GRADE NINE TECHNOLOGY TEACHERS' UNDERSTANDING AND PRACTICE OF ASSESSMENT IN TECHNOLOGY:

A CASE STUDY IN A DISTRICT OF ESTCOURT

BY

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ABSTRACT

Since Technology was introduced as a school subject, Technology teachers in South Africa have been subjected to many changes within the educational field including changes in assessment. Teachers were expected to assess more than just an end product. They were expected to develop and assess the processes and skills, not just the knowledge that learners represented.Literature reviewed reveals that teachers are experiencing challenges when it comes to implementing assessment in Technology.This study explored Grade Nine Technology teachers' understanding and practice of assessment in Technology. The study provides the nature of understanding and practice that Grade Nine Technology teachers encounter when they implement assessment in their classrooms, especially performance assessment. Performance assessment is an assessment, which is based on real life situations. Hence, appropriate implementation of performance based assessment by Grade Nine Technology teachers should develop learners' technological skills, knowledge and values so that they will play a great role in improving and sustaining the quality of lives of their societies.

The study was located within the interpretive paradigm and qualitative approach.Technology teachers were conveniently and purposively selected because it was easy for the researcher to reach participants who taught at schools close to where the researcher teaches. Three methods of data collection were employed, namely semi-structured interviews, structured participant's observations and structured questionnaires to gather data from the participants.The theoretical framework used to analyse this study is assessment theory. Assessment theoryprovided me (the researcher) with a framework to gather information on teachers' understanding and practice of assessment. Teachers can use Barlex's model (2007) as a framework when assessing learners' design process when learners are doing a Mini Practical Task (Mini-PAT) for summative and

formative assessment purposes. The model has proved to be a useful tool and framework for supporting sound decision making when designing and making productsfor projects in Technology.The findings of the study suggest that assessment in Technology is still a challenge to teachers. The study concluded that Grade Nine teachers are still experiencing challenges when employing performance based assessment and much still needs to be done to empower them.

PREFACE

Ethical clearance was granted for this project by the University of KwaZulu-Natal Research Office. The ethics Clearance Approval number is HSS/0002/012M.

The research described in this thesis was carried out in the School of Science, Mathematics and Technology Education, University of KwaZulu-Natal, under the supervision of Dr Linda van Laren and co supervision of Dr Angela James.

This study represents original work by the author and where use has been made of the work of others it is duly acknowledged in the text.

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DEDICATION

This thesis is dedicated to my late son Sabelo Zulu and my late fiancé Erdwin Jansen. Thank you for your continuous support, even though you didn't live long enough to see me completing this degree. You will always be in my heart. May your souls rest in peace.

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CHAPTER ONE

1.1 Introduction

The Department of Education introduced the Outcomes-Based Education (OBE) curriculum in 1998 to address past imbalances in the education system. These past imbalances included resource allocation, different forms of assessment practices and learner access to various choices of subjects that could create pathways to a wide range of interesting and exciting career opportunities (Department of Basic Education (DBE), 2011). Technology was introduced as a subject into this new schooling curriculum for the first time in 1998. The purpose was to develop a technologically literate population for the modern world (DBE, 2011). Since this new curriculum was introduced, teachers in South Africa, including Technology teachers have been subjected to many changes within the educational field (De Swardt, Ankiewicz & Engelbrecht, 2005). The changes included content topics, approaches to teaching and learning, and assessment. Assessment plays a crucial role in teaching and learning in Technology as it is one of the four principles which determines all the decisions pertaining to planning, teaching, assessment and evaluation. In the Revised National Curriculum Statement (RNCS) (Department of Education (DoE), 2002) Technology teachers were expected to assess more than just the end product (Van Niekerk, Ankiewicz & De Swardt, 2010). Teachers were expected to develop and assess the processes and skills that learners used, not just the knowledge that learners represented (Israel, 2005). Therefore, if teachers are to work with the changed assessment, it is important that their understanding of assessment is developed for effective implementation (James & Van Laren, 2008).

Since Technology teachers were expected to implement a new assessment policy, their understanding and action of assessment requires investigation. The investigation is done to gain an in-depth insight into teachers' implementation of the new assessment policy with the possible development of appropriate assessment practices, for successful teaching. More importantly, it is necessary to empower teachers to utilise appropriate assessment procedures to improve their understanding of the classroom situation as well as their teaching (Moreland, 2005). Utilisation and implementation of appropriate assessment will provide all stakeholders involved in education, such as learners, teachers, parents and policymakers with information on how learning can be improved (Pellegrino, 2006). Hence, appropriate implementation of performance assessment by teachers in Technology could be used to develop learners' technological skills, knowledge and values so that they could be able to play an integral part

in improving the quality of lives of their societies, and in sustaining their communities (Pavlova, 2006; Rasinen, 2003).

1.2 Broad problems and issues to be studied

South African teachers with the introduction of Curriculum 2005 (C 2005) in 1997, together with (OBE) were expected to implement different types of assessment in all learning areas (subjects), including Technology (DoE, 1997). The Revised National Curriculum Statement (RNCS) was released to replace C2005 (DoE, 2002). RNCS highlighted principles related to inclusion and access for all (DoE, 2002). In 2003, teachers implemented this revised curriculum policy. This curriculum contained a New Assessment Policy, which stipulated the changes in the way learners were supposed to be assessed from Grade R to Grade Nine, the General Education and Training Band (GET) (James & Van Laren, 2008). The RNCS was followed by the National Curriculum Statement Assessment Guidelines for GET Technology (DoE, 2002).

A particular type of performance assessment was included in the Assessment Policy. This type of assessment is based on real life situations and it is considered to be valid and reliable as it measures technical quality and truthfulness; has the ability to assess complex thinking skills; the use of technology and its appropriateness for high-stakes testing (DoE, 2002; Clarke & Dede, 2010). Furthermore, when teachers administer performance assessment in Technology, Jody and Dede (2010) mention that there are various forms of assessment that teachers need to utilise, in order to develop appropriate scientific and technological knowledge as well as skills. According to Looney (2011) these forms of assessment include interviews, presentations, research papers, investigation projects, portfolios, data collection, practical demonstrations portfolios, reflective diaries and role playing. These forms of assessment equip learners with a range of abilities, including the ability to apply knowledge attained (Orpwood, 2001).

In 2009, the ongoing implementation challenges resulted in another review of the RNCS (2002) and the National Curriculum Statement Grades 10-12 (2004), to produce a new document known as NCS Grades R-12 (DBE, 2011). Then from 2012, NCS for Grades R- 9 and Grades 10-12 were combined into a new document known as NCS for Grades R-12. The NCS for Grades R-12 not only builds on the previous curriculum but it also updates it in

order to provide a clearer specification of what needs to be taught on a term-by term basis (DBE, 2011). In addition, the NCS Grades R-12 represents a policy statement for learning in South African schools and comprises Curriculum and Assessment Policy Statement (CAPS) for all approved subjects including Technology, national policy pertaining to the programme and promotion requirements of the NCS Grades R-12 as well as National Protocol for Assessment Grades R-12 (DBE, 2011). In the amended NCS Grades R -12, the projects are reduced and portfolios are discontinued and Mini-Practical Assessment Tasks (Mini-PAT) emerged (DBE, 2011). The third curriculum change took place in 2012. The Curriculum and Assessment Policy Statement (CAPS) that was added to the altered NCS (DBE, 2012), was developed to assist both teachers and learners to focus more on subject content, including that for Technology. The CAPS document was developed as a means of improving assessment in all areas, including Technology. Additionally, Yore, Anderson & Chiu (2010, p. 599) state "learners' scientific literacy, self-efficacy, and self-concept towards science oriented careers are connected to the knowledge based society, educational policy equality, local control and teachers' background and classroom practices". Therefore, teachers need to administer kinds of assessment, particularly, performance assessment in Technology that will develop learners' technological skills and knowledge so that they will be encouraged to select Technology-oriented careers (Jody & Dede, 2010).

Moreover, performance assessment in Technology requires innovation, creativity and problem solving skills. The value of memorising by rote learning has little value in Technology (DBE, 2011) and so do the use of paper and pencil tests only. Paper and pencil forms of testing highlight only two abilities which are recalling of facts and the ability to solve short, well defined problems (DBE, 2011). Zhao (2012) dismisses the idea of placing a huge amount of accountability on test scores claiming that they are a poor measure of both the child's and teacher's quality. These ideas were echoed by Strauss (2012) who asserts that national standardised tests cannot evaluate complex thought processes as they kill innovation and creativity in learners (Strauss, 2012). Morris (2011) affirms that standardised tests provide a limited picture of learners' performance. Thus, when tests are testing narrow work and have a high value and motivate the behaviour of teachers and learners, then they are not serving the purpose of assessment. These tests reduce breadth and depth of the curriculum and they limit development of competences of learners (Black & William, 2003; 2009). Also, these forms of testing do not represent the diversity of requirements of a good scientist and technologist, and do not meet the demands of a changing global economy (Clarke & Dede,

2010). They maintain that "teachers have no means by which to prioritise what understandings and performances to emphasize; and lifelong learning" (Clarke & Dede, 2010, p. 4).

In South Africa, curriculum changes and assessment happen quickly, before teachers can adequately develop understanding of what the assessment practice is expecting from them. Teachers were expected to implement the Annual Assessment Task in Grade Nine classrooms in all Learning Areas, e.g. Technology (DBE, 2010). The Annual Assessment Task was in line with the guidelines used to standardise the setting of the Grade Nine examination paper GET Annual Assessment (DBE, 2010). Not long after that the *National Curriculum Statement Grades R-12 (NCS)* stipulated policy on curriculum and assessment in the schooling sector came into effect in January 2011. The Curriculum and Assessment Policy document was developed for each subject, including Technology and replaced the old *National Curriculum Statement Grades R - 9 (2002),* NCS (Subject Statements) 2002, Learning Programme Guidelines for GET-Technology (2007) and Subject Assessment Guidelines Grades R-12 (DoE, 2004). Consequently, South African teachers were expected to change assessment practices from content based learning to outcomes based learning where high quality of assessment practices of knowledge, skills and values are of the main focus as prescribed in the Assessment Policy (DoE, 2007). In exploring teachers' understanding, I argue that teachers, as change agents and the backbone of curriculum implementers (Stiggins, 2005), need to have a sound understanding of assessment policy procedures and the usage of a variety of assessments strategies, as set out in the assessment guidelines, in order to implement assessment effectively in their classrooms. In particularly, teachers need to have an extensive knowledge and understanding of performance assessment in order to equip learners with entrepreneurial and creativity skills.

1.3 Focus, purpose and research questions

The focus of this research is on Technology teachers and assessment in Technology. The purpose of this study is to explore Grade Nine Technology teachers' understanding and practice of assessment in Technology in the district of Estcourt. Earl (2003) states that teachers should use assessment to identify learning difficulties and then make adjustments to their teaching to improve their teaching. In addition, teachers should improve on the assessment skills that they already possess. Consequently, knowledge is very important in the

field of education and so is assessment, where assessment is used to assess what an individual knows (Earl, 2003). Thus teachers' skills, knowledge and understanding of assessment practices are the primary focus that require not only investigation but also development.

Taking into account the purpose of this study, the following questions were addressed:

- What are Grade Nine Technology teachers' understanding of assessment in Technology classrooms?
- How do Grade Nine Technology teachers practice assessment in Technology classrooms?
- Why do Grade Nine Technology teachers practice assessment the way they do?

1.4 The rationale for the study

I have been teaching Grade Nine Technology for the past eight years. I have noticed that Grade Nine Technology teachers in the local Estcourt district schools experience problems when they implement performance assessment in Technology. The following is an example of a comment made by a teacher in a cluster meeting where I met with Grade Nine Technology teachers to design and moderate learners' tasks:

> *I thought that assessment in Technology is all about making projects. I did not know that there are tasks or enabling activities that precede Mini-Practical Assessment Task* (*Mini-PAT) which must be done before learners make a prototype (Direct communication, February, 2010)*.

Jones and Moreland (2005, p. 196) found that although teachers could identify technological tasks, activities and problems appropriate for their learners, they had difficulty in implementing Technology in their classrooms. The following remark by Jones and Moreland (2005, p. 196) supports this view:

> *I can't see progress in Technology. I don't know what to look for. I would hope that the methods I am using are the right ones for Technology. I'm sort of trialling things that are right for me, but do they mean anything? So it is difficult, difficult to know what is right*.

Jones and Moreland (2005) state that teachers view Technology as a subject requiring the practical involvement of learners. Therefore, many learners' activities that teachers give to

learners are drawing, making and testing centred. Teachers only focus on the learners carrying out and completing practical activities for formal assessment.

In this study I have decided to explore the understanding and practices of Grade Nine teachers when implementing performance assessment in Technology classrooms. Assessment practices are not well understood by teachers and substantial effort is needed to support teachers in their development, use and interpreting of classroom assessment (Stiggins, 2005). According to James and Van Laren (2008), the reason for teachers' misunderstanding of assessment in Science and Mathematics could be linked to policy implementation processes as well as teachers' feelings about implementing a new policy. So, as teachers consider assessment to be challenging and changing, teachers' understanding of assessment must be investigated and understood in order to extend teacher development by those involved in the development of teachers (Stiggins, 2005).

This research aims to provide knowledge about the teachers' experiences when implementing assessment practices when teaching Technology. The research was informed by Black and William (1998) because these authors provide a comprehensive framework for thinking about teachers' assessment practices, beliefs and understanding of assessment. This is evident when they argue that assessment is a useful frame for thinking about the knowledge that teachers should possess in order to be able to integrate assessment into teaching and as to how teachers' understanding of assessment might be developed (Black & William, 1998). On the one hand, Cowie (2005) concurred with Asunda (2012) argues that there is abundant research on the variety and diversity of assessments used by teachers and on the other hand, there is a gap existing in terms of the subject dealt with because the researchers frequently referred to Technology when they actually meant Science, let alone performance assessment in Technology. Black and William (2009) concur with De Vries (2006) who points out that there has been scarcely any development in studies about assessment in Technology.

1.5 Methodology

An interpretive, qualitative case study methodology was employed to explore Grade Nine Technology teachers' understanding and practice of assessment in Technology. A case study provides in-depth understanding of teachers' understanding of assessment and their practices of assessment in Technology (Cohen, Manion & Morrison, 2011). Although a case study

lacks reliability, to eliminate this, the researcher generated data using three data collection methods.

Data was collected using semi- structured interviews, structured questionnaires and structured observations. These three methods were used for triangulation and for credibility and trustworthiness. The participants were interviewed by the researcher to explore how they implement assessment in Technology classrooms. Structured participant questionnaires were used to gather background information on each teachers' understanding of assessment and the reasons why these teachers practice assessment the way they did. The researcher used a structured participant observation schedule to gather information when observing three teachers teaching the design process and also during assessment of design process. Three Grade Nine Technology teachers were purposively selected. The data for the research were captured as themes which assisted the researcher in understanding, interpreting and finding answers to the three research questions.

1.6 Significance of the proposed study

The purpose of my study is to explore Grade Nine Technology teachers' knowledge and understanding of performance assessment. The findings from this research could be useful to policy makers as well as Technology subject advisers in informing them on how to make better judgments and decisions in order to improve assessment in the field of education. It will also assist Grade Nine Technology teachers to develop a better understanding of assessment practices. Technology teachers are expected to consider the legislative policies, and the set of guidelines for assessment of learning when implementing assessment practices in Grade Nine South African schools**.**

1.7 Definitions

Several terms are used in the chapters that follow. The purpose of this section is to provide definitions I have selected to use. Some of these concepts will be discussed in more detail as part of the conceptual framework of this thesis.

Assessment

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generation and collection of evidence of achievement; evaluation of this evidence;

recording of the findings and use of this information to understand and thereby assist the learner's development in order to improve the process of learning and teaching (DBE, 2011, p.38).

Continuous assessment (CASS)

> *CASS is an ongoing everyday process that finds out what the learner knows, understands, values and can do. This provides information that is used to support the learner's development and enable improvements to be made in the learning process. CASS must be an integral part of the teaching and learning process* (DoE, 2002, p. 11).

Performance assessment

> *This is a type of assessment that requires learners to demonstrate a skill or proficiency by asking the learners to create, produce or do something often in a setting that involves real world applications* (DoE, 2002, p.18).

Mini-Practical Assessment Task (Mini-PAT)

> *These are short Practical Assessment Tasks which make up the main formal assessment of learner's skills and application of knowledge during each term. It may be an assignment covering an aspect of the design process which includes investigating, designing, making, evaluating, and communicating (IDMEC) or it may be a full capability task covering all aspects of the design process* (DBE, 2011).

Alternative assessment

> *The use of alternative assessment relates to the change in the form of assessment used to accommodate all learners. It is important to vary the assessment strategy appropriately* (DBE, 2011, p. 38).

Design process

> *A creative approach used to develop solutions to identified problems or human needs. The associated skills are investigating, designing (development of initial ideas), making, evaluating and communicating* (DBE, 2011, p. 67).

Formative assessment

> *Formative assessment is developmental and is used to inform teachers and learners about their progress* (DoE, 2002, p. 2).

Summative assessment

> *Summative assessment gives an overall picture of learners' progress at the end of the term* (DoE, 2002, p. 2).

Moderation of assessment

> *Moderation refers to the process that ensures that assessment tasks are fair, valid and reliable* (DBE, 2011, p.47).

1.8 Outline of the study

The study is divided into five chapters, which are divided into several sections and subsections that focus and deal with various issues related to assessment.

Chapter one

In this chapter, I present an introduction to the thesis, provide a brief background of the study. The purpose and the rationale for the study are given. Finally, I provide the research questions and brief descriptions of the chapters contained in the study as well as definitions of terms used in the study.

Chapter two

I present a review of some research literature related to the assessment of Technology on a national and international level. Of particular concern is the literature on assessment of Technology in the South African curriculum, in GET band. Literature on issues related to the Technology teachers' understanding and teaching practice of Technology in Grade Nine are also discussed. In this chapter I focus on the assessment issues linked to: researching on assessment and focussing on teachers and assessment and Technology (subject); assessment practices in an emerging curriculum; the role of assessment in enhancing Technology literacies; making assessment explicit when teaching, and lastly the implementation of assessment in Technology. In this chapter I discuss the conceptual and theoretical frameworks for the study. The conceptual framework of assessment in Technology is used to

provide the meaning of assessment used in this research. The theoretical frameworks of Assessment theory (Black and William, 1998, 2003, 2009) and Barlex's model (2007), are discussed. These frameworks are used to analyse the data and inform the findings. An assessment framework was developed from the literature and the research. The chapter includes a description of how Barlex's (2007) model can be used by teachers when assessing design process.

Chapter three

In this chapter I explore the research design and methodology (including piloting of instruments) that were employed for this research project. An interpretive, qualitative case study was used in this study. Since meaning making is the focus of this research, an interpretive paradigm with a qualitative approach was most appropriate. A multiple case study consisted of three teachers' understandings and practices of assessment in Technology. Participants were purposively selected from a district in KwaZulu-Natal, Estcourt. Data collection methods included structured questionnaires; semi- structured interviews and lesson observations. The data analysis strategies were pragmatic in that inductive analysis was used for teachers' understanding and deductive for teachers' practices of assessment in Technology. The limitation of the study, ethical issues and research rigour aspects are discussed and clarified.

Chapter four

In this chapter I present the analysis of the data generated and the findings from three Grade Nine Technology teachers. Teachers' biographies and the context of their schools were examined to probe the participants' understanding and practices of assessment. The selected theoretical frameworks were used to analyse the data. The data is presented as a cross-case analysis of the teachers' understanding according to the following categories: teachers' understanding of the formative, summative and performance assessment in Technology. The implementation of teachers' assessment practices focussed on the key areas of design: conceptual, technical, aesthetic, constructional and marketing areas of design.

Chapter five

In this chapter I discuss findings of the study, recommendations and implications of this research. In this chapter I provide and discuss answers to the three research questions that guided the study. In this chapter I present recommendations on how teachers can be assisted

to improve their understanding and assessment practices. In addition, I suggest areas for future research. I also attended to the gap in knowledge that I identified in the introductory chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses literature on research studies that have explored teachers' understanding and practices of assessment generally, and more specifically in Technology. Assessment is a process that uses information gathered through measurement to analyse or judge a learner's performance on some relevant work task (DoE, 2002). According to Black and William (2009) assessment has always been a crucial issue as it is used to measure the learning process in order to give feedback to individuals for future success. In South Africa, assessment practices inform teachers about how learning might be improved in order to enhance a learner's individual growth and development (James & Van Laren, 2008). (CAPS) (DBE, 2011) provides teachers with a platform to move from an emphasis on learning content to specific outcomes and to apply various forms of assessment practices (Kanjee, 2009; DBE, 2011; Rourke, 2012). Teachers should implement assessment practices that focus on knowledge, skills and values as stipulated in the Assessment Policy (DoE, 2002). Thus, effective implementation of assessment practices of South African teachers could provide quality education for learners, which could adequately prepare them for future success (Meyer, Mabaso & Lancaster, 2001).

Firstly, I provide the conceptual framework and discuss the meaning and use of assessment. Secondly, I elaborate on researching on assessment with the focus on teachers and assessment, assessment and Technology as a subject, assessment practices in an emerging curriculum and the role of assessment in enhancing technology literacies. Thirdly, I discuss the implementation of assessment in Technology. Lastly, in the theoretical framework section I present the reasons why I selected assessment theory and Barlex's model for this study.

2.2. Conceptual framework – meaning of assessment and use

Assessment is defined in education policy documents, by researchers and scholars in the field. Assessment is a process that uses information gathered through measurement to analyse or judge learners' performance on some relevant task (DBE, 2011). McMillan (2007, p. 5) defines assessment as "gathering, interpretation and the use of information to aid teacher

decision making". If teachers are expected to assess learners by gathering information through measuring and analysing or judging learners' performance, then creating appropriate practical assessment strategies as well as establishing effective technological literacy efforts at each level of schooling should be the primary goal of the profession (Technology for all Americans Project, 1996; DoE, 2002). Israel (2005) regards assessment as the process of gathering information for the purpose of making decisions about curriculum development, educational policy, teaching programmes and about an individual learner's learning. In this study assessment is viewed as those assessment practices that should reflect the nature of the standards by assessing learner performance in an integrated way (Black & William, 2010). Performance assessment is "a type of assessment that requires learners to demonstrate a skill or proficiency by asking the learners to create, produce or do something often in a setting that involves real world applications" (DoE, 2002, p. 18). This type of assessment involves learners in constructing various products for diverse people with different needs. Thus creativity and critical thinking skills are promoted as learners have to employ various skills and knowledge in designing and making the product (Mueller, 2012). Performance assessment involves cooperative learning, promotes team work and social interaction among learners. Unlike traditional assessment which focuses on memorised knowledge, performance assessment is very effective and reliable for measuring learners' achievement as learners have to demonstrate their knowledge and skills (Mueller, 2012). A rubric is the most appropriate instrument that teachers use in performance assessment. Teachers should present the rubric to the learners at the very beginning of the Mini-PAT so that learners will understand the criteria for assessment and know what is expected from them.

Earl (2003) suggests three main purposes of assessment:

> *The three main purposes for assessment are, firstly, assessment for learning which occurs when teachers use inferences about learners' progress to inform their teaching (formative). Secondly, assessment of learning occurs when teachers use evidence of learners to make judgments on learners' achievement against goals and standards (summative). Lastly, assessment as learning occurs when learners reflect on and monitor their progress to inform their future learning goals* (Earl, 2003, p. 88).

Essentially assessment such as formative or summative assessment has been used extensively for assessing learners. Summative assessment, usually referred to as assessment of learning, involves judgements being made of learners' performance (Fautley & Savage, 2008).

Popham (2008) agrees with Shepard (2008) in considering that summative assessment should fulfil the role of documenting what learners know and can execute. Formative assessment is often called 'assessment for learning' because it is concerned with using assessment information to promote an individual's learning during a period of instruction (Pepper, 2012). For this reason, formative assessment differs from summative assessment which summarises an individual's learning at the end of instruction (Pepper, 2012). Black and William (2009, p. 15) are of the view that "formative assessment is how evidence about learner achievement is elicited, interpreted". This evidence may be used by teachers, learners, or their peers, to decide on "how they can improve teaching and learning which wouldn't be possible if there was no evidence collected" (Black & Williams, 2009, p. 15). Furthermore, formative assessment assists the teacher to find out if the learners are still on the right track (Black & William, 2009).

According to Bennett (2011) the purpose of formative assessment is to see the progress that learners are making. The purpose of assessment for learning is to continuously collect information on learner's achievement that teachers can use to improve learners' learning (DBE, 2011). The results of learners' work on a given task using formative assessment will assist the teacher to adjust or revise the lesson planned and to give learners advice on how to improve their work (DoE, 2002). "Moreover, assessment for learning is informal and must be developed, whereas assessment of learning is formal and is used for progression" (DoE, 2011, p. 39). The extent to which these two forms of assessment's reliability or validity use for assessing learners' competences is still a challenge among teachers. In practice, the balance between reliability and validity is determined by assessment purpose. Thus summative assessment emphasises reliability, assessing a more limited number of performances and range of the curriculum, and formative assessments emphasise overall validity, assessing more performances in a wider range of contexts. . Formative assessment also provides feedback to adjust teaching and learning (Bennett, 2011). Assessment creates a balance between assessment for learning as well as introduces assessment as learning which focuses on the learners, as active learning involves their being able to take control of their learning by monitoring it. These two forms of assessment, which are assessment of learning and assessment for learning, should be linked as assessment of learning ought to contribute to assessment for learning (Fautley & Savage, 2008). Teachers are still experiencing difficulties in prioritising what understandings and performances they need to emphasise regarding

workplace capabilities, knowledge-based economy; and lifelong learning (Dede, 2007; Jody & Dede, 2010).

2.3 Researching Assessment

There is evidence that assessment is a powerful process for enhancing learning (Killen, 2000). Assessment and learning are inextricably linked and are not separate processes (Jones, 2005; Black, 2010). Assessment becomes the basis for change in education because it is integral to the teaching/learning process (Israel, 2005).

2.3.1 Teachers and Assessment

Assessment is a useful frame for thinking about what knowledge teachers must have to integrate assessment into teaching and how they might develop their understanding of assessment (Black & William, 2003). Teachers should see assessment as a continuous process where they use feedback as a foundation for further development, not just only for grading (Black & William, 2009). Teachers need to be aware of their role in using assessment to support learners as not every learner is motivated when assessment is used for grading as achievements may be demotivating for some learners. In particular, for those learners who are not doing well in school, this reduces their self- esteem (Black & William, 1998) and may result in their devaluing the assessment process in order to avoid chances of failure. Stiggins (2005) states that teachers rely on assessment when they motivate learners by comparing them with those learners who are more successful. Therefore, teachers should think about how they can improve teaching in order to enhance learning by setting aside some time for reflection, and discuss with learners what assessment reveals about what they have learned as well as how they can improve their learning (Killen, 2000).

Teachers should involve learners in self and peer assessment because these types of assessment are more than just learners grading their own work (Black & William, 2009; Rourke, 2012). They provide learners with an opportunity to determine what high quality learning is when judging their own work and what was expected from them when answering questions (Rourke, 2012). Rourke (2012) supports Reiber (2006) in pointing out that learners also respond better to peer comments than to teacher comments. Hence, peer comments promote a more collaborative, uncompetitive learning environment where productive

insightful learning can take place (Reiber, 2006). The objective of engaging learners in peer review methods is to promote a more learner-centred education which is driven by engaging learners in active learning rather than an assessment driven curriculum (Reiber, 2006). However, teachers should ensure that learners understand the assessment criteria in order to avoid misinterpretation and inadequate scoring of marks. Three key processes required in assessment are establishing what knowledge and skills learners have acquired previously; where the knowledge and skills require further development; and what needs to be done to assist learners' development (William & Thomson, 2007; Black & William, 2009). Therefore, teachers are responsible for designing and implementing an effective learning environment, and the learner is responsible for the learning within that environment where the impact of failure can be mitigated (Black & William, 2009).

Teachers need to transform their methods of assessment and employ criteria when assessing learners' work, for effective assessment to occur (Rifaat, Ali, Sabhan, Al, Waleed, & Nour, 2012). When teachers formally assess the learners' work they are required to explain the criteria for assessment to all learners before the commencement of each activity (DoE, 2002). Consequently, teachers, as the implementers of the curriculum, should have a clear understanding of the assessment criteria of the intended outcome before the commencement of each activity (DoE, 2002). Black and William (1998) point out that making assessment criterion explicit is very important when assessing learners. Black and William (2009) suggest a number of strategies that teachers can employ in the classroom, such as rubrics, self-assessment, peer assessment as well as descriptive feedback. Furthermore, the criteria should be valid. In educational assessment, validity is a central concept because it provides an overarching criterion for evaluating assessments. It therefore serves as the primary procedural consideration for any assessment. If the approaches of validity and explicitly of assessment are carried out effectively it will benefit all learners of all ability levels. This can be achieved by allowing learners to construct questions and criteria themselves either individually or in groups (Israel, 2005). When learners work in groups, teachers should ensure that they implement manageable procedures during assessment and observation (Israel, 2005). Teachers could do this by using a general methodology for validation whereby they begin with an explicit statement of proposed interpretations and responses based on assessment results.

Teachers can determine the extent to which they develop each learners' competences that need areas of development (Stobart, 2011). Rifaat et al., (2012) view assessment methods as tools and techniques that measure the extent to which intended outcomes are achieved. Learners' performance criteria should be expressed in specific and measurable terms that are acceptable to a specific subject. There are a variety of methods, qualitative and quantitative, direct and indirect, that should be used by teachers to assess learners' work. A simple letter grade (A, B+, B) does not provide adequate feedback to a students' performance, because the letter grade does not identify the strengths and weaknesses of individual learning outcomes (Rifaat et al., 2012). Rifaat et al., (2012) maintain that appropriate usage of rubrics, which address the individual outcome components, will assist teachers to identify weaknesses and strengths of learners' performance. Rubrics describe the degree of quality, proficiency or understanding along an assessment continuum (Wiggins & McTighe, 2008).

More recently, education professionals and policy makers have recognised the importance of the appropriate and effective use of assessment processes (Redfield, Roeber & Stiggins, 2008). Therefore, teachers should ensure that assessment serves learners' knowledge, skills and development (Redfield, Roeber & Stiggins, 2008). Moreover, these authors state that teachers should ensure that performance assessment and rubrics are used reliably in order to yield valid results. According to Rourke (2012) teachers should provide clear and explicit marking criteria that learners practice applying before starting any assessment tasks. Furthermore, learners need to be provided with an opportunity to self-review their own contribution as well as other learners' contributions when they are doing group projects and to participate fully in those groups so that they will be able to reflect on what was done during the activities (Rourke, 2012).

2.3.2. Researching Assessment and Technology (subject)

In Technology, assessment should contribute to the development of highly innovative, creative and skilled individuals with lifelong learning attitudes which are a critical factor for the social, cultural and economic growth of our society. This can be achieved through performance assessment which deals with real-life tasks and authentic assessment. According to Mueller (2012) authentic assessment is a form of assessment in which learners are asked to perform real-world tasks that demonstrate meaningful application of essential knowledge and skills. The tasks to be used include collaborative problem-solving exhibitions, experiments, group work, interviews, plays, presentations, projects and role plays (Looney, 2012).

Performance assessment may also involve the use of listening, observation, portfolios and assessment (Looney, 2011). These two forms of assessment, if used appropriately in Technology could develop learners, who are innovative, risk-takers and reflective problem-solvers (Mawson, 2003). However, the researcher is interested in performance assessment as it is the one that Grade Nine teachers employ in Technology when they engage in Mini-PAT.

The conceptual and procedural aspects of technological knowledge and the relationship between them (what should be taught and learnt) may be sought in a conceptual framework derived from the content dimension of the essential features of Technology (Reddy, Ankiewicz & De Swardt, 2005). The content dimension of the essential features of Technology has the following components and sub-components: knowledge (with specialist and generalist sub-components); skills (with cognitive, motor and other technology related skills as sub-components); and technological capability (with the technological process as a sub-component (Van Niekerk, Ankiewicz, & De Swardt, 2010). In Technology there are "enabling" activities that precede the Mini-PAT. The intention of using these enabling activities is to develop the knowledge, skills and values to the point where learners are ready to be assessed (DBE, 2011). The construction of a technological knowledge base is fundamental for effective teaching. Teachers assist learners to construct knowledge and understandings on the basis of what they already know and believe (Black & William, 2009). The absence of conceptual understanding in technology education tends to make technological activities isolated occurrences rather than cumulative and purposeful experiences (Reddy, Ankiewicz & De Swardt, 2005).

2.3.3. Assessment practices in an emerging curriculum

In South Africa, assessment practices inform teachers about how learning might be improved in order to enhance a learner's individual growth and development (James & Van Laren, 2008). CAPS provides teachers with a platform to move from an emphasis on learning content to specific outcomes and apply various forms of assessment practices (Kanjee, 2009; DBE, 2011; Rourke, 2012). Assessment practices that focused on knowledge, skills and values were prescribed in the Assessment Policy (DoE, 2002). Thus, effective implementation of assessment practices by South African teachers could enable learners to be provided with quality education, which is not only academic in nature, but also provides

competitive skills, attitudes and values which will ascertain whether learners are adequately prepared for future success (Meyer, Mabaso & Lancaster, 2001).

Assessment should be regarded as fundamental to the teaching and learning process as it is the main focus for change in education (Israel, 2005). Teachers should employ appropriate assessment when assessing learners in order to enhance the results of teaching and learning (Price, Handley, Millar & O'Donovan, 2010; Bennett, 2011; Clements & Cord, 2013). Consequently, teachers are expected to re-think and re-design their teaching and testing from traditional teaching, and learning and assessment strategies to new forms of teaching, learning and assessment required for a technologically advanced society (Israel, 2005). "The policy: Assessment and qualification for GET Band describes an assessment task as an activity that is designed to assess a range of skills and competencies" (DoE, 2009, p. 9). Therefore implementation of new forms of assessment in Technology is necessary to cater for all learners and their different ways of learning (Israel, 2005). There are a number of different types of assessment that Technology teachers can select when assessing learners. These types of assessment include brainstorming/mind mapping, presentation, practical, demonstration, panel discussion, model making/ plans/ design, research project, investigation, exhibition, project work to mention but a few (DoE, 2002). One of the new forms of assessment is performance assessment, which is based on tasks that are real world in nature or simulation (Mueller, 2012). Some tasks will constitute more than one form of assessment, probably with a number of activities that support the form of assessment used (DoE, 2002).

In Technology, each task should at least consist of two activities, for example a performance based task might involve a project that includes investigation, models and presentation (DoE, 2002). Furthermore, performance assessment goes beyond traditional methods of assessment and provides an insight into how acquired knowledge can be utilised to make decisions, solve problems and address practical real life issues (Mueller, 2012). These practical tasks now form the Mini-PAT in Technology which gives learners an opportunity to develop and demonstrate their levels of ability (DBE, 2011). The Mini-PAT makes up the main formal assessment of a learner's skills and application of knowledge in Technology (DBE, 2011). Utilising the Mini-PAT allows for acquisition of skills and application of knowledge that learners could use to maximise their learning style and provide proof of their knowledge in different ways (Israel, 2005). For instance, the Mini-PAT could provide teachers with an opportunity to use exhibition to improve learners' ability and to apply knowledge attained. Knowledge therefore, should not be seen as the final product rather as the tool to be used

dynamically to solve problems (Rourke, 2012). It is then expected of teachers to perceive their approach to teaching as problematic so that they will be able to take responsibility for changing their teaching and assessment practices (Jones & Moreland, 2005).

According to Barnes (2005) the successful implementation of systematic education reform requires teacher involvement and their will to change. This is necessary for the successful implementation of Technology. For effective change, teachers should be willing to change in order to enhance their teaching or assessment in Technology (Jones & Moreland, 2005). This is supported by Khumalo (2006) when he states that teachers' involvement in implementation of systematic education can play a great role in ensuring that implementation is a success. However, many Technology teachers report that challenges are encountered when managing the necessary paradigm shift of employing new assessment practices (Barnes, 2005). Tweed (2013) notes that most teachers and parents now consider Technology as an integral part of providing a high-quality education. High-quality teachers who possess both content and pedagogical knowledge will not only ensure that learners learn and develop 21st century skills (Tweed, 2013) but they will also integrate performance and technology skills into teaching and learning.

To integrate performance and technology skills for higher-order use, teachers need to be assisted and their progress should be assessed for effective implementation of these skills to occur (McConnell, 2011). However, when teachers implement performance assessment they will also be expected to teach learners so that they will be able to retain particular skills. These skills include using digital tools when problem solving, communicating, collaborating, creating, and researching (Tweed, 2013). Teachers need to use various forms of assessment practices and assess a variety of the learner's work, because good assessment is based on a vision of the kind of learning that teachers value for their learners, and the use of a variety of assessments, rather than employing a single method. Furthermore, Mueller (2012) argues that new assessment methods are one of the reasons that proper implementation of Technology in classrooms is inhibited. In a study conducted by Stobart (2011) on validity of formative assessment in England, he concluded that there was evidence that teachers had some confusion about the methods and benefits of formative assessment. This resulted in reducing the likelihood of an effective and sustained change in teachers' practices. Therefore, teachers' understanding and practice of assessment is crucial because it is considered to facilitate better judgement of learner's work in Technology. "Through assessment for learning Technology

teachers need to ascertain learners' knowledge, perceptions and misunderstanding and use these as evidence to restructure curriculum planning" (Earl, 2003, p. 88).

When assessing, teachers are expected to design and use assessment instruments. Developing valid and reliable assessment instruments is not an easy task (Black & William, 2003). So, teachers should clarify the roles and purpose of assessment as it is considered a priority both educationally and politically (Pavlova, 2006). Quellmalz, Timms, and Schneider (2009) note that a number of large-scale testing programmes have designed innovative problem sets and item types that promise to transform traditional testing. Consequently, employing appropriate technology assessment practices will not only enhance teaching and learning, but will also develop learners' understanding and skills as well as attitudes that will enable them to develop into critical thinking adults. According to DBE (2011) basic skills knowledge is a necessity to all and this includes prior knowledge from previous Grades. This will ensure that learners develop proficiency in complex critical thinking, problem-solving and effective ways of communicating to meet demanding societal, economic and technological challenges.

If teachers plan assessment and use it effectively in their classroom, it will contribute to effective teaching (Black & William, 1998). Effective classroom assessment practice can be achieved if assessment is valid, educative, explicit, fair, as well as comprehensive (Moreland & Jones, 2000). Clements and Cord (2013) maintain that assessment can provide teachers with feedback on the effectiveness of their methods and styles. While sometimes motivating and supporting learners, assessment can also help teachers plan how to manage learners' progress (Clements & Cord, 2013). Povey and Angier (2007) point out that there are key characteristics of effective assessment for learning practice. These key characteristics that teachers should maintain are learner involvement where the learner is engaged as a partner and encouraged to take the driving seat. Teachers should let learners develop their own skills and awareness through self-assessment and peer review as well as through constructive feedback from teachers. Another key characteristic of effective assessment is when teachers use a range of skills and techniques to provide feedback, motivate learners and plan the next steps in learning. This should be done so that learners and teachers could share learning goals, assessment activities and support the achievement of these goals (Povey & Angier, 2007)

Black and William (2009) state that if teachers improve classroom assessments, effective teaching and learning would also improve. Moreland and Jones (2000) point out that one of the factors that contribute to effective Technology implementation in the classroom is specific teaching and assessment practices of Technology that lead to improved teacher confidence. Improved teacher confidence will ensure that teachers take their responsibilities of employing different forms of assessment when assessing learners. Moreover, it is the responsibility of a teacher to design and implement an effective learning environment, so that effective assessment can occur and the responsibility of a learner to learn within that environment (Black, 2010). According to Black and William (1998), improved teacher confidence can be achieved through enhancing teacher knowledge about the subject. Specific teaching and assessment practices of Technology include the nature of Technology, the areas of Technology as well as the technological knowledge. Moreover, specific skills as well as outcomes that need to be assessed must be identified (Compton & Harwood, 2003). So teachers should ensure that they connect learners to the world outside the classroom and promote real world practice so that learners will acquire life-long learning skills (Oliver, Jones, Tucker & Ferns, 2007). Teachers can promote the development of these learning skills and achieve this by assessing various problems (Herrington, Reeves & Oliver, 2010) and by implementing assessment which has real world relevance (Lombardi, 2007). When teachers employ such assessment, learners' critical thinking and creative problems-solving, higher order thinking skills of synthesising, analysing, and evaluating will improve (Rourke, 2012).

Durrant and Green (2000) regard teacher reluctance as the main barrier to the successful implementation of the Technology curriculum and the use of various forms of assessment in Technology, specifically performance assessment. Mizell (2008) argues that a major factor is that teachers lack knowledge and skills to address the particular learner's learning. When teachers know more about the subject then they can apply that knowledge to real world situations (Mizell, 2008; Tweed, 2013). However, increased workload and lack of resources makes it impossible for teachers to understand the complexities of change happening in assessment that they need to be aware of, to enhance teaching and learning (Zeichner, 2005). As part of the assessment process it is beneficial for teachers to provide learners with an opportunity to reflect on their learning (Rourke, 2012). Teachers therefore need to ensure that assessment engages learners with the learning process, in an active reflective manner so that they will acquire attributes and skills to apply in other learning activities (Rourke, 2012).

2.3.4 Role of assessment in enhancing Technology literacies

New technologies create opportunities for scientific investigations (National Research Council, 2011). However, Zuzovsksy (1997, p. 232) defines scientific and technological literacy as the "complex construct that emphasizes the ability to use scientific and technological knowledge for the purpose of sharing understanding, establishing a position, or choosing a preferred solution for a problem". Dani (as cited in Asunda, 2012 and International Technology Education Association (ITEA) 2007) points out that scientific literacy is concerned with understanding how scientific concepts can be used to informed life decisions with regard to science and technology. Nevertheless, Technology has a character of its own unique content based on its own specific concepts and principles that set it apart from other fields (Asunda, 2012; ITEA, 2007). Even though Technology may draw from other existing fields of study (Williams, 2011), it has its own epistemology, philosophy, aims, identity, structure, method of inquiry, curriculum, didactics and opportunities for the formation of problem solving and other higher cognitive skills (ITEA, 2007).

Technology literacy is "the ability to use, manage, assess and understand technology" (ITEA, 2007, p.242). This leads to four generalised competencies. These generalised competencies are: accommodating and coping with rapid and continuous technological change; generating creative and innovative solutions for technological problems; acting through technological knowledge both effectively and efficiently; and assessing technology and its involvement with human life judiciously (Asunda, 2012). Thus, "a technological literate person should have a certain amount of basic technological knowledge, some basic technical capabilities such as solving simple technological problems by employing aspects of design processes, able to think critically about technological issues and act accordingly" (Garmire & Pearson, 2006, p. 21; Asunda, 2012). In the study conducted by Barlex and Pitt (2001) in the National Curriculum for England on the teaching of Science and Design and Technology, they discovered significant implications for curriculum. One of those implications was that Science and Technology are independent disciplines or domains, with different goals, methods and outcomes (Lewis, Barlex, Chapman, & Christer, 2007). Thus, the methods of assessing Technology used by teachers are qualitatively different from those of other such fields (Ankiewicz, 1995, Lewis; Barlex, Chapman, & Christer, 2007). Vandeyar & Killen (2007) also conclude that often teachers' approaches to assessment were influenced by their background as well as their capacity to implement the curriculum. Tweed (2013) found that highly effective teachers tend to be more organised, try to find better ways of teaching and if

supported with enough resources teachers will implement various assessment because they are willing to experiment and use new instructional materials, use innovative methods, and show more enthusiasm for teaching (Tweed, 2013). It is the duty of the Head of Department to ensure that technology resources are provided to Technology teachers at school for effective implementation of Technology (DBE, 2011).

Potgieter (as cited in Pudi, 2005, p.87) reminds teachers that when assessing achievement in Technology the processes that the learners follow are as important as products (or artefacts) of the learning process. Pudi (2005) maintains that different methods, forms and types of assessment could be employed in order to facilitate outcome achievement. This contradicts William's (2000) views as according to him in design situations, teachers insist that learners must follow a design process by progressing through a set of stages in order to complete the task. These stages require learners to sketch four design alternatives to a problem or brief. But in reality this does not happen since the learners do not always follow the predetermined steps that teachers expect. They devise their own strategy as they are interested in only one, and do the other in order to satisfy the teacher (Barlex, 2007). Many researchers oppose the pre-determination of steps since it has no impact on learners' thinking as it limits their development of creativity (Williams, 2000; Barlex, 2007; Van Niekerk, Ankiewicz & De Swardt, 2010). Managed teacher projects, however, reduce learner's innovative performance in design and technology (Kimbell, 2006; Asunda & Hill, 2007). Teachers should only facilitate and develop learner's skills and check their progress and allow learners to take ownership (Asunda & Hill, 2007). Therefore, empowerment for teachers to implement and understand assessment practices will enable them to carry out effective classroom-based assessment in order to maximise valuable results and minimise harmful consequences, and in turn enhance technology literacies (Black & William, 1998).

2.4 Implementation of assessment in Technology

According to De Vries (2006) Technology is both a practical and intellectual subject where teachers teach learners how to design and make products. This presents a challenge as teachers search to construct a coherent technological content base (Reddy, Ankiewicz & Swardt, 2005). Therefore, development of conceptual knowledge is hindered by pressure that teachers make on learners to design and make products (Reddy et al., 2005). When assessing learner's designs, creativity and problem solving skills also need to be assessed by teachers (De Vries, 2006). Again the DBE (2011) recommends that teachers employ a Technology

approach when they introduce the required knowledge when teaching learners. Once the required knowledge has been delivered then teachers can give learners practical work where they will apply the knowledge attained (DBE, 2011). Moreover, teachers should structure their teaching using design process as the backbone for methodology (DBE, 2011).

Teachers impart knowledge of design to learners so that learners' capabilities are developed and as a result, learners are able to combine their designing skills with knowledge and understanding in order to design and make products in Technology (Mawson, 2003). However, defining a knowledge base for Technology is difficult. This is due partly to difficulties in finding a balance between process and content (Reddy et al., 2005). Although the models of the design process which are investigated, make, communicate, evaluate and design, place a strong emphasis on the role of two-dimensional drawing in creating the original design in Technology, research indicates this is not the preferred method for learners (Van Niekerk, Ankiewicz & De Swardt, 2010). When allowed to choose their own pathway they design orally or in three dimensions, or begin by exploring the materials and tools available to them (Mawson, 2003).

Teachers can use Barlex's model for summative and formative assessment purposes (Asunda, 2012). The model is interrelated and any change can affect some or the entire design process (Asunda, 2012). Other than knowledge, skills, attitude and values that are developed in the specific learning process, there are focal points of components of assessment that need to be followed for effective assessment to occur. These components are strategy, which deals with how to manage or plan assessment, and methods, where the procedure that will be followed to do assessment need to be taken into account (Van Der Walt & Van Der Walt, 2006). Moreover, these components involve tools or rubrics, where the actual instrument used is to assess the activity. The technique which is the special way or approach that will be applied to use a strategy, method, tool or rubric also needs to be considered (Van Der Walt & Van Der Walt, 2006).

Assessment implies far more than just awarding a mark or a symbol to a learner (Van Niekerk et al., 2010). The purpose of assessment is to provide learners with assessment practices that may prepare them for future challenges (Pavlova, 2006). Teachers should consider assessment as a tool to determine to what extent learners are on their way to attain the assessment outcomes or to establish whether they indeed have attained those assessment

outcomes (Van Niekerk et al., 2010). Teachers should ensure that learners nowadays not only master the subject content, but also need to integrate what they learnt into real-life practice (Pickford & Brown, 2006). As such, performance assessment should have real world relevance (Lombardi, 2007).

2.5 Theoretical frameworks

The theoretical framework is the lens through which the researcher views the world and knowledge. According to Cohen, Manion and Morrison (2011) ontological assumptions give rise to epistemological assumptions, which lead to methodological decisions and these decisions will inform researchers about which instruments to use for data generation. So, theoretical framework helps the researcher to make explicit assumptions about how interrelated things are connected in the world. Moreover, understanding of different research methodologies which are ontology, epistemology and methodologies also need to be understood by a researcher. The theoretical framework chosen for this study of Grade Nine Technology teachers' understanding and practice of assessment in Technology is assessment theory and Barlex's model.

2.5.1 Assessment theory

This study is guided by assessment theory. Assessment theory in this study provided the researcher with a framework to gather information on teachers' knowledge of assessment. This theory served as a framework to explore how teachers integrate assessment into teaching and learning in order to develop their understanding of assessment using semi-structured interviews, structured participant observation and structured participant observation as multi data sources. Assessment theory provides the researcher with a general framework for data analysis. According to Black and William (2009) assessment is an integral part of teaching and learning. Moreover, assessment is a useful frame for thinking about what knowledge teachers must have to integrate assessment into teaching and how they might develop their understanding of assessment (Black & William, 1998). There are certain principles that teachers need to follow when administering assessment. Cohen, Manion and Morrison (2011) point out that assessment is guided by certain principles:

> *The principles of assessment include firstly, the primary purpose of assessment, which is to improve learners' performance. Secondly, assessment should be seen as an understanding of how learners learn. Assessment is most effective when it reflects the*

> *fact that learning is a complex process that is multi-dimensional, integrated and revealed in learners' performance. Thirdly, assessment should be integral components of course design not something to add afterwards. Lastly, good assessment provides useful information to report credibly to parents on student achievement* (Cohen, Manion & Morrison, 2011, p. 256)

Furthermore, according to the National Curriculum Statement Grade R-12 (DBE, 2011) assessment should provide opportunities for continuous assessment of the learners' progress towards achieving stated outcomes (Killen, 2000). In addition, assessment practices should reflect assessment requirements by assessing performance in an integrated way. There is a range of assessment methods that should be applied by teachers. However, teacher assessment is the most important method which provides detailed insights about learner performance, over time. According to Black & William (2003) people have a tendency to learn while developing deep knowledge structured around conceptual framework. If the view is that learners construct knowledge and understandings on the basis of what they already know and believe, it is therefore, the duty of teachers to assist learners to order information into conceptual understanding. In this way the knowledge is transferred from one conceptual framework to another and it will allow for new knowledge to be created (Black & William, 2003). In addition, teachers should use learners' prior knowledge as the basis for further learning while identifying gaps that might exist. Teachers should engage learners and involve them in the construction of their own learning so that they will develop the ability to monitor and regulate their learning agenda (Januario, 2008). Consequently, it is the duty of the researcher in this study to understand the complex experience from the point of view of the participants (Mertens, 2005).

According to McCormick (2004) teachers acknowledge the existence of cognitive theories such as meta-cognition, concept mapping, reflection, situated learning, collaborative and learner centred approaches, cooperative learning, socially distributed expertise and project based learning. However, very few of them integrate these theories into their programmes (Sanders, 2010). Thus, current assessment practices need to reflect changes based on new understandings of assessment theories, new curricula that are being developed, new knowledge and skills that are in line and essential for the 21st century that teachers need to administer in their classrooms.

2.5.2 Barlex's Model

Barlex (2007) suggests an interrelated model that teachers can use as a framework when assessing learners' design process when learners are doing a Mini-PAT Practical. Asunda (2012) claims that teachers can use Barlex's model for summative and formative assessment purposes. Not only has the model encouraged learners to focus on designing and making activity when making their product but it has proved to be a useful tool and framework for supporting sound decision making when designing and making in Technology (Asunda, 2012). Learners are given short practical assessment tasks which are real life in nature to perform or do. In these tasks learners are expected to demonstrate meaningful application of knowledge and skills. These tasks may cover all or some of the design process where design is one of the most important aspects. Aspects of design include innovating, creating and thinking up ideas for identified reasons, however, in Technology great emphasis is on graphic mode when designing (DoE, 2002). The model designed by Barlex (2007), in figure 1, allows the assessor to focus on particular features of a learner's design without losing the important holistic overview of the design process. The teacher can use the model to focus on what they can expect from a learner's design.

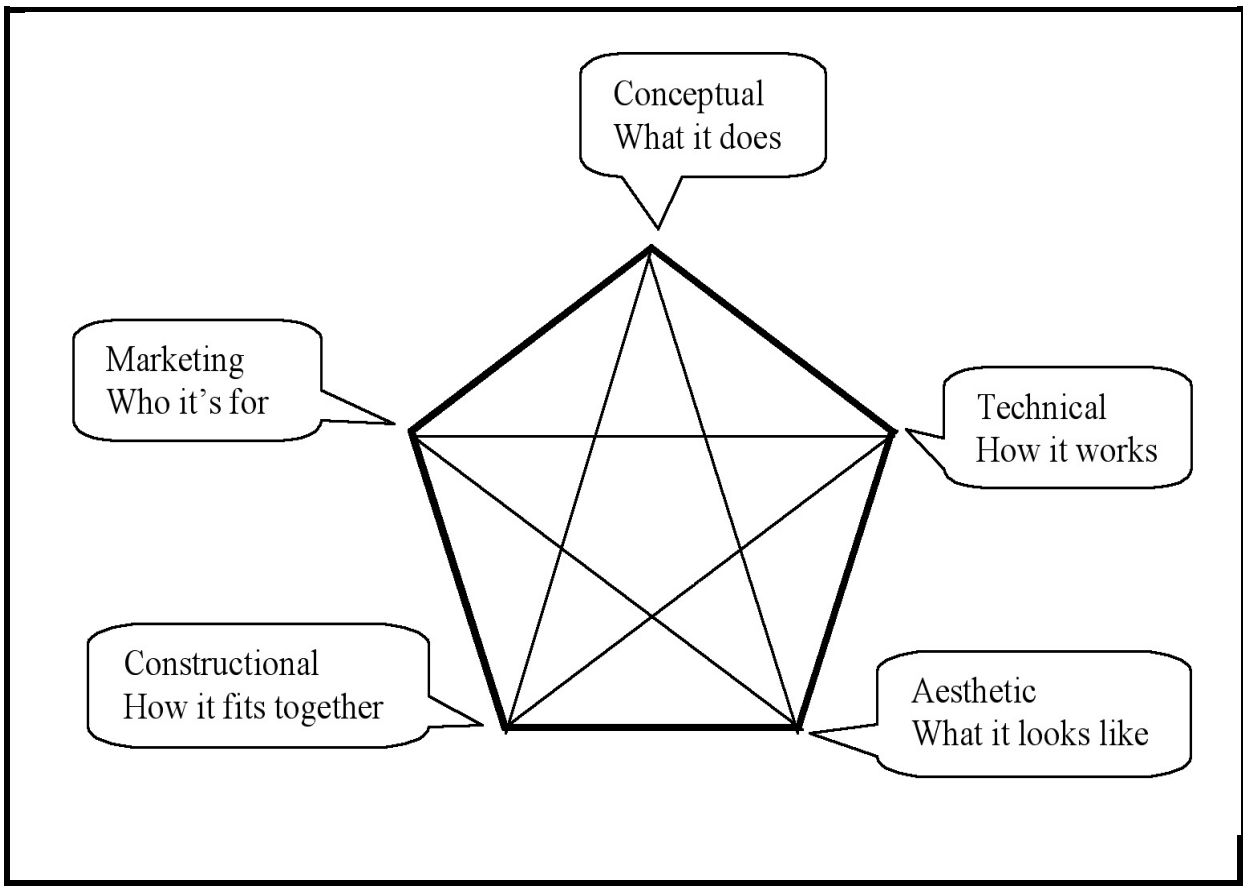

Figure 1: Key areas of design (adapted from Barlex (2007)

Barlex (2007) mentions that the five key areas of design decision are conceptual (overall purpose of the design, the sort the product will be), technical (how the design will work), aesthetic (what the design will look like), constructional (how the design will be put together) and marketing (who the design is for, where it will be used, how it will be sold). He adds that these areas are interdependent so they need not be changed as changes will affect the design decisions that exist between them. Moreover, teachers should not formulate methods, such as template approach or stages models of designing as this might limit or inhibit learners' designing skills (Barlex, 2007; Van Niekerk, Ankiewicz & De Swardt, 2010). When teachers give learners a task to design and make a product, sometimes it is difficult for them to engage in conceptual design especially if they have to make what they have designed. Teachers must give learners time to immerse themselves in the context of the task. Furthermore, teachers must also give learners an opportunity to explore different materials that learners will use to make the product and assess the suitability of material used (Mawson, 2003). Mawson (2003) identifies various models of the design process. These models, according to Assessment of Performance Unit (APU) of England, have moved from linear pattern to iterative pattern. APU designed the first performance assessment in England in the early 1980s. Furthermore, all these models describe a common thread ranging from inception of the idea to the reflection stage to evaluate the success of the outcome (Mawson, 2003). So, teachers must present design tasks to learners through rich and authentic context for learning. It may be an assignment covering iterative aspects of the design process which includes investigate, design, make, evaluate, and communicate (IDMEC). "The task may be composed of a variety of forms of assessment suited to the range of activities that make up a Mini-PAT" (DBE, 2011, p. 41). Additionally, teachers should encourage critical thinking, problem solving, and performance skills by employing various assessment strategies (Asunda, 2012). In conjunction with these skills teachers should foster active inquiry, collaboration, and supportive interaction (Black & William, 2010).

Teachers should encourage learners to take ownership of their design so that they will learn to overcome the challenges that they encounter during the design process (Barlex, 2007). Learners are expected to show and discuss their developing solutions to fellow learners and a teacher. Therefore, utilising Barlex's model provides a useful framework because it gives a clear indication of how assessment should be conducted when assessing the design process of real life tasks in Technology. The model also demonstrates what teachers could expect when assessing learners' design tasks.

2.6 Conclusion

To sum up, this chapter discussed literature on studies related to teachers' understanding and practices of assessment in Technology. The conceptual framework provided the definition and use of assessment. The literature discussed the purposes of assessment which were provided in this chapter with how and when different forms of assessment should be employed. The necessary shift from traditional assessment to other types of assessment by teachers was also emphasised. The theoretical frameworks were assessment theory, principles that guide assessment and models that can be used to assess learners' design process were provided. In this study, assessment theory and Barlex's model provided frameworks to understand teachers' understanding of assessment. Assessment theory was appropriate for this study because the framework facilitates exploration of how teachers integrate assessment into teaching and learning. The next chapter describes and explains the research design and methodology employed in this study.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1Introduction

In the previous chapter I reviewed relevant literature on assessment and discussed the conceptual and theoretical framework for this study. The choice of the research design is guided by the paradigm chosen. The research questions, the selection of participants and the choice of data collection methods, including the design of the instruments are informed by the chosen paradigm, in this study, the interpretive paradigm and data collection methods. In this chapter I present the research design and methodology of the study. The process of the selection of the participants is described and justified. The data collection methods as well as instruments used to explore teachers' understanding and practice of assessment in their classrooms is also discussed. In this study different data collection methods were used to gather data, which were questionnaires, interviews and observations. A variety of instruments were used to address issues related to credibility and trustworthiness. Research rigour, ethical aspects and limitations of the study are also discussed.

3.2 Research design

This is an interpretive, qualitative case study. The interpretive paradigm is associated with qualitative research and supports the view that there are many truths and multiple realities (Cohen et al., 2011). Interpretive research rests on assumption (epistemological, ontological and methodological). The ontology concerns the nature of reality. Ontology assumes that the reality we know is subjectively-based reality which is constructed through the meaning and understandings developed socially and experientially (Cohen et al., 2011). My ontological position was to explore teachers' understanding and practice of assessment. The epistemology of the interpretive paradigm is inter-subjective knowledge construction and is concerned with the relationship between researcher and participants. Therefore, interpretive knowledge was produced by interacting with participants for a prolonged period in order to understand more effectively teachers' understanding and practise of assessment. Methodology refers to the process and procedure of the research. The research instruments used in this study fit the interpretive paradigm as the researcher would collect data on

participants' understanding and their practice of assessment in their Technology classrooms (Cohen et al., 2011). These methods ensure that data that I collected from participants collaboratively construct meaningful reality of teachers' understanding and practice of assessment in their classroom (Cohen et al., 2011). Moreover, as this study is based on interpretive research it also involves participant observation. Participant observation not only provides access to symbol and meaning but it provided me with close contact with participants in order to understand their assessment practice and to define their situation and context. In this study an interpretive paradigm is used to understand teachers' experiences of implementing assessment in their classrooms. Teachers' understanding and practice of assessment depends on the quality and consistency of teachers' assessment and the quality of the type of task used (Morgan & Watson, 2002). Teachers' implementation of assessment methods based on practical tasks could provide meaningful information compared to written tests which penalise learners on what they cannot do or do not know (Morgan & Watson, 2002).

According to Creswell (2013), the qualitative approach is a method that seeks answers to questions and involves the collection of evidence. The qualitative approach is rooted in subjectivism. Subjectivism is the epistemology of the qualitative approach and deals with humanism and uses data in the form of ideas. The reason for doing a qualitative study is that it focuses on human phenomena and gaining in-depth information. In this study the focus was on exploration of Grade Nine Technology teachers' understanding and practises of assessment in their classroom. The qualitative approach uses triangulation to corroborate findings by drawing from various methods or theories to strengthen data collected (Cresswell, 2013). In conducting this qualitative study, as a researcher I was the primary instrument of data collection (Cohen et al., 2011). My role in the data collection process was crucial because I had to ensure that I developed trust with the participants while also being sensitive to their needs to avoid bias (Cohen et al., 2011). I had to maintain and strengthen a good relationship with the participants even though I was teaching Grade Nine in the same cluster as the participants. As a primary instrument of data collection I employed semi-structured interviews, participant observation and structured questionnaires (Cohen et al., 2011). The study employed transferability, trustworthiness, dependability and credibility by considering the sampling of the participants, the design of the instruments and the accuracy of the data collected. For qualitative data analysis, I systematically arranged and used responses collected from the instruments to answer the research questions. I provided a thick

description in order to produce data of inquiry that are transferable and remained neutral for trustworthiness (Cohen et al., 2011).

Being guided by a qualitative approach within an interpretive paradigm, the strategy that was deemed most appropriate for this study was a case study. A case study is used because it is one type of interpretive research used to undertake qualitative inquiry within a context (Cohen et al., 2011). According to Merriam as cited in Rule and John (2011, p. 5) "a case study is a unit (something that you study), a process (something that you do) and a product (something that you make). An advantage of using a case study is that it can generate questions for future investigation (Cohen et al., 2011). In this study, a case study allowed for an in-depth analysis where questions on how Grade Nine Technology teachers practice assessment in Technology classrooms and why they practice assessment the way they do, could be responded to. However, case studies have disadvantages, such as; the researcher could end up with massive unreadable documents as case studies take too long. Another disadvantage is that the results obtained from the study cannot be generalised. A case study allowed me to deeply understand a phenomenon within a bounded system with the purpose of illuminating specific issues as they relate to the phenomenon under exploration (Cohen et al., 2011). In each study "the case cannot be understood without reference to the wider context" (Rule & John, 2011, p. 39). In this study I paid careful attention to the school context of the participants and teacher factors, their biography and the way in which they assessed the learners. The research design is informed by Cresswell (2013) who points out that the researcher decides on a particular case and comes to know it well by probing what it is and what it does. "Identifying the case means first recognising the population in which the case falls and then finding individual cases that are members of this population" (Rule & John, 2011, p. 13). Therefore, a case study approach is utilised in this study to gain an understanding of Grade Nine Technology teachers' understanding and practice of assessment in their classroom, in the Estcourt district schools. In addition, a case study involves an intensive study of individuals or a group as an organisation. As the researcher I used a structured questionnaires schedule, semi-structured interviews and structured participant's observations schedule to gather data (Cohen et al., 2011).

3.3 Selection of participants

Selection of participants for qualitative study requires the selection of information rich cases having particular intent (Cohen et al., 2011). When selecting participants, I had to bear in mind the number of participants, the characteristics of participants and how access to participants could be gained (Cohen et al., 2011). Three Grade Nine Technology teachers were identified as suitable participants for this study. I approached the participants' school principals and requested permission and contact numbers of participants (see Appendices 1-3). Cohen et al. (2011) maintain that in many cases selecting participants purposively is used to access knowledgeable people, in other words, those who have in-depth knowledge about a particular issue. Grade Nine Technology teachers of the Estcourt district were conveniently and purposively selected because it was easy for me to reach participants who taught at schools close to where I teach. This minimised the cost of transportation and time. Also, Technology teachers were selected because the research had to be conducted in a specific defined real world environment in order to understand teachers' challenges of understanding assessment practices.

The Grade Nine teachers were selected because we all worked in the same cluster where I am a cluster coordinator. Clusters are formed by teachers teaching in schools from the same ward. These teachers teach the same Grade and the same subject. They come together twice or thrice in a term and sometimes the subject advisers avail themselves to cluster gatherings to assist teachers. They assist teachers with challenges they encounter when they teach or assess their learners. The first cluster meeting is usually for teachers to come together to design formal tasks for learners which are tests and projects in Technology. The second meeting is concerned with the moderation of learner's work that teachers have marked. Moderation is done at a school level, district level and provincial and national level using a moderation sheet and moderation grid for assessment (DBE, 2011). The moderation grid for an assessment should be completed with the name of the school, date, subject, skills, values and knowledge that need to be focussed on, forms of assessment and mark allocation. When teachers meet in their cluster they check whether moderation that was implemented at the school level was appropriately done. The reason for doing moderation is to check whether teachers were fair in assessing learners' work. The teacher responsible for moderation at school level is the subject head or Head of Department (HOD). Teachers also exchange ideas and assist one another in these meetings where Technology pedagogical content knowledge and assessment are acquired.

3.4 Data collection methods and instruments

In answering the three research questions, the researcher used three methods (as stated in section 3.2) to collect data related to Grade Nine Technology teachers' experiences. Different methods were used for the collection of data and this served for triangulation. Cohen et al. (2011) mention that the use of one instrument may bias the researcher's view. The following sections elaborate on how three different methods: questionnaires, interviews and observation schedules were used to generate data from three participants (Cohen et al., 2011).

In collecting data, three questions governing the choice of research design and methodology were addressed. The first research question focuses on teachers' understanding of assessment: 'What are Grade Nine Technology teachers' understanding and practices of assessment in a Technology classroom?' Three methods of collecting data were used to answer this question. The methods of data collection comprised of one-on-one teacher semi-structured interviews using an interview schedule, a structured participant observation schedule and a structured questionnaire schedule. The second research question 'How do Grade Nine Technology teachers practice assessment in Technology classroom?' informs the researcher about the way teachers implement assessment in their classroom. To respond to this question I observed the interaction that occurred between the teachers and their learners during teaching and learning. In addition, I used semi-structured interviews and structured participants' observation schedules to answer the second question. The third research question 'Why do Grade Nine Technology teachers practice assessment the way they do?' explored experiences of teachers that influence the implementation of assessment in Technology. To answer the third question, semi-structured interviews, completion of the structured questionnaire schedules and structured participants' observation schedules obtained using a structured participant's observation schedule. I transcribed interview transcripts immediately after I collected the data while I could still recall specific details of events.

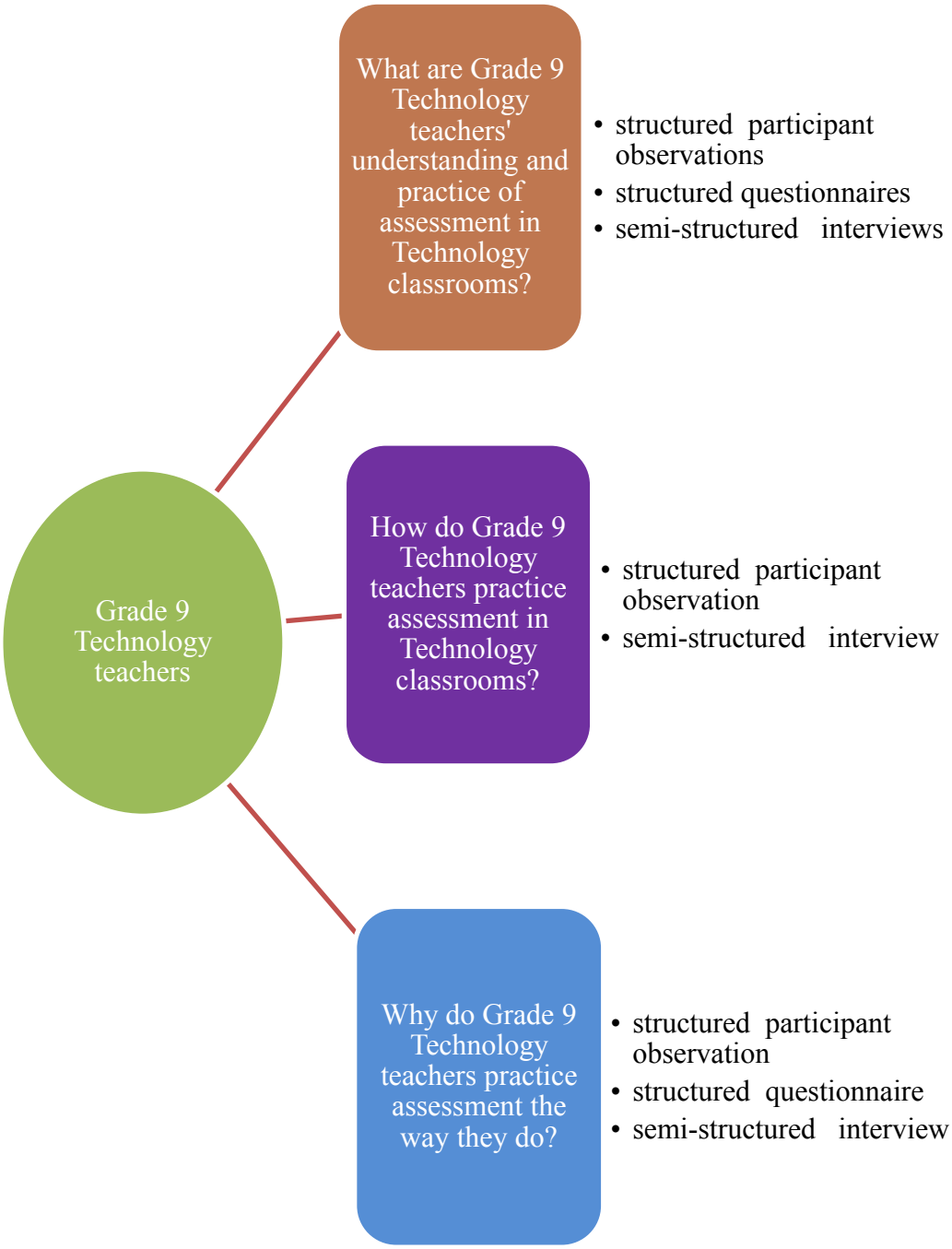

Figure 2: Radial list of data collection methods used to explore teachers' understanding of assessment

The radial list was used to show the data collection methods that were used to explore teachers' understanding and practice of assessment. Grade Nine Technology teacher's understanding and practice in respect of assessment were the unit of analysis. The detail of how these data generating instruments were used is discussed in the following sections.

3.4.1 Questionnaires

The structured questionnaire contained open-ended and closed questions (see Appendix 4). Open ended-questions were used to collect information on participants' assessment documents and their biographies. The researcher decided to use the questionnaire first to inform the questions to be used for the interview. The questionnaire was also used as it was the form of triangulation. The questionnaire was used to provide evidence of teachers' understanding of assessment as well as in-depth information about teachers' understanding and what they say about their teaching (Denzin & Lincoln, 2000). The questionnaire was used to gather background information on each teacher's understanding of assessment, usage and the possible reasons that lead teachers to implement assessment in the way s/he does in the classroom. The questionnaire had pseudonyms to identify the participants. I chose to use a questionnaire because it is reliable, cost effective and easy to administer and compare responses. Furthermore, if correctly administered the feedback obtained from the participants is trustworthy (Cohen et al., 2007).

Before the questionnaire was given to participants, it was piloted by asking another teacher, who was not a participant in this study to complete the questionnaire. The teacher is also a Grade Nine Technology teacher. The reason for piloting the questionnaire was a trial to see if the questions were appropriate or whether the questionnaire requires adjustment (Cohen et al., 2007). No changes were made to the questionnaire after piloting it because the teacher was able to complete the questionnaire without any difficulties and the required information was entered in the questionnaire. The questionnaire was given to the participants to complete on the first day of the researcher's visit to meet with the teachers. The questions that were asked in the questionnaire concerned teachers' biography, professional development, understanding of assessment and implementation of the assessment. It took the teachers almost two hours to complete the questionnaire which was longer than expected. This is one of the disadvantages of the questionnaire. I was present when the questionnaires were completed (Cohen et al., 2011). The completed questionnaires were collected from participants on the same day that the participants received them.

3.4.2 Interviews

I developed a semi-structured interview schedule (see Appendix 5). The purpose of using a semi-structured interview schedule was not only to follow up ideas and probe responses from the participants, but also to gain in-depth data from participants and to find out what teachers'

understandings of assessment are (Cresswell, 2009). In addition, interviews were used to obtain credible and trustworthy data from the teachers (Cohen et al., 2011). In this study I interviewed the participants when they taught about the design. Each of the participants was visited by the researcher in his/her school where the interview was conducted. Interviews were conducted after confirmation of the arrangements and permission obtained from the principals to see the participants. I briefed the participant about the purpose of the interview before I commenced and explained to him/her that an audio tape recorder was to be used during the interview session. The interview was recorded for transcription and analysis.

I used the interview schedule to record ideas when teachers were giving their responses on their experiences and understanding of assessment in Technology. The questions in the interview schedule included teacher's biographies, teacher's perception about assessment in Technology as well as teacher's assessment practice in Technology.

After recording each teacher's responses for the interview, I transcribed the responses and transferred and stored the recording on a disk. Two participants were not keen to be interviewed after they heard that an audio recorder will be used for recording their responses. However, I explained to them that it had to be used to store evidence of their responses. Eventually the participants consented to the use of an audio recorder. All participants were asked the same series of pre-determined questions as the questions appear in the interview schedule (Denzin & Lincoln, 2011). According to Denzin and Lincoln (2011) there is little flexibility in the way questions are asked in a semi-structured interview setting as I used the same sequence of questions and wording. I also did not interpret the meaning of questions or add to teachers' responses when transcribed them (Denzin & Lincoln, 2011).

3.4.3 Observation

I used a structured participant observation schedule to observe the participants when they implement assessment in technology classrooms (see Appendix 6). These three teachers were observed when they taught about the design process and also during design process assessment. The aim of using structured participant observation was to provide a comprehensive understanding of the complex reality surrounding implementation of assessment practices. This was done to ascertain what teachers actually do in the classrooms when implementing assessment as compared to their interview responses. I then made notes and reports of the findings, as well as interpreting what I observed in the classroom. No learners' documents were scrutinised and only the teachers' documents were examined to

observe how the teachers implement assessment in the Technology classroom. No attempts were made to make generalisations from the data collected. However, the findings of the study allow for suggestions for improvement and approaches that might exist in teachers' assessment practices.

I used the observation schedule when observing the three participants presenting their lessons. The teachers were observed three times: Firstly, when they were presenting their lesson teaching about design and facilitating when learners designed their solutions to the given problem; secondly when they were facilitating when learners made their projects; and lastly, when the teacher assessed learners' projects and designs using mark schedules with rubrics. The assessment occurred when learners were presenting their final product to other learners in the class. Each time the researcher observed lessons she completed the observation schedule. The observation schedule served as a guide in finding and recording what the teachers were doing in the classroom when assessing learners. This direct method of data collection assisted the researcher to conduct a "fine-grained analysis of the moment by moment process of classroom interaction" (Evans, 2009, p. 293). I was interested in how the participants assessed and how the teachers interacted with learners during the Technology lessons.

The participants gave the researcher lesson plans. I was able to see if the lesson plan provided was in line with the work schedule and whether the observed lesson was taught according to the planned lesson. After observing participants teaching and assessing, I discussed observations with the participants to ascertain whether what I observed was exactly what the teacher wished to convey during the lessons. The reason I decided to have a discussion with the participants directly after observing the lessons was to minimise investigator bias and to allow for verification. Another reason for having the discussion was to produce valid, reliable data when writing report findings as well as to maximise observational efficacy (Denzin & Lincoln 2011). Evans (2009) argues that there are limitations of classroom observations in research. The lessons may not represent the teacher's routine classroom teaching. Furthermore, the presence of the researcher and use of instrument may influence a teacher's practice (Evans, 2009).

3.5 Data analysis

The purpose of this study was to explore Grade Nine Technology teachers' understanding and practice of assessment in Technology in a district of Estcourt. The participants were three Grade Nine Technology teachers with whom I met at their schools after school hours. Teaching observations were done only during Technology lessons. The participants were advised that all responses were confidential and the demographic information collected would not identify participants in the study. Specifically, the study analysed the context of the school, teachers' years of teaching experience, professional development, and kinds of assessment that teachers use in technology classrooms and how they implement these kinds of assessment in the classroom. In this qualitative study I started data analysis immediately after data collection was completed. I started by examining raw data and interpreted the data to find linkages between the research objectives and the outcomes with reference to the research questions. McMillan and Schumacher (2006, p.461) define the qualitative data analysis as "an inductive process of organizing the data into categories and identifying patterns among the categories". Data were presented and analysed to answer the three research questions.

According to Evans (2009) in data analysis, where collected data might not have any quantitative criterion, researchers' discretion is required for interpretation. After collecting the data, I analysed teachers' responses in more depth by clarifying connected factors to a particular theory or idea (Evans, 2009). To accomplish this, I read and analysed responses on questionnaire schedules, reviewed teachers' interview transcriptions and observation schedules. The following converging radial diagram shows how the data analysis was done to probe teachers' understanding and practice of assessment.

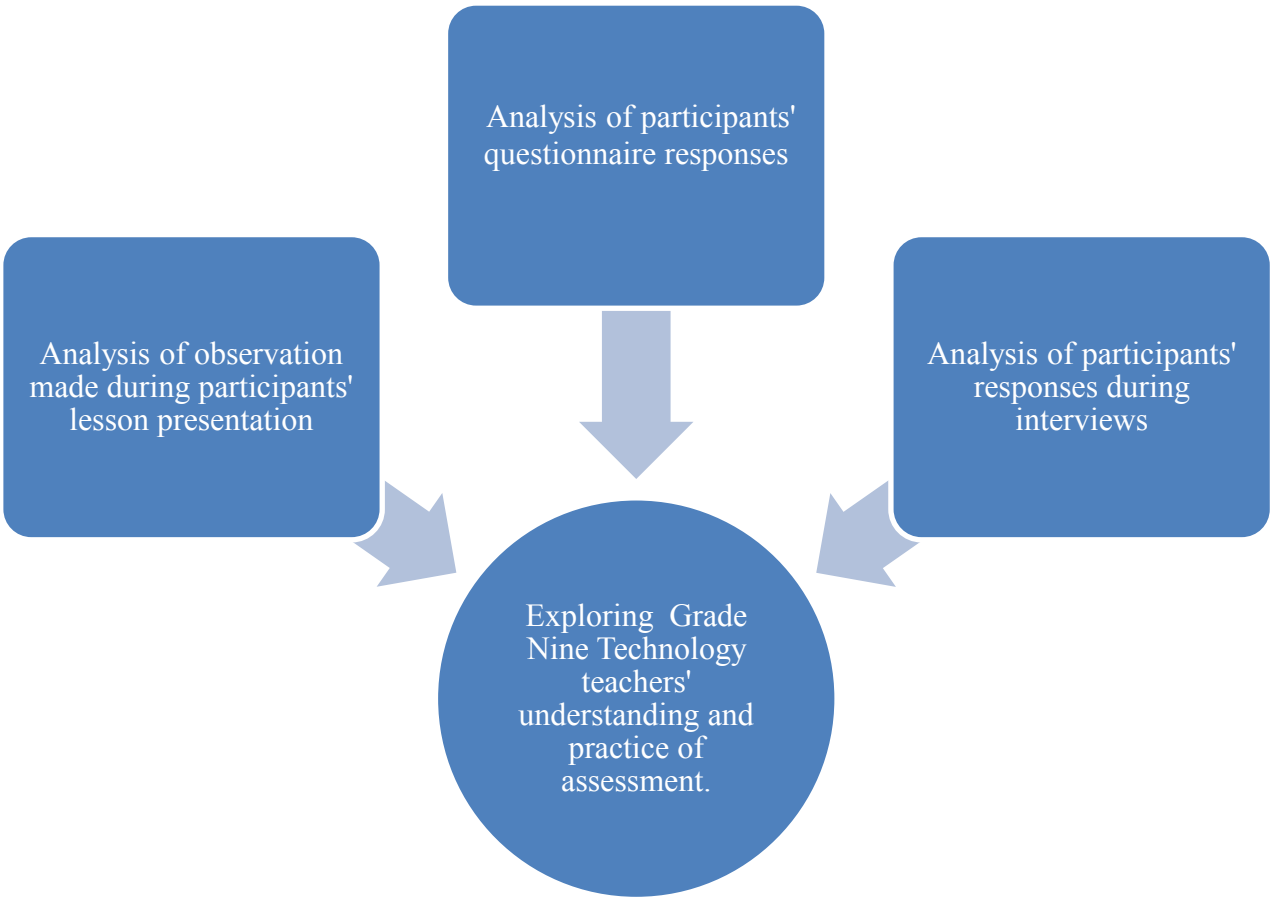

Figure 3: Data analysis of Grade Nine Technology teachers' assessment

From the data collected, after reading the data from all three instruments, related ideas were selected and reduced to make sense of the data. These three methods of data collection were selected in order to provide detailed analysis and to strengthen trustworthiness. When analysing data the researcher organised the data into three groups. Assessment theory was used to analyse the data where the researcher examine participant's responses in relation to Barlex's (2007) model. The researcher compared participant's assessment methods to Barlex's model as the model allows the participants to assess learner's designs. The researcher also looked at how participants integrate their knowledge of assessment into teaching and learning in their classrooms. The researcher outlined and examined the text from participant's responses from the semi-structured interview transcripts, structured questionnaire schedules and structured participant's observation schedules in order to discover the core ideas and hidden ideas on how participants assess Mini-PAT in their classrooms. Those core ideas were interpreted in order to give answers to the research questions. Participants' responses were compared by sorting and sifting where the researcher searched for types, similar patterns, or ideas so that the researcher could analysed the data inductively for the emerging themes (Cresswell, 2009).

3.6 Data collection process

The study was conducted over a period of one year during 2012 and the data was collected from February to September 2012. I encountered problems during the collection of data which are discussed in design limitation. I was only able to engage with participants over a period of 4-6 weeks since the participants were not always available. In figure 4 I present the data collection plan.

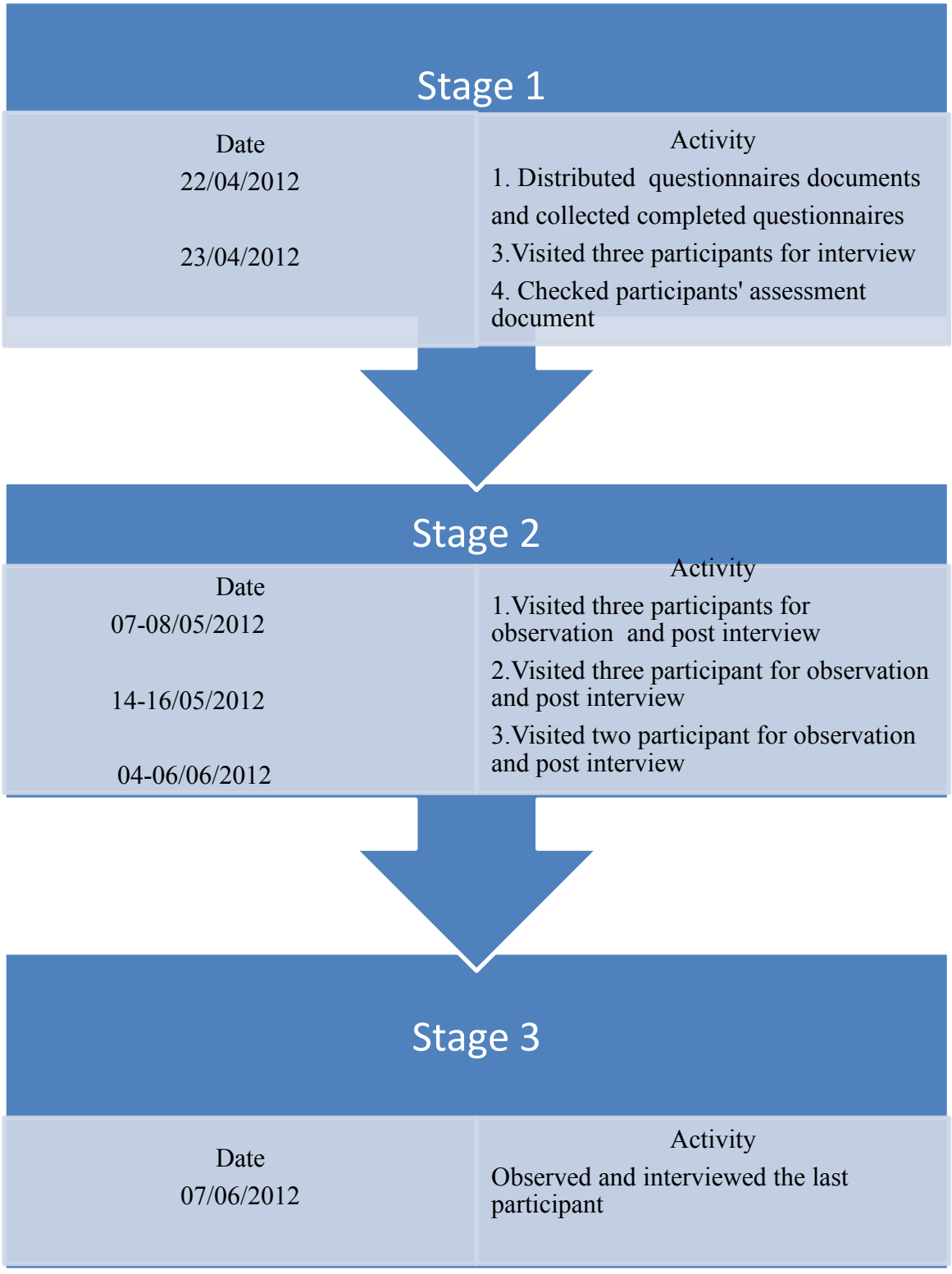

Figure 4: Processes used for data generation

The segmented process above shows three stages of the process that the researcher used when collecting data. The first stage shows two consecutive days. On the first day I distributed questionnaires to participants for completion and collected the completed questionnaires. On

the second day I interviewed the participants and collected participant's assessment documents to see the topic, content or knowledge focus the participants were dealing with at that time. The participants' assessment documents had assessment activities planned for the whole year. These assessment activities had to be written according to certain dates as planned. The activities and dates were in accordance with the participants work schedule. The second stage shows three days, the first day I observed and interviewed the participants when they were teaching about design and how they facilitated when learners were designing in their groups. On the second day I observed the participants facilitating when learners were making their products. The making stage includes making the model according to the working drawing, measuring and choosing materials and tools. On the third day I observed two participants facilitating when each group assessed other groups' presentation. During stage three I observed the last participant facilitating when the groups assess other groups' presentation. After observing participants facilitating I had a discussion with them.

3.7 Design limitations

There were certain limitations that were experienced during the research. In my cluster it is the norm that most Technology teachers are either minimally experienced or unqualified. The sample thus composed of teachers who had limitations. Furthermore, one of the participant was frequently absent from work due to various illnesses. This, therefore impacted on the data collection process, as I had to visit the school more often than I had planned before actually observing her Technology assessment practice. Time constraints were also one of the main difficulties that I faced as participants were often not available when I requested meetings with them. These factors contributed to the duration of the study being extended for an additional two weeks.

3.8 Trustworthiness

There are four criteria that should be considered by qualitative researchers in pursuit of a trustworthy study (Lincoln & Guba, 1985), namely: credibility, transferability, dependability and confirmability. To ensure trustworthiness I asked the participants to verify the emerging theories and inferences I made by giving reasons for particular patterns that I observed. The use of different methods such as questionnaires, observation and interviews strengthened

triangulation. The multiple methods used to compensate for individual limitations led to a more valid, reliable and diverse construction of reality. Table 1 shows how the criteria were addressed in this study.

Criteria	Definition of criteria	Application of criteria
Credibility	Is concerned with confidence in the truth of the findings	By triangulation: Data audio recorded Participants' written responses to the questionnaire Field notes taken
Transferability	Is concerned with showing that the findings could be applied in other contexts	Achieved when: Selected participants' written responses from the questionnaire Field notes taken
Dependability	Deals with showing that the findings are consistent and could be repeated	By triangulation: Transcripts from participants' interview responses Participants' written responses to the questionnaire Field notes taken
Confirmability	Refers to the degree of neutrality and not researcher biased, motivation and interest	By triangulation: Transcripts checked by participants Participants' written responses checked by participants Data audio recorded

Table 1: Criteria used to enhance trustworthiness of this study (Lincoln & Guba, 1985).

To increase the rigour of the research, another teacher who was not a participant in this study was chosen for piloting the research instruments. The reason for piloting was to check if the teacher would be able to understand and to answer questions contained in the data collection schedules before generating data for this study from participants. The teacher has been teaching Grade Nine for three years. The teacher has a four year degree specialising in Technology and has attended Technology workshops.

3.9 Ethical issues

Cresswell (2009) refers to ethics as the rules or set of principles with which researchers need to comply. These principles are autonomy, nonmaleficence and beneficence (Cresswell, 2009). Therefore, in this study, adhering to ethical guidelines guarded against any possible insensitivity. Guidelines adhered to factors such as privacy, approval and consent, permission, protection and the briefing of participants. Participants were also informed that they may withdraw from the project at any time and this allowed for participant honesty and free participation (Cresswell, 2009). I negotiated with my supervisors for storage and safe-keeping of the data. The supervisors will keep the data in a safe place at the university after which it will be shredded and destroyed five years after completion of the research.

For gate keepers, I wrote three letters. The first letter was sent to the school ward manager of the Estcourt circuit to ask for permission to conduct the study. The letter explained the purpose of the study as well as how the data would be stored after collection. The second letter was sent to the school principals to inform and explain about the study that I was conducting. The last letter was distributed to the schools and handed to Grade Nine Technology teachers to inform them about the study that I was conducting on assessment in Technology.

3.10 Conclusion

In this chapter I dealt with the research design and the methodology. The interpretive paradigm, qualitative approach and case study were provided and discussed. I provided the reasons why I selected this paradigm, approach and strategy. I explain the selection of participants, methods used in collecting data which are interviews, questionnaires and observation were explained. I provided a summary of how I collected and analysed the data generated. In the following chapter I present the data generated. In addition I discussed issues related to the design limitation and trustworthiness of this study.

CHAPTER FOUR

PRESENTATION OF DATA

4.1 Introduction

The previous chapter describes the research design and methodology of the study. Multiple data collection methods were used to generate the data. This chapter discusses and presents the findings. The qualitative data analysis focused through organising, analysing and interpreting data (Cohen, Manion& Morrison, 2011). Qualitative data analysis occurred as the researcher searched for types, classes, sequences, processes or patterns (Cohen et al., 2011). The aim of analysing data is to assemble or reconstruct the data in a meaningful or comprehensible fashion (Evans, 2009). To accomplish that I analysed responses from the questionnaire schedule on teachers' understanding and practice of assessment, interview transcripts on how teachers implement assessment in their classroom and observation schedules where I observed teachers teaching in their classrooms. Findings are presented in the next section.

4.2 Presentation of findings

In this section I present the cross case-analysis of three participants as well as describe my five day visit of classroom observation to participants. Data collected using the structured questionnaire schedule on teachers' profile information and the semi-structured interview schedule on teachers' understanding and practices of assessment is also presented. Three teachers were selected from three different schools as participants. The results from case studies relate to the teachers' experiences of assessing assessment in technology classrooms. For each participant a brief description of the teacher's background profile is provided. The teacher's profile consists of qualification, teaching experience, the number of years teaching as well as number of years teaching Technology. The description of the school context and teacher's biography are given in figure 5 and 6.

4.2.1 Context of the school

The vertical chevron list was used to represent the information on the context of the participant's schools.

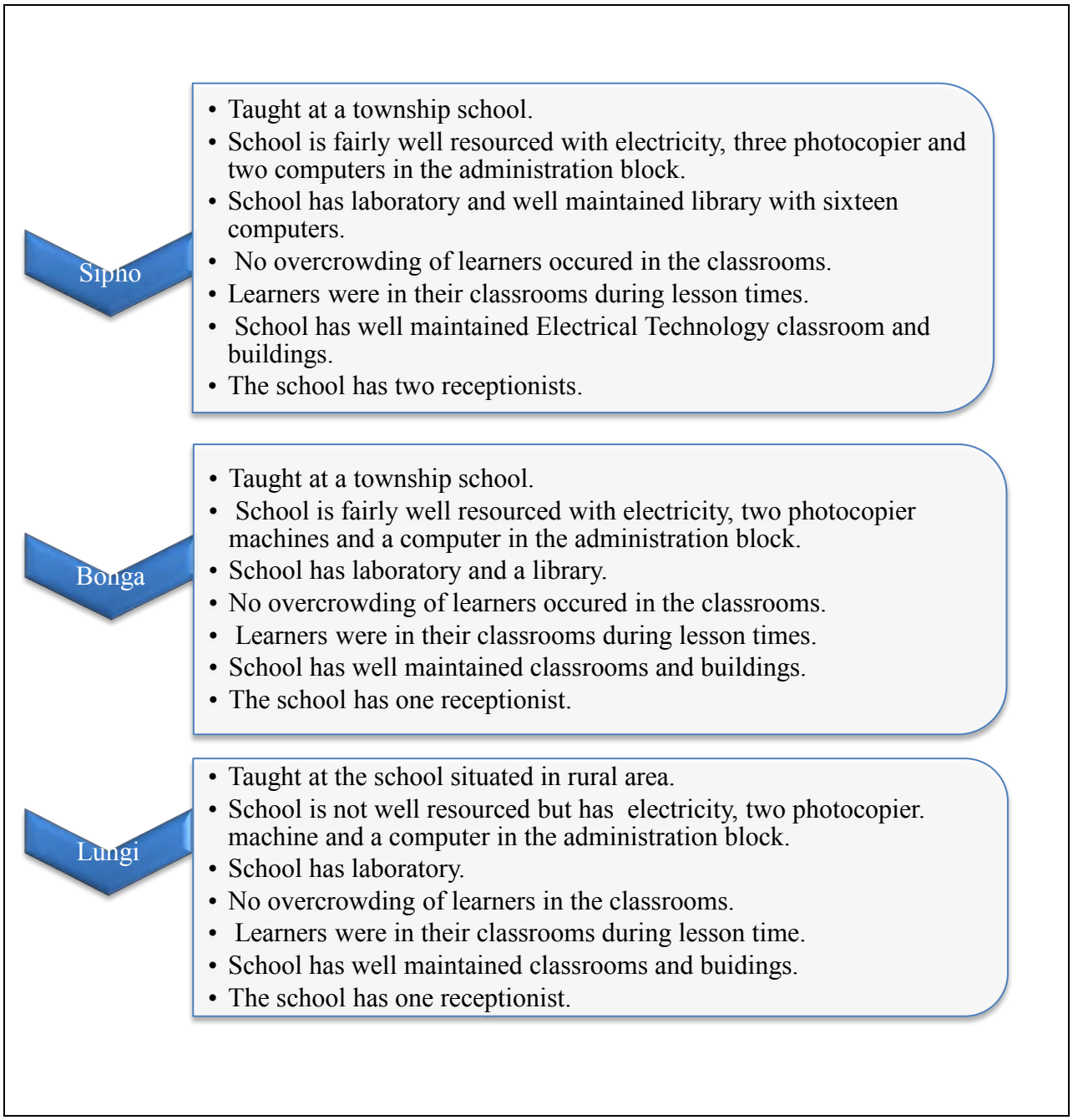

Figure 5: Context of the school

The participants were three Technology teachers, Bonga, Sipho and Lungi. The pseudonyms were used for ethical purposes to conceal the teachers' identities. Sipho and Bonga were teaching at township schools. Lungi was teaching in a rural area. Sipho's school has a well maintained Electrical Technology classroom with three photocopier machines and two

computers in the administration block. Bonga and Lungi's schools have two photocopier machines and only one computer in the administration block. Unlike Sipho's school which also have 16 computers in the library, both Bonga and Lungi's schools do not have computers in the library and there is no library in Lungi's school, however their schools both have a laboratory. The computers in the library are used by teachers and learners. All three schools have electricity and electricity is installed in all classrooms. The classrooms are neat with well-arranged desks. The desks were arranged in groups in all three schools. Arranging desks in groups helps learners during Technology periods when they work in groups to share ideas. It also increases their personal involvement, commitment and self-esteem. During lesson times learning and teaching took place in all three schools. All three schools have sufficient classrooms with suitable furniture and there was no classroom overcrowding.

All three schools had well-maintained school buildings; however, Sipho's school was better in terms of physical resources compared to Lungi and Bonga's schools. Although Lungi's school is situated in rural area and has been recently built in recent years but it is still in good condition. All three schools are surrounded by fence which keeps the mischievous individuals away from school. This protects and prevents the school from being vandalised. They have security guards at the gate who are responsible for security in the school. Upon arrival at the school you meet the security guard who will direct you to the receptionist. Sipho's school has two receptionists. Bonga and Lungi's school has only one receptionist. The receptionists welcome every individual or individuals who arrive at the school and direct that individual to the relevant office or somebody who could assist that individual.

4.2.2 Biography of participants

The vertical chevron list provides a summary of the teachers' biographies from the questionnaire and interview responses.

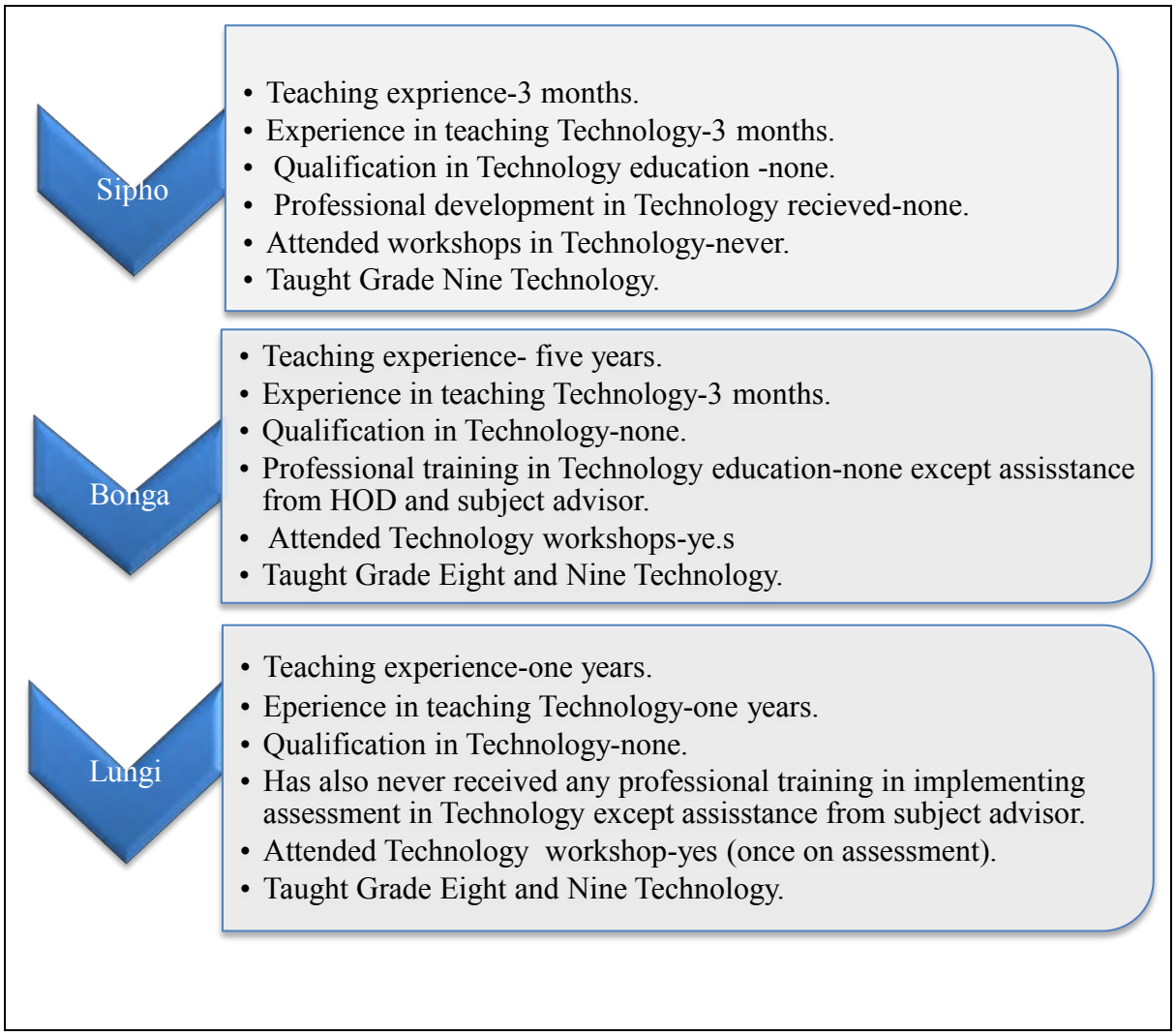

Figure 6: Professional development of teachers

Sipho was teaching Grade Nine Technology for the first time in that year. He has no qualification in Technology. However, for five years Bonga has been teaching another subject (not Technology). He has no qualification in Technology. Lungi has been teaching Grade Eight and Grade Nine Technology for a year. She has no qualification in Technology. All three teachers have never received any professional development in Technology. They have never received training in implementing assessment in Technology. Unlike Bonga and Lungi who at least attended a workshop, Sipho had never attended any Technology workshop. Bonga and Lungi received assistance from the subject advisor as they both

attended the workshops. The subject advisor visited Lungi's school to offer his assistance to her in Technology and spend the whole day assisting her. Lungi gained a lot of information from the subject advisor during his visit.

4.3 Cross case-analysis of findings

I tabulated findings from the case studies of participants. The following cross-case analysis was done so that I could provide the general statement for each participant which only applies to them in this case study. After organising the data as mentioned in data analysis (see chapter 3). I analysed the data inductively by sorting and sifting data where I searched for types and similar ideas (Cresswell, 2009). The following categories were used:

a) Understanding and knowledge of assessment practices
b) Implementation of assessment practices
c) Purpose of assessment practices

The following table reflect all the categories that emerged.

4.3.1 Understanding and knowledge of assessment practices
4.3.1.1 Teachers' understanding and practice of assessment in Technology
4.3.1.2 Teachers' understanding of formative and summative assessment in Technology
4.3.1.3 Teachers' understanding of kinds of assessment involved in formative assessment
4.3.1.4 Teachers' understanding of performance assessment in Technology
4.3.1.5 Teachers' understanding of similarities between formative and performance assessment
4.3.1.6 Kinds of tasks teachers use to assess learners in Technology
4.3.2 Implementation of assessment practices
4.3.2.1 Teachers' implementation of assessment in Technology
4.3.2.2 Nature of assistance offered to teachers
4.3.2.3 Teachers' reinforcing subject matter during the lesson
4.3.2.4 Reflection on poor performance
4.3.3.5 Teachers' assessment practice in Technology
4.3.3.6 Usage of appropriate assessment practices
4.3.3.7 Types of assessment that teachers use when assessing technology design

4.3.3 Purpose of assessment practices
4.3.3.1 How teachers encourage creativity in Technology classroom
4.3.3.2 Assessment procedures that teachers use when assessing learners' design process
4.3.3.3 Teachers' experiences when assessing learners' designs
4.3.3.4 Teachers' measurement of learners' performance
4.3.3.5 Teachers' subjective judgment
4.3.3.6 Capturing learners interest and attention during lesson
4.3.3.7 Teachers' views on projects done outside school premises
4.3.3.8 Teachers' understanding of the term diversity
4.3.3.9 Teachers' assistance to learners struggling with Technology design
4.3.3.10 Teachers' assessment of learners' design
4.3.3.11 Teachers' perception of Technology curriculum
4.3.3.12 Teachers' interest in the subject Technology

Table 2: Categories of the cross-case analysis

When tabulating findings under each category given, I provided direct quotations of the participant's responses to the researcher's questions. After presenting the participants' responses to a particular question and statements, I interpret, compare and contrast the responses.

4.3.1 Understanding and knowledge of assessment practices

Sections 4.3.1.1 to 4.3.1.6 were used to explore the teachers' understanding and practice of assessment. I ask a question and then present the responses from the participants.

4.3.1.1 Teachers' understanding and practice of assessment in Technology

Researcher: What do you understand by the term assessment in Technology?

In figure seven I present teachers' responses to the questionnaire.

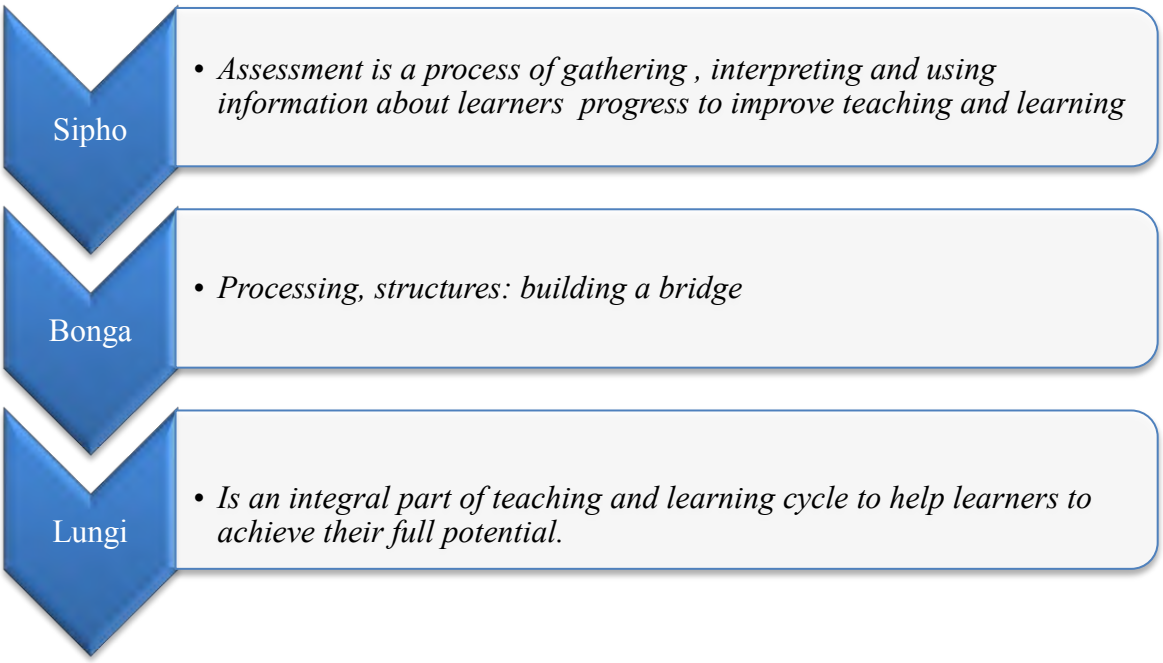

Figure 7: Teachers' understanding of the term assessment

Sipho's understanding of the term assessment focused on both teaching and learningin Technology. Bonga gave an example of the content that might be assessed in Technology. However, the response that Lungi gave was not a definition of assessment but, rather the purpose of assessment. Although Sipho and Bonga's mentioned process in their responses, however, by processing Bonga did not meant the procedure that Sipho meant when he gave definition of assessment. Lungi sees assessment as part of teaching and learning whilst Sipho consider assessment as the procedure to improve teaching and learning. The participants gave totally different understandings of the term assessment.

4.3.1.2 Teachers' understanding of formative and summative assessment in Technology

Researcher: Differentiate between formative and summative assessment in Technology.

In figure eight I present teachers' responses to the questionnaire.

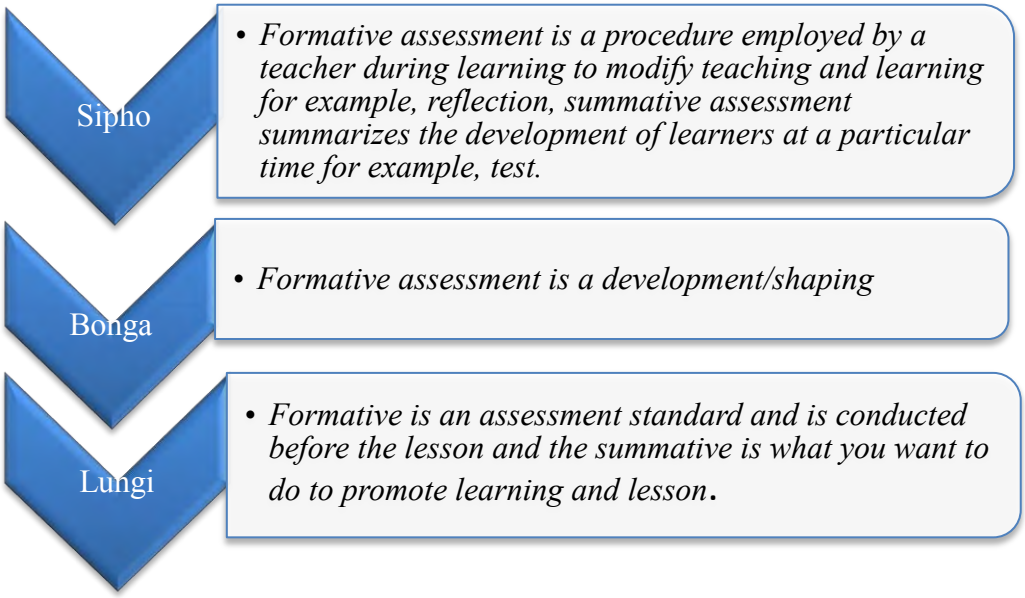

Figure 8: Differences between formative and summative assessment

Sipho views formative assessment as informal assessment used during teaching and learning and he viewed summative as formal assessment. Bonga did not differentiate between formative and summative assessment. He only mentioned what he thought formative assessment could be used for. He did not mention what formative assessment develops, not clear whether he referred to learners' understanding. Lungi considered summative assessment useful for formative assessment purposes as formative assessment could serve as baseline assessment. Both Sipho and Bonga considered formative assessment as the procedure employed to transform, however, only Sipho mentioned that it was teaching and learning that needs to be transformed. Although Lungi might consider formative and summative assessment as a procedure but her understanding of these two terms is the opposite of what they are used for.

4.3.1.3 Teachers' understanding of kinds of assessment involved in formative assessment.

Researcher: What kinds of assessment are involved in formative assessment in Technology? How often do you implement these kinds of assessment in your classroom?

In figure nine I present the questionnaire responses.

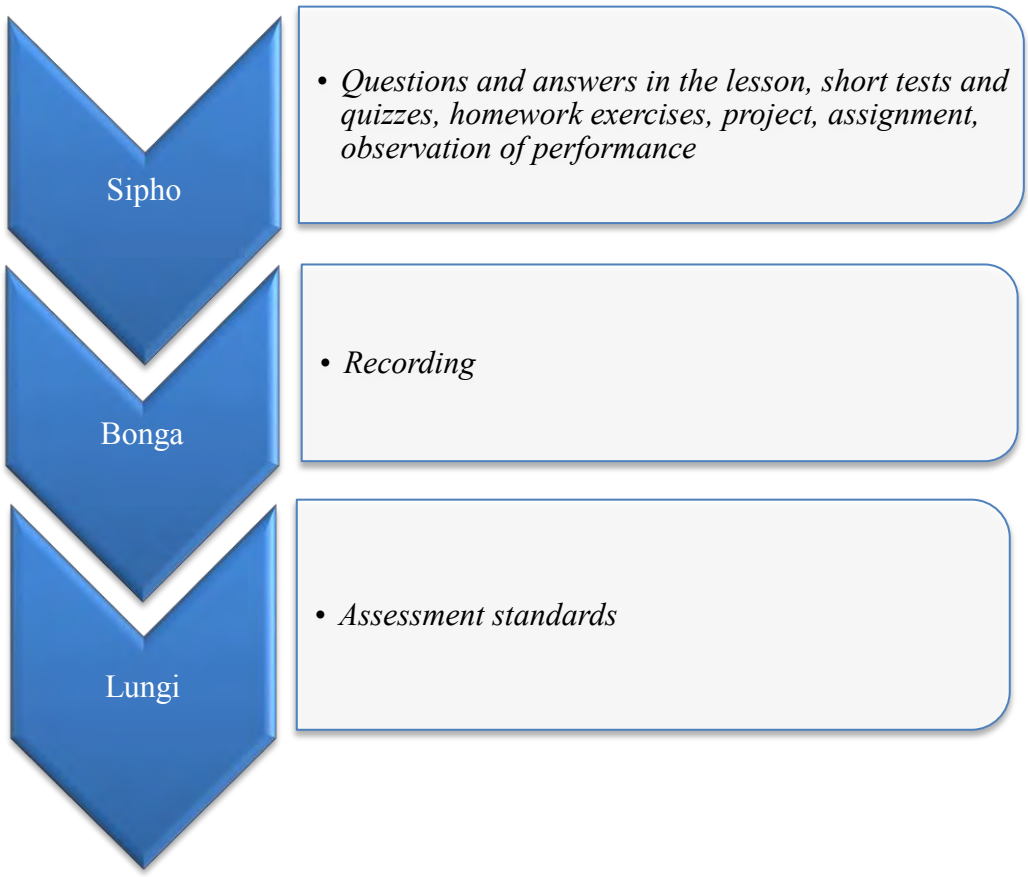

Figure 9: Kinds of formative assessment

Sipho gave kinds of assessment where formative assessment is used to collect information on how learners' achievement can be improved. Bonga's response focused on the recording aspects of assessment. He mentioned that recording is a form of formative assessment. Lungi mentioned assessment standards which are not the kinds of formative assessment. All three participants gave totally different kinds of formative assessment in Technology.

4.3.1.4 Teachers' understanding of performance assessment in Technology

Researcher: What forms of assessment are involved in performance assessment in Technology?

In figure 10 I present the questionnaire responses

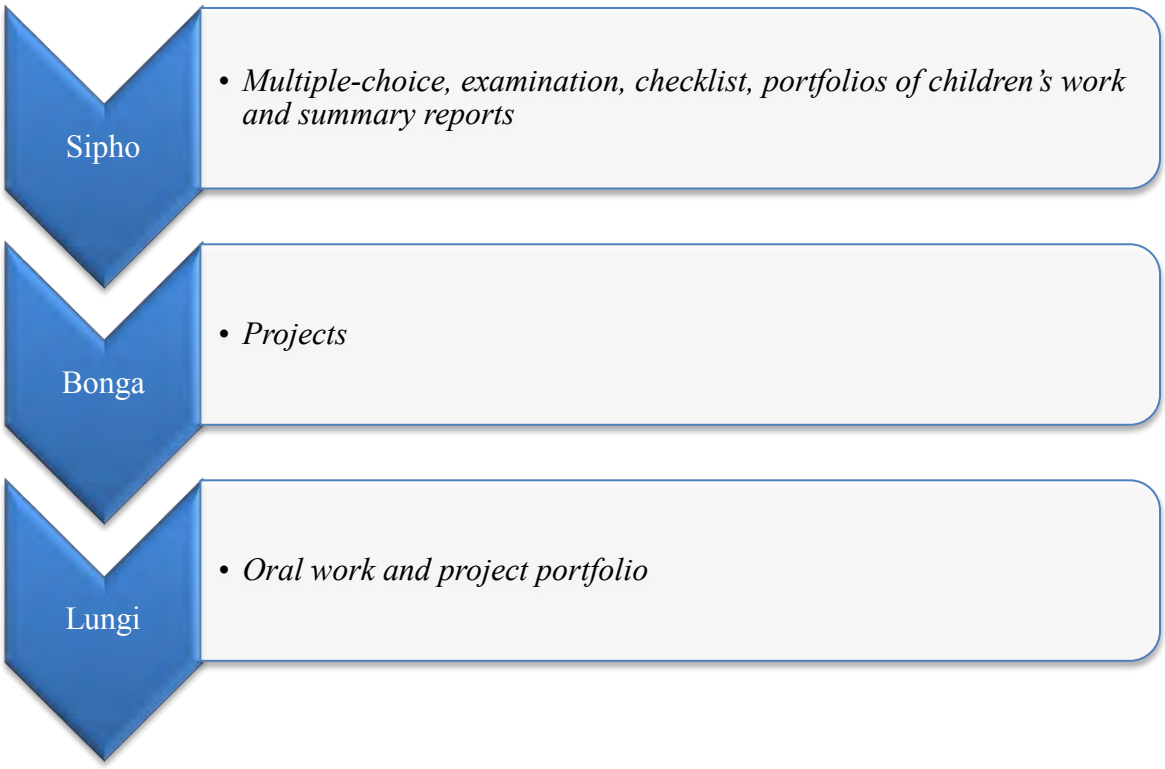

Figure 10: Forms of performance assessment

Sipho mentioned multiple-choice and checklist as forms of performance assessment in the questionnaire. In Technology there are enabling activities in the Mini-PAT that precede the making of a product; however, multiple-choice is not one of those activities. Performance assessment is about real life activities. Those activities involve practical exercises, practical assignments and models. Bonga had mentioned projects were appropriate for performance assessment. Lungi only considered oral work and projects portfolio were forms of performance assessment. It was not clear whether Lungi refers to presentations of designs and model or oral work as one of the types of assessment in Technology used to interpret or express ideas. All three teachers, however, in their responses provided at least a form of performance assessment.

4.3.1.5 Teachers' understanding of similarities between formative and performance assessment

Researcher: Are there any similarities between formative assessment and performance assessment? If so, what are those similarities? How do these two forms of assessment assist you in improving learners' achievement?

In figure 11 I present the questionnaire responses.

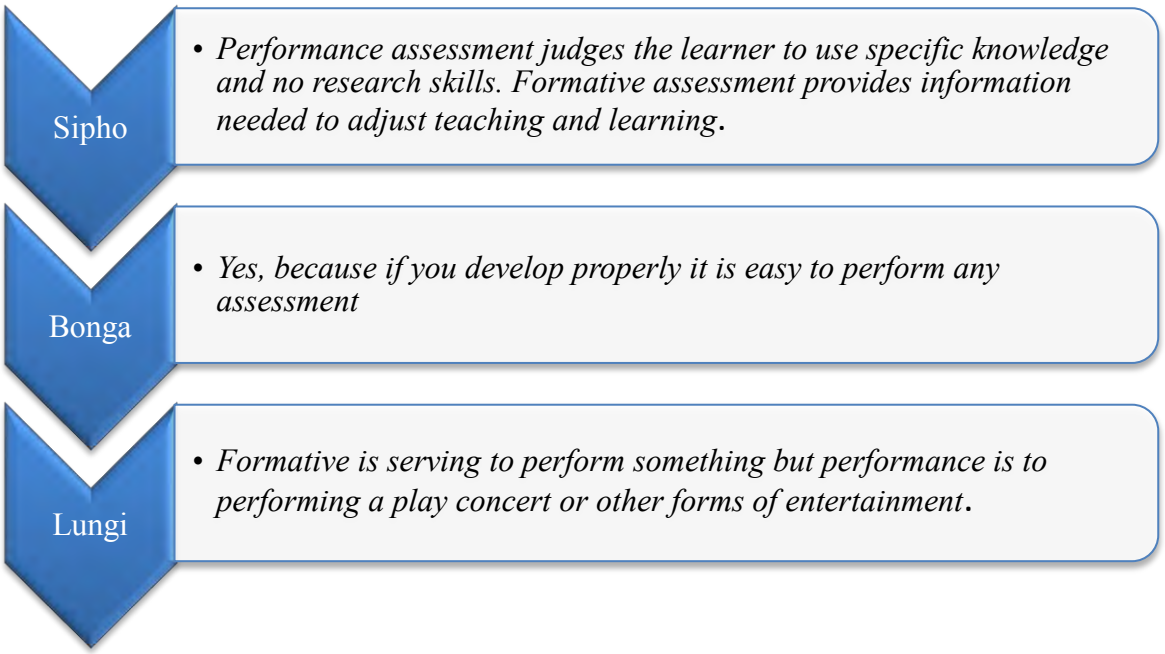

Figure: 11 Similarities between formative and performance assessment

When asked about similarities between formative and performance assessment in the questionnaire Sipho responded by comparing these two forms of assessment. Sipho views performance assessment as an assessment which does not includes research skills. Bonga did not compare these two forms of assessment at all as he only agreed on that there are similarities between these two forms of assessment. He did not specify how developing performance assessment or formative assessment could contribute in performing any assessment easily. Lungi's comparison of these two forms of assessment indicates that she was giving the meaning of these two terms using what happens in plays and other entertainment. She did not provide forms of assessment in Technology. Again there are no similarities between Sipho and the other two participants. However, by mentioning perform Bonga did not meant performance as to present or act as Lungi mentioned, but he meant to carry out assessment.

4.3.1.6 Kinds of tasks teachers use to assess learners in Technology

Researcher: What kinds of tasks do you assess in Technology?

In figure 12 I present the interview responses.

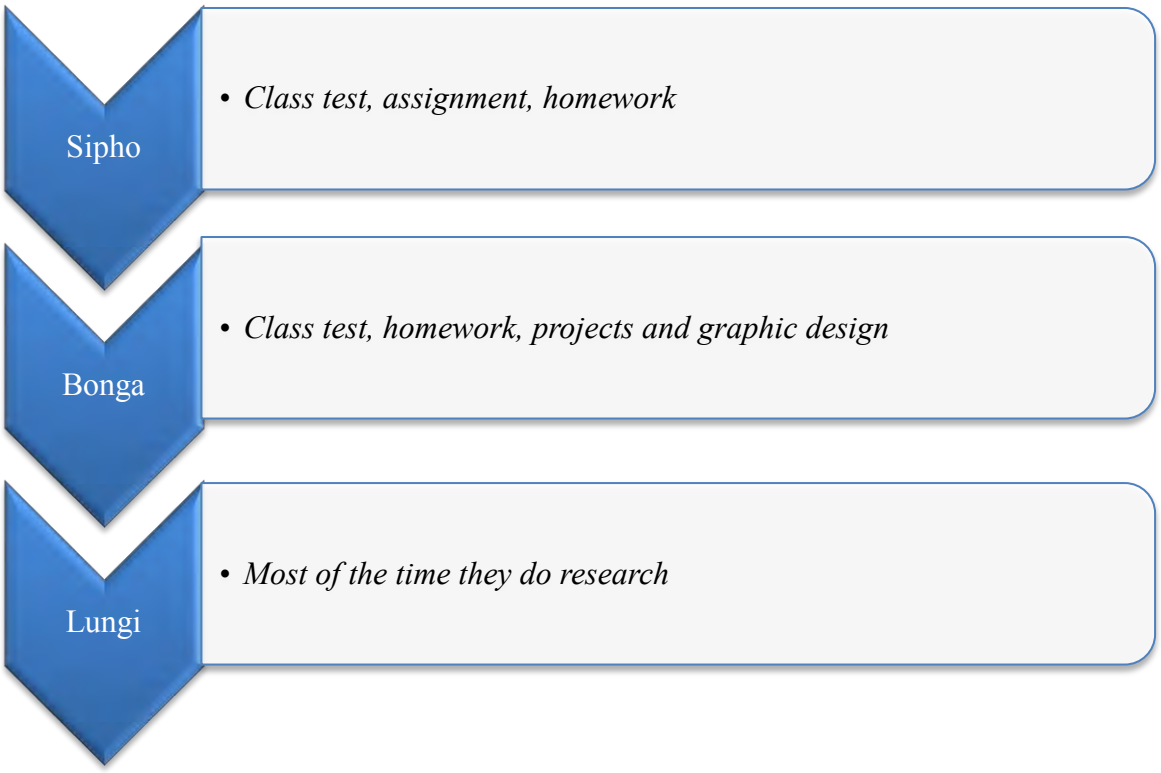

Figure 12: Tasks used to assess Technology

Sipho and Bonga did mention the kinds of task assessed in Technology during the interview, however, homework is not usually considered to be a one of a kind of task as they both mentioned. Lungi mentioned only research. But she did not expand on the kind of task that would be researched. When assessing learners' work in Technology teachers employ a range of tasks. However, the three participants only name the kinds of tasks that they mostly use in their classrooms. Research as Lungi has mentioned is part of projects as Bonga has pointed out as tasks to assess in Technology, where teachers give learners an investigation task to do.

4.3.2 Implementation of assessment practices

Sections 4.3.2.1 to 4.3.2.7 are concerned with how the participants implement assessment practices in their classrooms. I asked a question and then provide the participants' responses.

4.3.2.1 Teachers' implementation of assessment in Technology

Researcher: Do you find it difficult to implement assessment in Technology? Please explain.

If yes, then how do you assist learners to master the content?

In figure 13 I present post lesson interview responses.

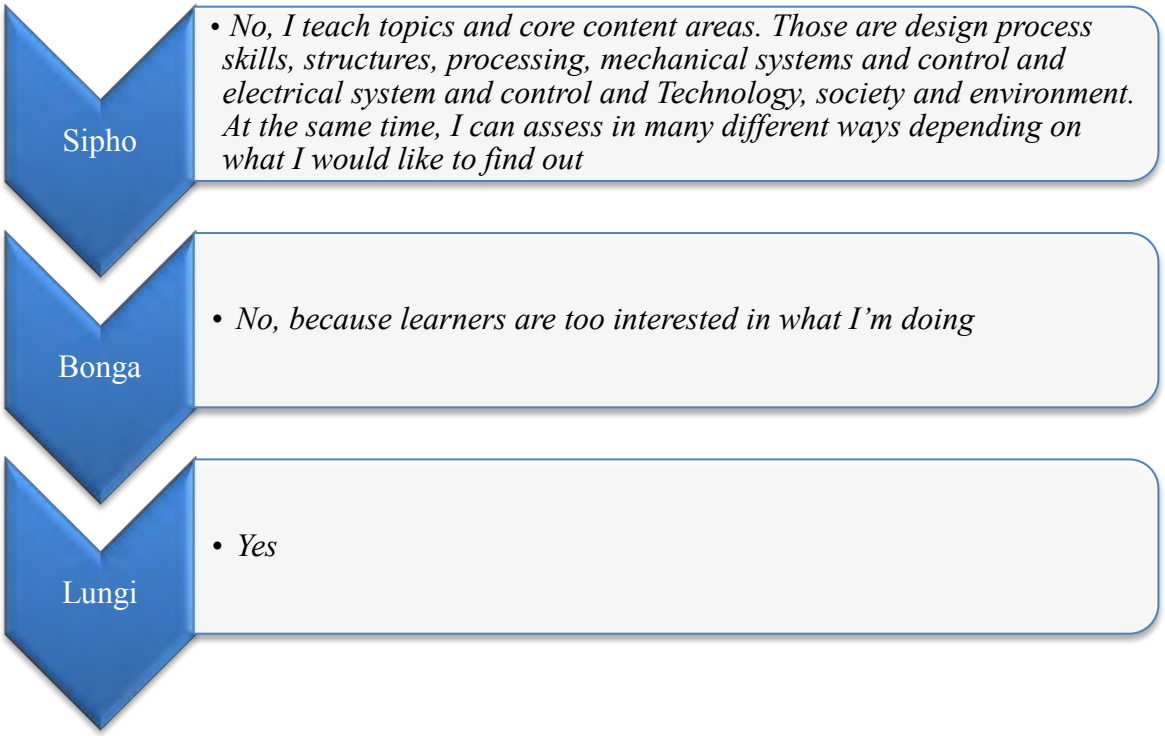

Figure 13: Teachers' implementation of assessment

When the teachers were asked about how they implement assessment Sipho and Bonga reported that they experienced no difficulties, but the exception was Lungi. From the questionnaire, it is evident that Sipho taught topics and core content area. Bonga was only concerned about keeping the lesson interesting. Although Lungi and Bonga received assistance in Technology from the subject advisor and Head of Department (HOD) respectively, Lungi acknowledges that she still experienced difficulties when implementing Technology. Lungi did not elaborate on the specific areas that she might experience difficulties. Sipho mentioned the contents that he could assess in Technology using various types of assessment whereas Bonga did not mentioned what he is doing during the lesson that keep learners focussed.

4.3.2.2 Nature of assistance offered to teachers

Researcher: Have you received any assistance in implementing assessment in Technology? What was the nature of assistance and who offered assistance?

In figure 14 I present the questionnaire responses

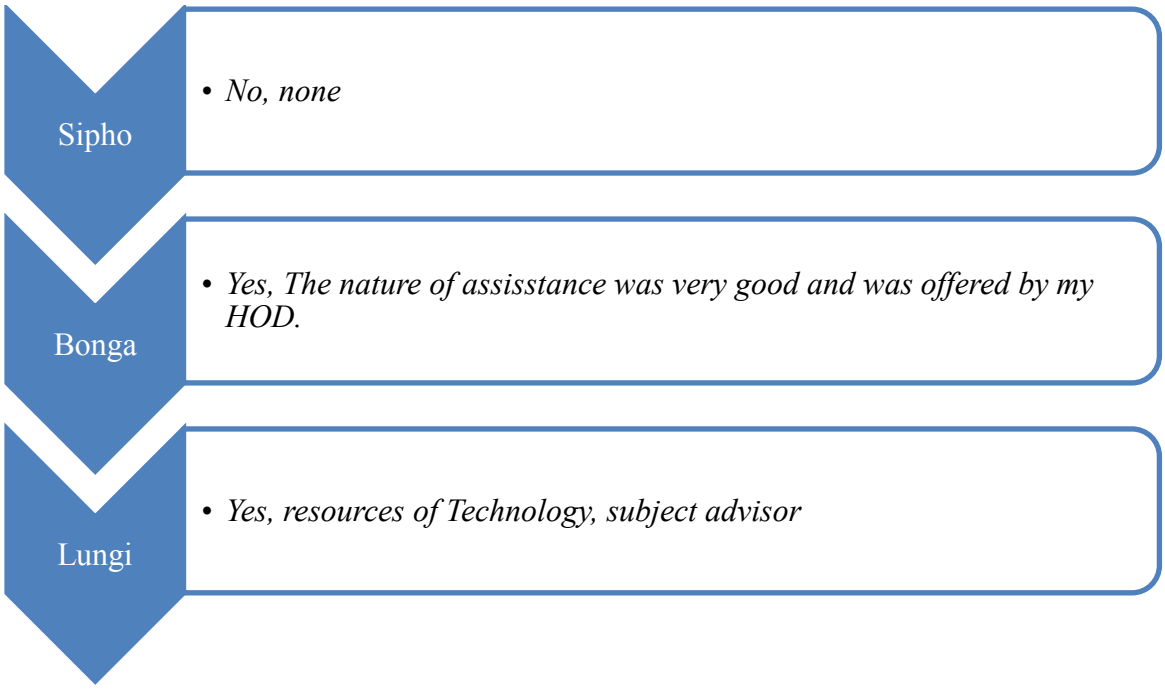

Figure 14: Assisting teachers implement assessment in Technology

Despite Lungi and Bonga having received assistance in implementing assessment in Technology from the subject advisor and Head of Department respectively, Lungi admitted that she still experienced some difficulties when implementing assessment in Technology. They both did not disclose the areas that were developed. Sipho had never received any assistance in Technology.

4.3.2.3 Teachers' reinforcing subject matter during the lesson

Researcher: If you teach a lesson and your learners don't seem to understand or follow, what do you do?

In figure 15 I present interview responses

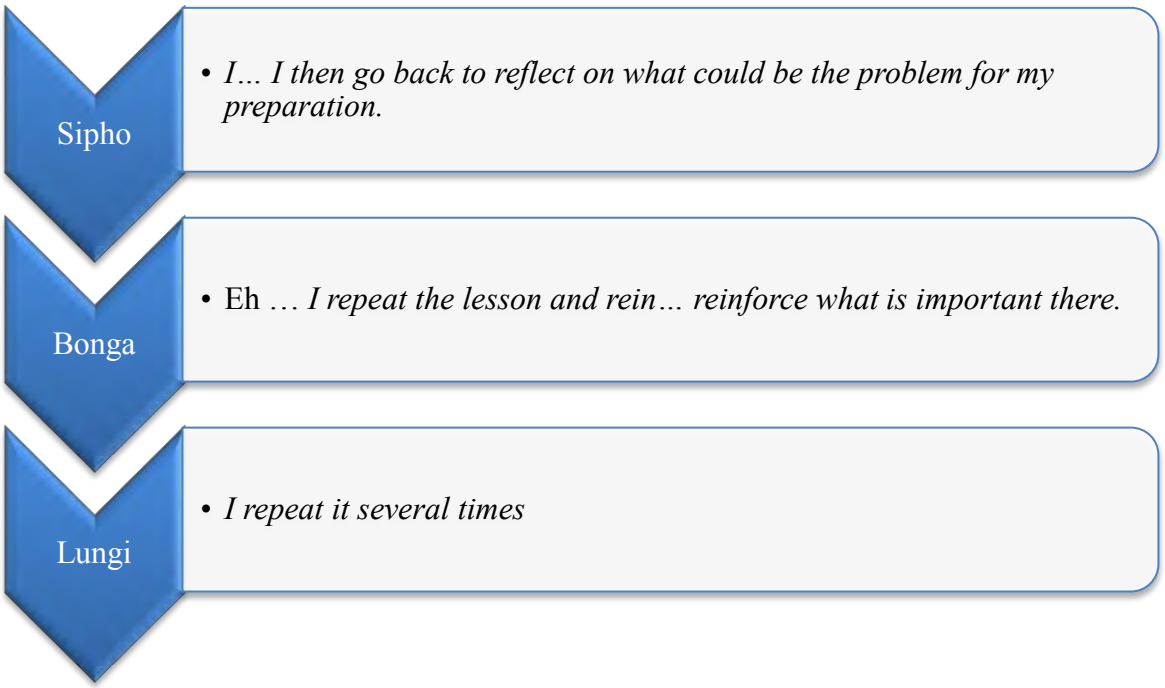

Figure 15: Reinforcement of the content

When learners do not seem to understand, Sipho said he reviews the delivery of his lesson. Bonga said he repeats the lesson and reinforces the content. Lungi said she repeats the lesson until learners understand. Bonga and Lungi repeated the lesson. Sipho find out whether there are any gaps in his preparation that led in misunderstanding of his lesson presentation. He is not saying whether he also repeat the lesson just like the two other participants after doing reflection.

4.3.2.4 Reflection on poor performance

Researcher: If you assess a task and your learners perform badly, what do you do?

In figure 16 I present the interview responses.

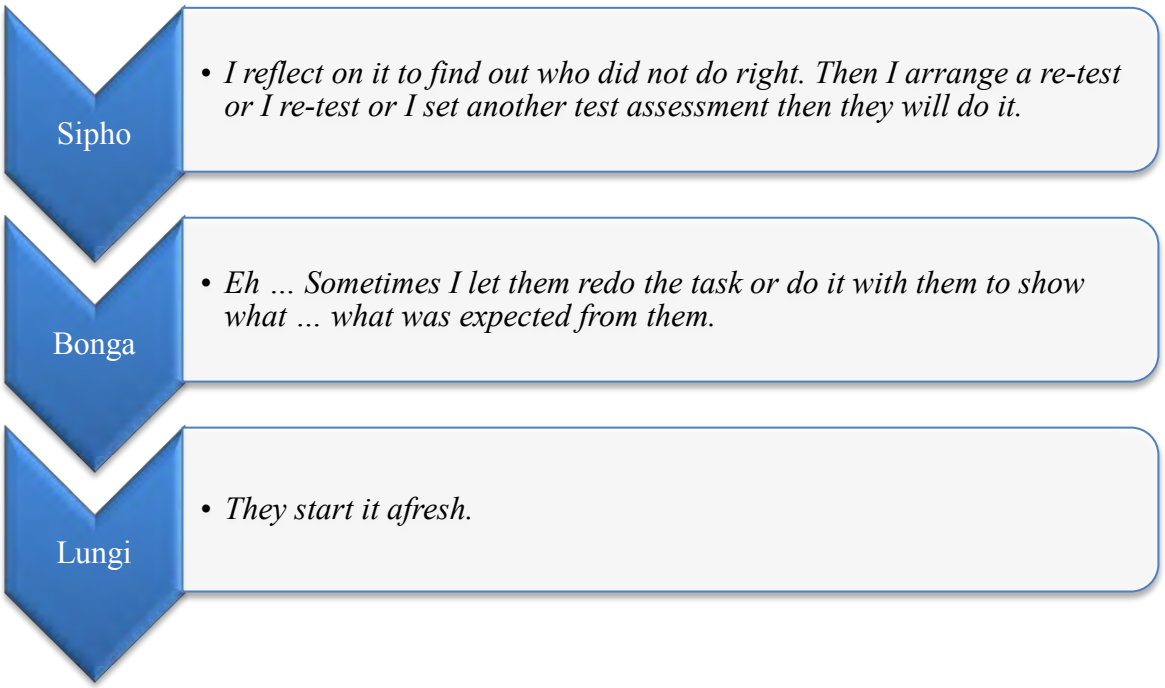

Figure 16: Reflection on assessment

Sipho reflected and identified those learners who perform badly. He even gives learners another test to check where the problem might be. Bonga and Lungi are not saying whether only those learners who perform badly redo the task or the whole class. When learners perform badly during the test, Sipho, Bonga and Lungi said they arrange for learners to re-write the test in order to improve their marks. However, during observed lessons no learners were told to redo or improve their project if the learners' projects were not up to standard.

4.3.2.5 Teachers' assessment practice in Technology

Researcher: What do you understand by the term technology design?

In figure 17 I present interview responses.

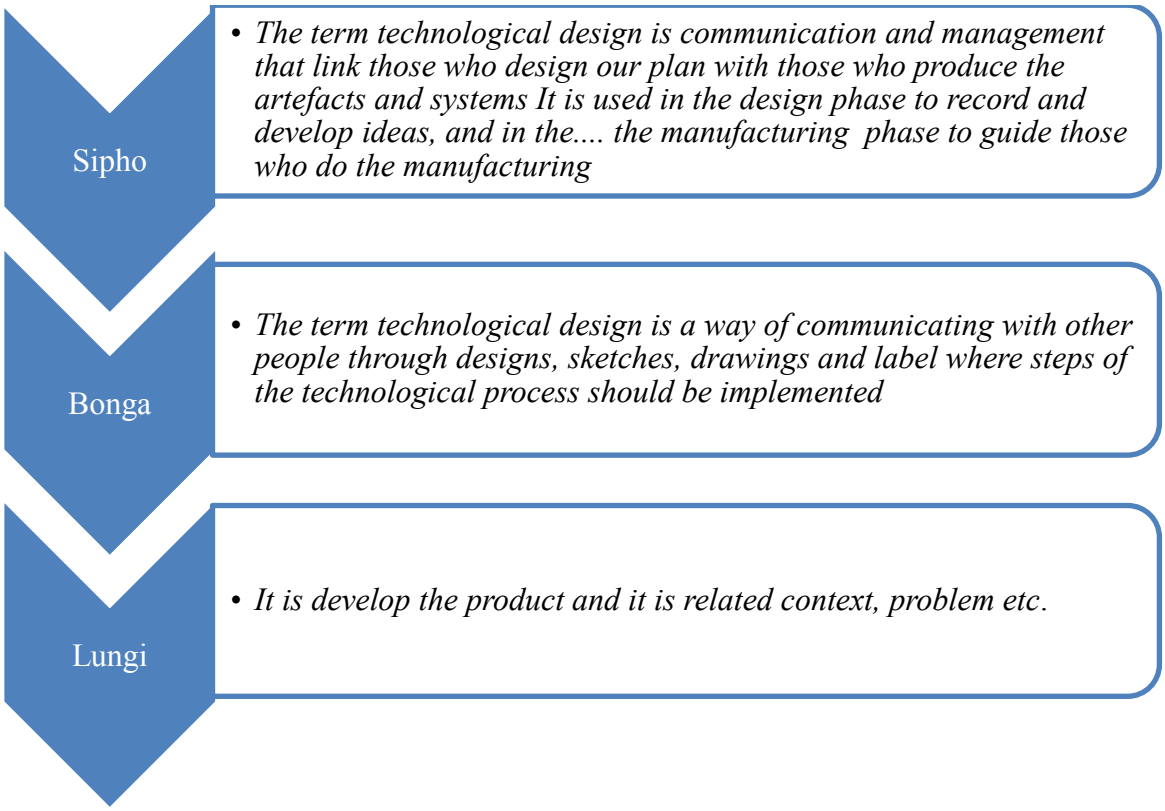

Figure 17: Teachers' understanding of the term technology design

Sipho and Bonga when asked about their understanding of technology design gave the definition of what technology design is and how and why it is implemented. Lungi gave a reason of why technology design is implemented. Lungi's response did not give the source of assessment practices she employed.

4.3.2.6 Usage of appropriate assessment practices

Researcher: Do you think your assessment practices are in line with the technology curriculum?

In figure 18 I present the interview responses.

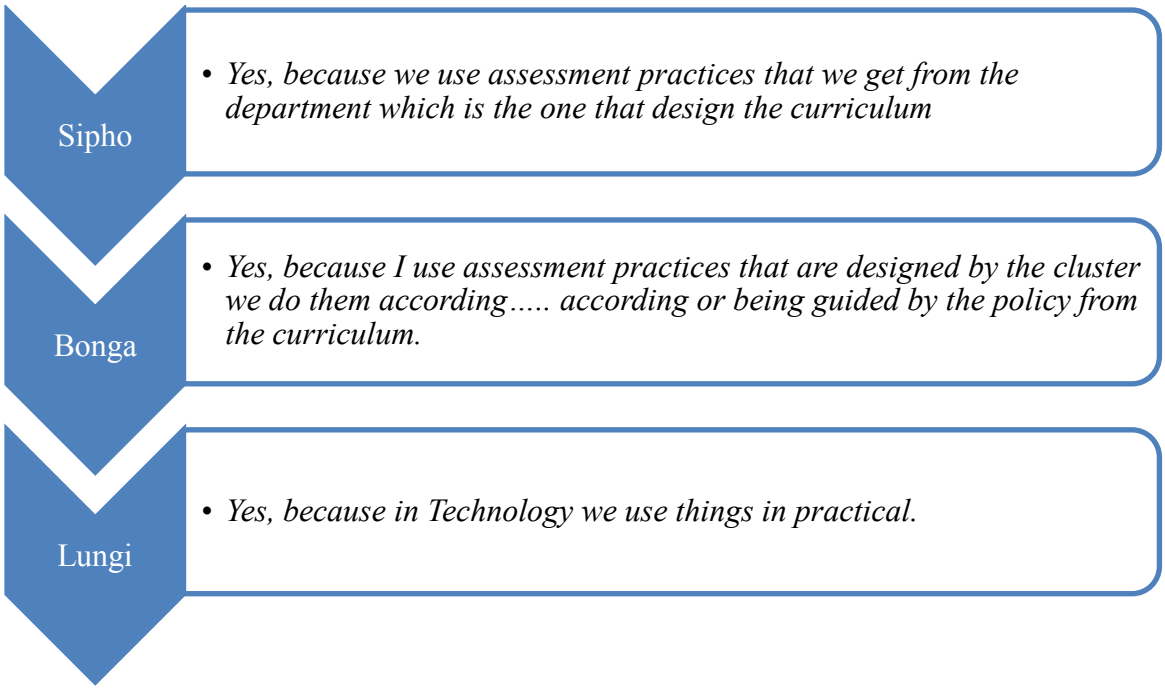

Figure18: Teachers' use of assessment practice in Technology

Sipho used assessment practices he obtained from the department which is the one responsible for designing curriculum. Bonga concurs that the assessment practices he used were designed in the cluster being guided by the policy. As for Lungi she is not saying who designed the assessment practices she is using for the practicals she mentioned. The participants agreed that the assessment that they were using was in line with the curriculum.

4.3.2.7 Types of assessment that teachers use when assessing technology design

Researcher: What types of assessment have you used when assessing technology design? Why do you use them?

In figure 19 I present provides the interview responses.

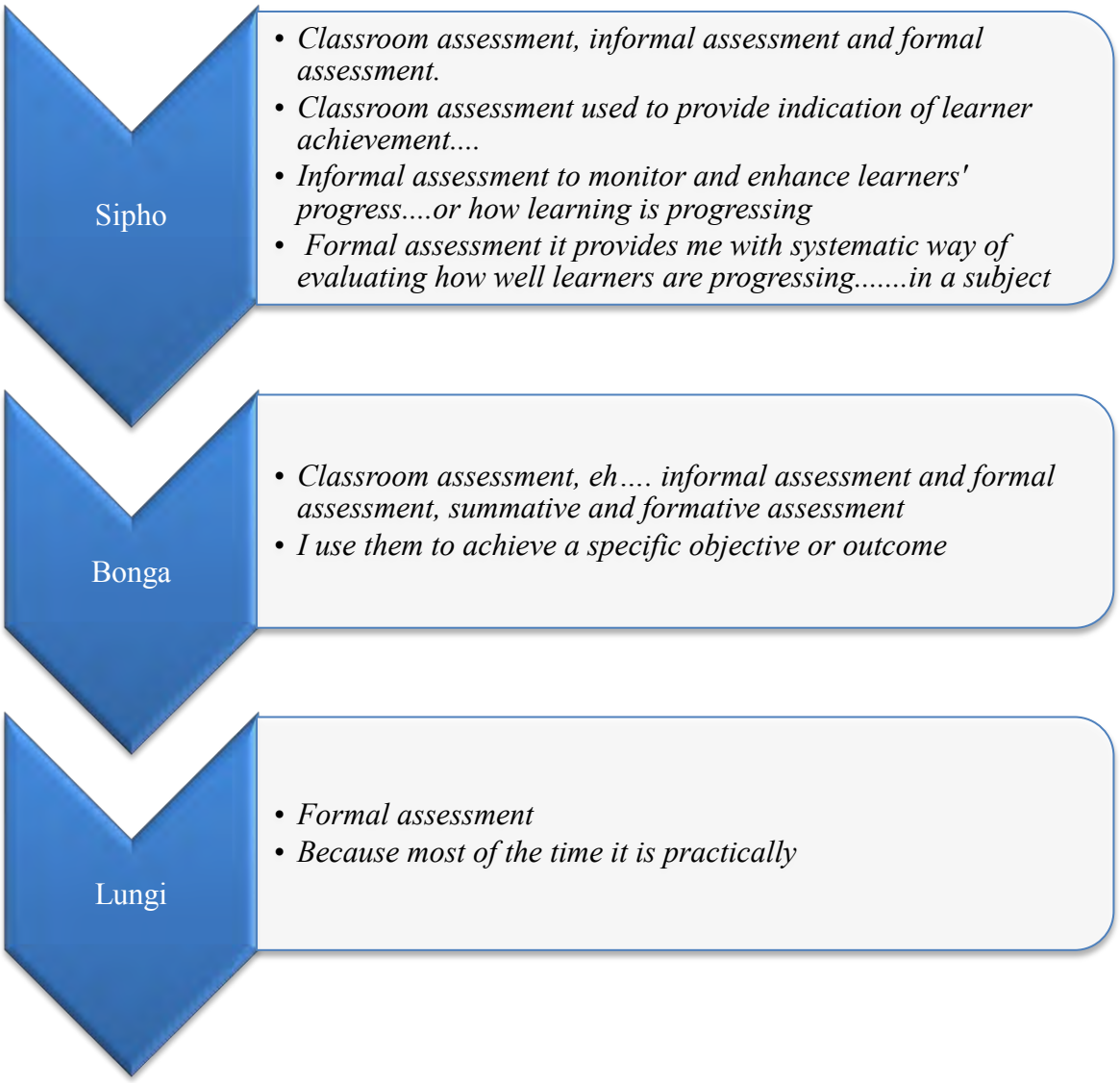

Figure 19: Assessment used to assess technology design

Sipho and Bonga considered classroom assessment whether informal (formative) or formal (summative) assessment as types of assessment in technology design. Classroom assessment uses both formal and informal assessment in Technology. Lungi mentioned only formal assessment as type of assessment that needs to be administered to assess technology design. Bonga did not give an indication whether he knows that informal assessment is formative and formal assessment is summative. Sipho and Bonga employed other types of assessment as well. However, formal assessment is the common assessment that all the participants employed in their classrooms.

4.3.3 Purpose of assessment practices

Section 4.3.3.1 to 4.3.3.7 were used to find out what the purpose of assessment practices is. Once again, I asked a question and then give participants' responses.

4.3.3.1 How teachers encourage creativity in Technology classroom

Researcher: In what ways do you encourage creativity in your Technology classroom?

In figure 20 I present the interview responses.

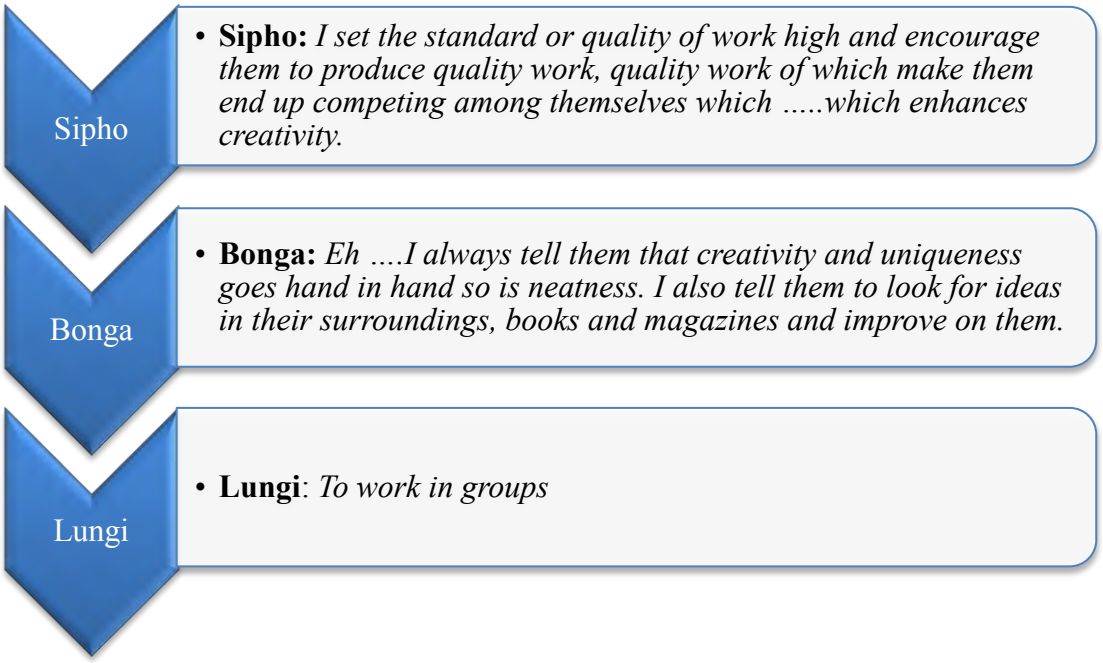

Figure 20: Creativity in Technology

From the response given by Sipho, he appears to encourage creativity by telling learners to produce quality work. He considers competing among the learners to be useful for promoting the quality of learners' work. Bonga encouraged learners' creativity by telling learners to do more research about topic, uniqueness and neatness. During lessons Lungi placed learners in groups of four, Bonga had groups of four and six learners and Sipho had groups of four learners. All three teachers ensured that learners' groups constituted of boys and girls. Lungi did not elaborate on how grouping learners together encouraged creativity. Observation confirmed that none of the participants promote creativity the way participants mentioned in the interview. The only time they spoke about creativity was when learners were presenting their projects; however, they all encouraged learners to work neatly. All three participants

promote creativity in different ways in their classrooms. Performance assessment in Technology requires innovation, creativity and problem solving skills. However, creativity is promoted when learners design freely during the design process, without following pre-determined steps of the design process (Williams, 2000; Barlex, 2007)

4.3.3.2 Assessment procedures that teachers use when assessing learners' design process

Researcher: What assessment procedures do you normally use when assessing learners' designs? Why do you use these procedures?

In figure 21 I present interview responses.

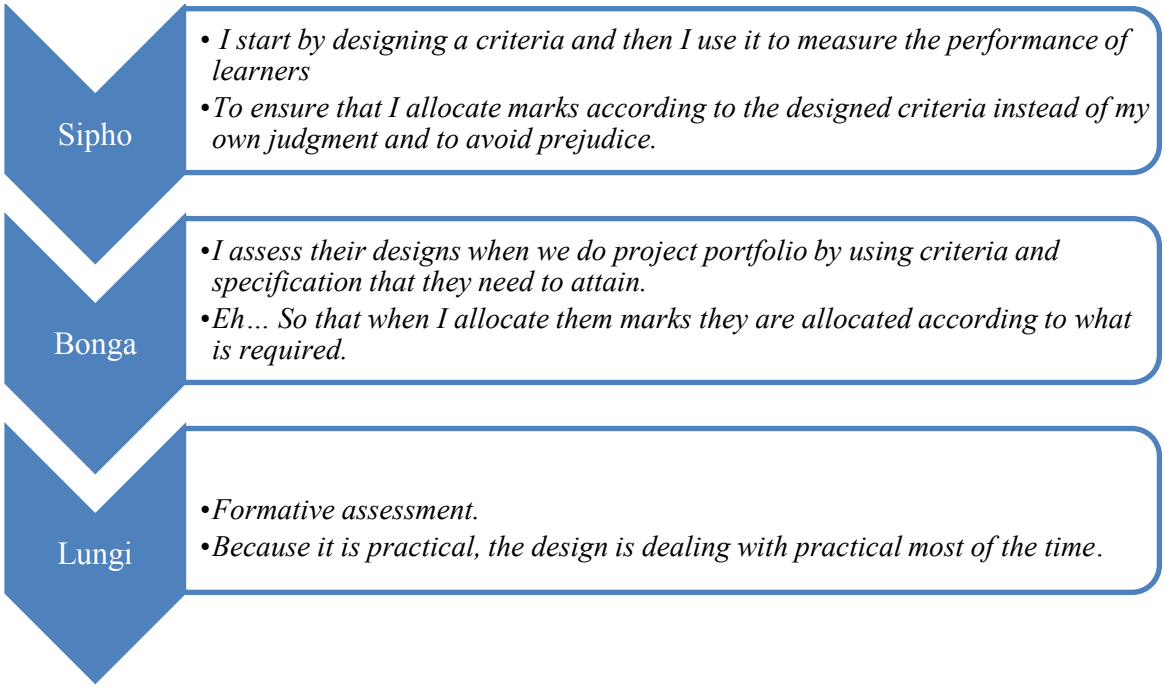

Figure 21: Assessment procedures for assessing design process

The interview response of Sipho and Bonga revealed that there should be a criteria used to assess learners' designs. Sipho knew that using designed criteria to assess learners' work reduces teachers' unfair judgment and prejudice. Furthermore, Sipho understood that criteria should be used to assess learners' designs. However, he did not specify the requirements of the criteria. After the end of the lesson, that I observed I asked Sipho what he was doing when he was moving around groups ticking the paper in his hand. He responded, by saying that he was using the checklist checking individual participation within the group. I asked Sipho why the checklist contained only learner's names and what exactly was he checking from those learners who were participating. He told me that he would add the marks

individually to the total marks learners received from the whole project which was the only way he encourages learners to participate. However, there was no rubric for marking the learners' completed projects.

Bonga's response shows that there must be criteria that teachers should use in order to assess learners' project portfolio so that marks could be allocated accordingly. I asked Bonga why he gave learners the rubric after he had explained it and why he did not hand it over to learners so that they could also read while he explained it to them. His response was that he wanted to get their undivided attention. When I asked Bonga about some learners not being active in their groups during the observed lesson he responded by saying that learners are not always passive, they do share their knowledge but perhaps they did not respond because of the researcher's presence.

Although formative assessment is an informal daily assessment involving structured and planned activities Lungi's interview response shows that there are procedures that need to be followed when assessing learners' designs in Technology. Lungi also knew that design is a practical aspect. I asked Lungi why she let learners write design briefs, specifications and constraints individually before sharing with the group members. Lungi responded by saying that she was asking for individual work in order to ensure that every learner knew how to write a design brief, specification and constraints. She added that some learners are still experiencing challenges with writing and differentiating these three concepts. During observed lesson Bonga and Lungi used project portfolio and rubrics for Mini-PAT except Sipho who used a checklist only when learners were designing their projects. However, both Sipho and Bonga gave responses where they assess design for formal purposes unlike Lungi who gave response where she assesses designs for informal purposes.

4.3.3.3 Teachers' experiences when assessing learners' designs

Researcher: What are your experiences when assessing learners' designs?

In figure 22 I present interview responses.

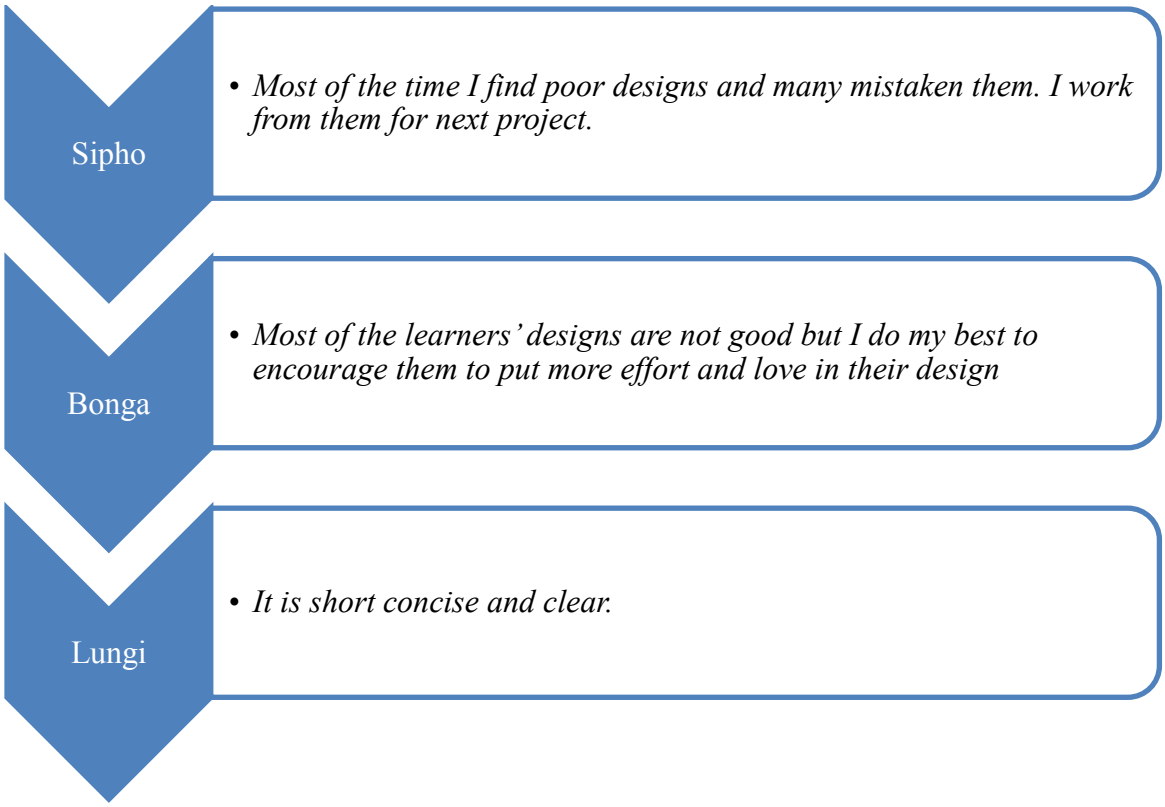

Figure 22: Assessment of learner's designs

Sipho and Bonga's responses during the interview indicated that learners' designs are poor, but they encourage learners to improve on them. Unlike Lungi who says the complete opposite of their responses. When the researcher compared what Lungi said with what the researcher observed, the researcher asked Lungi about what she meant about short, concise and clear. Lungi responded by saying that assessment criteria developed during cluster meeting makes it easy to assess learners' work. She added that learners were not experts in drawing. Therefore, she was fine with learners' attempts. However, she pointed out that learners still need a lot of practice to master the design process. Nevertheless, during the observed lesson Lungi did encourage learners to improve their designs when she was teaching them how to design.

4.3.3.4 Teachers' measurement of learners' performance

Researcher: How do you measure learners' performance?

In figure 23 I present questionnaire responses.

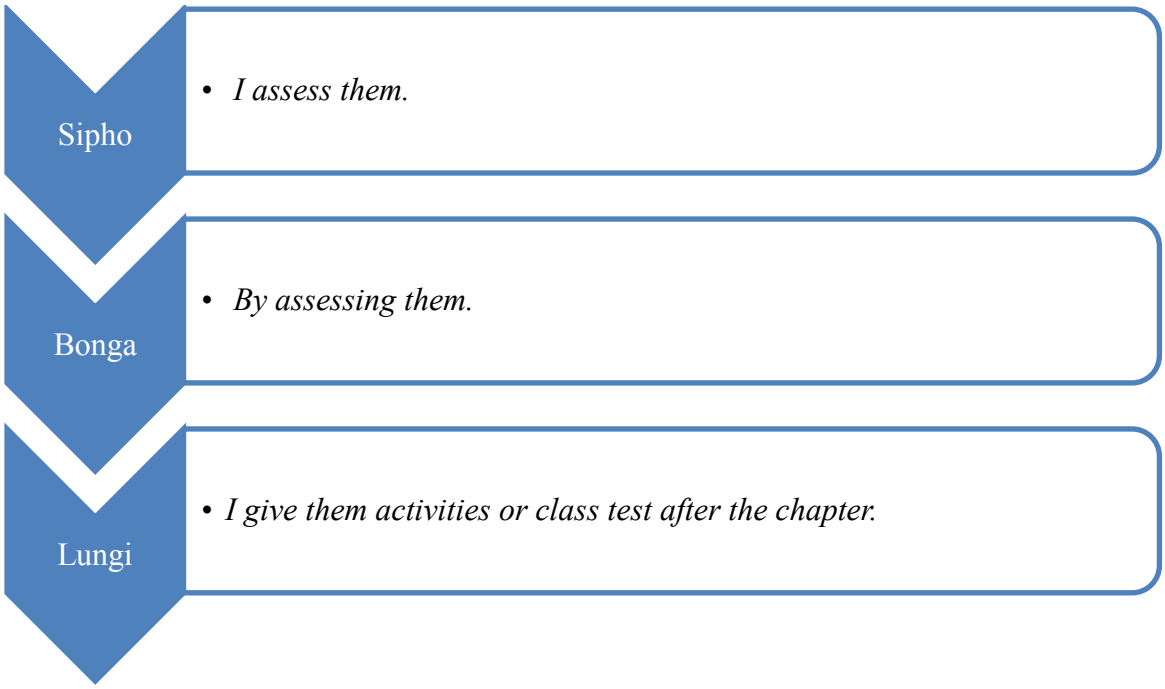

Figure 23: Measuring learners' performance

Sipho's questionnaire response indicates that he understood that learners' performance can be measured through assessment. Bonga's response indicates that he considers assessment to be the only way that a teacher can know how learners perform. Lungi gave examples of what she does to measure learners' performance. Such examples are activities and tests. Nonetheless, Lungi knows that learners' achievement can only be measured through assessment. She did not assess learners' designs only but also the way learners handle tools when working with them. During the observed lesson Lungi told learners to be careful not to hurt each other when working with tools and reminded them of the safety rules. During the making stage she moved around asking learners the functions of the tools that they were using as well as their names. Sipho and Bonga only reminded learners to bring all the necessary tools that could be used in the making of project and said nothing about safety to learners even when learners were making the project.

4.3.3.5 Teachers' subjective judgment

Researcher: How do you overcome teachers' subjective judgment when scoring your learners using performance assessment?

In figure 24 I present the questionnaire responses.

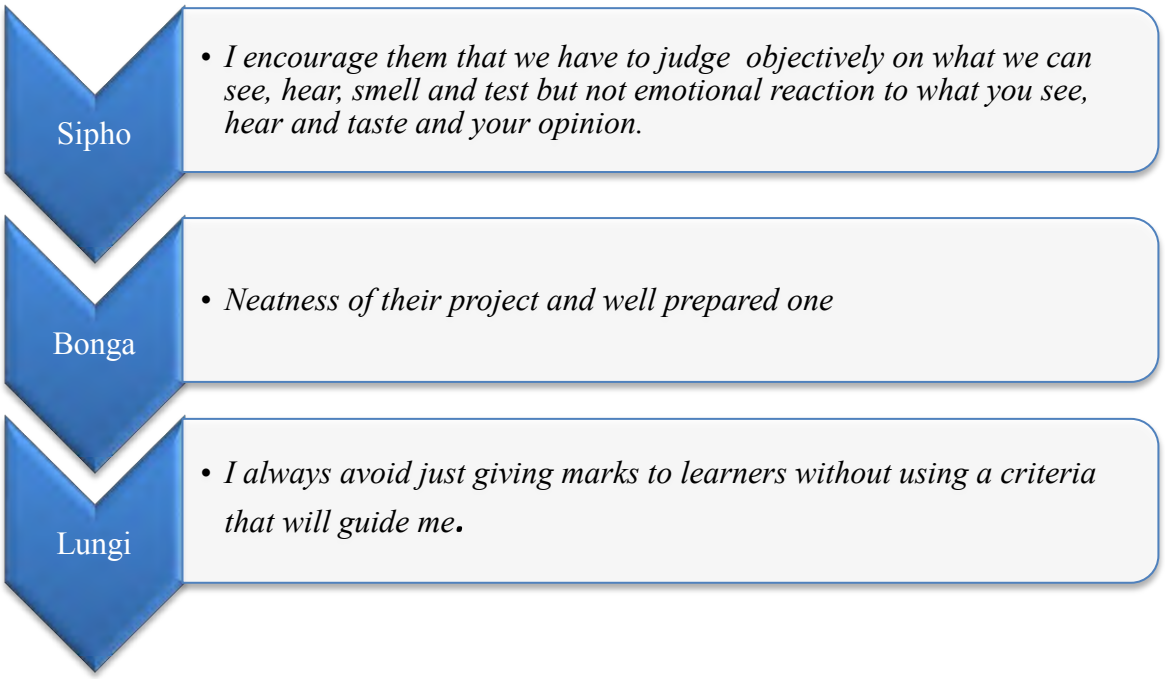

Figure 24: Overcoming teachers' subjectivity when allocating marks

Sipho described how assessment should be carried out in order to avoid subjectivity by saying that he encourages learners to judge objectively on what can be seen, heard or smelt. Bonga considered neatness and a well prepared project as the criteria that he would use to overcome subjectivity. In case of Lungi, she uses criteria to overcome subjectivity but she did not say which criteria she would use.

4.3.3.6 Capturing learners interest and attention during lesson

Researcher: How do you make learning interesting for your learners?

In figure 25 I present interview responses.

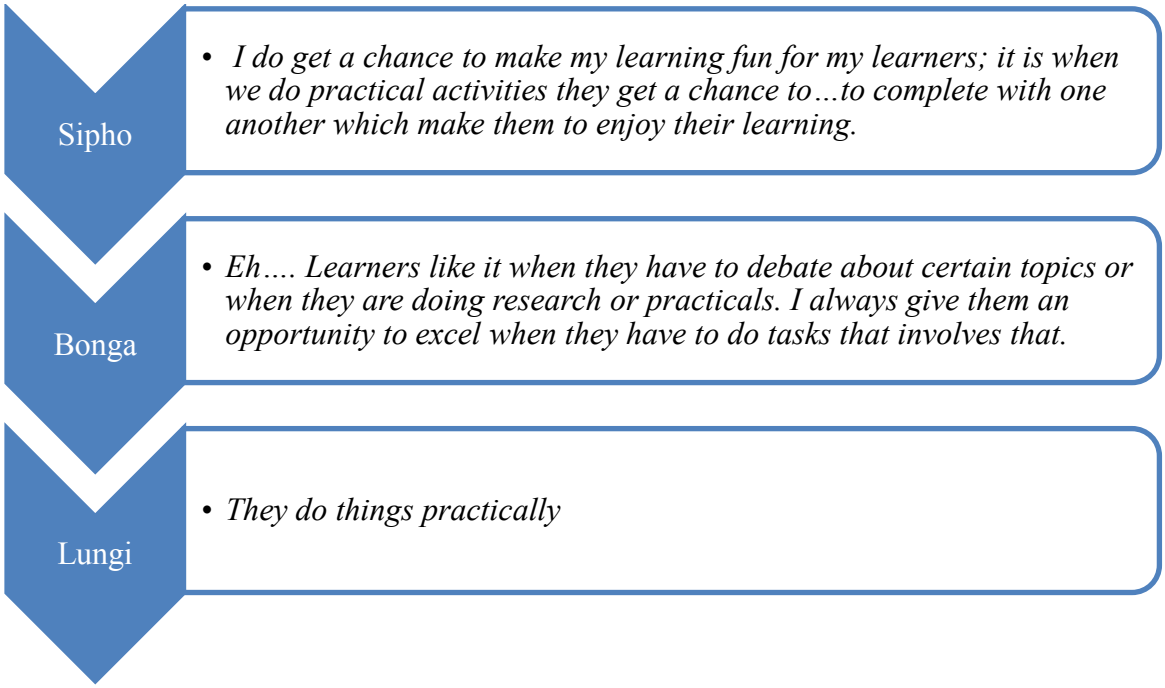

Figure 25: Making lessons interesting

Sipho makes lessons fun by giving learners a chance to compete through practical activities. Bonga engages learners though debates and practical activities. Lungi considers practical activities makes lesson interesting.

4.3.3.7 Teachers' views on projects done outside school premises

Researcher: What do you do if a learner submitted a mini task that was done by a parent?

In figure 26 I present interview responses.

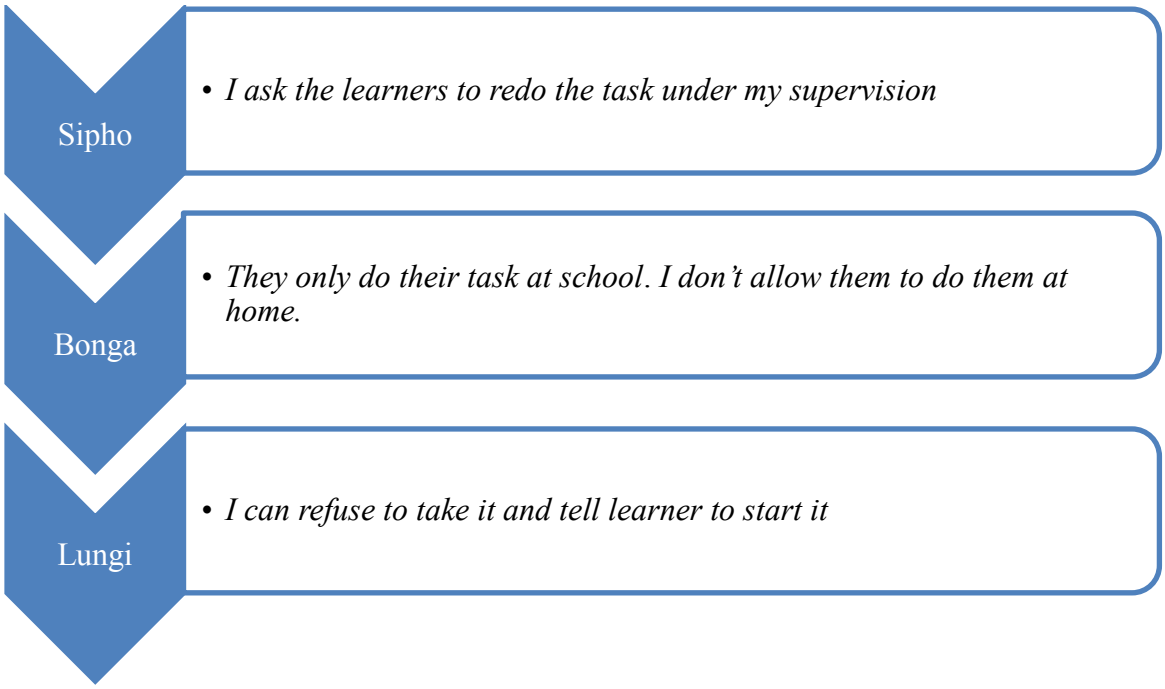

Figure 26: Projects done outside school premises

Sipho asked learners to redo the task if he suspects that the learner was not the one who made the project. Bonga ensure that learners do their projects at school. Lungi does not accept the project and tell learner to redo it. Responses from participants revealed that projects are done within school premises.

4.3.3.8 Teachers' understanding of the term diversity

Researcher: What does the term diversity means to you?

In figure 27 I present the interview response

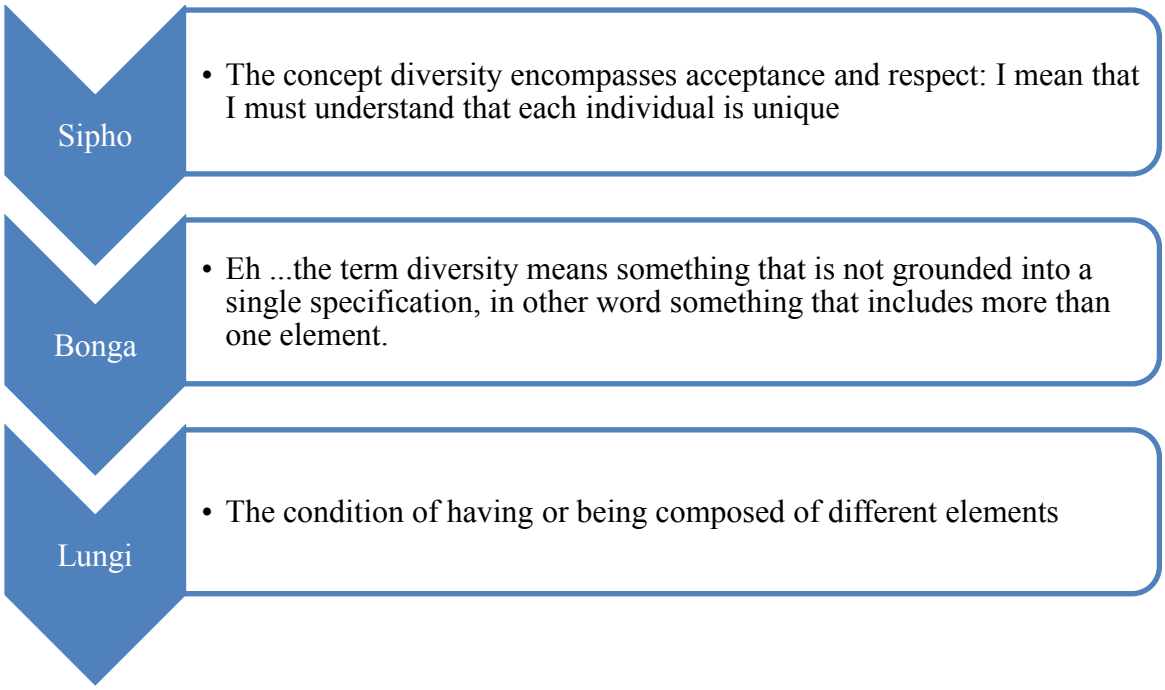

Figure 27: Understanding diversity

The participants gave the definition of the term diversity. Sipho's definition is concerned with acceptance and understanding of individual uniqueness. Bonga's definition is concerned about something with diverse aspects. Lungi considers various features. Lungi and Bonga have the same understanding of term diversity, whereas Sipho's understanding of the term diversity is concerned with treatment of individuality rather than acknowledging only their individuality. This individuality has to be taken into consideration when giving and assessing learners' tasks.

4.3.3.9 Teachers' assistance to learners struggling with Technology design

Researcher: Do you offer assistance to learners who are struggling with Technology design? Elaborate.

In figure 28 I present the interview responses

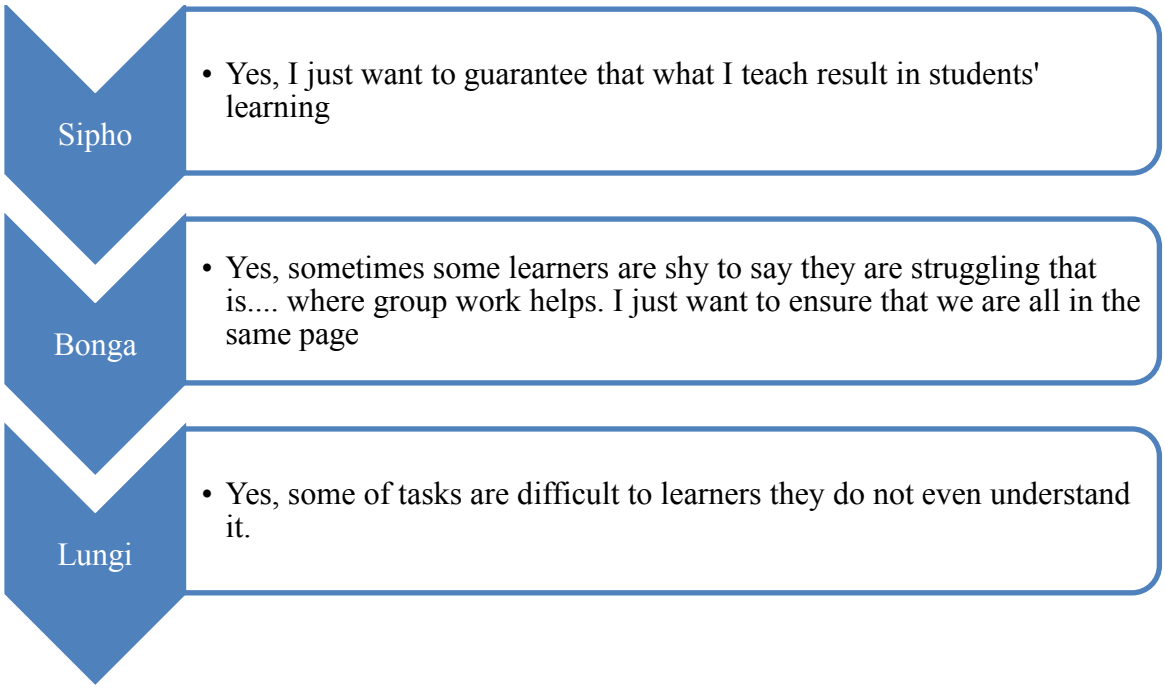

Figure 28: Assistance to learners struggling with Technology design

Sipho' response was that he gave learners assistance in order to promote teaching and learning. Bonga's reason for assisting learners was to ensure that all learners understand tasks given to them. Lungi's response shows that not all learners understood tasks given to them so they need extra attention. Bonga and Lungi's response shows that they are concerned about learners understanding the subject matter. Sipho is concerned about engaging learners in his lesson. The responses given during the interview by all three participants shows that they are aware that they have to cater for inclusivity among the learners because not all learners are capable of grasping information easily.

4.3.3.10 Teachers' assessment of learners' design

Researcher: How do you assess learners' designs?

In figure 29 I present an interview response

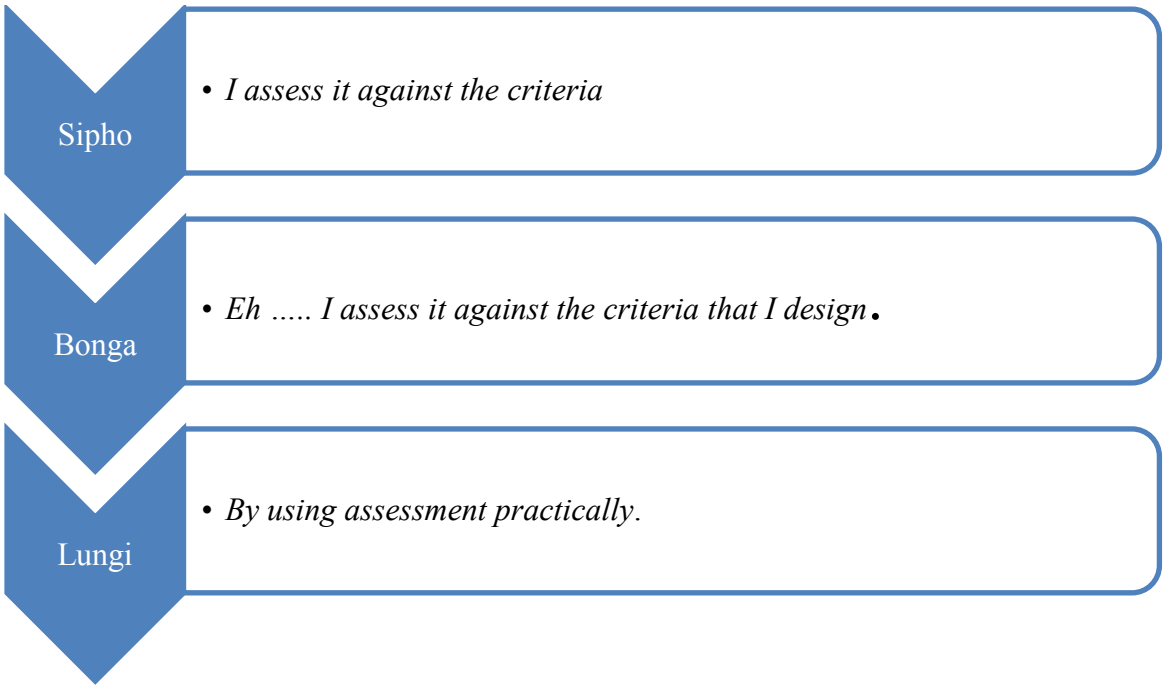

Figure 29: Assessment of learners' design

Sipho and Bonga response reveal that they assess learners' designs against the criteria. Lungi employed practical aspects of assessing designs. However, she does not mention those practical aspects. Unlike Lungi, there are similarities in the way Sipho and Bonga assess learners' design, they both develop a criteria that they would use.

4.3.3.11 Teachers' perception of Technology curriculum

Researcher: From your teaching experience, what is your perception of the Technology curriculum? Elaborate.

In figure 30 I present interview responses.

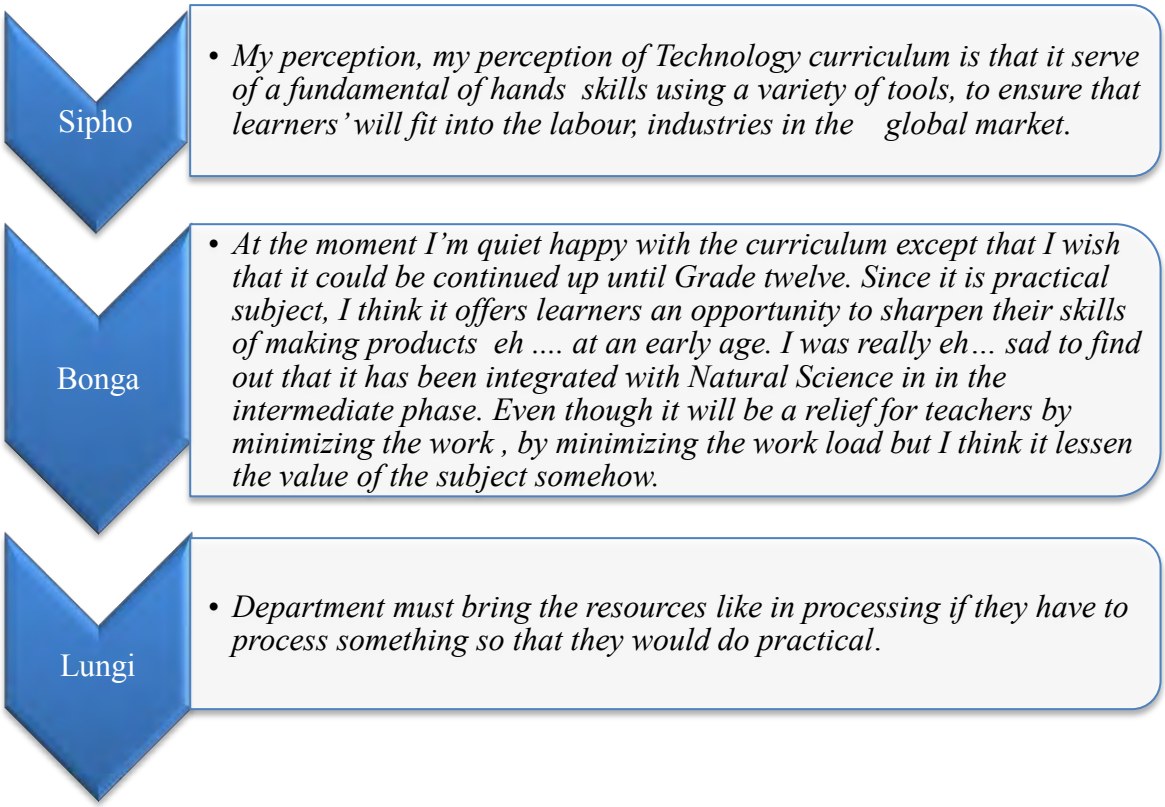

Figure 30: Teachers' perceptions of Technology

When asked about their perception of Technology, Bonga gave an explanation of what the Technology curriculum offers to learners. Bonga was concerned about integration of Technology with Natural Science in the intermediate phase. Bonga wanted Technology to be continued up to Grade 12. He also mentioned that Technology offers learners an opportunity to sharpen their skills of making products at an early age. Unlike Sipho and Lungi, who did not mention the skills that learners would gain through learning Technology Bonga acknowledged the skills that learners would develop. Lungi's concern was the issue of resources which hindered the effectiveness of teaching Technology in the classroom. Technology has its own methods which require resources for practical work. Both Sipho and Bonga are concerned about skills that Technology offers to learners whilst Lungi is concern more about resources.

4.3.3.12 Teachers' interest in the subject Technology

Researcher: What is it that you like about teaching Technology?

In figure 31 I present interview response

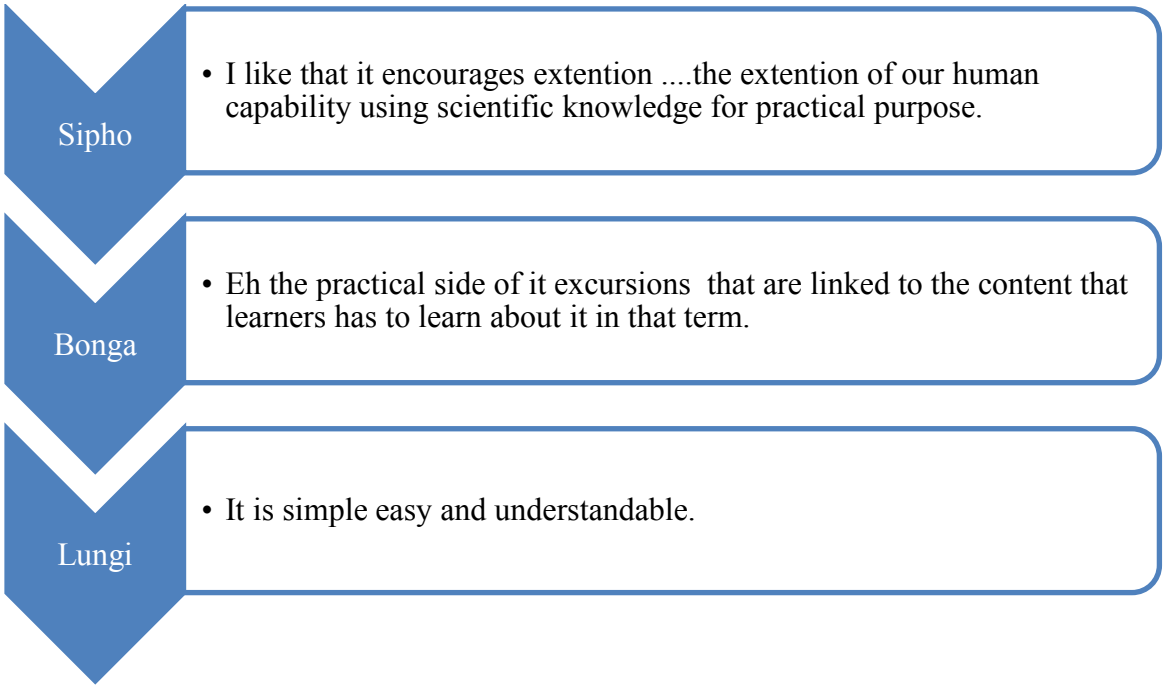

Figure 31: Interest in Technology

When I asked the participants about their interest in Technology, Sipho responded by stating the skills that Technology developed in humans as well as the integration with other subject such as science that Technology offers. Bonga considered the exposure that Technology offers to learners by linking the content with what is happening outside the school context. Lungi enjoys teaching Technology because it is an easy and understandable subject. Sipho and Bonga considered the skills that Technology has. These skills equip learners as human beings to face the world and make contributions through Technology. Lungi appreciated Technology.

4.4 Linking understanding and practice of participants

4.4.1 Performance assessment

The data from all three participants' case studies was then presented in the following table which can be read in any form, whether horizontally or vertically. The data were teachers' responses from instruments and assessment documents. The keys in the box below are used to identify the participants as their understanding and practice is compared in the table.

Key
S- Sipho
B-Bonga
L-Lungi

	Method	Outcomes	Evaluation
Type of assessment	Project portfolios (S/ B/ L) Research work / Investigation (S/ B /L) Project (S/B/L) Model making (S/B/L) Planning/ design(S/B/L) Oral presentation (L) Drawing (S/B/L)	Design process-employed in completing the task (S/B/L) Produces real world application (S/B/L) Creativity (L) Productivity(S/B/L) Team work (S/B/L) Tolerance among learners (S/ B/ L)	Criteria (B/ L) Checklist (S) Rubric (B/ L Record formal assessment task (S/ B/L)

Resources	Group discussion (S/B/L) Individual participation Within the group (S) Peer discussion (B/L) Who assesses? (teacher, peer, self) (B/L) Formal task kept in learners' portfolio (S)	Teacher analyses group input and participation (B/L) Teacher analyses research report(B/L) Teacher assist learners into grouping themselves (S/B/L) Teacher ensuring that learners have resources for the task (S/B/L)	
Integration	Emphasizes learners' ability to use knowledge and skills to produce work (S/B/L) Cooperation and social interaction(S/B/L)	Background of scientific and technology knowledge (S) Integration of subjects (S)	Presentation of technological process (S/B/L) Critical thinking (S/B/L) Data collection (S/B/L) Analysis skills Research skills (S/BL) Designing skills (S/BL) Management skills (S) Communicating skills (S/B/L) Presentation skills (S/B/L)

Table 3: Teachers' collective understanding and practice of assessment

Table 3 indicates the types of assessments that were used by the teachers when they assessed learners' work. The table also includes the assessments the participants commented on and assessments I observed during classroom observation. The table shows different skills participants used during Technology lessons and design process. The participants integrated scientific and technology knowledge. For example, they reminded learners about drawing to scale and using the correct International System of Unit and encourage learners to measure appropriately. Participants employed various methods of assessment such as projects,

drawings and models. I observed all three teachers used formative assessment to assess informal daily activities and provided feedback to learners. I noticed participants used formative assessment to inform planning for teaching. However, marks obtained from those activities need not have been recorded because teachers used those activities for informal tasks.

4.4.2 Designing and making process

When visiting participants in their school I followed a designed plan that I designed on how and when to observe teachers. The designed planned was designed after I met with the participants and they provided me with their classroom personal timetable. Below is the designed plan of observation that I used to observe participants teaching in their schools. Observation of teachers was discussed more in the observation section (see chapter three).

	WEEK 1	WEEK 2	WEEK 3
MONDAY	Sipho and Bonga	Lungi	Sipho
TUESDAY	Lungi	Sipho	
WEDNESDAY		Bonga	Bonga
THURSDAY			Lungi

Table 4: Participants' observation plan

All three participants presented a lesson where they were doing design activity that makes up a Mini-PAT. The participants' periods varied from school to school. Duration of Sipho' class period was 60 minutes. Both Bonga and Lungi's class period had duration of 55 minutes. I observed participants asking learners questions to evaluate learners' prior knowledge before they resume with the lesson for the day. They did their best to ask questions that arouse interest in their classroom. For instance, Lungi asked if learners can stay in a double storey house built with corrugated iron. Learners came up with different opinions and supported their arguments. However, I observed that during the lesson the most questions that participants asked were the "how" and "what" questions. Nevertheless, other learners were kept motivated though throughout the duration of the lesson. Sipho's intended outcome of the lesson was: How different materials influences designs used in buildings. Bonga's intended outcome of the lesson was: The effect of different materials used in the building of structures.

Lungi's intended outcome of the lesson was: Identify and give reasons for different materials used in buildings. The resources that participants brought in their classroom were different. Sipho brought pictures of different housed with different designs. The houses were built using different materials. Bonga brought textbook with different pictures of buildings. Lungi brought textbooks and hand-outs and handed them over to learners. The types of assessment that participants used were informal and formal. Tasks that were given to learners were done individually for informal tasks and in groups for formal tasks.

The participants linked the previous lesson by asking learners questions based on structural members (the parts of a structure). The participants focussed on structures when they asked learners questions about how to prevent structural failure in structures when choosing material. Lungi reminded learners that they cannot design the structure of the double storey-house if they do not know the kinds of material that they will use to build the house. Sipho asked learners three ways that causes structural failure. He also reinforced that learners should guard against fracture, bending and toppling over of structures. Bonga also added compressive and torsion forces that acts on structures that learners should consider when designing and making the double story house. Sipho asked learners about the purpose of graphics and what ideas are communicated in Technology for what reasons. Lungi asked the reason for putting labels in the drawings or designs. Bonga asked learners if it would be easy for engineers to communicate if they were not using symbols and drawings but instead used words only to communicate with other engineers. Bonga reminded learners to use correct conventions when designing the double storey- house. The participants asked if learners still remember the units that are used for dimensions which were millimetres. Learners seemed not to know that dimensions used should be in millimetres. Participants asked learners to differentiate between working drawing, final drawing and free hand sketches. Sipho asked which drawing is used to make the project between the three drawings. None of the participants asked learners about mind map which is used to organise ideas when learners are planning to design and make their product. The participants also reminded learners on how to write a design brief. Sipho wrote a short scenario on the board and learners gave different solutions for a design brief. Lungi only asked them the questions that learners need to answer in order to write a design brief which are, what is it that need to be designed, who will use it and where will it be used. Bonga asked learners to differentiate between specification, constraints and design brief. Other learners gave wrong answers; however, Bonga gave the correct answers at the end.

When participants were teaching about design, learners were already sitting in groups. Learners knew their roles and listen to each other and took turns to voice their opinions. There were learners who were borrowing rubbers and pencils from other groups. The teacher disciplined them because some learners were talking loudly. Most groups were mixed (constituted of boys and girls). However, in the groups the boys generally dominated. The designing of the house (double storey-house) fell within the planned Technology work schedule. Even though Sipho did not consider research as a form of performance assessment, when Sipho taught in the classroom during Mini-PAT he did encourage research. Sipho asked learners to investigate and compare ancient buildings to modern buildings in order for learners to obtain more ideas about different designs. Learners then used the information obtained from their investigations to design and make the double storey house. I noticed that girls appeared to lack motivation and were not actively involved in the designing of the double storey house. As a result, girls were not taking the initiative and let the boys do the designing.

But during teaching and assessment of the design process, I observed that Sipho had no evidence of investigation or marks allocated for investigation in the Mini-PAT. When I enquired about this, Sipho's response was that learners know that they should look for information before they commence with the project and no marks are allocated for that. I observed that Lungi and Bonga had already handed project portfolio's over to learners. Despite Lungi's questionnaire response that she uses a project portfolio for Mini-PAT, she and the other two participants did not make use of a project portfolio for that design activity. I asked Lungi and Bonga about that after the lesson and Lungi said that learners would transfer designs into the project portfolio in their groups. Bonga and Sipho said that learners were just practicing drawings. All three participants said there was not enough time for learners to finish their designs in one day, as the learners' designs were either not neat or up to standard. Participants allowed learners to draw rough sketches on the white A4 paper instead of using project portfolio for that design activity and yet participants complained that Technology had not been allocated enough time considering the practical nature of the tasks.

The design process assisted the researcher in observing how teachers practice assessment in their classroom and how they implement performance assessment. During teaching of design, the participants introduced the lesson. They checked whether all groups had all the necessary requirements needed for designing before learners commenced with their tasks. The

participants had told learners to bring their drawing instruments and material such as rulers, pens and pencil the previous day. Unfortunately, not all learners brought the necessary requirements. During the design lesson I observed that some learners experienced challenges with measurement during the design of the double-storey house. However, none of the three teachers did what they mentioned in figure 15 (Reinforcement of the content).I observed that the boys designed the project whilst girls were onlookers. Moreover, teachers were not encouraging girls to be the ones designing the project. The participants sometimes concentrated more on groups who seem to be performing well, especially the groups which comprised more boys than girls.

The day I visited the schools I observed learners making projects under the supervision of their teachers. I observed how the participants assess learners whilst learners make their projects. During the making of the project, girls took charge of the making of the double storey house and were hands on during the making process. The girls were actively involved with cutting and measuring the cardboard and they seemed to enjoy the making stage of the product. Girls who were not sure how to measure using the rulers asked for assistance from the teachers. This is a skill they should have been taught in the previous grades.

After observation I asked Lungi and Bonga how they promoted co-operation within the group as some learners were making a noise. Lungi responded by saying that she promoted co-operative learning by letting learners interact with each other in their groups. She also said that there was no way noise could be avoided because learners had to discuss. Bonga said learners are too excited during the making stage so to avoid learners making a lot of noise he told the groups that he will deduct marks from noisy groups who disturb others. One of the girls was disturbing other learners in Sipho's class. Even so, all three teachers disciplined the learners. The participants knew that they are supposed to promote creativity as they mentioned it in the questionnaire and during the interview; however, they did not mention it to the learners. They also promoted tolerance and teamwork among the learners.

The participants used certain criteria to assess learner's projects. The criteria were either a checklist or rubrics. All three teachers recorded marks for formal tasks when learners were presenting their project. Unlike the other two teachers when Sipho was assessing learners' projects he only compared learners' designs and projects to their project portfolio. The project portfolio consisted of different aspects of the design process that the learner had to complete when designing and making projects for Mini-PAT. These aspects are investigation,

designing, making, evaluation and communication. Participants shared with learners whether the assessment will be done in groups, in pairs or individually. They engaged learners in assessment and learners were equally involved in effective teaching and learning process. I asked participants if they acceptprojects that were obviously done by a parent. When it comes to work done "off campus" outside the direct control of the teacher, all three participants agreed that that was not acceptable. However, there were learners who completed their design and projects at home. I observed that one of Sipho's learners told him that he had forgotten his pair of scissors at home as he used them to trim the edges of their project.

I observed that even though Sipho's school was better in terms of physical resources compared to the other two schools; there was, however, a shortage of materials for teaching Technology even in the well-resourced schools. During the post observation interview I asked teachers about their concern about the availability of resources in Technology in their schools. The participants agreed that the availability of resources in Technology may contribute to effective implementation of Technology in Technology classrooms.

4.5 Conclusion

In conclusion, this chapter presented the findings. It provided the researcher's questions and teachers' responses. I presented the context of the participants' school and their biographies. I presented the cross-case analysis of the participants where I interpreted participants' responses. Qualitative methods were used to analyse data. In this chapter I also presented the section where I linked understanding and practice of assessment by participants. I separated the section into two parts which are performance assessment and designing and making process. The actual teaching and learning that I observed is provided as well as the observation plan that I used to. The comparison of similarities and differences among the participants is also discussed in this chapter. The following chapter provides the discussion of the findings, recommendations and conclusion. I provided data from all three participants linking participants' understanding and their practice of assessment.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

The previous chapter presented the findings of the study. The aim of this study was to explore teachers' understanding and practice of assessment in Technology. The case study method with its use of multiple data collection methods and analysis techniques provided the researcher with the opportunity of triangulating data in order to strengthen the research findings and conclusions. Semi-structured interviews, structured questionnaires and structured participant observation were used in this study for triangulation and as multiple data sources. The conceptual and theoretical framework and literature selected and reviewed provided the researcher with a framework and views of what other scholars say about assessment and more specifically assessment in Technology. In this chapter discussions, recommendations and conclusions of the study are discussed. This chapter also seeks to address the research questions posed in the study, namely

- What are Grade Nine Technology teachers' understanding of assessment in Technology classrooms?
- How do Grade Nine Technology teachers practice assessment in Technology classrooms?
- Why do Grade Nine Technology teachers practice assessment the way they do?

5.2 Discussions of findings

The participants in this study were three Grade Nine Technology teachers in the district of Estcourt in two different settings. Two of them were from a township area and the other teacher was teaching in a rural area. The following section focuses on answering the first research question that focuses on teachers' understanding and practice of assessment in Technology.

5.2.1 What are Grade Nine Technology teachers' understanding of assessment in Technology classrooms?

To respond to this research question, I had to find out each participants' understanding of assessment. Only one participant, Bonga, was unsure of the meaning of assessment. Sipho had a good understanding of the term assessment in Technology. Sipho's understanding of assessment seemed to be in line with the definition of assessment in Technology policy (DBE, 2011). CAPS (DBE, 2011, p. 38) defines "assessment as a "continuous planned process of identifying and interpreting information about the performance of learners using various forms of assessment". Although Lungi did not give the definition of assessment she knew the uses of assessment. Lungi knew that assessment is an integral part of teaching and learning and is used to enhance learners' achievement whilst improving teaching and learning (DBE, 2011). The participants partially understood the meaning of formative and summative assessments. According to Pepper (2012) formative assessment is assessment for learning. This form of assessment is used to promote an individual's learning during a period of instruction. Fautley and Savage (2008) claim that summative assessment is assessment of learning and is used to summarise an individual's learning at the end of instruction. It was only Lungi who did not distinguish between formal or informal assessment and when and where to use summative or formative assessment. Black and William (2003) stated that teachers employ formative assessment to collect information on learners' achievement. Moreover, participants use formative assessment to improve learners' performance during teaching and learning in practical subjects. CAPS, DBE (2011, p. 39) stipulate that this "can be done through observation, discussion, practical demonstration, learner-teacher conferences and informal classroom interactions". The participants employed discussions, observation and informal classroom interactions during the design process. When I compared what teachers said during the interview to the kind of assessment they administer in their classroom, there was evidence of the kinds of tasks that teachers mentioned in their assessment file.

Teachers can use performance assessment to assess learners' projects. Lungi and Bonga's formal assessment included performance assessment. Their work, except for Sipho's was prepared during cluster gatherings. Research is most important in performance assessment and could be done through investigation. Performance assessment involves projects as Bonga had mentioned. It also includes investigation and research work which contradicts with Sipho's response as he mentioned that there is no research. Portfolios,

presentations, research work, investigation, demonstration, exhibitions, practical exercises and models are also part of performance assessment (DoE, 2002). However, the analysis revealed that teachers are struggling with the understanding of assessment in Technology. Lungi and Sipho did not seem to know the forms of assessment involved in performance assessment. Lungi's understanding of performance assessment was that of performing for entertainment, not for Technology assessment. Nevertheless, there was evidence of practical tasks and assessment techniques in Lungi and Bonga's assessment file section. The following section answers the second research question that focuses on how the participants practised assessment in their classrooms.

5.2.2 How do Grade Nine Technology teachers practice assessment in Technology classrooms?

In answering this research question I looked at how teachers implement assessment practices in Technology. I looked at how the participants assessed learners during the design process, especially the designing and making of the project. Three participants initiated discussion and reflection by acknowledging and valuing learners' prior knowledge (DoE, 2002). They asked learners questions about their prior knowledge in order to see how much information or knowledge learners had about the new topic they introduced. All participants taught the topic of the designing of structures. However, one teacher finished teaching the topic for the second term in the following two weeks of the following term when the schools re-opened. Even so, learners did write the midyear exam even though not all the work for that term was covered.

Sipho said he did not find any difficulties when implementing assessment yet there was no evidence of criteria he could use when assessing learners' projects except for the checklist he used to allocate marks for participation. He did not use rubrics to mark learners' projects. He compared learners' designs in the project portfolio with the project allocated marks during the presentation of the project. He only gave learners a project portfolio and the due date for the project. The project portfolio was provided by the Department of Basic Education (DBE) as learning material and was presented to teachers by subject advisers at workshop. Bonga and Lungi gave learners an opportunity to design and make their projects using given criteria. They encourage learners to attend to criteria requirements before assessment commenced. Bonga and Lungi's criteria even had a section where learners were provided with an opportunity to self-review their own contribution as well as the group's contributions. Subsequently, learners tried to become more actively involved in their groups during the

design and making phase of the project. They tried to partake in order to be able to contribute during their presentations. This facilitated possible reflection on what was done during those activities (Rourke, 2012). The following section addresses what the researcher observed during the design process.

5.2.2.1 Designing process

The participants checked whether all groups had all the necessary requirements needed for designing before learners commence with their tasks. Teachers had told learners to bring drawing instrument such as pencils, rulers and pens the previous day but unfortunately not all learners brought the necessary equipment.

Black and William (2009) suggest that the primary purpose of assessment is to improve learners' performance. The participants facilitated while learners were designing in their groups and gave assistance when needed. Participants gave only input directions and information to learners while learners, especially boys, took ownership of their designs and learnt to overcome challenges that they encountered (Black & William, 2009; Asunda & Hill, 2007). All three participants emphasised the key elements in Technology. These key elements were the ability to think laterally and to develop original and appropriate solutions through innovative, creativity and problem solving (DBE, 2011).

Participants should have assisted girls in the design stage as they experienced challenges. Lungi and Bonga only allocated marks by ticking learners' work depending on whether the assessor was a teacher or a learner. These teachers applied informal assessment which was mainly formative assessment. Participants employed assessment practices prescribed in the Technology curriculum policy when assessing learners' activities. However, teachers did know that learners should be creative when making projects but none of them emphasised it to learners during the design phase. For learners to participate fully in Technology and provide solutions that will solve problems, not only design should be evaluated subjectively. Thus, for effective assessment to occur teachers should use Barlex's (2007) model as a framework to assess Mini-PAT. However, before teachers commenced with assessment they taught learners so that learners would be able to investigate using a variety of resources and to demonstrate their ability to draw in a specific style (DBE, 2011). Lungi and Bonga taught learners how to write a design brief where they provided specifications and constraints for the learners to select appropriate material for the model. This falls under the conceptual (overall purpose of design) according to Barlex's model. These two teachers also taught learners how

to plan the sequence for manufacturing the product (DBE, 2011). This deals with constructional elements (on how things fit together) (Barlex, 2007). Lastly, all participants taught learners to analyse a system using system diagrams and to communicate their solutions by employing a range of techniques (DBE, 2011, p.45). This deals with the technical part of Barlex's model. This was observed by the researcher from Lungi and Bonga's rubrics. Sipho's learners had a system diagram explaining how the elevator works. The next section addressed how the teachers assess during the making stage.

5.2.2.2 Making process

Learning is the responsibility of both a teacher and a learner (Black & William, 2009; Rourke, 2012). However, Black and William (2009) state that it is the responsibility of teachers to design an effective learning environment where learning will occur. During the making process the participants ensured that the environment was conducive to learning so that learners could voice their concerns.

I observed that the only time teachers gave learners the opportunity to work with tools that they use for making the project was on the making stage of a double storey-house. Lungi did consider safety for both her and the learners during the making stage (Pudi, 2005). Sipho used a checklist to assess each member's participation within the groups. Bonga assessed learners' participation by writing notes on how learners work while they were doing their capability task. Lungi only encouraged all members to participate. I noticed that there were no activities done to show learners how to strengthen their project because learners were not using correct joining methods. Some learners in Lungi's and Sipho's class drill holes with nails and fasten with ropes and then covered that with a piece of paper. When I enquired about that, they said that they assumed learners were taught that in the previous grades and that learners had to compromise because they do not have enough resources. The activity-based nature of the technological tasks provided sufficient opportunities for co-operative learning (Van Niekerk et al., 2010). The Mini-PAT task gave learners a chance to work as a team. Participants' engaged learners in a group that is part of the performance tasks. When learners work in groups they share a variety of skills, knowledge and competencies (Reddy et al., 2005).Technology assessment tasks should include skills, values and knowledge, and different forms of assessments. During the interview Sipho's response showed that he understood the kinds of tasks involved in Technology. Bonga mentioned homework. Homework is not classified as a Technology task. Apart from knowledge and values some Technology tasks have to reflect all the various skills such as investigating, designing,

drawing, making, communicating, evaluation and presentation skills (DoE, 2002). Lungi mentioned only research. However, research is neither the only skill nor the only task that should be administered in Technology. Nevertheless, the participants encouraged learners to employ most of the skills during the design process. It was only during the making stage that the participants mostly emphasised learners' ability to use knowledge and skills to produce work by employing different skills.

During the making stage Lungi reminded learners that creativity and neatness are very important aspects in Technology. Bonga and Sipho emphasised neatness more than creativity. The policy provides criteria for teaching and assessing learners' design features which also feature in Barlex's (2007) model. These criteria are "originality and aesthetic, value for money or cost effectiveness, fit for purpose and suitability of material, ease of manufacture, safety and ergonomics, environmental impact and bias towards or against a group" (DBE, 2011, p.12). For instance, Sipho and Bonga knew that learners' projects should show originality, aesthetic, ease of manufacture and guard against bias when assessing their projects. During the presentation of the project Bonga and Lungi intervened when learners were allocating marks unfairly. They only intervene when necessary to avoid bias from other groups. Assessment instruments can be a rubric where designs ideas are assessed (Van Niekerket al., 2010). However, Sipho had no rubrics for assessing learners' projects. Lungi and Bonga used the rubrics for scoring marks that were designed in the cluster gathering to assess learners' completed project portfolios and projects. For Lungi and Bonga even though they still lack assessment knowledge and assessment skills, did reflect the nature of the standards by assessing performance in an integrated way (Black & William, 2010).

None of the participants were specialists in Technology. The participants lack a firm background in Technology, which consequently resulted in their lack of confidence in teaching the subject. However, they delivered the subject matter according to what they prepared for the lesson for that day to the best of their ability. The Technology policy stipulates that the important part of documenting learners' level of performance in a specific task is by recording (DBE, 2011). Teachers record learners' marks to show learners' progress towards achieving knowledge as this is prescribed in the Curriculum and Assessment Policy Statement. This was confirmed when I checked teachers' assessment documents. However, when teachers were asked about the assessment procedures they use when assessing learners design, none of the teachers mentioned recording.

Sipho understood the main focus areas in the Technology curriculum that should be done in class as stipulated by the policy. His response revealed that he is confident about the content that needs to be done in the class; however, he does not indicate how that content should be assessed. He did not mention how he was going to implement assessment. For instance, the focal point of components of assessment, which are strategy (who will manage or plan assessment), methods (the procedure that will be followed to do assessment), tools or rubric (actual instrument used in the method of assessment and to record assessment) and technique (the special way or approach that will be applied to use strategy, method, tool or rubric). Implementing assessment in the Technology classroom was still a challenge for him. Bonga's response did not give a clear indication of how he implements assessment in Technology. Even though he says he is experiencing no difficulties, his interview response indicated otherwise. Even when he was asked about the nature of assistance he received, he did not give a clear description of assistance obtained. Tweed (2013) finds that 78% of beginning teachers claimed to have a mentor teacher but not always in the teacher's content area as Bonga could not state the nature of assistance he received. Jones and Moreland (2005, p.196) found that "teachers experience difficulties when it comes to implementing assessment in Technology". Lungi's interview response supported this statement; however, she received support from the subject advisor. The next section will address the third question on why these Grade Nine teachers practise assessment in their classrooms the way they do.

5.2.3 Why do Grade Nine Technology teachers practice assessment the way they do?

Henry (as cited in Tweed, 2013) discovered that there was a positive relationship between the number of years of experience of teachers in teaching Technology and the level of Technology implementation. Unfortunately, the researcher could not test this relationship with the participants the researcher chose. Sipho was teaching Technology for the first time in that year and the researcher had no idea that Sipho would be replacing the teacher who had been teaching Technology in Grade Nine in the previous years. Sipho had no professional training in Technology and Lungi and Bonga at least attended the Technology workshop. Lungi had one year's experience. Even though Bonga had been teaching for five years he was inexperienced in Technology. All the participants lacked experience of teaching Technology. Participants' teaching experience is discussed more under the biography of teachers (See chapter 4).

Evidence from the literature revealed that qualified teachers may make a difference to learners regarding what they learn in the classroom, school or at district level (Scott & Teale, 2010). When the researcher approached the schools to ask for permission to conduct the study, the three Grade Nine Technology teachers were identified for the number and attributes of participants that the researcher required. The researcher knew the participants from the cluster gatherings and as a cluster co-ordinator, the researcher noticed that most teachers who are teaching Technology in the cluster, are either inexperienced or have no Technology qualification. This was true with the participants in this study. This contributed to Technology assessment not being appropriately implemented in their Technology classrooms. Although, Bonga and Lungi may have received assistance from the HOD and subject advisor, respectively, implementing assessment was still a challenge. Subsequently, the development of teachers' knowledge of assessment, in all subjects including Technology, through workshops or by upgrading teachers' qualification is a necessity if our government, private sector, communities and learners really care about the standard of education in our country (Tweed, 2013; Scott & Teale, 2010).

5.3 Recommendations

The purpose of this study was to explore Grade Nine Technology teachers' understanding and practice of assessment in Technology in the district of Estcourt. However, many issues related to understanding and implementation of assessment by teachers still require addressing. As Earl (2003) points out teachers' skills and knowledge and understanding of assessment practices are the primary focus and need to be developed since assessment is the only tool that teachers use to see if the learners understood the subject content that they were taught. Future research in Technology should focus on how teachers' assessment skills and knowledge and their understanding of assessment – particularly, performance based assessment is implemented in Technology classrooms as teachers are expected to equip learners with innovative and creative skills. Further research could also include the impact of knowledge and use of English language by Technology teachers based on the responses of some of the participants to questions. Scott and Teale (2010) suggest that factors such as class size and teacher qualifications may play an important role in what learners learn and consequently on what the teachers assess. However, in this study participants used performance assessment to assess learners' projects. Participants gave learners projects that

were done by groups of learners. Therefore, the class size is not an issue to be considered if teachers have to improve assessment strategies which will in turn improve learners' performance in Technology. Nevertheless, teachers should be encouraged to assess learners individually within those groups during the design and making process. The project portfolio has a series of tasks and teachers can prescribe a completion date for each task to which learners need to adhere. Those tasks should be broken down so that teachers could provide necessary support and guidance. Furthermore, teachers attend workshops where different clusters meet together for development in the presence of subject advisors. Consequently, workshops as professional development can play a crucial role in enhancing teachers' practices (Jones & Moreland, 2005). Teachers also learn from each other when they do activities during workshops.

In addition, the variety of forms and types of assessment that teachers should implement in their technology classrooms makes it crucial for teachers to stay abreast of changes in assessment method. Considering teachers' biographies in this study, it was noted that participants received no professional development at all. Pudi (2005) maintains that good Technology teachers must be well informed and be up to date with current issues. Teachers can achieve this by reading extensively to extend their pedagogical content knowledge in Technology, regularly engage in professional development, exhibit positive professional traits and enthusiasm for Technology (Scott & Teale, 2010). Mizell (2010) concludes that when teachers engage in quality professional development, they gain knowledge about how to implement assessment that will assist learners learn. Quality professional development will benefit the learners and allow the teacher to extend learners' knowledge (Mizell, 2010). I agree with Mizell (2010) when he said that teachers who do not seek additional professional development do not improve their skills. Teachers need to be kept updated and assisted on a regular basis on how to implementing the various forms of assessment in their classrooms. They need to implement performance assessment effectively, especially now that Mini-PAT accounts for more marks in Technology assessment than a test. Research should be done on the pre and post effects of the performance assessment implementation. Hopefully, Technology implementation of performance assessment in the classroom will increase as a result of the coaching efforts that will come from quality professional development. Teachers' knowledge not only of the content of the subject they teach but also on the way they assess needs to be constantly investigated. Teachers will be in a better position to offer

assistance to learners when teaching Mini-PAT if they have knowledge and understanding of what and how to assess.

Moreland and Jones (as cited in Van Niekerk et al. 2010) state that due to the lack of knowledge teachers consider assessment in Technology to be difficult. Compton and Harwood (2003) confirmed that shortage of knowledge in Technology education was due to teachers' deficient knowledge. Teachers experience problems in developing programmes in Technology that support learners' learning and provide various assessments that will give learners the opportunity to excel (Compton & Harwood, 2003). However, Pudi (2005) claims that even though teachers are fairly knowledgeable, they should be ready to admit their knowledge deficiency that includes lack of knowledge in assessment practices. If experiments or designs in the Technology workshop fail, Technology teachers should use such an opportunity to improve on their effort and use alternative assessment methods and be open to solutions in order to improve learners' achievements (Pudi, 2005). Nevertheless, in practice, teacher assessment is conceived in summative terms where the focus is in relation to the achievement of a target, reliability and objectivity. Research shows that some teachers are more effective than others; however, less is said about examining the characters or practices of more or less effective teachers (Kaba, 2005). Those teachers who are more effective in Technology ought to be encouraged to assist those who are less effective. Looney (2011) indicates that training of teachers can improve inter-alia reliability in performance assessments.

Black, Harrison, Hodgen, Marshall and Serret (2007) suggest that the right type of support is needed by teachers in order to improve their assessment strategies. This includes time spent doing projects in Technology as learners have to do projects under teacher supervision. This is done so that teacher knowledge and understanding of Technology subject matter as well as assistance to teachers in conducting performance assessment could be developed. According to William (2007), 'blind marking' during moderation meetings where teachers' can compare, discuss and resolve judgments based on assessed learners' sample work may be useful in attaining parity among schools. This could develop Technology teachers' assessment practices and thus Technology teachers should be encouraged to attend cluster meetings. Consequently, through networks and guidance of teachers' assessment judgment can be enhanced while a positive environment is being created for positive feedback (Black, Burkhardt, Daro, Jones, Lappan, Pead, & Stephenson, 2011).

5.4 Implications

Answers to the three research questions provide evidence that teachers are still experiencing difficulties in administering assessment in Technology. More support is needed to address this issue especially since Technology is being taught by teachers who have less experience in teaching Technology in schools. As the biography of participants revealed that

they had no professional development. Mueller (2012) argues that new assessment methods are the reason that proper implementation of Technology in classrooms is inhibited. This is supported by De Vries (2006) who maintains that matters are complicated by the fact that Technology at school level is globally a developing learning area. No equivalent academic discipline exists for Technology, which can serve as a foundation for curriculum development (De Vries, 2006, p. 283) of Technology teachers. This has resulted in limited development of knowledge relating to assessment in Technology. The assessment and qualification for GET Band policy describes an assessment task as "an activity that is designed to assess a range of skills and competencies" (DoE, 2009, p. 9). If participants are not capacitated with regards to the kinds of tasks involved in Technology, their lack of understanding and practice of assessment could inhibit their judgement in choosing the appropriate form of assessment for that particular task. Assessment tasks should reflect various forms of assessment and assess various skills (DoE, 2002).

When teachers administer Mini-PAT they are required to give learners a project portfolio. A project portfolio helps learners to organise their work. As Pepper (2011) emphasises, one important form of performance assessment used in many countries is portfolio assessment. During the Mini-PAT participants can use the project portfolio to assess learners' completed projects. However, there should be criteria that will be used that will illustrate the standard or requirements of how criteria will be applied to assess learners' projects. Black (2010) argues that the method of assessment using project portfolios can either be summative or formative. Participants can use these portfolios for both formative and summative assessment. To meet quality and parity requirements, teachers should allow learners to use project portfolios in groups (Black, 2010). Moreover, teachers should allow learners to use self- assessment and peer-assessment and not only teacher- assessment. In this study, Bonga and Lungi made use of project portfolios although Sipho did not do so. Assessment instruments can be rubrics where design ideas are assessed (Van Niekerk et al., 2005). Two participants used the assessment criteria that were developed in the cluster to mark project portfolios and the

product. One participant did not use assessment criteria developed during a cluster meeting because he did not attend the cluster meeting. Teachers should ensure that no learners are dominating the group and that every learner contributes. As boys were dominating during the design stage teachers should find ways of encouraging girls to contribute more actively during the design stage. Observations confirmed that experiential learning through hands-on activity occurred mainly by engaging learners in capability tasks. Teachers should give learners the opportunity to work with tools and material not only during the making stage of the Mini-PAT as this was the case with participants. There are enabling activities that precede Mini-PAT where learners are given an opportunity to work with tools. Moreover, group interaction is related to improved performance when co-operative instructional approaches to learning are used (Reddy et al., 2005). Teachers promoted co-operative learning when learners were interacting with each other in their groups where they shared ideas by giving informal oral feedback. During the Technology lesson observations it was noted that some learners were too passive. However, all the participants gave written feedback immediately after the groups had presented. Not all groups in the classroom presented on the observation day and neither of the groups reflected on feedback provided on how they could improve on their project.

Participants might claim that they have a mentor or received assistance with implementation of assessment practices however, they still need continuous support. Therefore, more support is needed in the form of moderation where areas of development should be identified so that necessary development and support could be provided (DBE, 2011). Although teachers attend cluster meetings where they develop questions to assess learners, this is not yet yielding good results. Some of these teachers do not attend the cluster gatherings due to various reasons. These reasons include that they are busy with other activities at school and they expect to be given work done by those teachers who attended cluster meetings. This eventually contributes to those teachers not gaining or benefiting from cluster gatherings because of their non-active participation. I conclude that teacher assistance on how teachers assess in the Technology classroom is still a challenge and I suggest that teacher professional development be encouraged for teachers to attend and present at performance assessment workshops. The intervention of Technology subject advisers during cluster meetings should be encouraged to monitor the progress and participation of the teachers. The findings revealed that all three participants still experienced difficulties when implementing technology assessment in their classrooms. Subsequently, teachers' understanding and

implementation of Technology in the classroom requires further development in terms of both Technology content knowledge and Technology pedagogical content knowledge.

Finally, this chapter provides answers to the research question and compared teachers' experiences to the literature review discussed. The purpose of this study was to explore Nine Technology teachers' understanding and practice of assessment in Technology. Findings of the study were based on the three Grade Nine Technology teachers' understanding and practice of assessment and how they practice assessment in their classroom. These findings were categorised into three sections in order to answer three research questions. The first research question was concerned about the teachers' understanding of assessment. The findings revealed that teachers' understanding and practice of assessment is still a challenge. The second research question dealt with implementation of assessment practices. The findings reveals that participants are still experiencing challenges when implementing assessment practices even though two of the participants did not indicate the need for further assistance when implementing assessment in Technology classrooms, however, assistance should be provided. To answer the third question, considering biography of the participants, the findings revealed that lack of experience and professional training in Technology as well as shortage of physical resources could be the contributing factor for the way they implement assessment in their classroom. The study showed that more research in the field of Technology, focusing on performance assessment, will contribute to the subject and in turn improve teachers' understanding and practice of assessment in their classrooms.

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APPENDICES

APPENDIX 1: LETTER TO THE DISTRICT MANAGER AND CIRCUIT MANAGER

P.O.Box 66009
Estcourt
3310

Uthukela District
Private Bag X
Estcourt
3310

TO: DISTRICT MANAGER
ATTENTION: CIRCUIT MANAGER

RE: PERMISSION TO CONDUCT RESEARCH

I would like to request to be permitted to do a research in your circuit. The research will be done with three Grade 9 Technology teachers from three schools in Wembezi ward. The three teacher participants teach at the following schools Drakensberg Comprehensive, Wembezi Secondary School and Khandimfundo Secondary School. I am doing a Masters Degree in Technology Education at University of KwaZulu - Natal. The research will be conducted during the first term from February 2012 to March 2012 over a period of three weeks. The proposed title of my dissertation is 'Grade 9 Technology Teachers' Understanding and Practice of Assessment in Technology Education: A Case Study in a District of Estcourt'. The schools involved in this project will benefit from the guidance and support that the teachers will receive in Technology assessment since I have been studying Technology Education and I am also a Technology teacher. Participants will benefit by obtaining increased understanding of the usage, interpreting and implementation of assessment in Grade 9 Technology Education. Participants may withdraw from the study at any time if they wish to.

2/4/2012

P.S. Mngunikazi
(RESEARCHER)

DATE

I the undersigned, hereby grant consent to Miss P.S. Mngunikazi to conduct her research at the above schools.

CIRCUIT MANAGER

KWAZULU-NATAL EDUCATION & CULTURE
ESTCOURT CIRCUIT
28/11/2014
PRIVATE BAG X7082, ESTCOURT 3310
UKHAHLAMBA REGION

2/4/2012

DATE

APPENDIX 2: LETTER TO THE PRINCIPAL

P.O. Box 66009
Estcourt
3310

TO: THE SCHOOL PRINCIPAL AND SGB
RE: PERMISSION TO CONDUCT RESEARCH

I am completing a Masters degree in Technology Education at University of KwaZulu - Natal. As part of a Masters degree I am expected to conduct and report on an empirical research project. The proposed title of my dissertation is 'Grade 9 Technology Teachers' Understanding and Practice of Assessment in Technology Education: A Case Study in a District of Estcourt'. I would like to request to be permitted to do research in your school. The research will be conducted during the first term in your school from February 2012 to March 2012 over a period of three weeks. The schools involved in this project will benefit from the guidance and support that the teachers will receive in Technology assessment since i have been studying Technology Education and I am also a Technology teacher.

Participants will benefit by improving their understanding of the usage and implementation of the Assessment Policy in Grade 9 in Technology Education. Participants may withdraw from the study at any time if they wish to.

22/11/2014

P.S. Mngunikazi
(RESEARCHER)

DATE

I the undersigned, hereby grant consent to Miss P.S. Mngunikazi to conduct her research in this school.

PRINCIPAL

27/11/2014
DATE

CIRCUIT MANAGER

27/11/14
DATE

P.O. BOX
ESTCOURT 3310
DATE: 27/11/14

APPENDIX 2: LETTER TO THE PRINCIPAL

P.O. Box 66009
Estcourt
3310

TO: THE SCHOOL PRINCIPAL AND SGB
RE: PERMISSION TO CONDUCT RESEARCH

I am completing a Masters degree in Technology Education at University of KwaZulu - Natal. As part of a Masters degree I am expected to conduct and report on an empirical research project. The proposed title of my dissertation is 'Grade 9 Technology Teachers' Understanding and Practice of Assessment in Technology Education: A Case Study in a District of Estcourt'. I would like to request to be permitted to do research in your school. The research will be conducted during the first term in your school from February 2012 to March 2012 over a period of three weeks. The schools involved in this project will benefit from the guidance and support that the teachers will receive in Technology assessment since I have been studying Technology Education and I am also a Technology teacher.

Participants will benefit by improving their understanding of the usage and implementation of the Assessment Policy in Grade 9 in Technology Education. Participants may withdraw from the study at any time if they wish to.

02/04/2012

P.S. Mngunikazi **DATE**
(RESEARCHER)

I the undersigned, hereby grant consent to Miss P.S. Mngunikazi to conduct her research in this school.

2/4/12

CIRCUIT MANAGER **DATE**

DISTRICT MANAGER **DATE**

28/11/2014

[redacted]

UKHAHLAMBA REGION

APPENDIX 2: LETTER TO THE PRINCIPAL

P.O. Box 66009
Estcourt
3310

TO: THE SCHOOL PRINCIPAL AND SGB
RE: PERMISSION TO CONDUCT RESEARCH

I am completing a Masters degree in Technology Education at University of KwaZulu - Natal. As part of a Masters degree I am expected to conduct and report on an empirical research project. The proposed title of my dissertation is 'Grade 9 Technology Teachers' Understanding and Practice of Assessment in Technology Education: A Case Study in a District of Estcourt'. I would like to request to be permitted to do research in your school. The research will be conducted during the first term in your school from February 2012 to March 2012 over a period of three weeks. The schools involved in this project will benefit from the guidance and support that the teachers will receive in Technology assessment since I have been studying Technology Education and I am also a Technology teacher.

Participants will benefit by improving their understanding of the usage and implementation of the Assessment Policy in Grade 9 in Technology Education. Participants may withdraw from the study at any time if they wish to.

02/04/12

P.S. Mngunikazi
(RESEARCHER)

DATE

I the undersigned, hereby grant consent to Miss P.S. Mngunikazi to conduct her research in this school.

PRINCIPAL

HIGH SCHOOL
2012 -04- 02
P.O. BOX 1823, ESTCOURT 3310
PHONE: 036 3

04-04-12
DATE

CIRCUIT MANAGER

2/04/12
DATE

APPENDIX 3: LETTER TO PARTICIPANTS

P.O. Box 66009
Estcourt
3310

TO: THE PARTICIPANT
RE: CONSENT FOR RESEARCH

I would like to request you to participate as one of members for my research project. I am doing a Masters Degree in Technology Education at University of KwaZulu - Natal. The research will be conducted in your classroom as you are Grade 9 Technology teacher. The research will be conducted during the first term from February 2012 to March 2012 over a period of three weeks. Teachers involved in this study will benefit by gaining guidance and support in Technology assessment. Participants will benefit by understanding, interpreting and implementing effectively classroom assessment in Grade 9 in Technology Education.

Participants may withdraw from the study at any time. The results obtained from the study will be used for my masters' dissertation. Codes will be used to identify the responses you will provide. The provided information will be treated with confidentiality. The data collected will be shredded and destroyed after five years after publication of research. Taped material will be incinerated.

P.S. Mngunikazi
(RESEARCHER)

02/04/12
DATE

I the undersigned, hereby grant consent to Miss P.S. Mngunikazi to use my assessment documents, observe me in the class and conduct an interview with me for her Masters degree research in this school.

PARTICIPANT

02/04/12
DATE

CIRCUIT MANAGER

28/11/2014

2/4/12
DATE

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Estcourt
3310

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(RESEARCHER)

DATE

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PARTICIPANT

2014/04/02
DATE

CIRCUIT MANAGER

[redacted] HIGH SCHOOL
2012 -04- 02
P.O. BOX 1823, ESTCOURT 3310
PHONE: 036 3530353

2/04/12.
DATE

APPENDIX 3: LETTER TO PARTICIPANTS

P.O. Box 66009
Estcourt
3310

TO: THE PARTICIPANT
RE: CONSENT FOR RESEARCH

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02/04/12

P.S. Mngunikazi
(RESEARCHER)

DATE

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PARTICIPANT

02/4/2012
DATE

CIRCUIT MANAGER

2/4/12.
DATE

DEPT O[redacted]URE

ES[redacted]
DATE: 02/4/2012

APPENDIX 4:

Questionnaire schedule

The required contact details of participants will be requested for a follow up interview. After confirmation of the arrangements and permission to see the participants will be asked the following questions:

1. **Biography**

1.1 Which Grades have you taught Technology Education?

……
……

1.2 State number of years you taught in each Grade.

……
……..

2. Professional development

2.1 Have you received any training in implementing assessment in Technology Education?

……
……
……
……..….

2.2 Describe the nature of this training.

……
……
……
……...

2.3 Are there any workshops you have attended on assessment in Technology?

Education?

……

.....

.....

.....

.....

2.3.1(When, where and by whom) were these workshop conducted?

……

……

……

……...

2.3.2 What was the duration of these workshops?

……..……

……

……

……

3.Understanding

3.1 What do you understand by the term assessment in Technology?

……

……..……

……..……

……

……

3.2 When do you usually assess Technology learning?

……

……

……..……

……..

3.3 How do you assess Technology learning?

.....

.....

.....

3.4 Why do you assess Technology in that particular way?

……

……

……

4. **Implementationof assessment**

4.1 Do you find it difficult to implement assessment in Technology in your classroom? Please explain

.....…

……

……

……

4.1.1 Have you receive any assistance in this regard?

……

……

……

4.1.2 What was the nature of assistance and who offered the assistance?

……

……

……

……..

4.2 Name and briefly describe the strategies that you use when assessing Technology?……

……

……

……

…….

4.3 Have you been able to overcome any challenging experiences whilst assessing Technology?

Please explain the strategies you used to overcome these challenges.

……

……

……

……

…….

Appendix 5

Interview schedule

Educators' biography

1.1 How did you come to teach Technology?

1.2 Do you have any Technology qualifications?

1.3 What has been your experience of teaching Technology?

1.4 From your teaching experience, what is your perception of Technology curriculum?
Elaborate?

1.5 What is it that you like about teaching technology?
Explain, why?

Perception about assessment in Technology education

1.1 What kind of tasks do you assess in Technology?

1.2 If you assess a task and your learners perform badly, what do you do?

1.3 If you teach a lesson and your learners don't seem to understand or follow, what do you do?

1.4 How do you make learning fun for your learners?

1.5 In what ways do you encourage creativity in your Technology classroom?

Assessment practice in technology education

1 What do you understand by the term technological design?

1.2 What types of assessment have you used when assessing technology design?
1.2.1 Why do you use them?

1.3 What does the term 'diversity' mean to you?

1.4 Do you offer any assistance to learners who are struggling with a technology design task?
1.4.1Do you show them how the task is done?
1.4.1 Why?

1.5 How do you measure learners' performance in your class?

1.6 What assessment procedures do you normally use when assessing learners design process?
1.6.1Why do you use these procedures?

1.7 How do you assess learners' designs?

1.8 What are your experiences when assessing learners' design?

1.9 What do you do if a learner submitted a project that was done by a parent?

1.10 Do you think your assessment practices are in line with the technology curriculum?

Explain your response

APPENDIX 6

Classroom observation schedule

Pre- observation data Teachers' pseudonyms: ……. Date: ……. 1. Class period: …… 2. Duration of the period: …… 3. Activities: …….. 4. Resources that will be used: …….. 5. Objective/s (Intended outcome/s)of the lesson: …… …… 6. Type of assessment (formal/informal): ……... 7. Group/pair/individual task: …….
During class visit/observation **1. Type of questions asked**
1. 1 Do questions asked arouse interest?
1.2 Do questions asked increase learners' participation?
1.3 Do they evaluate learners' prior Technology knowledge?
1.4 Who respond to the questions? Is it boys or girls?
1.4.1 How often do boys respond?
1.4.2 How often do girls respond?
1.5 Level of difficulty of the questions asked in terms or level/order (low, middle or high)
2. **During class visit / observation**
2.1 Class environment
2.1.1. How was the lesson introduced?
2. 2 Do all learners have necessary technology material to carry out given task (design drawing)?
2.3 Are there any safety rules explained to the learners?

2.4 Has the teacher explained clearly what learners should do (design, make)?
2.5 Are learners participating/ following during the lesson?
Discipline
3.1 Does the teacher discipline learners?
3.2.1 How does the teacher respond?
3.2.2 Are learners able to take criticism?
4. Assessment
4.1 Assessment procedure employed (formal/informal)
4.2 Teacher/peer/learner assessment

APPENDIX 7: SOME RESPONSES FROM QUESTIONNAIRE SCHEDULE (SIPHO)

Question and answer in the lesson, short test and quizzes, homework exercises project, assigment observation of performance.

3.3.1 Are there any similarities between formative assessment and performance assessment? If so, what are those similarities?

Performance assessment judges the learner to use specific knowledge and no research skills. formative assessment provides information needed to adjust teaching and learning.

3.3.2 What forms of assessment are involved in performance assessment in Technology Education?

Multiple-choice examination, checklist, portfolios of children's work and summary reports.

3.4 Have you ever assess your learners using performance assessment? Why do you assess Technology in that particular way?

Yes. I wanted to evaluate progress as well as performance of my learners. I have also wanted to contribute to meaningful curriculum planning and design of developmentally appropriate educational intervention.

3.5 How do you overcome teachers' subjective judgement when scoring your learners using performance assessment?

I encourage them that we have to judge objectively on what we can see, hear, smell and test but not emotional reaction to what you see, hear and taste and your opinion.

APPENDIX 7: SOME RESPONSES FROM QUESTIONNAIRE SCHEDULE (BONGA)

Recording

3.3.1 Are there any similarities between formative assessment and performance assessment? If so, what are those similarities?

Yes because if you developed properly it is easy to perfour any assessment

3.3.2 What forms of assessment are involved in performance assessment in Technology Education?

Projects

3.4 Have you ever assess your learners using performance assessment? Why do you assess Technology in that particular way?

By building Bridges and make circuit board.

3.5 How do you overcome teachers' subjective judgement when scoring your learners using performance assessment?

Neatness of their project and well prepared one

APPENDIX 7: SOME RESPONSES FROM QUESTIONNAIRE SCHEDULE (LUNGI)

Assessment standard.

3.3.1 Are there any similarities between formative assessment and performance assessment? If so, what are those similarities?

Formative is serving to form something but performance is to performing a play concert or other form of intertainment

3.3.2 What forms of assessment are involved in performance assessment in Technology Education?

Oral work
Project portfolio.

3.4 Have you ever assess your learners using performance assessment? Why do you assess Technology in that particular way?

the leaner should planning, Research and presentation

3.5 How do you overcome teachers' subjective judgement when scoring your learners using performance assessment?

APPENID 7: SOME RESPONSES FROM INTERVIEW SCHEDULE (SIPHO)

Perception about assessment in Technology education

Researcher: What kind of tasks do you assess in Technology?

Participant*: Class test, assignment, homework*

Researcher: If you assess a task and your learners perform badly, what do you do?

Participant*: I reflect on it to find out who did not do right. Then I arrange a retest or I re-test or I set another test assessment then they will do it.*

Researcher: If you teach a lesson and your learners don't seem to understand or follow, what do you do?

Participant: *I… I then go back to reflect on what could be the problem for my preparation.*

Researcher: How do you make learning fun for your learners?

Participant*: I do get a chance to make my learning fun for my learners; it is when we do practical activities they get a chance to…to complete with one another which make them to enjoy their learning.*

Researcher: In what ways do you encourage creativity in your Technology classroom?

Participant: *I set the standard or quality of work high and encourage them to produce quality work, quality work of which make them end up competing among themselves which… which enhances creativity*.

Assessment practice in Technology Education

Researcher: What do you understand by the term technological design?

Participant: *The term technological design is a communication and management that link those who design our plan with those who produce the artifacts and systems. It is used in the design phase to record and develop ideas, and in the … the manufacturing phase to guide those who do the manufacturing*.

APPENDIX 7: SOME RESPONSES FROM INTERVIEW SCHEDULE (BONGA)

Perception about assessment in Technology education

Researcher: What kind of tasks do you assess in Technology?

Participant: *Class test, homework, projects and graphic design*

Researcher: If you assess a task and your learners perform badly, what do you do?

Participant*: Eh … Sometimes I let them redo the task again or do it with them to show what … what was expected from them.*

Researcher: If you teach a lesson and your learners don't seem to understand or follow, what do you do?

Participant: Eh …*I repeat the lesson and rein… reinforce what is important there.*

Researcher*:* How do you make learning fun for your learners?

Participant*: Eh…. Learners like it when they have to debate about certain topics or when they are doing research or practicals. I always give them an opportunity to excel when they have to do tasks that involves that.*

Researcher: In what ways do you encourage creativity in your Technology classroom?

Participant*: Eh … I always told them that creativity and uniqueness goes hand in hand so is neatness. I also told them to look for ideas in their surroundings, books and magazines and improve on them*.

Assessment practice in Technology Education

Researcher: What do you understand by the term technological design?

Participant: The term technological design is a way of communicating with other people through designs, sketches, drawings and labels, where steps of the technological process should be implemented.

APPENDIX 7: SOME RESPONSES FROM INTERVIEW SCHEDULE (LUNGI)

Perception about assessment in Technology education

Researcher: What kind of tasks do you assess in Technology?

Participant*: Most of the time they do research*

Researcher*:* If you assess a task and your learners perform badly, what do you do?

Participant*: They start it afresh*

Researcher: If you teach a lesson and your learners don't seem to understand or follow, what do you do?

Participant: *I repeat it several times*

Researcher: How do you make learning fun for your learners?

Participant: They do things practically

Researcher: In what ways do you encourage creativity in your Technology classroom?

Participant*: To work in groups*

Assessment practice in Technology Education

Researcher: What do you understand by the term technological design?

Participant*: It is develop the product and it is related context, problem etc*

Researcher*:* What types of assessment have you used when assessing technology design?

Participants*: Formal assessment*

Researcher*:* Why do you use them?

APPENDIX 8

UNIVERSITY OF
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

Research Office, Govan Mbeki Centre
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Fax No: +27 31 260 4609
snymanm@ukzn.ac.za

25 January 2012

Ms PS Mngunikazi (206520653)
School of Science, Maths & Technology

Dear Ms Mngunikazi

PROTOCOL REFERENCE NUMBER: HSS/0002/012M
PROJECT TITLE: Grade 9 Technology Teachers' understanding and practice of Assessment in Technology Education: A case study in a district of Escourt

In response to your application dated 11 November 2011, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.
PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Professor Steven Collings (Chair)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc. Supervisor – Dr L van Laren and Dr A James
cc. Mrs S Naicker / Mr N Memela

APPENDIX 9

Angela Bryan & Associates

6 La Vigna
Plantations
47 Shongweni Road
Hillcrest

Date: 01 December 2014

To whom it may concern

This is to certify that the Masters Thesis: 'What are Grade 9 Technology teachers' understanding of assessment in Technology classrooms?' written by Prudence Mngunikazi has been edited by me for language.

Please contact me should you require any further information.

Kind Regards

Angela Bryan

angelakirbybryan@gmail.com

0832983312

APPENDIX 10

Turnitin Originality Report

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