, are assessed.

The third aspect to be looked at is the **learning activity**. What kind of activities are the learners engaged in? Do they use group work, cooperative learning, and collaboration, and is the choice of activity appropriate for the learners' developmental levels? Is it relevant to the learning experience, and how was it applied?

Fourthly, analysis examines the **learning attainment** coupled with **continuous assessment.** This part questions whether learning is taking place by looking at the attempts made by the teacher as the learning facilitator to assist learners in the process of learning. Is learning demonstrated in the class? This section also includes **Closure,** which is concerned with whether a meaningful summary of the learning material is made. This aspect is included here because the learning facilitator is expected to continuously consolidate the learning experience by making a summary to link each section to the learning outcomes. At the end of the lesson each learning unit should be linked back to the previous one and forward to the next.

The fifth and final section in this part will look at the integration of **media** by checking what media were used, and how and whether they were used appropriately. The main concern is the manner in which media is integrated to attain learning goals. This study believes that the value of media integration lies in the creativity as well as the purpose and the manner in which they are used in the lesson. Even high technological artefacts such as television and computer programs make a contribution if they are integrated properly with the learning experience.

3.5 CONCLUSION

This chapter discussed the methodology and procedures followed in gathering relevant and useful data for this study. Before data gathering procedures could be discussed it was necessary to explain the paradigm from within which the research was conducted. This is necessary because the paradigm explains the world view and the assumptions that the researcher brings into the study .It further discusses the methodological choices, namely the techniques used for data gathering, including the role of the researcher. Having chosen the emancipatory paradigm as the framework, this study employed qualitative interviews and classroom observations for data collection.

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

This chapter reports on the data analysis which proceeds in three stages. The first stage reports on the analysis and interpretation of data collected through interviews. This phase of the analysis attempts to indicate how the two respondents conceptualised educational technology differently. One respondent (Lerato) sees it as a product, and the other (Themba), sees it as a process. The next phase analyses and interprets the data collected through classroom observations and will show that the respondent who conceptualises educational technology as a process also uses educational technology differently from the one who conceptualises it as a product. This is followed by a concluding section which attempts to integrate the findings.

4.1 Differences in the conceptualisation of educational technology

In analysing the interviews it became apparent that the respondents conceptualise educational technology differently. The manner in which the two teachers conceptualised educational technology could be associated with the two categories identified in Chapter 2 ('process' versus 'product'). As further elaborated in the following discussion, Lerato conceptualises educational technology as a 'product' while Themba conceptualises it as a 'process', or method or 'know how'.

4.1.1 Background knowledge of the concept '*educational technology*'

The conversation with the teachers revealed that they both did not have formal knowledge of the concept *educational technology.* It means that in teacher training they were never introduced to the concept in relation to their teaching practice. Themba makes it clear from the beginning that this concept was not used during his teacher training course. The following extract from Themba 2 (lines 2-10) bears witness to this fact.

2. T: Me (Laughter) I don't have these, as I have already explained to you that I was wondering what this is eh about, this that eh tech ... education technology, so what I know is only the method, not technology. I don't know in this ... I think is because I have done This eh training long time before, so that is why I don't know this eh what it mean technology, but as fas as the meaning is concern, for I think the way we do things that is technology education, technology for me I think is method of what we are doing things.
3. R: Mh
4. T: Yes but eh it was not given that name. We are talking about methods that is education technology I think it is.

5. R: Mh, but you understand it would mean the same thing as the method, the way you go about teaching?
6. T: For the first time I understand today.
7. R: That's interesting, you say for the first time you understand it today.
8. T: Mah ..., that is ...
9. R: Can you elaborate, can you explain a little bit ka nane?
10. T: Is because you are talking of the educational technology, now we have found the new name for the method of ..., I think that the thing we used to call the method of teaching, and now I know it is technology, is how we do things in the eh past, that is why we have other means like innovation, that is the way we have improved on our methods of doing things in the past. I think for example I'm doing eh at school the , eh sport management, I'm not going to call it sport management, I'm going to call it eh sport innovation.

From the above extract it seems Themba is grappling to make sense of the concept in a way that, he confesses, he has never considered as such before. Themba's meaning of educational technology is constructed from an understanding of technology as 'know how'. He finds it easy to transfer this understanding of technology to educational technology where he sees it as nothing else but the method or 'the way we do things'. He does not see educational technology as a fixed entity, for people continue improving on what they know and on the way they do things. He emphasises the aspect of innovation. From this moment onwards he continues to interpret educational technology in this manner as will be seen in the next paragraph (4.1.3).

Lerato also revealed that she was never introduced to the concept of educational technology during her teacher training course. When asked about this question Lerato had this to say (Lerato2 lines 219 - 228):

219 I: In your training, you trained here locally .....
220 L: Yes
221 I: For your teaching, you never heard of ..... technology of Education
222 L: No
223 I: Or Educational Technology
224 L: No
225 I: Something in that line
226 L: No
227 I: But you worked with various teaching aids
228 L: Yes

From an earlier question about the meaning of educational technology it became clear that she associated the concept technology with electronic artefacts such as television, mobile phones, radios and so on (see paragraph 4.1.3). The next paragraph goes further to explore how the two respondents interpret the concept educational technology.

4.1.2 Educational technology as a 'product' or 'thing'

The manner in which Lerato conceptualises educational technology is closely linked to her understanding of technology as a 'thing'. To Lerato technology is mainly related to machines

and other gadgets of the electronic family. The following extract indicates her understanding of technology clearly (Lerato 2, lines 29-34, 18-23, 43-49 and 47-55):

29. *I: Okay (pause) Mh ... maybe let me ask you further about, just technology, what ... what does technology mean to you? What comes to your mind when you think of technology?*
30. *L: May be ... cell phones is part of technology, televisions tele ... Yes*
31 *I: So you see it as specific as things like that?*
32. *L: Ja ... (Yes)*
33. *I: ... Like this and that ...*
34. *L: Mh ... or maybe by ... by inventing some of the ... just technology*

As shown in the above extract Lerato's understanding of technology centres around a specific family of gadgets, the electronic gadgets of communication such as television sets, radios, cell phones and computers. There is no indication of her seeing technology as a 'process' throughout the conversation. This understanding of technology further informs the manner in which she conceptualises educational technology as indicated in the following extracts:

18. *I: All right (pause) I ... want to say can you tell me, to you ... what Educational Technology is? ...According to your understanding, your ... knowledge.*
19. *L: I think Educational Technology is maybe to make pupils in schools here to be aware, to teach them about maybe machineries or telephones.*
20. *I: Okay*
21. *L: In everything to do with technology.*
22. *I: Okay*
23. *L: So that when they are finishing their studies here at ... at schools*

Lerato's understanding of educational technology can be related to her understanding of technology as specific gadgets in at least two ways. Lerato seems not to make any distinction between technology of education as a learning area in the curriculum and educational technology as applicable to all learning areas across the curriculum. When the researcher probed further by asking her what an educational technologist would be doing she had this to say:

43. *L: Educational .....?*
44. *I: (Clarifying the question) If ... if we were talking about somebody who is an Educational Technologist ...*
45. *L: Mh*
46. *I: What would you expect that person .....*
47. *L: Maybe who is teaching Technology .....?*
48. *I: ..... to be doing just*
49. *L: Who is teaching Technology?*

To probe further, the question was limited to focus on just what a technologist is and this was her response:

47. *L: (Giggling) He ..... he ..... I think a Technologist (pause) Mh ..... can make maybe researches*

48. *I: Okay .....*
49. *L:Mh .....*
50. *I: To research*
51. *L: Maybe ..... how did they do maybe Cell phones*
52. *I: Okay*
53. *L: You know all those things*
54. *I: Okay*
55. *L: Where television comes from?*

According to the above extracts, the exploration of Lerato's understanding of educational technology seems to yield one response which runs throughout the conversation. Her response is that educational technology is about teaching learners about the 'new' communication gadgets. It is not understanding educational technology as the use of these gadgets for educational purposes, namely to enhance learning See Chapter 2). Technology to Lerato does not invoke thoughts of media, a view that seems to colour many discussions of educational technology.

4.1.3 Educational technology as a 'process'

In contrast to Lerato the conversation with Themba indicated from the onset that his interpretation of educational technology is related to a process, the 'know how' of educating. To the first question as to what he thinks educational technology means he responded thus:

2. *T: Me (laughter) I don't have these, as I have already explained to you that I was wondering what this is eh about, this that eh tech ... education technology, so what I know is only the method, not technology. I don't know in this... I think is because I have done this eh training long time before, so that is why I don't know this eh what it mean technology, but as far as the meaning is concern, I think the way we do things that is technology of education, technology for me I think is method of how we are doing things.*
3. *R: Mh*
4. *T: Yes but eh to it was not given that name. We are talking about methods that is education technology I think it is.*

From the above extract it is apparent that Themba does not associate the concept technology with specific gadgets but with the way things work, innovation and something that can be improved upon every time. The meaning is not fixed, as the following extract lends evidence:

223. *T: Okay, now I think technology is the way we do things in any field.*
224. *R: Mh*
225. *T: It is eh technology, because each and every time if we have these technology we can improve on it.*

To substantiate his argument Themba makes the following examples of his understanding of technology (Themba 2):

227. *T: You can innovate it to see that this is okay the advantage of this and this is also the disadvantages. So can't we improve in order that we can do more easier, that is I think that is why we are having technology.*

228. *R: Mh*

229. *T: Because for example in the olden times, let's say T.V. it was a new technology then, and then we were having a black and white.*

230. *R: Mh*

231. *T: now we are having the 'tech' the colour T.V.*

232. *R: Mh*

234. *T: That is the innovation it is an innovation like the car ..... In the car industry, new technology, now the more petrol they are trying to make it rounder, like, I am thinking of eh aeroplane, aeroplane is sharp at the front there, so that it can go easy against the wind.*

235. *R: Mh. Mh*

236. *T: So that it cannot consume more petrol. And also now with the car they have changed totally the way they are doing cars. Now also they are trying that they should be sharper not eh having eh big front is a little bit smaller, that is the new technology.*

237 *"That is the way how they are doing things so that they can er ... be more better, for example cars so that they cannot consume petrol. In education so that there can be more learning and understanding from the learners.*

Although the above examples refer to specific things such as the television and the car, his focus is clearly not on the gadgets for their sake but it is how they are made and changes are implemented in them to meet new challenges. This is a powerful statement that clearly indicates Themba's stand in interpreting technology. The change in car shapes, after the aeroplane, is related to a particular understanding of the dynamics of travelling, which includes forces against the wind as well as assumptions regarding fuel consumption.

Themba finds it easy to relate to the above understanding of educational technology. This relationship does not seem to appear in Lerato's conceptualisation of educational technology as a specific thing. As revealed in the classroom interaction patterns (see par.4.3), Themba is more flexible and ready to improvise in his lesson than Lerato.

As observed above, the manner in which Lerato and Themba conceptualise educational technology agrees with the evidence indicated by the literature review (see chapter 2). The difference in their conceptualisation of education is further evident in the manner in which their conversation relates to other themes characteristic of educational technology as a process. The themes explored here (as discussed in chapter 2) include views about the teacher's role in the classroom, the value of group work, learners' role in classroom learning and issues related to integration. These themes are briefly discussed below.

4.1.4 Views about role of technology in classroom teaching and learning.

Chapter 2 established and argued that the understanding of educational technology as a process is congruent with a learner-centred classroom approach (, Heinich et al, 1989; Rowntree, 1982).

Teachers are therefore seen as life-long learners and participants with their learners in the construction of knowledge. A teacher who conceptualises educational technology as a 'process' would be expected to understand his or her role as a facilitator. He or she organises learning activities as a director in a community of learners. He or she does not see him herself as the sole owner of knowledge.

Since Lerato seemed not to make a distinction between 'technology education' and 'technology of education', it was difficult to let her speak of educational technology in relation to her teaching of Geography and other subjects. She first thought of the relationship between the teachers' role and educational technology as that of a teacher teaching learners how to operate things such as computers. On requesting her to clarify her response in the context of Geography teaching, she had this to say:

105. L: *Okay, they are related because let's say maybe you are using ..... you are doing eh ..... Geography.*
106. *I: Mhm ....Oh! ..... Yes*
107. *L: Maybe you want to show them something maybe a map.*
108. *I: Okay*
109. *L: What did they use this thing ..... Mh ..... so that people can see clearly*
110. *I: Okay*
111. *L: What is this thing they use?*
112. *I: Overheard projectors*
113. *L: Overhead projectors*
114. *I: Okay*
115. L: *I think is ..... is Technology, you can use every ..... in every learning area.*
116. *I: Okay. Okay. So .....*
117. *L: I think that's technology*

As already indicated above when considering educational technology Lerato looks at specific things (gadgets or artifacts). The use of educational technology in her teaching is associated with using the overhead projector and using computers, television and radios in the classroom. As has been argued in chapter 2 the absence of these items/gadgets at the school is equated with absence of technology, and it seems to impede learning. To the question about how Lerato handles the situation in the absence of these resources she had this to say (Lerato 2, lines 159 - 160; 161)

159. L: *They can think*
160. *I: They can think?*
169. *L: I help them (pause) I get them to ..... lead them to the answers maybe*
170. *I: Okay*
171. *L: I don't know how to ..... I'm using leading questions*

From the above extract it is observed that Lerato's concept of educational technology does not move beyond the specific kind of media. She does not readily think about teacher and/or learner-

made media as an aspect of educational technology. She does not talk about improvising or making her own media which can be used to substitute the technological artefacts that she does not have. Rote learning seems to be a natural alternative.

Contrary to Lerato, Themba sees the application of educational technology in his teaching as the application of techniques such as group work which focus attention on learners. This is a shift in how things are done in line with changes in pedagogy. His argument is (Themba 2lines 18; 61):

18. *T: So but the technology now in education is that we should involve eh .....children more.*

66 *T: Because children were not they were passive, but now in the new technology now there is more involvement of children, that is why I am saying excuse me more time should be given to the children so that they can participate, they are the ones who suppose ... Just the way teachers suppose to guide them only, they should come up with everything.*

Learner involvement, according to Themba, also involves considering the learners' knowledge and he sees the group work as a relevant technique in this regard. The following extract (Themba 2 lines 22 - 26) testifies to this understanding:

22. *T: Is concerned and we also talk of skills*
23. *R: Mh..*
24. *T: That is why sometimes we ask them to do things like group work is focussing on the knowledge that they have.*
25. *R: Mh.*
26. *T: Sometimes you ask them to draw things, for example today if we are having er.. If it was you were going to be in the second lesson, we were going to er.. Introduce the map of South Africa previously and now, so they were going to tell me how was South Africa before, can you draw me that map so that I can see there are talents in the children that they are good in drawing and so on, like that, and their past knowledge. And how did they see now, South Africa the new South Africa with nine provinces instead of four provinces.*

Unlike Lerato, Themba's views concerning the use of technology refers not to specific gadgets but focusses on learning and the involvement of learners in learning and includes teaching methods and techniques such as group-work, and letting learners talk more than the teacher in the classroom. He believes that the teacher is a facilitator but learners must do the learning and construct their own knowledge and draw maps etc. to demonstrate their understanding. His views on the role of the teacher are captured in the extract below (Themba 2).

64. *T: Okay, the difference is that the old method that we were using is just not child-centred.*
65. *R: O.K*
66. *T: Because children were not, they were passive, but now in the new technology now there is more involvement of children, that is why I am saying , excuse me, more time should be given to the children so that they can participate , they are the ones who suppose...Just the way teachers suppose to guide them only, they should come up with everything.*

4.1.5 Differences in conceptualisation of educational technology in a nutshell

The evidence extracted above indicates that as witnessed in the first theme Lerato's understanding of the use of educational technology in the classroom is attached to specific gadgets. She thinks specifically of using overhead projectors and she says she would use them if they were available. The absence of the equipment is seen as disarming and as an absence of technology. There seems to be no immediate sense of 'integration between pedagogy (theory) and media.

On the contrary, when Themba talks about using educational technology in the classroom he integrates issues of pedagogy (theory) technique and media. Another theme that comes through from both teachers, although expressed differently, is that they understand that educational technology should be applied to their teaching. However, the different ways in which they conceptualise educational technology, seem to inform their understanding of problems associated with the use of educational technology in classroom teaching and learning.

4.1.6 Problems related to the use of educational technology

The differences in conceptualisation of educational technology translate into differences in the understanding of problems facing teachers in their teaching. For the teacher who conceptualises educational technology in terms of things the problem is interpreted differently from the one who sees educational technology as a process. Lerato, whose concept of educational technology is constructed around specific gadgets, sees the problem (from a 'product' point of view) as lack of resources, hence her recourse to the question and answer method of teaching.(see par 4.1.3 above). As shown in the extract below (Lerato 2 lines 227 - 263), Lerato does not lack the skills of improvising but does not see the need to do so. As a student of art she used different materials, from everyday life, to make teaching aids at College and she has tried to do this in her teaching of arts and culture. (see Lerato 1 237 - 250).

L: The teaching aids that we were using there
7. I: Mh .....
8. L: We were using real things
9. I: Okay
10. L: Like maybe when we are doing a collage
11. I: Aahaaa .....
12. L: We will go with rice, we take that rice from home
13. I: All right
14. L: And glue, we are going to ..... maybe you are building a house
15. I: Okay
16. L: With that rice
17. I: Mh .....

18. L: You know you are pasting, we were using real things but now in our schools when you say to a child come with rice, others don't have it
19. I: Mh ..
20. L: Because at college we were having resources, because we were students
21. I: Okay
22. L: They were paying for that
23. I: Okay
24. L: Mh .... everything was there overhead projectors, computers, televison, radios
25. I: mH ..... MH .... MH ..... so do you sometimes find that you have to make your own teachings aids?
26. L: Yes, sometimes .....
27. I: At school?
28. L: Yes. MH .....
29. I: Can you tell me one example, what have you used ?.....
30. L: Yes. Eh ..... in Art, Art and culture
31. I: Okay.
32. L: I did use {Clearing her voice} printing, you know printing,
33. I: Okay

The problem is that the resources which were available at college are not available at the school environment. Some of the learners are so poor that if the teacher asked them to bring things from home they do not have them. (See lines 250 - 251). It was easy at college because the resources and the (technological) gadgets (see lines 257 - 263) were available. At another level Lerato does improvise for teaching Arts. When she thinks about improvised teaching aids she thinks about 'Art and Culture' as a learning area. There she is free to improvise and she has tried some of the skills in her teaching. (See lines 231-235) and (Lerato 2 lines 262 - 268).

L: MH ..... most of them came with it let's say all of them they managed to come with that potato.
34. I: MH .....
35. L: The lesson was very successful
36. I: Okay
37. L: We use the painting, here at school we have the painting
38. I: I see
39. L: The brushes.
40. I: All right, all right
41. L: They have designed very beautiful patterns
42. I: Okay
43. L: It was successful

This improvisation, however, seems to belong to the specific learning area (Art and Culture). It is not transferred to other learning areas such as the teaching of Geography (see Lerato2 288 - 298). It seems from the above discussion that Lerato's conceptualisation of educational technology is built around fixed categories of knowledge. Knowledge comes in fixed compartments to her. She sees learning areas as fixed, separate entities with specific skills that apply to them. Teaching aids of a certain category are suitable for particular learning areas and there seems to be no integration of knowledge in her understanding.

In his conceptualisation of educational technology as 'know how' Themba advances different factors that challenge teachers' use of educational technology at schools. He is aware of the problem of lack of resources (mentioned by Lerato) but (unlike Lerato) he sees improvisation as a natural aspect of teaching. He puts value in teacher-made as well as learner-made media, hence the use of flash cards and own maps. The drawing of maps by learners is to him a learning activity and a necessary exercise indicating their knowledge and skills (Themba 2 lines).

> T: And sometimes you ask them to draw these things, for example today if we are having, eh if it was you were going to be in the second lesson, we were going to eh to introduce the map of South Africa previously and how, so they were going to tell me how was South Africa before, can you draw me that map so that I can see there are other talents in the children that they are good in drawing and so on, like that, and their past knowledge. And how did they see now, South Africa, the new South Africa with nine provinces instead of four provinces.

Although the above is related to media, Themba moves beyond media in talking about challenges facing teachers who want to use educational technology in their teaching. For him the changes in methods and techniques of teaching and learning such as outcomes-based-education, are aspects of educational technology. The use of educational technology is then associated with the expectations laid upon teachers by their superiors and employing departments. In this regard he argues that the learner centred technologies (as introduced in the curriculum 2005) are time consuming and that in order to finish the prescribed work teachers tend to revert to teacher-dominated classroom practices. A similar reaction has been observed among teachers in other parts of the world when faced with similar challenges (Mc Donald & Ingvarson 1997). The extract below (Themba1 lines 16(a) - 16 (i)):

> 16. Okay. I am also ... we are now, being introduced so soon into eh O.B.E. so now that is eh another
> 16 a) eh education technology the improvement in education because, the first one; when
> 16 b) you have been trained, we were trained as that there were no involvement of the children, but
> 16 c) now eh the education technology have changed now because we are involving more of the
> 16 d) children, unless, eh we are because is not, we are trying, but we are not yet. I don't think we
> 16 e) are (laughter) fifty-fifty or (laughter) we are still above. I think sixty-forty, the teacher is still
> 16 f) having sixty instead of forty as the children should participate more. Eh. Another reason I
> 16 g) think that is, that's why ..., the problem is lying on that, at the end of the day you are going
> 16 h) to be asked, why the children have not achieved so much and so much, and then the teacher
> 16 i) they tend to continue a much of talking and less involvement at the teaching.

From the above extract Themba refers to educational technology as an approach to teaching and learning and one problem which can hinder its adoption. There is still another problem that he sees as a stumbling block in the adoption of a new approach to teaching and learning.

Themba argues that when a new educational technology is introduced to the education system there is always the problem that those teachers who have been in the field for long, and who were

trained under old technologies, tend to resist change. In resisting change they tend to negatively influence new teachers who arrive with new ideas. Since the new teachers depend on the experienced teachers for socialisation and guidance into their profession. they tend to conform to what is happening at the schools. They yield to the pressure of those who are normally senior and have power to influence their professional development positively or negatively. The following extract bears testimony to this observation (Themba lines 38 - 40):

38. T: When you teach this, teach it in this and so on. So it is not good for, eh, the department of education or any eh, eh education institution to having a few individuals being taught the new methods or new techniques how to do things.

39. R: Mh

40. T: And then the others they are not being introduced, because now there is going to be confrontation, coming with a new thing and this, your superiors, because he is your superior. He is going to say no this is not been done like this, lets do it and then the information that you have is going to sip away because you are not using it. Since then I was behaving real like a cram, since because it was that time, that I went to school, it was that time and then meaning that there were new methods of teaching and so on.

Educational technology is presented as a function of discourse. From the above extract it is clear that Themba's broad conceptualisation of educational technology yields insight to problems of a socio-political nature operating in the understanding and use of educational technology by teachers. Media are not the only concern. Authorities, as well as older teachers in the system, influence the discourses around technology and hence tend to colour the concept and teacher practices in a negative way.

4.1.7 Summary

This section analysed and interpreted the data collected through interviews. The findings from this analysis indicated that as revealed in the literature review, educational technology is conceptualised differently. The manner in which the respondents conceptualised educational technology was found to be similar to that found in the literature. The next section discusses the findings gathered from classroom observation. The analysis is done through the LAG (see Chapter 3).

4.2 FINDINGS FROM CLASSROOM OBSERVATIONS

The differences of how teachers conceptualised educational technology were compared to the way in which they handled their classes in practice.

4.2.1 Creating a conducive learning environment

This section looks at how the lesson is introduced, that is, the quality of arousal. Other aspects include flexibility, centering on how flexible the teacher is in responding to learners, meaning, whether learners are accepted for who they are and whether they are recognised as individuals. The teacher's response to learners also forms an important aspect of this section because in them the teacher's attitude to the learners' knowledge is revealed. It is also important in determining whether the learners are encouraged to think constructively and articulate their views, or if they are only expected to repeat what they read in the book. Thus, creating a conducive learning environment is more about attitudes than it is about physical space and equipment, although the latter has an important role to play. Learners are first humans holistically before they are learners, and they must be addressed as such.

4.2.1.1 Quality of arousal.

The manner in which Themba introduces his lesson on the 'Rainbow Nation' (lines 1-8), shows an attempt to make the lesson personally meaningful to the learners, an act which indicates an emergent awareness of educational technology as a 'process' operating in his teaching. Asking the learners about 'who among them was born before 1994' (line 1) is an invitation to each learner to relate the learning experience to their personal life from the beginning. Their years of birth may not be directly connected to the lesson, but they are each and all invited to the lesson as persons.

Extract from Themba 1:

1	T: Who was born eh, before 1994? {The teacher rephrases the question} Who was born before 1994? {Some learners raise their hands up}
2	Is only one, two, three, four, six, seven { counting learners }
3	Only the half of class say who...the people who were born before 1994. {Pause}Haa!
4	When were you born? { The teacher reformulates the question}
5	L1: In 1985.
6	T: { repeats learner's response} 1985. Nineteen eighty-five is before or after nineteen...nineteen ninety-four
7	LS: { in chorus} Before nine...
8	T: It is before. Why you don't you put your hand up? Why?

From the above extract, one sees the teacher using probing strategies to assist the learners to remember when they were born (line 2-3) and then whether they were born before the year 1994 or not.

As a strategy to gain their attention and interest the teacher invites the learners to relate personally to the learning experience as part of their lives and not only detached as geographical events.

As this question is used to get the learners' attention, the teacher waits to get the learners to respond before moving on with the lesson. When he sees that only a few learners show that they were born before 1994, he reformulates the question and even pauses to see that the learners pay the necessary attention to the question (line 3) before reformulating the question (line 4).

The situation is different in Lerato's lesson. Although Lerato also begins her lesson on 'Resources for survival' with a question (line 1), it is an analysis of the lesson topic which is already written on the chalkboard. It becomes clear from the onset that what the lesson is about is the content and there is no clear concern about creating an invitational atmosphere for learners to participate meaningfully in the lesson. The manner in which the learner's response to the very first question is handled shows no flexibility towards his attempt. Besides the fact that the teacher expected a specific answer it is not clear why this learner's response is not accepted (lines 2-4). The teacher does not show any appreciation of the learner's attempt to answer her question. Thus the learner is not encouraged to make another attempt or explain his understanding of 'survival'. The following extract from Lerato 1 (lines 1 - 11) bears evidence to this fact.

1. What is to survive? To survive? Bergman. {picking the learner}
2. Invisible learner: To be save.
3. T: Ha! (What?)
4. L1: To be save
5. T: to be save {then says something inaudible picking another L.}
6. Invisible learner: To live
7. T: To live neh!
8. LS: Yes: Eya (yes) to be alive, to live , to be...
9. LS&T: alive
10. T: Survival resources for...{reading from the board}
11. LS: life
12. T: now what are the resources ? resources. What are the resources? {No response from the learners}
13. Okay take out your dictionaries, and look for this word resource. Take out your dictionaries, quickly {learners do likewise.} Another learner is going to fetch his dictionary from his classmate} dula maan. (Sit down!) {He is going back to his seat} Okay! Refilwe, did you get it?
14. Invisible learner: {Refilwe} Yes mem.
15. T: Okay!
16. Invisible le rner: {Reading from dictionary} Resources are things that are needed most by the country.
17. LD: Yes. Resources are things neh!
18. LS: Yes mem.
19. T: Needed mostly by a ...
20. LS: Country.
21. T: Neh!
22. LS: Yes mem {some nod their heads}

The problem here is that the same meaning the learner associated with 'survival' is again used by the teacher (line 23) when she asks the learner to name resources.

23. T: Now, who can tell me, what things do we need in our country? That can save our life, our daily lives {one learner is raising his hand up} What things do we need in our country, that can save our lives? Aha! Banda {picking another learner}

Given the opportunity the learner would be happy to know the difference in this interpretation of 'survival' from what he said in lines (2 and 4). Thus the rigid categorisation of meaning revealed in conceptualisation of educational technology surfaces here in Lerato's treatment of the learner's response.

From the above discussion it can be argued that Themba's lesson is superior to Lerato's in terms of the quality of arousal towards creating a conducive learning environment. Themba goes out of his way to appeal to learner's personal experience in order to get their attention, thereby indicating his emergent awareness of educational technology as a process: focusing on the learner. Lerato seems to take the learners' attention for granted. Her concern seems to be on decontextualised content, a kind of practice that seems in line with the rigid inflexible manner in which she conceptualised educational technology as specific artefacts. She does not show the same degree of flexibility and patience to make the learners feel invited and comfortable as shown in Themba's lesson.

This point is even clearer in the discussion of how the teachers deal with learners' prior knowledge and their response to questions.

4.2.1.2 Establishing prior learning and flexibility towards learners' responses

In moving on with his lesson Themba makes a decided attempt to use the learners' relevant prior knowledge as a stepping stone to the classroom discussion. In line with his emphasis on group work technique as an aspect of educational technology, his lesson begins with the learners brainstorming in 'buzz' groups.

Instead of going ahead with the lesson by discussing what the 'rainbow nation is about', Themba uses the learner's existing knowledge as a stepping stone to begin the lesson. Learners are further given a group exercise to distinguish between the apartheid and democratic eras by listing things and events characteristic of each one (Themba 1 lines 38 -43).

38 T: So now, I want you to, Eh in your groups, to tell me {putting a piece of paper on the
39 table} things in the apartheid regime which were not...which were there and the things that
40 are being done now in the { democracy }So in your groups ...{taking sheets from the table}
42 can't you write about five. {learners are given task} In your group you know your groups
42 LS: Yes.
43 T: Now start, is the time {I'm...} I'm just giving you only...about six minutes. { learners do likewise}

By using this group work exercise to begin the lesson, the teacher indicates an attempt to use the learners' prior knowledge as a point of departure in this lesson. The learners are collaboratively engaged, as they are expected to use their knowledge and experience towards defining apartheid and democracy. These learner-group discussions culminate in a whole class discussion in which group representatives report their findings. This approach builds towards active participation of the learners in the co-construction of meaning. This reality is different in Lerato's class.

The manner in which Lerato treats learners' responses does not encourage exploration. When she asks questions, it seems, the only acceptable responses are those read from the textbook or from the dictionary. The only responses accepted are those predetermined by the teacher at the specific time.

The same rigidness and lack of flexibility observed in her conceptualisation of educational technology as specific artefacts seems to operate in her treatment of knowledge in the classroom. Learners are thus forced to read definitions directly from the books . The teacher does not give them any opportunity to formulate their own responses to her questions (Lerato: lines 12 - 21; see par. 4.3.2.1). Even the definition read from the dictionary is accepted without interrogation, thus again indicating a degree of rigidity which is not compatible with a situation in which technology is used as a 'process' rather than a thing. The effort to make the learning event relevant to the learners' life experience which was observed in Themba's lesson seems to be absent in Lerato's lesson. This lack of flexibility is further evident in the manner in which the teacher reacts to the learner who wants to fetch her dictionary from a classmate during the lesson. The following extract (Lerato1: lines 20-26) bears witness to how the learner is harshly reprimanded and actually stopped from fetching her dictionary.

20. Okay take out your dictionaries, and look for this word resource. Take out your
21. dictionaries, quickly {learners do likewise.} Another learner is going to fetch his
22. dictionary from his classmate} dula maan. (Sit down!) {He is going back to his seat} Okay!
23. Refilwe, did you get it?
24. L4: {Refilwe} Yes mem.
25. T: Okay!
26. LS: {Reading from dictionary} Resources are things that are needed most by the country.

While it can be argued that it is the learner's responsibility to have his books together before the beginning of the class, the teacher also could be more understanding of the learners' intentions. The manner in which the learner is reprimanded 'dula maan'(sit down) in line 22, does not acknowledge him as a person with good intentions, though his timing is wrong.

4.2.1.3 Reinforcement

Teachers who understand educational technology as a process will be aware of the importance of using positive reinforcers in creating an environment conducive to learning. Both teachers know their learners and call them by their names (a commendable behaviour in recognising them as persons). However, there are differences.

As already mentioned above, the manner in which the teacher responds to learners' answers is not encouraging the learners to attempt their own responses. The only answers that get applauded are those read from the textbook. It is good to use resources such as textbooks and dictionaries but a teacher who does not see knowledge in such a rigid manner as argued in chapter 2 will allow learners to explore meanings and make their contribution; thereby nurturing the learners' self esteem.

T: Neh! And nourishment {writes on the board while saying it }
24. Nourishment. What is..... what is to nourish, to nourish. The meaning of this word. To nourish. To nourish.
25. Moenane {picking L}
26. L14: To nourish is to feed
27. T: Ha! (repeat again)
28. L14: To nourish is to feed.
29. T: To feed or to do what? To feed or.....Molwabi {picking another learner}
30. L7: To keep a person or animal alive and well by means of food. { L7 is reading from the textbook}
31. T: Yes. Keeping animal or a person alive by means of.....
32. LS&T: Food

Conversely, Themba seems to treat his learners politely and he goes out of his way to express appreciation of their contributions. Consider here the following extract:

169 T: Very well, okay, thank you {writing the response on the chalkboard}
170 No marriage between black and white.
And
239 T: Thanks .....Er.....Thonana, when you are educated you are marketable, what can we say.....
240 T/LS: .... Marketable

Themba also seems to handle learners responses better than Lerato in that he does not just discard them as Lerato does when they do not repeat what is in the textbook. He reformulates or

acknowledges and redirects them, showing why certain parts are not acceptable. In this way learners are not discouraged from exploration but they are encouraged to reflect on their understanding. Thus even in reinforcement Themba's dealing with the learners indicates efforts to implement a learner-centred approach which is characteristic of educational technology as a process. The manner in which he deals with learners reveals more learner-centredness than it is the case in Lerato's lesson.

To conclude this discussion about creating a conducive environment for learning, it becomes clear that, although the two lessons are not completely different in that they are both content-based, Themba's lesson indicates a clear attempt towards using educational technology as a process. The manner in which he introduced his lesson, appealing to learners in a personal way and the manner in which he uses reinforcement and flexibility in dealing with learners' responses attest to his emergent awareness of educational technology as a process. Lerato's focus on content and the rigid, inflexible manner in which she treats the learners and their responses to questions reveal the same understanding of educational technology as a specific thing and the categorisation of knowledge into specific compartments. This attitude is not compatible with the assumptions underlying Curriculum 2005, which encourages integration of knowledge in the various learning areas as well as the use of various resources to facilitate learning. The next section looks at learning activities as an aspect of a technology of education.

4.2.2 Learning activity

In as far as learning activities are concerned, Themba' s lesson indicates an attempt to employ learning-centred strategies which are associated with the awareness that educational technology is a process rather than a "thing". Themba's lesson seems to move comfortably between learner-groups and teacher-led whole-class discussions.

38 T: So now, I want you to, Eh in your groups, to tell me {putting a piece of paper on the
39 table} things in the apartheid regime which were not...which were there and the things that
40 are being done now in the { democracy }So in your groups ...{taking sheets from the table}
42 can't you write about five. {learners are given task} In your group you know your groups
42 LS: Yes.
43 T: Now start, is the time {I'm...} I'm just giving you only...about six minutes. { learners do likewise}

The choice of group work at this stage can be seen as the teacher's decision to give learners ownership of their learning. It is a good strategy to acknowledge the nature of learning as active,

constructive and collaborative (see Chapter 2) and the activity is appropriately used given the nature of the task and developmental level of Grade 7 learners. Learners are also required to write their responses in preparation to give a report at the end of the group discussions. The group reporting and the teacher-led whole class discussion is an important activity in that it allows for sharing and the consolidation of the knowledge dealt with within the groups. The teacher finds an opportunity to deal with misconceptions and to explain where necessary. Learners are also given practice opportunity to articulate their understanding of the work.

290	*A rainbow nation. What does that mean? A rainbow? Yes, Mncele {pointing another learner}*
291	*visible learner} it means the ending of the rain*
292	*S:....Natin*
293	*So now what does that mean to us as South Africans?*
294	*Thiss rainbow. Yes {pointing a learner*
295	*learner} End of fighting*
296	*T: Stopping fighting. The Blacks, whites, coloured, Indians each an every group of people who os in South Africa we are ....one {demonstrating unity with his hands} Isn't it?*

However, Themba is courageously trying to conduct his lesson according to his conceptulisation of educational technology as a 'process' which is currently based on learner-centred, social constructivist pedagogy.

Unlike Themba, Lerato's lesson follows one mode of interaction, a one-dimensional question and answer method in which the teacher is asking questions and the learners are mainly involved in providing the answers. As already mentioned above, the answers to her questions must also be looked up in the textbook. For example learners are required to read advertisements and shopping lists from the textbook. At Grade 7 learners are capable of dealing with these activities in a more practical way but they are not challenged to do so. Thus, the rigid manner in which Lerato conceptualises educational technology as 'things' is evident in the way in which learners are expected to reproduce textbook or dictionary definitions without reflection, even in aspects that can be dealt with practically.

In Themba's lesson, an emerging awareness of technology as a process can be observed. In spite of the poor conditions and lack of resources, one observes a clear attempt to make the process of learning meaningful in the manner in which he organises the learning experience.

As observed in the conceptualisation of educational technology as 'know-how', Themba makes a clear effort to give learners more space to actively participate in the learning process. While his lesson is based on content, beginning his lesson with buzz groups indicates an attempt to involve

learners in co-operative learning by handling the content themselves. The learners are given the time and, the paper to write their responses and they are required to report back to the whole class at the end of their group discussions. The teacher visits the groups during their discussions to ensure that they are doing the task.

4.2.3 Facilitator's role

The facilitator's communication abilities constitute another crucial aspect of the use of educational technology as a process in the classroom. This section looks at the effectiveness of communication between the learners and the teacher. How the teacher assists learners towards the construction of meaning by intervening in their misconceptions is important. The teacher should be able to direct learners' activities without taking over.

4.2.3.1 Effectiveness of Communication

The effectiveness of Lerato's communication tends to be disturbed by vague consensus seeking remarks instead of explaining issues clearly to the learners. The chorused consensus from the learners, as shown by the following extract (Lerato 1, lines 22 - 27), is not a good indication of understanding:

22 LD: Yes. Resources are things neh!
23 LS: Yes mem.
24 T: Needed mostly by a ...
25 LS: Country.
26 T: Neh!
27 LS: Yes mem (some nod their heads)

Much time is spent in this kind of interaction and the purpose is not clear and it does not seem to contribute any meaningfulness to the learning process. Conversely, Themba seems to be more conscious of his communication with the learners. Although he also does more talking, his statements are better formulated and he explains meanings to the learners. For example, in the following extract one hears the same chorused responses but a different kind of communication from Lerato's above.

2. LS: Yes Sir.
17. T: But now what is happening?
3. LS: we are allowed
4. T: we are allowed to go to school there but many of us don't have
5. T&LS:.... Money

6. T: In order to go to.....
7. T&LS:.....town

4.2.3.2 Ability to direct learners' activities without taking over

Both teachers seem to have a problem when it comes to directing learning without dominating. The difference again is seen in the awareness displayed and attempts to deal with it. As indicated the subheading on learning activities, Themba is trying but has not yet overcome this problem while Lerato is silent about the issue.

Lerato does not allow learners the opportunity to explore meaning by guessing word meanings from the context or using their experiential knowledge before checking words from sources such as dictionaries. While the learners are constantly answering the teacher's questions, there seems to be little or no opportunity to reflect on or even formulate responses to the questions. As she asks the question she already looks for a learner with a response and immediately refers learners to the dictionary. The following extracts bear witness to this observation (Lerato 1, lines 12 - 16):

12. T: now what are the resources ? resources. What are the resources? {No response from the learners}
13. Okay take out your dictionaries, and look for this word resource. Take out your dictionaries, quickly {learners do likewise.} Another learner is going to fetch his dictionary from his classmate} dula maan. (Sit down!) {He is going back to his seat} Okay! Refilwe, did you get it?
14. Invisible learner: {Refilwe} Yes mem.
15. T: Okay!
16. Invisible learner: {Reading from dictionary} Resources are things that are needed most by the country

In the above extract the learners are not guided or even given opportunity to guess the meaning before they are directed to their dictionaries. While it is good to refer learners to learning resources, this reaction does not encourage them to communicate contextually and negotiate meaning. This practice represents a contradiction to a learner-centred environment where educational technology is understood as a process and meaning is negotiated.

4.2.3.3 Mediating meaning

Regarding the construction of meaning and intervention in the clarification of concepts Lerato seems to have given all authority to the textbook and the dictionary as discussed above. Learners are not encouraged to interrogate even the dictionary meanings. For instance, the dictionary does not give a single meaning for the word 'resource', but the first definition read by the learner is accepted as is. The result is that this meaning has restricted the discussion to the 'needs of a country' while needs and thus resources apply to individuals, and so on.

23 T: now what are the resources ? resources. What are the resources? {No response from the learners.

24 Okay take out your dictionaries, and look for this word resource. Take out your

25 dictionaries, quickly {learners do likewise.} Another learner is going to fetch his

26 dictionary from his classmate} dula maan. (Sit down!) {He is going back to his seat} Okay!

27 Refilwe, did you get it?

28 L4: {Refilwe} Yes mem.

29 T: Okay!

30 L5: {Reading from dictionary} Resources are things that are needed most by the country.

31 LD: Yes. Resources are things neh!

32 LS: Yes ma'am.

33 T: Needed mostly by a …

34 LS: Country.

Themba on the other hand uses experiential knowledge and examples to explain concepts. For example to explain the meaning of the Rainbow Nation, he discusses the example of the rainbow coming at the end of the rain and the fact that it has many colours to help the learners make sense of the term. To explain apartheid and the separation of residential areas, learners are forced to broaden their thinking from just blacks and whites to other groups. For residential areas they are directed to think about the locations where they live, then the coloured townships and the suburbs, starting with the examples in their own area. Thus, classroom learning is grounded in reality rather than book knowledge only.

4.2.4 Learning attainment

This section of the grid looks at the degree to which the learning outcomes have been attained in the categories of knowledge, understanding, values, attitudes and life skills. Although it is believed that all outcomes are not attainable in one lesson session, there needs to be a demonstration of some degree of attainment of the learning outcomes. A teacher who uses educational technology as a process in the class will be aware of the learning taking place and will consciously assist the learners towards the attainment of learning in the above aspects.

Although both lessons are seemingly focussed on content learning, Themba seems to be more conscious of opportunities to negotiate meaning and to caution the learners about behaviours which may not be compatible with good citizenship. The following extract reflect the aspects:

121. L8: All people have the right to vote

122. *T: Oh... okay , democracy it means that the people are having the right ....*

123. *T & LS: .....to vote*

124. *T: meaning that we talk of the (writing on chalkboard) government in short of the people. When we talk of democracy because if we can interpret democracy the children will think that democracy is when we want to do our own things where there is no one who is in authority, our parents even, they have no authority on us; now give me the things that were being done during the apartheid regime.*

In Lerato's class the focus remains on content as the lesson follows the textbook without reflection on the multiplicity of meanings a word can have. It seems the only acceptable definition is the textbook one. The following extract bears witness to this observation:

294. *T: Neh! And nourishment {writes on the board while saying it }*

295. *Nourishment. What is..... what is to nourish. to nourish. The meaning of this word. To nourish. To nourish.*

296. *Moenane (picking L}*

297. *L14: To nourish is to feed*

298. *T: Ha! (repeat again)*

299. *L14: To nourish is to feed.*

300. *T: To feed or to do what? To feed or.....Molwabi {picking another learner}*

301. *L7: To keep a person or animal alive and well by means of food. { L7 is reading from the textbook}*

302. *T: Yes. Keeping animal or a person alive by means of.....*

303. *LS&T: Food*

From the above extract it is unclear what the teacher does with the response the first learner gives for she moved to redirect the question without any comment. This is especially important because there is no difference between the learner's understanding and the explanation given by the textbook. The value of the textbook is in the formulation of response. This action may leave the learner with the impression that to be 'correct' is to regurgitate the contents of the book as it is. Thus again the rigid categorisation revealed in Lerato's conceptualisation of educational technology becomes a limiting factor in terms of knowledge building. From this instance (and others in the class) it seems that the questions asked of the learners required them to read the answers from the text book as they are. Even at the end of the lesson learners are expected to read advertisements from the textbook, thus losing an opportunity which the learners could use either to analyse the given advertisements or to make their own in order to demonstrate their understanding of the importance of these resources. The learners are not encouraged to move beyond copying to apply and/or transfer the learning attained.

317. *T: Neh! People are...are advertising their things neh, that are...that they are selling neh, so that the people can go there and buy those things neh!*

318. *LS: Yes*

319. *T: That is to advertise neh! Here are the examples of {pause} advertisement. They say here {reading from the textbook} "This advertisement which follow to find out where life forms can obtain the things they need and use to stay alive". It means in this advertisement, these things, are the things that makes you to stay....*

320. *LS&T: alive*

321. *T: Neh! The atmosphere show. Here is an advertisement*

322. *LS&T: Atmosphere show.*

323. *T: We said we need atmosphere neh! {Showing learner things that make atmosphere}*
324. *LS: Yes*
325. *T: The air akere? (Not so?)*
326. *LS: Yes*
327. *T: The air. {looking at the textbook} Who can read that advertisement for us. Who can read that advertisement.*

In his lesson Themba uses various opportunities to integrate learning across learning areas. He also talks to learners about further education and encourages them to consider learning in a broad perspective. For example learners are encouraged to learn in order to have better jobs and overcome the past in which blacks had no jobs and had to live in poverty (Themba 1,lines 328-337)

T: Do we have jobs today?
328. L8: No.
329. T: What can we do in order to improve ourselves? {rephrasing the question}
330. What can we do in order to improve ourselves to have jobs, what can we do?
331. Yes, Letswalo {pointing a learner}
332. L5: We must be educated.
333. T: The first thing we have Letswalo {writing on the chalkboard} improvement the first one
334. is.....
335. T&LS: Education. {writing on the chalkboard}
336. Why we need to be educated , why? Why Mncela?
337. L22: we can't have a better job when we are not educated.

In terms of continuous assessment, there is a great deal of questioning in both lessons. However, there is a difference in what the questions expect from the learners. In Lerato's class, as indicated already, learners are expected to regurgitate material from the book (see par 4.2.3.4 above) The questions in Themba's class cover a broad spectrum and learners are expected to use previously acquired knowledge as well as their experience in answering the questions. As revealed in his conceptualisation of educational technology, Themba sees assessment as an integral part of learning and uses it as such. For example, when learners talk about separation of people and residential areas, the teacher takes the opportunity to correct learners' misconceptions by indicating that separation does not only refer to 'black' and 'white', but all the demographic groups in the country. The following extract bears evidence (Themba 1):

57 Yes, Thonana
58 L4: People and white people.
59 T: Separation of...
60 Inv. learner &T: the...T:(of people
61 Inv. L&T: {Inv.L} The...{Teacher}....people. Of people only. Don't say that black and white because there are how...
62 Is there only black and whites in S.A.
63 LS: {In chorus} No.

From this extract, Themba's broad conceptualisation of educational technology as a 'process' is seen operating. He does not see things in pre-packed categories and he assists the learners towards the same mindset as he intervenes to indicate to them that South African citizens are not only black and white.

From the above discussion it can be concluded that Themba is closer to the use of educational technology as a 'process' and Lerato more towards the opposite pole. The learning activities in Themba's classroom, the focus on different types of learning as well as the continuos assessment seem to be directed towards learner-centeredness. In Lerato's class the focus is strictly on book knowledge, thus indicating the fixation on specific things as revealed in her conceptualisation of educational technology.

4.2.5 Media

This section focusses on the preparation and use of media (teaching/learning aids), their appropriateness and creativity in both aspects. A teacher who uses educational technology as a process would be expected to be innovative not only in preparing media but also in the way they are used lessons. The teacher would not only use "new" media but would also be imaginative so as to use "old" media in new ways (Rowntree, 1982). Of the important media used in the learner-centred classroom where meaning is a more important aspect of learning than memorisation, is learner talk. Teachers who use educational technology as a process will allow learners to articulate their understanding and language forms an important tool of meaning construction and negotiation (Vygotsky 1994).

Both teachers make use of media. Lerato, however, seems to stick to the given sources, namely the textbook, chalkboard and dictionary, while Themba goes further to use improvised material such as posters and flash cards alongside the chalkboard and the textbook. As already alluded to above, the textbook seems to be the dominant authority in Lerato's class. There seems to be very little opportunity for learners to use language creatively and constructively as they seem to be restricted to either the textbook or dictionary meaning (see 4.2.3.7 above). Thus the fixed manner in which Lerato conceptualises educational technology as a 'thing' (par 4.1.2.1) again appears. She seems to be restricted to pre-packaged teachings aids.

Although he does not have sophisticated media (electronic), Themba uses both the textbook and improvised items as media. He uses these alongside the chalkboard systematically during the progression of the lesson. Group work as a technique for learning features at different stages of the lesson. Flash cards and posters are also used as teaching and learning aids in Themba's lesson.

T: And also when we start to have our own business, if you don't think about business it
338. means that South Africa is going to remain very.....{lifting up a word card} is going to
339. remain.....
340. LS: {reading from the word card} very poor.
341. T: Is going to remain.....

Themba uses flashcards naturally as teaching aids. To him improvisation seems natural. The difference in the use of media seems to follow the differential conceptualisation of educational technology.

4.2.6 Closure

This section of the grid looks at whether the teacher consolidates the work meaningfully during the progress of the lesson. Teachers who use educational technology as a process will ensure that they have cognitively consolidated the work with the learners at every section of the lesson. This is to ensure that the learners develop a meaningful cognitive structure of the work as they move from one section of the work to the next. The teacher and learners are aware that each lesson does not stand in isolation but that it is connected to both the one preceding and the one following it.

This consideration seems to be absent in Lerato's lesson as she does not indicate this linkage either during the lesson or at its end. The class ends with the instruction to the learners about the task of designing the advert and there is no linking of the lesson to the next as the following extract indicates:

518. T: You must not copy that one, Ra utlwana ? (Do you understand me?)
519. LS: Yes
520. T: You can choose sunlight neh!
521. LS: Yes
522. T: In your own way. You can choose minerals food. You understand.

It is a different case in Themba's lesson for he makes an effort to consolidate the knowledge by way of summarising and linking it to the next contact session. The following extract bears witness to this observation:

301. T: And then when we say now.....U...U..Zenzile, Zenzile have said that it's a ....rainbow.....

302. T/LS:....Nation

303. T: So now what does that mean to us as South Africans?

304. This rainbow. Yes {pointing a learner

305. Invisible learner} End of fighting

306. T: Stopping fighting. The Blacks, whites, coloured, Indians each an every group of people who os in South Africa we are ....one {demonstrating unity with his hands} Isn't it?

307. T: In South Africa we suppose to work together we must be united because we are free at last, we are....

From the above extract it can be observed that the teacher takes time to consolidate the section while the next extract shows how he links the end of this lesson to the next one:

331. T: Thanks for your time, in the next period we are going to continue to talk about these things in groups, the things that we can do developing, industry {displaying the word cards} is what we have talked about starting business and then agriculture we talk of stock farming and then we will be.....{displaying/showing a word card}

332. LS: Break

4.2.7 Analysis of classroom observations: Summary

This section of the chapter focussed on analysing and interpreting the data collected through classroom observation. This discussion has indicated that although there are some similarities between Lerato and Themba's classroom interaction patterns, Themba's classroom reveals an attempt to follow a more learner-centred approach than Lerato's. Lerato's classroom was rather rigid and more teacher-centred with the textbook being the most determining authority of both knowledge and classroom interaction. Themba's class indicates an emerging pattern of the use of educational technology as a process. The next section discusses the analysis and interpretation of the data collected through qualitative interviews.

4.3 FINDINGS IN CONTEXT: COMPARING THE RESPONDENTS

In view of the discussion in Chapter 2, Lerato's conceptualisation of educational technology as a 'thing' is not surprising if viewed from its socio-historical context. That specific interpretation of educational technology, is in line with the 'commonsense' view of technology. This is the view which associates educational technology with progress, enlightenment and it being a determinant factor for the future(Noble 1991, Mackay, Young & Beynon 1991).

Lerato's conceptualisation of educational technology is situated in the commonsense understanding as disseminated by the media (Noble, 1996) as well as the traditional educational

technology discourse (Kozma, 2000). Carried further, this is the same view displayed by the science teachers in the study by Sameul, Naidoo & Suranski (1992) who thought that science experiments had to be done in formal science laboratories with prescribed equipment as prescribed by the text books.

The point made here is that while Lerato's classroom practices seem to be inferior compared to Themba's, there is a sense in which they (Lerato's classroom practices) as well as her conceptualisation are not anomalous. The politics of the textbook as a form of control (Apple, 1999; Hartshorne, 1992) and an ideological artefact (Thomas & Koyabashi, 1987), in the design of teacher-proofed curricular (McLaren, 1989) are some of the avenues that may need to be explored in order to understand Lerato's conceptualisation and use of educational technology. Teacher-training curricular in which such methods as the textbook method as well as the question and answer method are advocated may also be evoked to understand, to some extent, the interactive, but teacher-centred use of the textbook in the lesson.

The above discussion is no justification for what has been already classified as a non-technological approach to the classroom interaction. It is hoped that in this discussion it can become clear how teachers' behaviour and consciousness can be seen as connected to the wider contextual processes of education and society.

Moreover, the pattern discerned in Lerato's class is not far from the traditional methodology which specified linear steps in classroom teaching as introduction, exposition, actualisation and then functionalisation. In other words, the teacher teaches and then the learners practice. This is not judging traditional approaches to teaching as 'wrong' or valueless, but the argument here is that, read in context, the seemingly rigid, inflexible behaviour and practice witnessed in Lerato's classroom cannot simply be attributed to lack of resources or any single reason. The traditional understanding of educational technology, rooted in behaviourist approaches to education may be one of the factors to be explored towards understanding teachers' classroom practices, and the future development of upgrading programs.

Among the many teachers consulted in preparation for this study, Themba's conceptualisation of educational technology was a departure from the norm. The initial attraction to request him to participate in this study based on his practical approach to his profession, particularly in teaching agriculture (see Chapter 3), was confirmed, not only in Geography teaching, but in that his

conceptualisation of educational technology, as such, has moved beyond products to 'process', or 'know-how'.

Themba is not apologetic about improvising to make media for illustration in his lesson and he is aware of his responsibility as a 'facilitator' of the learning process in the classroom. Classroom learning to him is not completely separated from the societal context, a fact which is attested to by his flexibility of movement between what the book says and what is happening in the community/societal context.

4.4 CONCLUSION

This chapter analysed and interpreted the data collected in the field-work. The analysis sought to investigate whether the differences in conceptualisation of educational technology found in the literature reviewed in Chapter 2 existed among the respondent teachers. The data indicates that there is differential understanding of the concept of educational technology among the participants. The teacher who understands educational technology as the use of specific artefacts seems to also have a rigid concept of knowledge with fixed meanings. She seems to take the knowledge presented in books, namely textbooks and dictionaries, religiously without interrogating or contextualising it for the learner. Her teaching is therefore associated with the positivist behaviouristic approach associated with teacher-centred content-based pedagogy.

On the contrary, the teacher who conceptualises educational technology as a process seems to operate from a different orientation of knowledge. His teaching reflects a decided attempt to implement a learner-centred approach advocated by Curriculum 2005. In the absence of sophisticated media, he is not apologetic about improvising and making his own media or letting the learners do it. His understanding of educational technology seems to be more compatible with Curriculum 2005 than that of the other teacher.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter reflects on the study as a whole by first summarising the findings. Thereafter, the study is assessed, focussing on its limitations. Finally, suggestions and recommendations for future research are made. The summary briefly looks at the whole study focussing on the aims and goals, the research question and how the investigation was carried out. The latter reports briefly on the findings from the literature review. The methodology and findings of the qualitative research methods are also discussed briefly. The critique focusses on the limitations of the study methodologically and on its findings. The final section considers the findings and makes suggestions and recommendations for future research.

5.1 SUMMARY

This study, as stated in Chapter 1, investigated the conceptualisation and the use of educational technology by teachers in selected primary schools in Mangaung. The South African education system is undergoing changes, and Curriculum 2005 is one of the indications of the Government's commitment to democracy. It is a time when educational practices of teachers are in the spotlight and curriculum changes seem to be exerting even more pressure on teachers to reflect on their classroom practices, as national leaders search for means to reinstitute a culture of learning, teaching and service in schools.

5.1.1 Aims and goals restated

The aim of this study was to investigate how the conceptualisation of educational technology, by two Grade 7 geography teachers in two primary schools in Mangaung, translated into classroom/teaching practice. To accomplish this aim, it was necessary to first investigate how these teachers conceptualised educational technology.

Broadly stated therefore this study explored the following questions:

- How do the respondent teachers conceptualise educational technology?

- How do these teachers' conceptualisations of educational technology translate into classroom practice?

In order to systematise the investigation, the study looked at two seemingly contestational conceptualisations of educational technology, namely, technology as a 'thing' and technology as a 'process', and how these respectively translated into classroom interaction practice.

The first step in response to this question was to undertake an extensive review of related literature. However, before reporting on the findings of the literature review, a word on the choice of the paradigm is deemed important.

5.1.2 The choice of paradigm

It is important to mention that from the onset this study did not seek to find cause and effect relationships between conceptualisation of educational technology and classroom practice. The focus of this study also was not on how teachers used media in education. The main focus was on the meaning of educational technology as constructed by teachers in historically disadvantaged schools. [It can be emphasised that these schools are still disadvantaged materially and that the term historically advantaged should not only be read as referring to the past].

Since the focus is on meaning, the quantitative, empirical research tradition was found inadequate in dealing with this investigation as the study would be forced to rigidify that which is believed to be a dynamic process. The investigation was also interested in establishing what theoretical assumptions and underpinnings informed the respondents' conceptualisation of educational technology. This interest informed the whole study, namely the choice of the paradigm, the literature reviewed, the choice of respondents and the methods and techniques used for data gathering analysis and interpretation.

This study was therefore couched in the emancipatory paradigm, based on the neo-Marxist critical theory which originated with the sociological scholars of the Frankfurt school in the 1930's. The knowledge constitution theory propounded by Jurgen Habermas (1972), provided an organisational framework through which the contention that knowledge and the conceptualisation of educational technology as socially constructed, could be investigated. With

this as the overarching framework, the literature reviewed for this study was mainly selected from the writings of the social-critical theories associated with this paradigm.

5.1.3 Findings from related literature

The literature reviewed (see Chapter 2) indicated that 'educational technology' was a complex concept. Although the concept originated with educationists, the existence of "educational technology" as a separate 'field' or 'discipline' made the meaning of this concept even more complex. What came through strongly was that defining educational technology is a continuing debate since its inception in the 1960's (Reiser & Ely 1999). The main debate centred around the interests of practitioners who came into the field as either audiovisual specialists (hardware) or software specialists (programming). These groups conceptualised educational technology either as either "products" or "processes" respectively.

The literature review further revealed that the conceptualisation of educational technology as 'products' or 'artefacts' was supported by the behaviourist theoretical perspectives on education (teaching and learning). This understanding of education tends to focus on the quantifiable behavioural aspects of knowledge. It is associated with the teacher-centred, content focussed didactical approach to education.

On the other hand it was revealed that the concept of educational technology as a 'process' was more compatible with a learner-centred approach to education (Heinrich, Molenda and Russel 1989). Developing from this observation was one major finding - that the conceptualisation of educational technology as a 'process', especially as propounded by Rowntree (1982), Ashman and Conway (1993), Jonassen (1995), and Jonassen and Murphy (2000), was based on the same assumptions as the social-constructivist theory underpinning Curriculum 2005 and outcomes-based Education.

A third observation made in this study from the literature review is that even the concept of "process" has different meanings for educational technology practitioners and educational practitioners or learning facilitators respectively. To the former group, "process" is mainly associated with programming, while the latter group regard it as the whole "process" of instruction. In other words, when educational technologists talk about products or artefacts, they mainly refer to hardware such as television sets, radios, computers and other gadgets and when

they talk about 'process' they refer to learning programs and packages. On the other hand this study argues that to teachers as learning facilitators programmed learning packages prepared for use with specific hardware (such as televisions and video recorders or computers) are "products".

Based on the above argument then, this study observed that even the "process" concept may not be as useful as it seems when its interpretation is left to those outside the field of education. This observation is substantiated by Eraut who observes that:

> Educational technologists can be viewed as an interest group whose conceptual frameworks are intended not only to guide and describe practice but also to gain political or academic credibility. Thus claims about effectiveness and utility of educational technology serve an important political purpose in attracting resources and sponsorships, and claims about the theoretical foundations of educational technology play an important part in justifying its academic status, for which criteria related to disciplined and research-based study usually count more than those related to utility Eraut (1996 p.2).

In the light of the above argument the contention that educational technology is market driven and that it centres around specific hardware items or media, may be worth considering. This observation confirms another finding revealed by the literature namely that the debate about whether educational technology is a 'process' or 'product' continues (Kozma, 2000 and Richey, 2000). In the debate about the state of the discipline (educational technology as a field) in relation to the theoretical developments in education, Kozma (2000) took a firm position that, for educational technologists, media and programming form the crux of their field. He closed his article with these words:

> But if we choose to ignore media considerations in our thinking, if we continue to treat them as mere delivery devices, both our thinking and our field will be impoverished. Our future will be doubtful and others will take our place (Kozma 2000 p.14).

This finding raises the problem associated with separation of theory from practice. It is not clear how far this discipline's interests coincide with educational interests.

To address more practical issues in the arena of classroom practice this study had to appeal to the critical questions raised by Rowntree in 1982, as well as the more recent work on cognitive education by Ashman & Conway (1993, 1997). It was important throughout this study to reiterate the fact that its concern and focus were on 'meaning' and not on the discipline per se. The researcher in this regard does not consider herself an educational technologist in the sense

of 'what technologists do' (Rowntree 1982), but an educational technologist in the sense of 'what educators do'.

To sum up this discussion up, it is important to reiterate the assumptions of this study, namely that research is never (if ever) a neutral or disinterested pursuit of knowledge. Even concepts such as 'process' take on different meanings in the context of educational technology depending on whether they are used by 'practitioners' in educational technology as a discipline or by educators or learning facilitators. It is therefore important to be clear from the onset, in doing research dealing with meaning, especially the meaning of a complex and contested concept such as 'educational technology'.

Investigating the discourse of educational technologists indicates a complex relationship in which educators (teachers and facilitators) are seen as clients or consumers of products and services, provided by educational technologists (Kozma, 2000). This original business of educational technologists (as audio-visual specialists or programmers) who saw themselves as consultants or advisors to teachers, continues to influence educators.

Given the focus of this study it was not necessary to follow the debates of educational technologists as such, but ignoring them completely would also be ignoring a line of discourse that has great influence on the conceptualisation of educational technology. The following are some of the themes which were revealed by the literature reviewed.

Congruence between the concept of educational technology as a "process" and the social constructivist philosophy underpinning Curriculum 2005 is characterised, and emphasised by the fact that the learner and his or her learning process are the focus of all learning activities. This tradition believes that learning is active, constructive, intentional, collaborative, contextualised, and reflective. The goal of education is not only to attain pre-specified objectives, but to help learners attain their learning goals. Learning outcomes are both planned and emergent.

Unlike "teacher proofed" curriculum approaches adopted by certain countries this approach affirms teachers. The teacher is no longer the all-knowing transmitter of knowledge, but a facilitator, a coach and a backstage director of learning activities. He or she uses different approaches, techniques, media and contexts to organise learning opportunities for the learners. Learners are seen as 'a community', sharing information and taking advantage of one another's

skills in the co-construction of knowledge. The methodology section sought to investigate the existence of this understanding in teachers' awareness and classroom practice.

5.1.4 Methodology summarised

In keeping with the chosen paradigm, this study employed qualitative methods to collect, analyse and interpret data. After a pilot study done informally among selected primary schools in Mangaung, two teachers were selected to participate in the investigation. One teacher conceptualised educational technology as a product while the other on conceptualised it as a 'process' or 'know how'. Having chosen qualitative methods the researcher did not adopt a detached, objective stance towards the researched. The researcher played a central role and as the main research instrument she was immersed in the process, collecting data through in depth interviews and analysing and interpreting findings using discourse analytic procedures.

Thus, this study, as discussed in Chapter 3, was conducted within the norms and parameters of the qualitative research tradition. Reason (1994), Creswell (1998) and Smaling (1995) make it clear that qualitative research is a tradition and a science in its own right. Moreover, qualitative researchers do not shy away from subjectivity. Objectivity in this tradition is attained by acknowledging and managing one's subjectivity (Heshusius, 1994) and approaching that which is studied with an open heart and an open mind (Smaling, 1995). According to Meulenberg-Buskens (1997), the researcher needs skill and keeps that which is personal and that which is general in perspective. Issues of subjectivity and objectivity are paradigmatic and, as observed by Reason (1994), even positivistic research is not neutral.

Data were collected through audio tape recorded in-depth interviews with each one of the teachers. Video recordings were also used to collect data on the classroom action of the respective teacher and his or her learners so as to investigate how their conceptualisation of educational technology translated into classroom interaction. Both sets of data were further transcribed and analysed for interpretation. It must also be mentioned that none of the respondents were familiar to the researcher before the study. The initial interest in the respondents was based on the understanding of their contribution to their schools as informed by the principal in one case. The other was the teachers' practical approach to his profession as identified during school visits. The choice of respondents was influenced by their willingness to participate as well as their proximity to the researcher's place of work. Interviews were

conducted with each of the respondents individually at the staff offices immediately after classroom observations. Although further interaction continued after these recordings, namely watching the classroom video playback, no further formal data recording took place.

5.1.5 Summarised findings

Although the findings of the qualitative investigation undertaken in this study may not be conclusive, the trends can be summarised as indicated below. From the analysis and interpretation of the interviews, as well as the classroom observation data transcripts, it became clear that educational technology is understood differently among teachers. The meanings which were indicated in the literature review do exist in reality among the respondent teachers. It was also discovered that certain understandings of educational technology could be associated with particular classroom interaction patterns. To map this clearly, the findings showed the following patterns:

(1) Lerato, whose teaching patterns were categorised as leaning more to the traditional, teacher-centred pole of the continuum, also indicated the following in the interview:

- an understanding of technology as artefacts of the electrical/electronic family such as radios, television, computers and cell phones
- the same understanding of technology transferred to educational technology, as either teaching learners about the said artefacts or using appliances/devices such as overhead projectors in teaching.

Thus her understanding of educational technology seemed to be fixed on the common sense understanding in which technology is referred to as artefacts of high technology. In the light of that, educational technology mainly refers to the incorporation of such 'high tech' media in education.

(2) In contrast to Lerato, Themba, whose classroom interaction patterns were categorised as leaning more towards the social-constructivist, learner-centred pole of the continuum, indicated the following about his conceptualisation of educational technology:

- an understanding of technology as the 'know how', method or way of doing things. He emphasised the purpose focus on the manner in which technology is conceptualised and he could take examples from different areas of life.
- In line with his conceptualisation of technology, Themba conceptualised educational technology as a 'process', methods, the way in which people are educated. To illustrate this he could make examples of method, technique and media. He does not see method (theory) and technique as different things when it comes to classroom practice.

Although both classes were content-based and therefore different, in Themba's classroom a clear emergence towards learner-centredness could be discerned and it became even clearer in the interviews that he was making a decided effort to focus on the learners in the learning experience.

Both Themba and Lerato indicated an awareness of the poor conditions in which they have to operate but their reactions were different.

Lerato, in her conceptualisation of educational technology as a specific 'thing' seems disempowered and disarmed by the fact that the 'tools' (around which her concept of educational technology is constructed) which were used at the college during training are not available in the professional context. This makes it impossible for her to implement the 'methods' which her training exposed her to, hence she is forced to resort to the question and answer methods, guided by the 'textbook'.

Themba, however, seemed to spend less time on mourning the lack of resources. While he is aware of the problems, he seems more prepared to take action by making his lessons practical, and challenging learners to co-operate. He seems more in control of the situation and has practical ways and suggestions to improvise and make learning practical. He is more focussed on the purpose of learning. To him technology and subsequently educational technology is not as much about 'things' as it is about purpose, improvement on how things are done, and to improve efficiency and learner understanding in classroom learning. The insights displayed by Themba about the conceptualisation of technology and educational technology seem to connect with the confidence he displays in his ability as a teacher.

Themba does not just 'mourn' the poverty of the teaching context within which he has to operate, he also does not focus on the hope that the state, or whoever is in power, will come to the rescue by providing material resources. He is, however determined to do what he can to implement the pedagogical insights he has and to use whatever material is available to make media for learning.

5.2 CONCLUSION

From the findings arrived at through the literature review as well as the qualitative research methods employed in this study, the following can be concluded:

- Educational technology can be conceptualised to empower the teacher towards implementing a learner-centred approach to classroom teaching/learning. On the other hand, it can be conceptualised in a manner in which the teacher finds him/herself disarmed and disempowered. The teacher who conceptualised educational technology as 'a thing' seems to be fixated on the lack of resources, which results in resorting to rote-learning or the teacher-centred approach to classroom interaction. On the other hand, the teacher who conceptualised educational technology as a 'process' seems able to transcend the problems of poverty and lack of resources to implement a more learner-centred approach to the teaching and learning process.

- However, it is again important to remember that the categorisation (product versus process) above was made for the convenience of classification and identification in the study. Educational technology as such cannot be packed in a neat manner as used here. The point is made however, that the manner in which educational technology is conceptualised cannot be disassociated from the interest, the theoretical discourses about knowledge and power, as well as the position, of those who define the term.

5.3 LIMITATIONS TO THE STUDY

One of the outstanding problems which became apparent in dealing with the meaning of educational technology is that a dissertation was too limited to do justice to the two components 'conceptualisation' and 'use' of educational technology, even if focussed on teachers' classroom

practices only. The study did not only demand commitment and discipline in defining and abiding by this focus, but also demanded expert prioritisation.

As a result of the above, this study could not do justice to either 'conceptualisation' or 'use' of educational technology as such. This however this does not render the effort fruitless. Sensitization to the complexity of the issues surrounding the manner in which educational technology is conceptualised in relation to teachers' classroom practices was attained. Despite these challenges this study was considered valuable. Previous research tend to focus exclusively on media. The researcher felt a pressing need to address the issue in relation to teachers, particularly in the light of the position adopted by this country (South Africa) and the epistemological position accompanying the new curriculum (Curriculum 2005).

The researcher's interest was influenced by trying to bring educational technology closer to the teacher and to the attention of teacher educators as such. This interest was sustained by the contention that educational technology, in the hands of the so-called educational technology community, does not seem to serve the teachers' interests as much as it does those of educational technologists.

This researcher is aware that the findings of the study represent an interpretation. No study however is neutral, for all research is ultimately an interpretation of reality, whether quantitative or qualitative methods are used. Every researcher's choice of topic, method and technique is coloured by his or her world view and beliefs about what constitutes the 'truth' (Reason, 1998). In a similar manner, this study has been influenced by the position of the researcher as one of the 'researched' in terms of background and professional identification. The researcher is a Black teacher whose experience is similar to the respondents' in that she went through the same education system as well and teacher training. Being a current member of a teacher-training faculty, the researcher finds herself confronted by these issues on a daily basis.

This study was conducted with the awareness that the shift of emphasis of educational technology from artefacts to "process" may be used to excuse those who have a responsibility to provide schools with material 'resources'. Such a move would be sad, as it would perpetuate the marginalisation and exclusion of the poor from these privileges. While this study maintains that these artefacts do not define educational technology, it does not advocate that they do not have a role as media in the education process. The message sounded here is captured in a warning

by Coombs (1985) who had the following to say in relation to the different electronic artefacts seen as educational technology:

> The devices in question certainly have a high potential for assisting learning; properly used, they can help increase the quality and availability of education at affordable costs. But all too often in the past, enthusiastic advocates of one or another particular new technology have mistakenly regarded it as a complete and self-contained teaching and learning system in itself instead of seeing it as only one component of such a system. Such one eyed promoters in the 1950's and 1960's often viewed their favourite technology- as if educational films, radio, teaching machines, or open or closed circuit television as a cure for whatever ailed the schools. With their favourite technology in hand they went scouting for an educational problem to solve, which usually meant superimposing the new technology on the malfunctioning existing teaching and learning process like a geologic layer.

The above observation is still true in this age of information technology and the South African education community needs to be warned of the hype and misinformation associated with marketing strategies (Butcher, 1997; Noble, 1997). Education must be characterised by high technology in pedagogical principles, including the training of the teaching corps, as well as media. High technology in media only may not help, and experience has shown that evoking high technology media to substitute for teachers is not an economical exercise.

5.4 RECOMMENDATIONS

Based on the findings of this study the following recommendations can be made:

In line with the stance taken by the South African education system to affirm teachers and their role as learning facilitators, teacher educators and trainers need to incorporate educational technology as a pedagogical issue rather than just focussing on the use of specific equipment.

In- service teacher upgrading programs geared toward the implementation of Curriculum 2005 must be clear that classroom practice does not only entail methods, techniques and tools but epistemological and pedagogical assumptions. Teachers need to be affirmed and their abilities recognised in the same way that they are expected to do to their learners. In this way space will be created for them to apply their skills in their classrooms.

The above calls for educational training institutions to bridge the artificial gap between formal and informal knowledge systems. For instance, Themba (in this study) managed to transcend this division, hence he is able to bring together the life experiences of his learners in the classroom. The difference with Lerato is that integration is missing in her approach. She does not lack the practical skills, but she operates from a rigid, inflexible epistemological position, hence the difficulty in attaining the pedagogical shift associated with Curriculum 2005.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

- The conceptualisation of educational technology as a 'process' rather than a product may be one of the avenues to be explored in understanding teachers' classroom practises. Such exploration needs to go beyond the questions of programming to teacher-based classroom education delivery.
- Even when talking about educational technology as a 'process', it is still important to identify which voices formulate the definitions and in whose interest. Educators will have to take the lead, integrating theory and practice to see educational technology as a goal-directed process.
- Research in educational technology needs to be directed at transcending the dichotomy by commitment to a balanced perspective of learning goals and purposes. Perhaps the statement of the 1968 crisis reporte, still has much relevance here. According to Coombs this report observed that educational technologies:

> Range from the lecture method to the Socratic dialogue, from the seminar to the drill session. They include the blackboard, desk, and textbook; the pupil-teacher ratio and the layout of classrooms and corridors; the chronological grade system, the academic calendar, and the bell that influence students' futures. Each of these is an integral part of a "system" and a "process" whose ultimate aim is to induce learning Coombs (1985 p.126)

This balanced perspective needs to inform all teacher training (pre-service and in-service) towards the establishment of a commitment to a learner-centred pedagogy as advocated by Curriculum 2005.

- Based on the need to empower learners to become critical and socially responsible citizens, teachers need to be equipped with the knowledge, skills and tools for mediating the attainment of such skills by learners. The view of educational technology as a process may be exploited towards that goal.

Although it has already been indicated that educational technology has many journals and books that bear its name (HSRC, 1981), the fact that became apparent in going through the literature is that the focus of these writings is rather on 'how to' rather than 'why' questions (Apple, 1995, 1993, 1991; Bromley & Apple, 1998; Rowntree 1982). In fact, one of the observations that have been made is that educational technology is big business and the number of articles whose debate centres on how the field will survive are more concerned about keeping the positions of practitioners as consultants and programme producers to their clients (teachers and learners), rather than to equip the teachers with the necessary knowledge, skills and attitudes to mediate the learning process (Eraut, 1999).

Research is needed from educators whose purpose and interest is to empower the educational community, particularly teachers. Such research needs to emphasise the balanced view which will help the teacher use his or her skills confidently, while maximising learning opportunities by using all available resources to make learning meaningful. Theory and practice should be integrated for the edification of education.

This study only looked at teachers from the historically deprived background. Comparison with their counterparts in the other groups would be an interesting study. Although the respondents were drawn from different gender groups, no comparison was made whether men conceptualised educational technology differently from women.

When this study began, one of the ambitions of the researcher was to explore indigenous knowledge systems and their place in the South African Education System. The scope and focus of this study did not allow this ambition to be fulfilled, thereby , leaving another avenue open for further research.

5.6 FINAL WORD

Studying *conceptualisation and use of educational technology* simultaneously has proved both challenging and interesting.

In the process of defining educational technology people's identities and societal positions are reified and sustained. By referring to technology as ways and means of educating, this study does not mean to shift responsibility, for it is this researcher's belief that teachers in the historical disadvantaged communities are no different from their counterparts in the other groups. The difference is mainly discursive and the position from which knowledge about their profession is constructed determines the degree to which they are able to participate meaningfully.

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APPENDIX 1

Teacher: Themba
Grade :7
Lesson Theme: The Rainbow nation

1. T: Who was born eh, before 1994? {The teacher rephrases the question} Who was born before 1994? {Some learners raise their hands up}
2. Is only one, two, three, four, six, seven { counting learners }
3. Only the half of class say who...the people who were born before 1994. {Pause}Haa!
4. When were you born? { The teacher reformulates the question}
5. L1: In 1985.
6. T: { repeats learner's response} 1985. Nineteen eighty-five is before or after nineteen...nineteen ninety-four
7. LS: { in chorus} Before nine...
8. T: It is before. Why you don't put your hand up? Why?
9. L2: Hey Sani...
10. L2 is saying something irrelevant to the question asked by the teacher
11. T: He! {L2 on saying something inaudible and Another learner: {reprimand} Hey!
12. T: {ignore those learners} So meaning that now eh when ...All of you have been born before
13. T&LS: Nineteen ninety-four
14. T: The government of South Africa, what type of the government was there before 1994? {learners raise up their hands } Eh, masiv' apha, Mzwandile {let's get /hear a response from mzwandile}
15. L3: {Mzwandile } Apartheid government
16. T: Apartheid government. {Turning to the board} Was...{while starting to write}
17. LS: Apartheid government {The teacher is writing on the board}
18. T: We were having...
19. T&LS: Apartheid government
20. T: Good {finishing up writing on the board}...That is the name that we are going to use. Apartheid...{using his hand to let other learner to come inside the classroom.
21. LS&T: {learners} Government {Teacher} Regime
22. T: Or the apartheid...
23. LS&T:...government.
24. T: Okay! What things, shows that there was apartheid government? What things do...were there showing you that there was apartheid government? Yes Lindale!
25. L4: {Lindiwe} Black people were not allowed to vote.
26. T: The Black people were not allowed to vote. But because now I want you to come up with other things. In 1994 what had happened? In 1994. Eh..! Phumzile
27. LS: Black people voted
28. T: Black people were voting . Voted for...
29. T&LS:...their own government.
30. T: It was the time that we started to have a right to...
31. LS&T: ..vote.
32. T: So now, I want you to, Eh in your groups, to tell me {putting a piece of paper on the table} things in the apartheid regime which were not...which were there and the things that are being done now in the { democracy }So in your groups ...{taking sheets from the table} can't you write about five five. {learners are given task} In your group you know your groups
33. LS: Yes.
34. T: Now start, is thee time {I'm...} I'm just giving you only...about six minutes. { learners do likewise} In your group. This is your group. This is....{grouping them} five. We are going to talk about apartheid and democracy. The things that happened during the apartheid regime and {Pause} during the time of democracy. { The teacher is passing word cards on the board while learners are discussing among themselves in their respective groups}
35. T: Khawulezani (Be quick)
36. {There is an intense discussion among the learners but the conversation is inaudible. The other learner is the scribe, while others are giving him facts to write down. The scribe passes the sheet on to another learner so that he can write}
37. {A voice from an invisible learner} Haa! (No)
38. {Another voice} Sh....
39. T: Short sentences. Don't put long...sentences, short sentences.
40. {Learners continue with their discussion and the teacher is moving around the class checking their work}
41. When I say write only about five not more because of the time. It can be less but try five, five. Thee things that happened during thee apartheid government and the things that are happening now during the democracy.
42. {The groups are still discussing intensely, they are all actively involved on the discussion}
43. Not long sentences, long sentences they are taking time. You know if you say democracy what does that mean, you are going to talk about.
44. So just....put.....Er.....Only the most important points
45. L6: {from the first group} Yes
46. {The teacher is moving around while learners are continuing with their discussion in their respective groups}
47. T: Three minutes left. {Emphasising repeating himself} Three minutes left.
48. {learners in the other group are discussing but their conversation is inaudible}
49. Two minutes left {The other group is discussing and the conversation can be heared here and there and is not clearly audible but it sounds relevant because the other one is saying "white

people didn't like him"}

50. T: One minute left. Ncumisa one minute left.
51. {learners in respective groups are still busy }
52. T: Okay! Stop! Stop! {learners do likewise} Before your leaders give us thee reports first, can you say something about apartheid {pointing at the word card on the board} What do you mean by apartheid. Eh {pointing at the learner} yes Phumzile
53. L7: Separation
54. T: It is...
55. T&LS: separation {The teacher writes under be column of apartheid}
56. T: Separation of what? {Some learners raise up their hands}
57. Yes, Thonana
58. L8: People and white people.
59. T: Separation of...
60. L &T: the...T:{ of people
61. L&T: The...{Teacher}....people. Of people only. Don't say that black aaand white because there are how...
62. Is the only black and whites in S.A.
63. LS: {In chorus} No.
64. T: What Ethnic that we have in S.A. Yes {pointing at the learner} Eh....Mncela
65. {Mncela} Indians
66. T: Indians. Zama Zama {pointing another learner }
67. L9 : {Zama Zama} Batswana.
68. T: Haa! (repeat again)
69. ZamaZama: Batswana
70. T:Batswana. Okay. Let's eh...just say Batswaaa, differentiate the other group. We say Indians. Yea Ncamane
71. L10 : {Ncamane} Coloureds.
72. T: Coloureds. What do we have. Yes {pointing another L}
73. L11: Afrikaners.
74. T: Afrikaners. Oh no, what are we going to say. {pointing another learner}
75. L12: Sotho's
76. T: Ah! Yes Zam...Elias Baba's
77. L13: Kulas (Indians)
78. T: Indians. Yes {pointing another learner}
79. L14: Boers
80. T: Mm! What do we call Boers in English
81. L15 : Says something inaudible
82. T: No! (Are you sure) He!
83. L15: Still inaudible
84. T: Yes.
85. L15: Griekwas (Greeks)
86. T: Griekwas.Yes {pointing to another learner}
87. L16: Tswanas
88. T: I said that we should not differentiate the other....the black people. We have about ...
89. lets say many people here they are white {writing on the board} the other one?
90. LS: Blacks
91. T: Indians {writing on the board} The other one?
92. LS: Coloureds
93. T: Coloureds {writing on the board} These are the....
94. That's why we talk of the ....{pointing on the board}
95. LS&T: Separation
96. T: You know here {demonstrating with his hands, implying around us} what type of people are living in the locations?
97. LS: Blacks.
98. T: They are Blacks. Where do the coloureds live?
99. LS: In town.
100. T: They are living in town?
101. {Hesitant some} No
102. T: In Heidedal, they are not living in Heidedal?
103. LS: They are living in Heidedal.
104. T: What about the whites?
105. {no response}
106. T: {prompting} He...
107. LS: In town
108. T: In town. Isn't it?
109. LS: Yes
110. T: But here in Bloemfontein is there any town or place of the Indians?
111. LS: No Sir
112. T: No. But ZamaZama can tell us that there is a place where....in Kwa Zulu Natal of the...
113. T&LS: Indians
114. T: The whites and the Indians and the coloureds and the blacks they are not staying in the....
115. T&LS: Same place
116. T: IN the....during the....
117. T&LS: ....apartheid government
118. T: So when.....during those time of apartheid we talk of separation or segregation {writing on the board}
119. So would you .,....okay, what is democracy ? Can you explain to he meaning of democracy {pause} democracy.
120. {emphasizing} Democracy ? Mzwandile {pointing at learner}
121. L17: All people have the right to vote

122. T: Oh! ....okay, democracy it means that the people are having the right....
123. T&LS: ....to vote.
124. T: meaning that we talk of the {writing on the chalkboard} government in short of people. When we talk of democracy because if we can interpret democracy the children will think that democracy is when wee want to do our own things where there is no one who is in authority, our parents even they have no authority on us; know give me the things that were being done during the apartheid regime.
125. This group can you give us one {referring to the learners in the other group} who is the leader here?
126.
127. L6: Black people were not allowed to vote.
128. T: Okay {writing on the chalkboard} Blacks no vote.
129. Er.... This one, this group {referring to the other group}
130. L18: Black people they .....{teacher interrupted}
131. T: So you think that we already had this one
132. {voice} Yes
133. T: So I don't want this one. Yes.
134. L18: Black people they were not allowed to marry white people
135. T: Very well, okay, thank you {writing the response on the chalkboard}
136. No marriage between black and white.
137. And then... Yiza (comee on) Mncela, okay Phumzile, you are the one
138. L2: Black people didn't have rights. Black...
139. T: The rights of what? .... No. this is right, is the vote, when you don't have the .... The right to vote , it is the right.
140. Know I want....other things.
141. L2: White people were always having better jobs
142. T: Er....no jobs for Black people {writing on the chalkboard}
143. No better jobs for Blacks.
144. Because of time let me go on the other side. What is happening now on the democracy.... government. Yes let's hear from the group of Ncumisa {inaudible}
145. L19: In 1994 the Black people do not vote
146. T: were?
147. L19: vote
148. T: I .....{saying something inaudible}
149. {the other learner from the same group grab the sheet from learner10}
150. L20: {reading from the sheet} In 1994 Black people voted.
151. T: Okay. Black people voted.
152. Or let's say not black {writing on the chalkboard} all the people of South Africa voted in 1994.
153. Another thing ? This group {pointing another group}
154. L21: Black people had right to live at town.
155. T: And now {writing on the chalkboard} we have to live anywhere or where we like.
156. Yes {pointing another learner}
157. L8: But now we can sell beers there is no arrested
158. T: I beg yours
159. L8: {repeating his response} But now we can sell beers there's no police arrested us, the Black people are selling beers.
160. T: Okay {giggling} okay, there are no people who are arresting us because what he is saying, he is saying that in the previous government, in the apartheid government no people were allowed to drink....
161. T&LS:....alcohol.
162. T: Beers, brandy and so on. But that one is no important.
163. Ja, but people they like that but if you , you cannot drink it would be better we can have a better society, a better Er.....country, a better Er... life and also we are going to have Er.....Er....a better jobs because people... and better families, lets say if you are drinking, Mzwandile you are going ...tomorrow is Friday, you wont come home your family is going to be hungry, don't you think that?
164. Now what can we do because we know that these are the things that had happened they are many, like Education is it not like that?
165. LS: Yes.
166. T: we were not allowed to go to town, to study there, isn't it?
167. LS: Yes Sir.
168. T: But now what is happening?
169. LS: we are allowed
170. T: we are allowed to go to school there but many of us don't have
171. T&LS:.... Money
172. T: In order to go to.....
173. T&LS:.....town
174. T: ...And study there. So what can we do ,because now the; the Blacks they don't have....You said here {turning to the chalkboard} no better jobs for Blacks, isn't it?
175. L8: Yes.
176. T: Do we have jobs today?
177. L8: No.
178. T: What can we do in order to improve ourselves? {rephrasing the question}
179. What can we do in order to improve ourselves to have jobs, what can we do?
180. Yes, Letswalo {pointing a learner}
181. L5: We must be educated.
182. T: The first thing we have Letswalo {writing on the chalkboard} improvement the first one is.....

183. T&LS: Education. {writing on the chalkboard}
184. Why we need to be educated , why? Why Mncela?
185. L22: we can't have a better job when we are not educated.
186. T: we cannot have a .....
187. T&LS: ....better job
188. T: when we are not....
189. T&LS: .....educated
190. T: why we want to be educated? What is it? You ha ave said that you cannot get a better job what does that mean, Thonana?
191. L4: {the response is not clearly audible}
192. T: Thanks .....Er.....Thonana, when you are educated you are marketable, what can we say.....
193. T/LS: .... Marketable
194. T: {code switching} use nokuthini, ukuthengiseka, you can get a better job. If you are educated, education is very important but now what I have found out is that you are not studying your books, you are not doing well, how can you get a better job if you are not educated ,another thing that you can do, what other things can we do? {silence} He...? (what?)
195. {no response}
196. In education we said we must learn better things {writing on the chalkboard} better things. Another thing there should be parents, teacher and also there should be parent, teacher, child.....
197. T/LS: ....Relationship
198. T: What does that mean? {rephrasing the question} what does that mean, {clarifying} when we have..... yes {pointing a learner}
199. L23: The parent must help her child to be educated.
200. T: Yes, very good, the parent should make sure that his child is studying is going to school, is doing his work. And another thing? About the parent, teacher and the child.
201. Yes Thonana {pointing L4}
202. L4: The parent must take care of his child.
203. T: The parent should take care, love their...
204. T/LS: ....children.
205. T:So that ....why is it important I have said many times to you that you must not have girls .....friends and....
206. T/LS: ....Boy friends
207. T: You must not sleep with boys and.....
208. T/LS: Girls.
209. T: So if.....you are doing that it means that you are going to be a single parent. So the children won't be .....
210. T/LS:....Loved
211. T: You cannot be loved if you one parent, a child having a child.
212. So parent, teacher and child there should be a relationship.
213. The parent should come to thee teacher if he is seeing a problem with his child, that he is not doing homework why my child has failed he should come to the teacher.
214. And also the children should not fear thee teachers, they should come together, {pause} and talk if you have a problem you must not fear the teachers and also you must talk to your parents.
215. Another thing that we can do, the third one, we are going to talk about this thing, what can we do in order to have money, to have jobs other than education. What can we do? To start what, in EMS MS Mpongwane is teaching that.
216. Yes, Eh.....Lindiwe {pointing L1}
217. L6: To start a business
218. T: To start business {writing on the chalkboard}
219. That is what we should do. What we need to have in order to start a business, the first thing that we must have?
220. L24: We must have money
221. T: Money other people they can start business without having money
222. Yes {pointing a learner}
223. { L}
224. T: He ? (what?)
225. {the very same learner repeating his or her response} Is
226. T: Is?
227. L25: Yes
228. T: Yes I
229. L5: Risk
230. T: You must be prepared to take risks. Yes ZamaZama {no response}
231. Yes Ncumisa
232. L10: Opportunities
233. T: Ye...?(what....?)opportunities, you look for these opportunities, if you want to set a business here you should go ands look whether there are....
234. T/LS: Opportunities
235. T: So in order to start a business you must have {writing on the chalkboard} ideas after you had ideas you must make aa.....
236. T/LS: .....Business plan.
237. T: And after you have a business plan where as you have no money as long as your ideas and your business plan is good you can go to the banks and ask them to finance you.
238. Is when we start to have.....
239. T/LS: Small
240. T: Businesses. Do you know that the big companies they have no time to make other things or to improve what they have. The only thing that they are doing is just to improve but they

cannot start other things, so it is up to us to start small business like in America there are big companies there but there are many small businesses. When you start your own thing that is not there and then people can have jobs through you and then the things that you have introduced it can be sold to other people so that you can get money and more jobs are being created. Another thing that you can do {pause} other then starting a business {silence}

241. T: He.....(what?)
242. L6: {raising her hand}
243. T: Yes {pointing L6}
244. L6: you must have capital.
245. T: Capital, that's what I was talking that if you have a business plan you take it ti the bank, that is where you are going to get money , that is the capital, they are going ti give you the capital.
246. Another thing if we say there are many forms {writing on the chalkboard} that agriculture. Agriculture is very important, what two types of agriculture you can do?
247. {reformulating the question} what types of farming can we do?
248. Yes {pointing to a learner}
249. L26: stock farming
250. T: Very good, we can do stock farming. Let's say here {writing on the chalkboard} stock farming and....
251. He ....(what?) Yes....Moleko
252. L27: crop farming.
253. T: ....and.....
254. {repeating her response} crop farming.
255. T: {writing on the chalkboard} crop farming, that is very important. These things we can do, there is a school at the University of the Free State which is dealing ....in University of Free State there is a department of Agriculture, there you can learn many things, so that you can be a stock farmer or a ....
256. T/LS: .....crop farmer.
257. T: where you are going to produce maize everything, everything it can be potatoes....what can you produce in a crop farming?
258. He....(come on}
259. L28: Cabbage
260. T: Cabbage. Yes
261. L29: Carrot
262. T: Carrot. {pointing another learner}
263. L30: Spinach
264. T: Spinach and all other things. Isn't it?
265. L8: Yes
266. T: Okay in stock farming what we can keep there in stock farming? What we can Keep? Yes {pointing to a learner}
267. L31: Cows
268. T: Cows. What do we call cows?
269. {voice} sheep
270. T: cattle. Isn't it?
271. LS: Yes
272. T: Cattle farming. And another thing? Yes {pointing a learner}
273. L32: Sheep
274. T: Sheep farming. Another thing? {Looking for responses, learner raises his hand} Yes, Phopho
275. L33: Horse
276. T: Ho...Horses
277. L33: E (Yes)
278. T: Okay . Yes {pointing another learner}
279. L34: chicken
280. T: Chicken farming that is poultry farming. Siyevana (do you understand?)
281. Uzokuba nee nkomo nee gusha (stock farming}
282. Okay because of time now we are ending our lesson by talking about, what do we call this name?
283. LS: Rainbow
284. T: A rainbow, what does that mean, a rainbow?
285. {silence}
286. He...? (what?)
287. {no response}
288. He....(What? Oh yes {pointing to a learner} {pasting a word card on the chalkboard}
289. Yitsho (tell us) {facing the board}
290. L35: rainbow nation
291. T: A rainbow nation. What does that mean? A rainbow? Yes, Mncele {pointing another learner}
292. L36: it means the ending of the rain
293. T: It shows the....
294. T/LS: ....Ending of rain
295. T: So meaning that their won't be..... there's no continuation of rain at that time, at that small time {demonstrating with his hands}, that he is referring at that particular moment} it's the ending of the rain, what.....how many....or can you describe for me a rainbow?
296. Mncele {pointing a learner}
297. L37: Rainbow has three colours.
298. T: It has colours , lets not say three colours, there are not three colours there are.....
299. T/LS: ... many colours
300. T: Isn't it?

301. LS: Yes
302. T: And then when we say now.....U...U..Zenzile, Zenzile has said that it's a ....rainbow.....
303. T/LS:....Nation
304. T: So now what does that mean to us as South Africans?
305. This rainbow. Yes {pointing a learner
306. L38: End of fighting
307. T: Stopping fighting. The Blacks, whites, coloured, Indians each and every group of people who is in South Africa we are ....one {demonstrating unity with his hands} Isn't it?
308. LS: Yes
309. T: we are....
310. T/LS:...one.
311. T: It is the rainbow....
312. T/LS:.....people
313. T: Do we see?
314. LS: Yes
315. T: In South Africa we suppose to work together we must be united because we are free at last, we are....
316. T/LS:.... Free at last.
317. T: Okay, if we have said there improvements, that is developments we and then there is a good relationship between parents .....
318. T/LS: teachers and children.
319. T: And also when we start to have our own business, if you don't think about business it means that South Africa is going to remain very.....{lifting up a word card} is going to remain.....
320. LS: {reading from the word card} very poor.
321. T: Is going to remain.....
322. T/LS: Very poor.
323. T: We must do this part {showing a word card} develop in all things, in our minds meaning that our skills we must be morally clean so that we cannot have this thing
324. Like aids {showing them a poster}
325. Isn't it?
326. LS: Yes
327. T: If we are morally clean we don't have girls and boys, it is very good that when you don't have {showing the poster on prevention of aids} I'm telling you, many of you, that is why they are suffering today, they don't stay with the father or they are not staying a with their....
328. T/LS: ....parents
329. T: Both their parent because of people who are not morally clean, please let us be morally clean, if we have.....we are morally clean we are going to have a good society and a good nation, We are going to have goof leaders, Think of the one who is drinking ,always drinking , smoking. He is not setting a good example a leader who is like that...for the people [pause}
330. You are not setting a good example, if you want to be the good people of South Africa, the rainbow nation, we must do away with this thing of sex.
331. Aids only the way that we can stop aids is not to have sex that us the only way, {concluding the lesson by the lesson}
332. Thanks for your time, in the next period we are going to continue to talk about these things in groups, the things that we can do developing, industry {displaying the word cards} is what we have talked about starting business and then agriculture we talk of stock farming and then we will be.....{displaying/showing a word card}
333. LS: Break
334. T: We will be working on.....
335. T/LS: .....rich
336. T: Okay, thank you {giggling} you can go to your break
337. {learners are leaving and going out for break}

APPENDIX 1

Teacher : Lerato
Class : Grade 7
Lesson theme: Survival resources for life

1. T: What is to survive? To survive? Bergman. {picking the learner}
2. L1: To be save.
3. T: Ha! (What?)
4. L2: To be save
5. T: to be save {then says something inaudible picking another L.}
6. L3: To live
7. T: To live neh!
8. LS: Yes: Eya (yes) to be alive, to live , to be…
9. LS&T: alive
10. T: Survival resources for…{reading from the board}
11. LS: life
12. T: now what are the resources ? resources. What are the resources? {No response from the learners }
13. Okay take out your dictionaries, and look for this word resource. Take out your dictionaries, quickly {learners do likewise.} Another learner is going to fetch his dictionary from his classmate} dula maan. (Sit down!) {He is going back to his seat} Okay! Refilwe, did you get it?
14. L4: {Refilwe} Yes mem.
15. T: Okay!
16. L5: {Reading from dictionary} Resources are things that are needed most by the country.
17. LD: Yes. Resources are things neh!
18. LS: Yes ma'am.
19. T: Needed mostly by a …
20. LS: Country.
21. T: Neh!
22. LS: Yes mem {some nod their heads}
23. T: Now, who can tell me, what things do we need in our country? That can save our life, our daily lives {one learner is raising his hand up} What things do we need in our country, that can save our lives? Aha! Banda {picking another learner}
24. L6: {Banda} water
25. T: Yes. Water is very important. Why water is important?
26. Why water? Tshitso {picking another learner}
27. L7: { Tshitso } Because everything is done by water.
28. T: Like what? Everything is done by water, like what?
29. L8: {Tshitso} By washing, cooking, cleaning the house {Inaudible}
30. T: cleaning houses, cooking…Aha! {picking another learner}
31. L9: And also transport
32. T: It also serves as a source of …
33. LS&t:…. Transport
34. T: Neh!
35. LS: Yes ma'am
36. T: Eh! Which sources of transport…. Which eh…,means of transport that uses water?
37. {some learner are whispering a word "car"}
38. L10: {whispering to his friends} Car
39. L11: A taxi use water.
40. T: In which way ?
41. L12: In…In the… In the engine
42. T: In the engine? Hm! (No) { The learners are saying something inaudible} In which way?
43. L13: The engine
44. T: Okay
45. L14: A train
46. T: Ha! (What?)
47. L15: a train
48. T: A tr…a train
49. L9&L13: Trail
50. T: Okay! A trail
51. L16: Boat
52. T: A boat or…
53. LS: A ship
54. T: Neh!
55. LS: {sone LS nod}
56. LD: Yes. Resources are things neh!
57. LS: Yes ma'am.
58. T: Needed mostly by a …
59. LS: Country.
60. T: Neh!
61. LS: Yes ma'am {some nod their heads
62. Eh, what other resources ? { No response from learners} Is water. We need water neh {writing on the board} And what else? Palesa
63. L17: {Palesa} Industrial
64. T: Ha! (what?)
65. Palesa : Industrial
66. T: No! Now were are … we are through with the uses of water, neh! Yes, eh…in the industries they use water. Neh!
67. LS: Yes
68. T: Yes { Then pick another learner}

69. L18: We need sunlight
70. T: Yes, we need sunlight. What is sunlight? { while writing on the board} What is sunlight {x2}Sunlight. Eh! Banda
71. L6: { Banda } Sunlight is the heat of the sun.
72. T: Is the heat... Is the heat of the...
73. LS: Sun
74. T: Now, how is sunlight important to our lives. How is it important to our lives? Why do we nee
d sunlight ? Why do we need sunlight? { silence } Sophy
75. L19: {Sophie} It get warm.
76. T: Ha!
77. L20: It get warm.
78. T: So, or when it is cold neh
79. LS: {nod} Yes
80. T: The heat of the sun gives us..
81. T&LS: Warm
82. T: Neh!
83. LS: Eya (Yes)
84. T: And what else ? { some learners raise up their hands } And what else?
85. Voices: Sunlight
86. T: Eh, Morwanyane
87. L8: To dry our clothes
88. T: Ha ! So that we can dry our...
89. LS: clothes
90. T: Ha o hlatswa washene neh!
91. LS:Yes
92. T: You put your clothes on the washing line neh!
93. LS: Eya (Yes)
94. T: The sunlight dry our...
95. LS: clothes
96. T: Good. Pula {calling out learners name}
97. L21: {Pula} For the plants
98. T: In which way? For the plants. Good. In which way? {the teacher is moving infront of the class} Sunlight is very important for our plants in which way? Ha! { looking for learner with answers} Hm! How? Why do plants need sunlight {picking the learner}
99. L22: Plants need sunlight to... to..
100. T: Hm!
101. L23: Plants need sunlight to grow.
102. T: To grow, neh!
103. Voice: Eya (yes)
104. T: to grow. Plants need sunlight to grow
105. LS: grow
106. T: Ah! What are other resources. Aha! {Picking another learner}
107. L24: Plants
108. T: { Thinking } Who can help her. Who can help her. Tshitso!
109. L7: { Tshitso } we need plants for { not clear } and minerals.
110. T: Hm!
111. L7: we need... { Teacher interrupts L3 }
112. T: Yes, we need minerals neh!
113. L8: yes
114. T: Minerals { she writes on the board } Our country needs minerals neh!
115. L8: Yes
116. T: So that we can... our country can be rich neh!
117. L8: Yes
118. T: what are the minerals, that we need? Olay! Which minerals do we get in /South Africa? { The teacher is saying something inaudible the writes on the board } Ramodise { picking the L }
119. L25: { Ramodise } Gold
120. T: Gold neh! { writes on the board } Okay! From gold, what gold. Moleme { picking another learner }
121. L26: { Moleme } rings
122. T: rings { pointing another learner }
123. L27: Jewelry
124. T: Jewelry neh! { then points another learner }
125. L13: Bracelet
126. T: Bracelet. Mh!
127. L28: Necklace
128. T: Necklaces { touching hers } Neh!
129. LS: Yes
130. T: Okay! What other minerals you know. Eya (Yes) { pointing the learner }
131. L29: Diamond and coal
132. T: Diamond, Which things do we get from diamond? {asking while writing on the board }
133. L8: { Says something inaudible }
134. T: Ha! (What?) Morwenyane
135. L8: { Morwenyane } Crystals
136. T: ha! (What?)
137. L8 Crystals
138. T: { use her face to show that she can't hear her (L8) }
139. L8: { This time the learner is not clear }
140. T: Yes, crystals neh!

141. Voices: Yes
142. T: Ke tse di benyang tse la di bona. (They are shining)
143. { Showing their sizes using her fingers }
144. LS: Eya (Yes)
145. T: And what else?
146. L30: Jewelry
147. T: jewelry neh! Jewelry mh! Okay! What are other jewellery, only gold and diamond { pointing on the board }
148. LS: No { Raising their hands up }
149. T: Ha! Only gold and diamond? Seakano { picking learner by calling out his name }
150. L10: { Seakano } Oil
151. T: Oil { Says oil while writing on the board } Eh! How oil is important too our lives? { looking around } Ha!
152. L31: in cars
153. T: Hm!
154. L32: {reports } In cars
155. T: what do we get from oil { pointing on the board }. What do we get from oil. { teacher nod her head meaning learner may respond. }
156. L33: We get oil from the car.
157. T: What do we get from oil ? Re kryang mo oiling, from oil, what do we get from oil ? {Silence } ah! {picking the learner }
158. L34: We get petrol.
159. T: We petrol neh! For our cars, akere. (Not so ?)
160. LS: Yes
161. T: for our....
162. LS&T: Cars
163. T: Very good. { looking at the textbook } what other resources? We have water, sunlight, minerals (referring from the board) And what else?
164. L10:
165. T: come from this {pointing on the board } from minerals neh! Eya (yes) Molato
166. L35 : Coal
167. T: Coal. { writing on the board } Coal is also a mineral akerere? (not so?)
168. L8: yes
169. T: Now what other minerals? Except { underline them } the minerals? What other resources except the minerals. {Silence } Except the minerals, what are other resources, {pause } we need in our country. { she moves towards the learners and pick another learner }
170. L36: Animals
171. T: Animals, in which way?
172. L37: For food.
173. T: We need food, akere? (not so?)
174. LS: Yes
175. T: We need food. We need food {writing on the board } in our...
176. LS&T: Country
177. T: Akere? (not so?)
178. LS: Yes
179. T: Now let go to a ....to a books, in your books. { learner look at their textbooks } There is a shopping list. There is a shopping list. There's a shopping list neh!
180. LS: Yes
181. T: Are we together?
182. LS: Yes ma'am.
183. T: Now, who can tell me, what is a shopping list? What is a shopping list { learners are discussing among themselves } When a we doing a shopping list? Let me put it in that way. A shopping list. Bangi. { picking the learner by calling out his name }
184. L38: A shopping list is a paper that we write things that we need.
185. T: Ha! (repeat again }
186. L38: A shopping list is a paper that we write....
187. { The teacher interrupt him }
188. T: What do we write
189. L38: the things that we want.....
190. T: For what?
191. L38: for cooking or for washing
192. T: Now, okay! Let me put it in this way. What is shopping, shopping? { She then writes on the board } What is shopping?
193. Eya (Yes) Ramane
194. L39: A shopping is the so ..... is the list that you write a thing that you need in the home. { learners are saying something inaudible }
195. T: Shop... what is shopping? { pointing to the board }
196. L40: Shopping is when going to buy at the town
197. T: Yes, when you go to buy something neh!
198. LS: Yes
199. T: In town or at the supermarket neh!
200. LS: Yes
201. T: You are doing shopping neh!
202. LS: Yes
203. T: Now in you shopping list, what thing do you write? What thing do you....do you write? { some learners are whispering the word grocery }
204. L41: Grocery. Grocery.
205. T: Groceries neh!
206. LS: { some learners } Yes
207. T: Things that you...

208. LS&T: need
209. T: Neh! Things that you....
210. LS&T: Need
211. T: So that you can stay alive neh!
212. LS: yes
213. T: Akere? (Not so?)
214. LS: Yes
215. T: Now, here is the shopping list. The have { starting to write }air. The have....
216. LS&T: air
217. T: Neh! Er...Er hoe can we put it... how can we...er we say ... what is air. { pointing "air" on the board } air? What is air? Why do we need air? /why is air in our shopping list? { pointing on the shopping in the textbook } Air. Why do we.....
218. Why do we need air. Why we need air. Why is air in our shopping list? We said in our , in the shopping list you write things that you need mostly neh!
219. LS: Yes ma'am.
220. T: Why air is in our shopping list? How air is important to our lives. { The teacher reformulate the question}.
221. Why do we put air in our shopping list? Because we said we write things we need mostly in the shopping list neh!
222. LS: Yes
223. T: Now we have air. {Pointing on the board} why air is so important, to our lives? Yes { Pointing learner using head}
224. Isaacs.
225. L42: Air is important to our lives because it helps us to breath.
226. T: We breath.....
227. LS&T: air
228. T: Neh! We breath in.....
229. LS&T: air
230. T: Neh! { she is moving towards the table and look at the textbook} Er! The second one is the ...{ writing on the board }
231. Voice: Warmth
232. T: Warmth. Why do we have warmth in our shopping list?
233. {pointing at it} how is important is this warmth, warmth to our lives. {calling out learner's name} Minor.
234. L43 : {Minor} So that it can get warm when is cold.
235. T: Yes, so that we can get warm when it is..
236. LS&T: Cold.
237. T: Neh! And then we have {writing on the board} water in our shopping.....
238. LS&T: List
239. T: How important is this water. Why do we write water in our shopping list? Water. Where are the other people?
240. Khalhnyane {picking another learner}
241. L11: { Kgalanyane } we drink and wash ourselves.
242. T: Yes, we drink and wash...
243. LS&T: Ourselves
244. T: And what else. Palesa
245. L44: to cook.
246. T:To cook. To cook food. Kagisho
247. L45: {Kagisho} To bath.
248. T: To bath, that's good.
249. L12: To wash your clothes.
250. T: To wash your clothes.
251. L46: For transport.
252. T: for transport
253. L47: for animals to drink
254. T: for animals to.....
255. LS&T: Drink. {now learner are eager to respond.}
256. TL What about plants? {Repeat the question}. Mapadeka
257. L13: For cleaning
258. T: Cleaning the plants? What about the plants?
259. L48: For watering plants.
260. T: for watering .....
261. LS&T: Plants
262. T: Or irrigating the.....
263. LS: Plants.
264. T: And for industrial purpose at the factories neh!
265. LS: Yes.
266. T: They mostly use water neh!
267. LS: Yes
268. T: To manufacture 'some things neh! Like.... Which factory do you think it uses water, mostly? Hm! Which factory.
269. Difeme. Ko difemeng. Which factory do you think it uses water mostly. Eya (yes) Tshepo
270. L10: {Tsepo} Iron factory
271. T: Ha! (what?)
272. L10: Iron factory
273. T: In which way? Hm! { looking for answers from other LS }
274. Because in the iron factory I think they melt what? Iron neh!
275. LS: Yes
276. T: Which factory in Bloemfontein or a firm neh, that uses water mostly? { pointing another learner}

277. L14: A milk factory
278. T: A milk factory neh
279. LS: Yes
280. T: And what else? And which other factory, what about SAB. South African Brewery. When they are....When they are mixing beer maybe neh!
281. LS: Yes
282. T: They use....
283. Voice: Water
284. T: This water {pointing on the board} neh!
285. L49: Mistress.
286. T: Hm {listening to learner's suggestion}
287. L49: And in....in drink's factory.
288. T: As coke, coca cola neh!
289. L49: yes ma'am
290. T: They use a lot of....
291. LS&T: Water
292. T: So water is important to our...
293. LS&T: lives
294. T: Neh! And nourishment {writes on the board while saying it }
295. Nourishment. What is..... what is to nourish, to nourish. The meaning of this word. To nourish. To nourish.
296. Moenane {picking L}
297. L14: To nourish is to feed
298. T: Ha! (repeat again)
299. L14: To nourish is to feed.
300. T: To feed or to do what? To feed or.....Molwabi {picking another learner}
301. L7: To keep a person or animal alive and well by means of food. { L7 is reading from the textbook}
302. T: Yes. Keeping animal or a person alive by means of.....
303. LS&T: Food
304. T: Neh!
305. Voice: Yes
306. T: So our body need food, neh!
307. LS: Yes
308. T: That's why in our shopping list we have nourishment, neh!
309. LS: Yes
310. T: Now let's go back to our, books. On page there are advertisement. Adver.....
311. LS: tisement.
312. T: What is an advertisement. What is an advertisement?
313. Minor. {calling out L's name}
314. L15: Advertisement is when something is advertise, like maybe you sell something you advertise it well so that people can come and buy it.
315. T: Very good. Is when....Er, in a television or on the.....
316. LS: Radio
317. T: Neh! People are...are advertising their things neh, that are...that they are selling neh, so that the people can go there and buy those things neh!
318. LS: Yes
319. T: That is to advertise neh! Here are the examples of {pause} advertisement. They say here {reading from the textbook} "This advertisement which follow to find out where life forms can obtain the things they need and used to stay alive". It means in this advertisement, these things, are the things that makes you to stay....
320. LS&T: alive
321. T: Neh! The atmosphere show. Here is an advertise at the
322. LS&T: Atmosphere show.
323. T: We said we need atmosphere neh! {Showing learner things that make atmosphere}
324. LS: Yes
325. T: The air akere? (Not so?)
326. LS: Yes
327. T: The air. {looking at the textbook} Who can read that advertisement for us. Who can read that advertisement.
328. Tebello. {calling out learner's name so that she can read}
329. L16: {Tebello is reading an advertisement from the textbook. Other learner are laughing but she goes on reading till she is finished and she sits down.}
330. T: Okay thank you. Okay I'll read it loud so that we can all hear neh!
331. LS: Yes
332. T: { Reading from the textbook} The atmosphere shop: Your friendly supplier of Nitrogen 78%, Carbon dioxide 3%, oxygen 21%, other gases 0.97%, open 24hrs a day for all your breathing needs. Human animals and plants are welcome {laughter} free, free ultraviolet trapping service for every customer while the OZONE LAYER last. {she has finished reading} Now...{laughter} Okay, listen {while putting textbook on the table}
333. The atmosphere is made up of different gases? What are those gases? That are very important to our bodies {repeats}. The atmosphere is made up of different gases. Which are very important to our....to all living things on earth.
334. Akere? (not so?)
335. LS: Eya (yes)
336. T: Er....Letshego
337. L50: {Letshego} Oxygen
338. T:Oxygen? Why oxygen is important to us? Oxygen! Er,...Phakudi
339. Invisible learner: To breath.
340. T: Yes we are breathing....

341. LS&T: Oxygen
342. T:Neh!
343. LS: Yes ma'am
344. T: Aha! (Okay!) What other gases {not her head to say yes}
345. Invisible learner: nitrogen and Carbon dioxide
346. T: Yes, now, we .... We inhale .....er, to inhale ke go tsenya akere {Demonstrate}'
347. LS: Yes
348. T: We ,we breath in ....
349. LS&T: Oxygen
350. T: Neh
351. LS: Yes
352. T: We exhale
353. LS: Carbon dioxide
354. T: Carbon dioxide neh!
355. LS: Yes
356. T: Neh!
357. LS: Yes
358. T: That's why Carbon dioxide is important to....
359. LS: our lives.
360. T: To our lives. Now when you exhale that Carbon dioxide, plants are going to use that Carbon dioxide neh. And again the plants is exhale that Carbon dioxide neh!
361. LS: Yes
362. T: And that Carbon dioxide we are going to use it as a.....
363. LS&T: Oxygen
364. T: Akere (not SO?) Neh!
365. LS: yes
366. T: It's a circle, la e bona? (You See?)
367. LS: Yes
368. T: Er, lets go to the water circle who can read that advertisement. Eddie, read it once.
369. L49: {Eddie} is reading from the textbook.
370. T: Hm! {laughter. Then the teacher read that water cycle again} The water cycle neh! "Drafted specialist of earth, 95,5% salt water produced in seas and oceans, and 3.5% fresh water stored in lakes, rivers in snow and underground. If you need water for cooling the body as a medium in which chemicals reactions takes place to dissolve substances in the body, to transport nutrients around the.....
371. Some LS&T: body
372. T: Neh! So, we are the best, established since life begins. {asks learners question in connection with what she has just read } When did they established this? {pointing at the water cycle in the textbook} Ha! When did this shop start. {calling out learner's name then pick another learner}
373. L51: This shop started, started before life begin.
374. T: Before....
375. LS&T: Life begin
376. T: Neh!
377. LS: Yes
378. T: Ja (yes) Er, the advertisement on sunlight. Who can read for us. {looking for any volunteer(s)} Hm, where are the other people?
379. {Then pick the learner} Sophy, read that for us.
380. L17: {Sophy which will be L17 is reading from the textbook.}
381. T: Okay! {Silence} The, the last one. {The last advertisement}
382. L52: {Whispering} The food chain.
383. T: The food chain. The food chain. {The pick another learner}
384. Marumo.
385. L53: {Marumo} Supplies of the {inaudible}
386. T: {interrupt L53 by correcting her} "Supplies"
387. L53: Supplies of the inaudible
388. T: {correct the spelling } "Whites"
389. L53: White (not clear) of the nourishment for all earth's features. Something for everyone to eat and something to eat everyone. {laughter} If you cannot find it here, it must be ex.....(learner is struggling) {Both the teacher and the learner are helping her}
390. T: The food chain {The teacher is reading} The suppliers of the widest range of nourishment for all earth's
391. creatures, all creatures {Stops reading and explain to learners in Sesotho}
392. Ret tlo...Hala-rotlhe (all of us). Er, we live in which planet? {learners are raising the hands} What is the name of our planet? Our planet. Eya (yes) {Pointing the learner}
393. L54: Earth.
394. T: Earth neh! Earth is our.....
395. LS&T: Planet.
396. T: Now they say here. {Start to read what she read before}
397. Supplies of the widest range of nourishment for all earth's creatures. Ka mantswe a mang, halarotlhe (meaning all of us neh)
398. LS: Yes
399. T: Mo planeteng ya rona. (in our planet)
400. LS: Earth
401. T: Our earth.
402. T: {reading} Something for everyone to eat neh!
403. LS: Yes
404. T: And something to eat {laughter} everyone {laughter}
405. If you can't find it here it must be extinct. {Stops reading}
406. Okay! What is the meaning of extinct. If you can't find it here.....If you can't find it here it

must be extinct {learners are discussing something inaudible} What is the meaning of extinct. Rasengalo. {Referring the question of the learner}

407. L55: {Rasengalo} If you can't find it here it must be dead.
408. T: It must be.....
409. LS&T: Dead
410. T: Neh! It must be....
411. LS&T: Dead.
412. T: Er! Now, who can tell, is what is a food chain, A food chain. A food chain. What is a food chain {learners are discussing their answers among themselves.} A food chain Pula.
413. L56: {Pula} A food.....
414. T: We can't hear you.
415. L56: A food chain is an order of animals and plants eating each other.
416. T: Is an order neh!
417. LS: Yes
418. T: In which plants and animals are eaten by cach.....
419. LS&T: Other
420. T: That is a.....
421. LS&T: Food chain
422. T: {looking in the book} Now there are other resources on page 50. They say they are...
423. LS&T: Other resources
424. T: They say there are resources that are non-renewable. There are resources that are
425. LS&T: Non renewable {The teacher is writing on the board}
426. T: What do they mean? {while writing} They are non-renewable. Manong. {picking learner to respond}
427. L57: Renewable resources are resources that can't be renewed
428. T: Ha!
429. L57: Renewable resources are resources that can't be renewed
430. T: They can't be..
431. LS&T: Renewed
432. T: They are non-renewable. Can you give me an example of non-renewable resources {writing resources} Resources that cannot be changed neh, or used again, Ah, what are those resources. {waiting for answers from learners} Think! Ah. (yes) Sarah.
433. L58: {Sarah} A cup
434. T: When it breaks {writing or the board} A cup, you can't fix it again. A cup. {looking around} Lungile
435. L59: {Lungile} A bottle
436. T: Ha! (what?)
437. L59: A bottle.
438. T: A bottle {writing on the board} When it breaks you can't use it again, neh!
439. Voice: Yes
440. T: Aha! (And what else?)
441. L60: A glass plate
442. T: A glass plate or a plate neh!
443. Voices: Yes {Then the teacher writes on the board.}
444. T: Now there are non-renewable resources and ....
445. LS&T: Renewable resources.
446. T: {while writing} What are the renewable resources? We said non-renewable resource that cannot be changed or used again. Akere (not so?)
447. LS: Yes
448. T: Now what are the renewable resources. What are the renewable resources , Minor {Minor is saying something inaudible and the teacher reformulate the question} Can yo give an explanation of a renewable resources.
449. L15: {Minor} renewable resources is something when it grows that can be used again
450. T: Yes! When something in neh! It can be....
451. LS&T: Used again.
452. T: Now that ....?Give me an example of the renewable...
453. LS: resources...
454. T: That can be used over and over neh! It can be renewed. {the teacher is saying something inaudible in Sesotho} Akere (Not so?) It can be renewed.
455. T: Ha! (yes)
456. L61: Shoes
457. T: Hm! (What?)
458. L19: Shoes
459. T: Yes shoes can be renewed neh!
460. LS: Yes
461. T: how can we renew shoes? How can we renew the shoes?
462. Moloabi {Pointing the learner} How can we renew the shoes?
463. L62: {Moloabi} We sew them
464. T: We sew them neh!
465. LS: Yes
466. T: Mh! Example of the renewable resources. Bantsi {picking another learner}
467. L63: {Bantsi} Clothes.
468. T: Clothes {Writing on the board} In which way? {Learner are discussing intensely} Clothes, in which way, how do we renew clothes.
469. L64: for sewing them.
470. T: By sewing, sewing. Neh! {waiting for responses from other learners and pick another learner} hm!
471. L65: Car
472. T: A car {writes on the board} How can we renew a car? Hee! (No?)
473. How can we renew the car? How can we renew the car?

474. {No response from learner and the teacher decides to pick learn of her choice.} Saul, how can we renew the car? {Saul could not respond} O etswa ke hore o ntso lwana moo. (It's because you were fighting) [then the teacher picks another learner}
475. L66: By fixing it
476. T: By fixing it or repairing it
477. LS&T: It. Akere? (Not so?)
478. Voice: Yes ma'am.
479. T: To, to design an advertisement. {learners are given tasks to do in groups}
480. T: We are coming to design our....
481. LS: Advertisement
482. T: Each group must have its own
483. LS&T: Advertisement
484. T: Neh!
485. LS: {same learner} Yes.
486. T: Are we together?
487. LS: Yes
488. T: Do you understand what are you, are you going to do
489. LS: Yes
490. T: Do you understand what are you, are you going to do
491. LS: Yes
492. T: Now, in our advertisement, the language {writing on the board} The language, it means you must look for the correct spelling, neh {The teacher is giving instructions}
493. Voice: Yes
494. T: Your work must be ....
495. LS&T: Correct
496. T: And the size, and the {writing on the board} the size of your ,your advertisement. Ka mantswe a mang (in other words) it must not be too long. Ra utlwana (do you understand me)
497. LS: yes
498. T: It must not be....
499. LS&T: too long
500. L67: Ma'am should we
501. T: Ha!
502. L68:
503. T: It's up to your group. It's up to your.....
504. LS&T:Group
505. T: Neh! Okay, in a peace of paper. You can do it in a .....piece of...
506. LS&T: Paper
507. T: Yes {The teacher is saying something inaudible while the learners starting to do their task. But before then they are now discussing in groups. The teacher is handing sheets to different groups. One sheet per group} Okay listen
508. Voice: Sh!
509. T: Okay. You, can choose any advertisement according to our shopping list. Ra utlwana? (Do you understand me?) According to the resources we need for....
510. LS&T: Life
511. T: Neh! Ra utlwana? (Do you understand me?)
512. LS: Eya (Yes)
513. T: Life.... We can make it.... We can choose water.
514. But not that one {The one that appear in the textbook you understand?
515. LS: Yes
516. T: You can use you own. You must be creative. You must think. Neh!
517. LS: Yes
518. T: You must not copy that one, Ra utlwana ? (Do you understand me?)
519. LS: Yes
520. T: You can choose sunlight neh!
521. LS: Yes
522. T: In your own way. You can choose minerals food. You understand.
523. LS: {some learners who are listening} Yes. {learners are discussing in their respective groups and the teacher is attending another group disagree with what they are doing though they are invisible}
524. {Learners are discussing circles that they have chosen in the respective groups and the teacher attending their group while moving around the class to see whether they understand what they are doing and assist them through discussion. A certain group is discussing their advertisement}
525. L69: Is about we are inviting alliance in our planet {Her team mate is saying inaudible to her}
526. Voice: Will you read
527. L69: Hothwe eng? (What does her or she says?)
528. {Their team mate is showing he or she their sheet where they have written their advertisement}
529. L69: Yes. Ha re baleng halarotlhe. (Let's all read)
530. {Reading as a group from their sheet}
531. "Hi there alliance, air is for free in our planer. There is enough air for all of you. If you cone in our planet, you can see air with your eyes"
532. {The above group is through with their advertisement. Then the other group read their advertisement}
533. L70: Yes
534. Voice: Okay
535. L71: I said when you, when you...
536. Voice: Bath
537. L71: " When you bath we water, like manana, you'll be white like pumpkin" {Reading their advertisement}

538. Voice: Like
539. L70&L71: Like pumpkin

APPENDIX 1

I: INTERVIEWER
L: LERATO

I: {Inaudible} I'm busy now with my .....{pause} MED with VISTA
L: Mh .....
I: And apparently, I'm working on this research project .....
L: Okay
I: That ..... Ah .....
L: Mh .....
I: ..... Has sent me now to the schools
L: Mh
I: I ..... My study ..... I'm actually looking at Educational Technology
L: Mh .....
I: What do teachers think Educational Technology is? I wanna get the meanings that people have; apparently I've discovered ..... It doesn't mean one thing at all ..... but .....
L: Mh .....
I: What would you expect that person .....
L: May be who is teaching Technology .....?
I: ..... to be doing just
L: Who is teaching Technology?
I: Eh ..... Okay what a Technologist before we talk maybe about an Educational Technologist ..... what .....what would a Technologist be doing ..... in your thinking? {silence}. If a person is a technologist .....
L: {Giggling} He ..... he ..... I think a Technologist {pause} Mh ..... can make may be researches
I: Okay .....
L: Mh .....
I: To research
L: May be ..... how did they do maybe Cell phones
I: Okay
L: You know all those things
I: Okay
L: Where television comes from?
I: Okay Have you ever said ..... someone ..... or heard talk about maybe read some where talking about technology of Education?
L: Hee, no
I: You have never heard that .....
If you were to think about that, what would ..... what would you ..... have in mind?
L: Technology of Education?
I: If you had to talk about Technology of Edueation {Silence}
L: According to me I think Technology of Education .....
I : Mh .....
L: Is to educate ..... to be educated about the technology.
I: {Paraphrasing} Educated about technology?
L: Yes
I: Okay
L: I think so
I: Okay (Prompting}
L: In studies you are going to concentrate on technology. If ..... if ..... If ..... Specifically on technology
I:You would be ..... are you asking me?
L: No, I'm .....
I: Oh! ..... you are telling me that the person would be doing specifically and what kinds of things would he be ..... looking at? {Silence}
L: May be dealing with machineries .....
I: Mh ..... what .....
L: Investigating something maybe .....
I: Okay {Silence} okay.
L: Making Eeh ..... Ja researches all those things, about something that it has to do with technology.
I: Okay. Can you give me one example maybe, one example ..... just ..... just an example
L: Lets say a computer
I: Okay
L: A Technologist may look at it {pause} to operate it maybe .....yes I think that is technology
I: Okay. As a teacher what do you think .....you as a teacher or any teacher would be relating to technology, how does it relate to the teacher's job?
L: Technology?
I: Yes
L: I think it relates to our job Eh .... If you are a technology teacher you'll be able to use ..... to operate this ..... may be computer
I: Okay
L: Some machines all those things.
I: Okay. Okay
L: And you can be also ..... know how to teach these kids, how to operate these things.
I: Okay

77. L: Mh .....
78. I: Teaching you thinking about teaching kids
79. L: Mh .....
80. I: Specifically about computers .....
81. L: How to use it ..... Mh .....
82. I: Or telephones
83. L: Yes
84. I: As you have mentioned
85. L: Mh .....
86. I: Okay. If you are teaching another subject like Geography or ..... even Biology or
87. Science whatever, how would you relate to technology .....?
88. L: Okay, they are related because let's say maybe you are using ..... you are doing
89. Eh ..... Geography.
90. I: Mhm ..... Oh! ..... Yes
91. L: Maybe you want to show them something maybe a map
92. I: Okay
93. L: What did they use this thing ..... Mh ..... so that people can see clearly
94. I: Okay
95. L: What is this thing they use?
96. I: Overhead projectors
97. L: Overhead projectors
98. I: Okay.
99. L: I think is ..... is Technology, you can use every ..... in every learning area.
100. I: Okay. Okay. So .....
101. L: I think that's technology
102. I: Okay. Is there any kind of technology in your teaching for instance?
103. L: Yes. If I had ..... we had an overhead projector .....
104. I: Okay
105. L: Maybe at school .....
106. I: All right
107. L: We would have been used it.
108. I: Okay
109. L: In my lesson
110. I: Okay. Otherwise you don't have overhead projectors
111. L: No .....
112. I: No computers
113. L: No computers
114. I: Televisions
115. L: No. Even Radios, we don't have radios
116. I: Okay. so how ..... how do you think that affects your teaching?
117. L: I think the pupil ..... Eh ..... {pause} they take a long time to understand
118. I: Your learners
119. L: Mh ..... Mh .....
120. I: Okay
121. L: The learners
122. I: Mh ..... Mh .....
123. L: Others may understand quickly, others maybe after a long time
124. I: Okay
125. L: Mh .....
126. I: Mh ..... you find that as a problem
127. L: As a big problem
128. I: Okay
129. L: Lack of resources, okay
130. I: Mh .....
131. I: Okay, and ..... Eh ..... do you think now {pause} without those resources you
132. find it very problematic to ..... to actually .....
133. L: Not so much
134. I: Okay
135. L: ..... Because our kids ..... I don't think most of our kids gets ..... so many
136. problems,
137. I: Okay
138. L: As ..... as ..... you saw in this when we were talking about resources
139. I: Yes
140. L: They just { using gesture to indicate the activeness/participation of the learners in
141. the lesson} and it was a new lesson
142. I: Okay, okay
143. L: Mh .....
144. I: How ..... how ..... do they think they .....?
145. L: They can think
146. I: They can think?
147. L: Eh ..... they can think
148. I: Okay
149. L: Mh .....
150. I: So ..... so
151. L: They use ..... mostly they use their thinking
152. I: All right
153. L: Mh .....
154. I: Okay. Do you .....?
155. L: I help them {pause} I get them to ..... lead them to the answers maybe
156. I: Okay

157. L: I don't know how to ..... I'm using leading questions
158. I: Okay
159. L: To that answer maybe.
160. I: And how do they do at the end, do you find that they do well .....
161. L: Yes very well
162. I: When they .....
163. L: Mh .....
164. I: Okay
165. L: They do very well ..... Mh
166. I: So basically .....
167. L: Or let's say {pause} our teaching aids, I just say maybe I give them assignment,
168. lets say maybe resources, I can say to them go home
169. I: Mh ..... h
170. L: Collect some pictures in your magazines
171. I: Mh .....
172. L: Something like that
173. I: Mh .....
174. L: And you paste it {pause} you know I just want to see whether they understand,
175. maybe what is a ..... maybe a sheep
176. I: Okay
177. L: Mh ..... {pause} we did in the classroom neh, I didn't give them that picture, show them that picture
178. I: Mh .....
179. L: Then I say to them go home, come with that picture, paste it in your books.
180. I: Mh ..... h
181. L: If he didn't understand it I see it maybe this girl or a boy didn't understand, what a
182. sheep is
183. I: Okay
184. L: Mh .....
185. I: Okay. Tell me maybe one last question
186. L: Mh .....
187. I: In your training, you trained here locally .....
188. L: Yes
189. I: For your teaching, you never heard of ..... like technology of Education
190. L: No
191. I: Or Educational Technology
192. L: No
193. I: Something in that line
194. L: No
195. I: Okay. but you worked with various teaching aids
196. L: Yes
197. I: Can you mention .....
198. L: At the college?
199. I: Mh ..... yes {silence}. What kinds of teaching aids did you .....
200. L: At the college?
201. I: Ewe, Yes.
202. L: At the college I was doing art
203. I: Okay
204. L: As my major subject
205. I: All right
206. L: The teaching aids that we were using there
207. I: Mh .....
208. L: We were using real things
209. I: Okay
210. L: Like maybe when we are doing a college
211. I: Aahaaa .....
212. L: We will go with rice, we take that rice from home
213. I: All right
214. L: And glue, we are going to ..... maybe you are building a house
215. I: Okay
216. L: With that rice
217. I: Mh .....
218. L: You know you are pasting, we were using real think but how in our schools when
219. you say to a child come with rice, others don't have it
220. I: Mh ..... Mh .....
221. L: You understand?
222. I: Mh ..... Mh ..... Mh ....., so you find it difficult to do the same things
223. L: Yes, we did ..... but at eh college .....
224. I: But you did it at college
225. L: Because at college we were having resources, because we were students
226. I: Okay
227. L: They were paying for that
228. I: Okay
229. L: Mh .... everything was there overhead projectors, computers, television, radios
230. I: Mh ..... Mh .... Mh ..... so do you sometimes find that you have to make your own
231. teachings aids?
232. L: Yes, sometimes .....
233. I: At school?
234. L: Yes. Mh .....
235. I: All right

236. **L: The teaching aids that we were using there**
237. I: Mh .....
238. L: We were using real things
239. I: Okay .
240. L: Like maybe when we are doing a college
241. I: Aahaaa .....
242. L: We will go with rice, we take that rice from home
243. I: All right
244. L: And glue, we are going to ..... maybe you are building a house
245. I: Okay
246. L: With that rice
247. I: Mh .....
248. L: You know you are pasting, we were using real think but how in our schools when
249. you say to a child come with rice, others don't have it
250. I: Mh ..... Mh .....
251. L: You understand?
252. I: Mh ..... Mh ..... Mh ....., so you find it difficult to do the same things
253. L: Yes, we did ..... but at eh college .....
254. I: But you did it at college
255. L: Because at college we were having resources, because we were students
256. I: Okay
257. L: They were paying for that
258. I: Okay
259. L: Mh .... everything was there overhead projectors, computers, television, radios
260. I: Mh ..... Mh .... Mh ..... so do you sometimes find that you have to make your own
261. teachings aids?
262. L: Yes, sometimes .....
263. I: At school?
264. L: Yes. Mh .....
265. I: Can you tell me one example, what have you .....
266. L: Yes. Eh ..... in Art, Art and culture
267. I: Okay.
268. L: I did use {Clearing her voice} printing, you know printing,
269. I: Okay
270. L: To print a thing
271. I: Okay
272. L: Yes
273. I: Okay
274. L: I said to them they must come with a potato
275. I: Mh .....
276. L: At home
277. I: Mh ..... Mh .....
278. L: Mh ..... most of them came with it let's say all of them they managed to come with that
potato.
279. I: Mh .....
280. L: The lesson was very successful
281. I: Okay
282. L: We use the painting, here at school we have the painting
283. I: I see
284. L: The brushes.
285. I: All right, all right
286. L: They have designed very beautiful patterns
287. I: Okay
288. L: It was successful
289. I: It was beautiful, but you've never seen yourself using that in teaching HSS or
290. Geography,{Pause}.
291. L: Those patterns?
292. I: Using the same kind of .....
293. L: No
294. I: Okay
295. L: Hm .....(NO)
296.

I: Okay, Okay

APPENDIX 1

INTERVIEW....THEMBA2

1. R: Ndifunda apha e Vista. I am doing my M.Ed. and now I had to do this research, but I have chosen to look at educational technology. They are specifically looking at what teachers understand by educational technology. What they thing educational technology is and as I said I appreciate your cooperation. Now let us come to the actual thing. Tell me what you think tech ... educational technology is, what do you think people mean when they talk about educational technology, what people are talking about? What meaning do you have?

2. T: Me (Laughter) I don't have these, as I have already explained to you that I was wondering what this is eh about, this that eh tech ... education technology, so what I know is only the method, not technology. I don't know in this ... I think is because I have done this eh training long time before, so that is why I don't know this eh what it mean technology, but as fas as the mean is concern, I think the way we do things that is technology education, technology form I think is method of what we are doing things.

3. R: Mh

4. T: Yes but eh it was not given that name. We are talking about methods that is education technology I think it is.

5. R: Mh, but you understand it would mean the same thing as the method, the way you go about teaching?

6. T: For the first time I understand today.

7. R: That's interesting, you say for the first time you understand it today.

8. T: Mhh ..., that is ...

9. R: Can you elaborate, can you explain a little bit ka ncane.

10. T: Is because you are talking of the educational technology, now we have found the new name for the method of ..., I think that the thing we use to call the method of teaching, and now I know it is technology, is how we do things in the eh past, that is why we have other means like innovation, that is the way we have improved on our methods of doing things in the past. I think for example I'm doing eh at school the , eh sport management, I'm not going to call it sport management, I'm going to call it eh sport innovation.

11. R: Okay

12. T: I want it that, it should be ... I am doing it managementally, the sport innovation, so that just to capture the interest of pupils. So I think that is how, why, that is why today we are saying education technology. It is the way now we have found it. This is the way things are being done and maybe edueation or teaching, so that is why I'm saying education technology might mean the same thing as methods.

13. R: Mh, cay you tell me how you see these applying to your teaching?

14. T: Methods?

15. R: Mh, how does these now if we let's say talk about education technology which is very interesting, you were saying to me is just about how we go about teaching. I am interested to know for instance if you have to go to class what, what (silence) how do you see yourself working technologically.

16. T: Okay. I am also ... we are now, being introduced so soon into eh O.B.E. so now that is eh another eh education technology the improvement in education because, the first one; when you have been trained, we were trained as that there were no involvement of the children, but now eh the eucation technology have changed now because we are involving more of the children, unless, eh we are because is not, we are trying, but we are not yet. I don't think we are (laughter) fifty-fifty or (laughter) we are still above. I think sixty-forty, the teacher is still having sixty instead of forty as the children should participate more. Eh. Another reason I think that is, that's why ..., the problem is lying on that, at the end of the day you are going to be asked, why the children have not achieved so much and so much, and then the teacher they tend to continue a much of talking and less involvement at the teaching.

17. R: Mh.

18. T: So but the technology now in education is that we should involve eh children more.

19. R: Mh, then

20. T: And we focus on the attitude how do they feel and also their knowledge as far as the area.

21. R: Mh.

22. T: Is concerned and we also talk of their skills.

23. R: Mh

24. T: That is why sometimes we ask them to do things like group-work is focusing on the knowledge that they have.

25. R: Mh.

26. T: And sometimes you ask them to draw these things, for example today if we are having, eh if it was you were going to be in the second lesson, we were going to eh to introduce the map of South Africa previously and how, so they were going to tell me how was South Africa before, can you draw me that map so that I can see there are other talents in the children that they are good in drawing and so on, like that, and their past knowledge. And how did they see now, South Africa, the new South Africa with nine provinces instead of four provinces.

27. R: Mh.

28. T: So that's why, that is why we are doing, but as far as technology we are having a problem. I remember when I came from school, eh starting in the field of work in 1987, Mhh, eh, we were teaching the methods, that we were using, is just to teach and children like in the language it not about the language.

29. R: Okay

30. T: Eh, when we are teaching grammar or telling them, now we are going to do the past tense or present tense and so on, it was teaching about language, but when we let them eh talk the language, it means we are teaching the eh in language. But eh my Principal, then was a P.T.C. teacher and when I was ..., I was new, I knew about the work that we have learnt from the college, and when I was presenting those new methods he said "no this not ...(inaudible)". He was not prepared to learn a new thing.

31. R: Mh

32. T: So I was also changed, because the methods which were introduced to us or we learned from the college, they were not introduced to the teachers, who were there before and then, they were our superiors, so they were going to be our mentors in the class.

33. R: Mh Mh

34. T: And when we introduce these methods. He was going to change me.

35. R: Mhh

36. T: And really he changed me. He said "this is not the way you are supposed to do things it is this way you are supposed to".

37. R: Mhh

38. T: When you teach this, teach it in this and so on. So it is not good for, eh, the department of education or any ehh, ehh education institution to having a few individuals being taught the new methods or new techniques how to do things.

39. R: Mh

40. T: And then the others they are not being introduced, because now there is going to be confrontation, coming with a new thing and this, your superiors, because he is your superior. He is going to say no this is not been done like this, lets do it and then the information that you have is going to sip away because you are not using it. Since then I was behaving real like a cram, since becase it was that time, that I went to school, it was that time and then meaning that there were new methods of teaching and so on.

41. R: Mh

42. T: But there were those people who had P.T.C. who did not know anything about new methods.

43. R: Mh.

44. T: So it was bad thing for us, asking yourself, for myself really the thing I have learnt the old method, the new methods for that time, and we did not use them.

45. R: Mhh. Mhh.

46. T: I was forced to do the old ones.

47. R: Mh. Mh. Which you feel were not if you come back to what you are saying, were not technological, in other words ...

48. T: Yaah, yaah and we know because by that time, it means education had improved, the methods, the technology of education.

49. R: Yes.

50. T: Now the old one who did not know about this new innovation in education, they were not accepting it, or they did not know about it. So that is why they did not consult it and then we form victims.

51. R: Mh. Mh.

52. T: Their victims and then we go back instead o f forward.

53. R: Do you feel now, you getting ..., you have now been given more freedom to go back to what you ...

54. T: Yes, but it means for many years those eh, those things were not used, meaning some of them slipped because you not used them so you have forgotten about them, for example I was having (inaudible) my first principal was the P.T.C. one and also second one. That is ... meaning two years of my ehh ...

55. R: Initial teaching

56. T: Yes

57. R: Going into the field

58. T: Into the field. I was having eh P.T.C. teacher, and if you had not had the foundation for the first time, it means you are just being destroyed it's either, you are being built or being destroyed.

59. R: Destroyed, yes.

60. T: And after that, I am going to the second school but for one year, but the other one for six years but also the whole P.T.C. They were telling us "no we cannot give also we cannot give also the management because we are earning too much money. So few of them were teachers said no, no we were not being improved really.

61. R: Ehh, ehh

62. T: Taken to the HOD courses and so on like that because they were saying no we are all reading, so meaning they were not interested in us, or to improve in anyway. They were just using us just to be in the classes, whether the children are passing they do not care. How? They know how, how to go about in the class in order for children to learn more they were not interested in that.

63. R: Yes. Yooh tichela, this is interesting. I want us to please for my sake, maybe I will use this for other teachers as well. Let's see what do we see as the difference between those old teachers and the teaching that they had and the more innovative. If I'm using your words.

64. T: Okay, the difference is that the old method that we were using is just not child centred.

65. R: Okay

66. T: Because children were not they were passive, but now in the new technology now there is more involvement of children, that is why I am saying excuse me, more time should be given to the children so that they can participate, they are the one who suppose ... Just the way teachers suppose to guide them only they should come up with everything.

67. R: Mh.

68. T: Of the lesson. So that is how, what we can do group work, individual assessment or group assessment that is how (inaudible), and it is a continuous evaluation, because in the point in time, the children the way they are being tested in the things have learned from January, and then also in December, they should be tested and then. But now the things are being changed, other that White education, it is not like the way we are doing things, and also still now because teachers they are still, especially in our eh areas, Black areas we are still using the old methods of eh assessment eh using tests only.

69. R: Mh

70. T: They are not using the other ways that we can assess children but through OBE I think this is coming to an end.

71. R: Yes.

72. T: That we are using many methods of assessment other than the tests.

73. R: Mhh

74. T: Eh, but I think also that is the government, also is adamant, and do not want to stay away from tests. He need that ... they should for an example if we are doing eh assessment for year, standard four is an external examination, they are going to the paper, for standard four, meaning that if we say to ourselves. So assessment we are not going to have eh June examinations what we are going to have is eh, we are going to continue assessment no only in test.

75. R: Okay. Okay.

76. T: Yes, but we don't have special the time that we are saying that we are going to write June test.

77. R: Mh.

78. T: We are going just to continue assessing, them every month or week.

79. R: Mh, yes.

80. T: And the quarterly we have some final assessment, every quarter so that we can see where he has done better in the first quarter, and then this quarter and so on.

81. R: Mh.

82. T: But now, but in town, those schools in town they assess every month and every quarter, every quarter they are giving out the results, their assessment and so on, and then they do not test the whole year's eh work. If you have been tested and that you have passed in the first place you are through with it.

83. R: Mh...mh

84. T: And the next thing will be work and so on. But what we are doing we are still doing the testing and piece from the first work they have done in the first quarter and the last quarter.

85. R: Mh.

86. T: So they can forget about that because it is a lot of work.

87. R: Yes.

88. T: They give to children.

89. R: Okay tichela, we are from class as I was saying to me today that was very interesting, sitting in your class. But now can we go back, talk about it, the very lesson you were teaching today. Can you tell me how you went about, preparing for that lesson. Just ... (laughter)

90. T: Okay, we are having eh, the work eh, what we should work on for example the essay what we started, that is time after the Kagisanong teachers have hone. So we started with the rainbow nation, an what I have done is just a preparation, I have planned more of it. I tried to find more of the information concerning the rainbow nation and also the thing that I know, eh what had happen ... not only the things that are in the books.

91. R: Yes.

92. T: I know because I was part of this and I know everything that had happened ... at least some of the things that had happened in the past. So I have that basic knowledge and other information and also the text book that we have.

93. R: Mh. Mh.

94. T: And try to make it simple so that the children for the level of their understanding of the children & that is it.

95. R: Mh.

96. T: And try to use method of eh technology (laughter). I am not used to these things, technology.

97. R: Yes. Okay.

98. T: Yaah, that I am going to use in the involve them.

99. R: Mh ... Mh. You had remind me you had besides the chalkboard you had some ...

100. T: Flash cards

101. R: Flash cards and you had ...

102. T: Yaah, group work also

103. R: Group work and ...

104. T: I was having some maps but eh because of the book, do you see the way we are doing things sometime the thing that you have prepared it won't fit because of the ... eh information that is coming.

105. R: Yes.

106. T: In that case at that time you see that now won't be able to finish up, that is why in the OBE

we are not taking, we are talking about more ... it can be a lesson for two months.

107. R: Okay.

108. T: Talking about rainbow nation, many sub-themes we can talk about.

109. R: Mh. So what is important to you is not finishing but ...

110. T: Yaah, the kids should understand what we are doing.

111. R: Okay.

112. T: And if they come up with these things, and also, when they come up we should also get clarity on that so that they can understand.

113. R: Mh. Mh.

114. T: And sometimes is only a little bit of knowledge that they have, so they should open up (the teachers voice is inaudible).

115. R: Mh...Mh. It is very interesting. What did you see as the role of those flash cards, group work you see all that working together, can you tell me how did you plan to have all that together.

116. T: I also ... on the part of time, so if we have less study we won't have lot of writing.

117. R: Okay.

118. T: And then also, when you have flash cards the children, they are well ... you can capture their interest.

119. R: Mh. Mh.

120. T: Through eh flash cards, and then you ... they know that it is not going to be there for when you are holding that in your hand it can it cannot be there, so that they can sometimes go and see it on the board. So it is just that they see, they are ... they suppose just to look on at it. They would ... just eh try to capture their interest and put it down.

121. R: Mh. Mh

122. T: And also eh the group work is that, they encourage them to participate.

123. R: Mhh.

124. T: But also there are advantages and disadvantage of group work if you cannot eh monitor it, the other kids they won't be participating in the lesson, they won't participate.

125. R: Mh ...Mh

126. T: But if you are monitoring it they can participate.

127. R: Mh

128. T: And also sometimes through the group work you can ask them who do not participate they should tell you.

129. R: Mh.

130. T: So the kids, they would do that they won't hide.

131. R: Mh

132. T: So that you can have ... and they see that is important for them to participate.

133. R: Okay. Okay.

134. T: That is why you can ask the kids so that if they feel to participate they won't be given the group mark; because they didn't participate.

135. R: Mhh. Mhh.

136. T: (inaudible)

137. R: There seems to be a lot of thinking on your part.

138. T: Yaah, there is a lot that ...eh they should because of the assessment also, you assess them individually like when you ask questions.

139. R: Mh.

140. T: And when they put their hands up, asking them but also in the year group, and also another way of assessment in their test.

141. R: Okay.

142. T: That is giving individual group assessment and so on so that is why they are having that and also we are encouraging group work so that cannot have (the teacher is inaudible), so one is going to be the leader or the teacher, he should be able to stand up and talk to the others.

143. R: Mh. Mh. This is beautiful I think ..., although it cannot now see the lesson, but I'm sure you will have very clear the stages you were going through. If I may ask just one doable last question, even though I feel there is something more but, I wanted to ask now if you have to move to another class or you maybe you were to give the same lesson to other, to the same class, is there something you think I would have to change, this or I would do the same thing. Do you find it?

144. T: Yaah; I think there would be some alterations, because I have seen this has worked, or eh whether it has worked, no I can improve.

145. R: Okay.

146. T: And so on, like that. That is what we are suppose to do as teacher.

147. R: Mh.

148. T: If you are for example you are having many classes, I don't think you can eh do the same thing whereas you do the same thing but you improve on it.

149. R: Mh. Mh.

150. T: That is ... that we are doing. And then if it was too long and then it can be even to summarise it in a way.

151. R: Mh. Mh.

152. T: Yes.

153. R: Eh tichela, thank you for your time. I think for now there is a lot that I am learning from you, because sometime I hear people just talking about ..., talking about ... when I say education technology, thinking about maybe radios, computers and all that, but I have been talking to you, you have not even mentioned that.

154. T: Okay on that, yaah I was thinking the way the invention or the renovation or innovation of things.

155. R: Mh. Mh.

156. T: That are there because that is for example the radio that is other method that we are using in order to hear news and so on like that, know advertisement and so on.

157. R: Mh. Mh.

158. T: And after TV came up the invention of the TV.

159. R: Mh.

160. T: That is the modern technology now.

161. R: Mh.

162. T: That is now ...taken from these grounds. That is why now I've been thinking now technology.

163. R: Of education

164. T: (Repeating) of education. Now I think that is the method, how we can do things.

165. R: That is beautiful

166. T: How we can do things better.

167. R: Mh. Mh.

168. T: Technology ...because now it is improving every time and then I thought of okay, the improvement in education so we need the more innovative way in order that eh the children or eh not only the children the individuals can be ale to learn more farther.

169. R: Mh.

170. T: So that they can understand,

171. R: Mhh. Mhh

172. T: Yes

173. R: So according to you using anything that you can use?

174. T: Yes. As long as is going to enable ... that we can learn faster and more.

175. R: Okay.

176. T: Yes

177. R: Just tell me on thing there are ways ... if you were to work with other let's say HSS because we now, we wanted to say Geography, and I still think Geography, if you were and other Geography teachers, are the ways you would say, okay, I think this works, I think this is how we could go about in Geography class.

178. T: Yaah we can ... when we are together we can see and we talk about how we can do more, and sometimes that is why ... you can ask for example, I like to ask other people to show me how to do things. I think I am a eh slow starter (laughter). But what I know that I can improve more on the things that I ... or someone can show me I can improve more on that, that is good work? We come together. We share things.

179. R: Mh.

180. T: How we can do it better.

181. R: Mh.

182. T: In this eh language and so on, because sometime is different when you go in the languages and also in the different eh learning areas.

183. R: Okay.

184. T: We cannot use the same methods.

185. R: Okay. Okay.

186. T: Yes.

187. R: This is great, I think there should be more teachers thinking the way you think (laughter).

188. T: I think they are thinking more of ... (laughter).

189. R: Is it?

190. T: Yes. Yaah.

191. R: That is beautiful, okay. Maybe I should just ask you one last question. Why did you use flash cards, or was there anything that you could have used instead?

192. T: When I'm using flash cards? Flash cards eh ... that is another thing, that is eh the ... (silence). When we don't have some other things that are ready there, you are suppose to use, to find ways how for example I am having a map there, I am having the map, the map of Southern Africa but they are not political maps, I wanted political maps.

193. R: Okay.

194. T: So I decided, no I should eh draw a map on my own.

195. R: Okay.

196. T: And then also, when you draw it on your own, you do it on your own it is going to be what you want really, it means that one of Southern is not Southern Africa, Namibia is there, Botswana is there, but now because I have done it on my own. I am having those four provinces and also for the eh the new South Africa I'm having those nine provinces.

197. R: Mh.

198. T: So now you can do exactly what you want so that children cannot be distracted by other things.

199. R: Oh yes.

200. T: For example you have flash cards you want them to learn democracy, this is democracy only if you put them in eh a big piece you write democracy and so on. You are going to ... want them to talk about democracy. They are going to look on other things, so they are distracted.

201. R: Mh. Mh.

202. T: So if you have these one, so it means that now it is easier for them to look ... they would know what you want them now to know.

203. R: Okay.

204. T: This is the ... that is the advantage of the flash cards because, each and every time you are going to talk about this they would see it and so on.

205. R: Mh.

206. T: But if you having all the names there in one paper they are going to look eh having the time to ... it would be like eh this calender, do you see the ... how many colours are there?

207. R: Mh.

208. T: They are going to look like that oh! The core food and he would be hungry and then he is going ... whereas you are there Bloemfontein Celtics that guy down there.

209. R: Mh. Mh.

210. T: There are many distracters when you use another thing like writing all of them instead of flash cards.

211. R: I see. So you had your choice.

212. T: Yes.

213. R: To use something you feel is going to do something that you feel is going to do what you want.

214. T: Yes.

215. R: To see happening in

216. Both: Class

217. T: Yes.

218. R: Is going to like make children learn what you want them to focus on what you want them to do.

219. T: Yes. Yes.

220. R: Okay.

221. T: It is for their attention.

222. R: Okay, that is beautiful. Tichela thanks. Okay so I say that eh at the end before I finish just ... let's go back and say I just want to know again and get the meaning of technology to you, from you that's it.

223. T: Okay, now I think technology is the way we do things in any field.

224. R: Mh.

225. T: It is eh technology, because each and every time if we have these technology we can improve on it.

226. R: Okay.

227. T: You can innovate it to see that this is okay the advantage of this and this is also the disadvantages. So can't we improve in order that we can do more easier, that is I think that is why we are having technology.

228. R: Mh.

229. T: Because for example in the older times, let's say TV it was a new technology then, and then we were having a black and white.

230. R: Mh.

231. T: Now we are having the deck the colour TV.

232. R: Mh.

233. T: That is the renovation it is an innovation let the car ... in the car industry, new technology, now the cars ... because they want eh, they cannot consume more petrol they are trying to make it rounder, like I am thinking of eh aeroplane, aeroplane is sharp at the front there, so that it can go easy against the wind.

234. R: Mh. Mh.

235. T: So that it cannot consume more petrol. And also now with now the car they have changed totally the way they are doing ears. Now also they are trying that they should be sharper not

eh having eh big front is a little bit smaller, that is the new technology.

236. R: Mh. Mh.

237. T: That is the way now they are doing things so that they can eh be more better for example in cars so that they cannot consume petrol. In education so that there can be more learning and understanding from the learners.

238. R: Mh.

239. T: So I think on that part of education new methods, new ways of teachers or not teachers or tutors or lecturers that they can make more easier for the learners to learn.

240. R: Mh.

241. T: That is the reason of ... I think of the education technology.

242. R: It seems to me even if as you were using your flash cards, who will matters to you is to see ...

243. T: Learning is taking place.

244. R: Alright.

245. T: Easy.

246. R: Alright.

247. T: Easy, that is the reason. If there were any other way that can come up we were going to use as long as it is going to help learning to be faster.

248. R: Mhh.

249. T: And easier.

250. R: Okay. Okay.

251. T: That is very, very important.

252. R: Okay, okay. So your focus is on what you want to accomplish.

253. T: Yes, yes. The know how yes.

254. R: Okay, okay alright. Tichela thank you very much.

APPENDIX 2

FREE STATE PROVINCE

Enquiries : Mr P E Phenethi/LB
Reference no. : LB65/2000

Tel: 051-404 8076
Fax:051-404 8218

2000-06-27

Dr M G Mahlomaholo
Vista University
Faculty of Education
P O Box 380
BLOEMFONTEIN
9300

Dear Dr Mahlomaholo

REQUEST TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION

1. Your application dated 23 June 2000. to administer Science and Technology Learning (STL) research questionnaire to learners in grades 7.8 and 9 to a representative sample of schools in the Free State refers.

2. Approval is hereby granted to conduct this research under the following conditions:
   - 2.1.1 Learners and educators participate voluntarily in the project.
   - 2.1.2 The names of the schools, principals.educators and learners involved remain confidential at all times.
   - 2.1.3 This letter of permission must be shown to all participants
   - 2.1.4 A report of this study must be donated to the Free State Education Department.
   - 2.1.5 The researcher must address a letter to the Head: Education. for attention Mr W B van Rooyen. accepting the conditions as laid down.

3. We wish you every success with your research.

Yours faithfully

HEAD: EDUCATION

LEARNING ASSESSMENT GRID

ASSESSMENT CRITERIA	NO	IMPROVED	YES	
1 Learning unit outcomes Clarity Manageability/realistic Appropriateness				
2 Creating a conducive learning environment Quality of arousal of interest Establishing prior learning levels Flexibility Reinforcement (positive or negative)				
3 Learning Activity Choice(eg. Group work, collaborative, etc.) Appropriate for the level Relevance Correct application				
4 Facilitator's role Clarity and effectiveness of communication Engagement/ mediation/intervention Enthusiasm Backstage directing Challenging learners Stimulus variation				
5 Learning attainment Demonstration Outcomes attained Attainment of knowledge / understanding / values /attitudes / life skills				
6 Continuous assessment Assessment rubric usage Is learning taking place Any attempt by facilitator to assist learners in learning (eg. Relating to practical knowledge / self awareness/conceptualisation/ownership of knowledge)				
7 Facilitator's response to learners Building self esteem Positive reinforcement Correction of wrong conceptions in a positive way				
8 Media Preparation and use Appropriate Creative				
9 Closure Summary Meaningful outcomes Consolidate / linkage to next lesson				
10 Learning Unit Planning Linkage between planning and implementation Effectiveness Flexibility and improvisation Realism Thoroughness				