THE UNIVERSITY OF KWAZULU-NATAL

AN INVESTIGATION INTO THE IMPLEMENTATION OF FORMATIVE ASSESSMENT IN GRADE SEVEN NATURAL SCIENCES: A CASE STUDY OF THE THREE PRIMARY SCHOOLS IN UMLAZI DISTRICT

BY

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ABSTRACT

The study rests on the assumption that teachers of Natural Sciences apply various assessment strategies in their interaction with learners. Among the strategies that are proposed by the National Department of Education is the use of formative assessment. Due to the challenges that face teachers of this learning area, the researcher opted to explore the implementation of formative assessment, especially because there is vast lack of implementation of various departmental programmes and initiatives that are aimed at the betterment of our education system during this transformation period.

To engage in this study, the researcher purposively selected three primary schools with Grade Seven classes in Umlazi District. Three research methods are employed to investigate the implementation of formative assessment in Grade Seven Natural Science classes, namely, semi-structured interviews, semi-structured observations and document analysis. Purposive, criterion-based selection was used to select participants to the study. Participants involve teachers of Natural Sciences at Grade Seven level.

Data were collected using the afore-mentioned methods, and were analysed using Vygotsky's theory constructivism and his concept of the Zone of Proximal Development (ZPD). Data were presented narratively, graphically and in tabular forms. The data are extensively discussed with reference to literature on formative assessment. The discussion is aimed at responding to the three research questions that drive the entire investigation. Findings thereof are presented in narrative form.

The data collected helped the researcher to make sound conclusions about the implementation of formative assessment in the three sampled primary schools. Recommendations are made concerning the implementation of formative assessment in respect of what could help teachers achieve the prescribed learning outcomes and assessment standards through the use of formative assessment. Though the findings presented indicate the contextual factors typical to the three sampled schools, particularly the Grade Seven classes, they could be transferred to other institutions with similar settings because this is a case study research. This means that what happens in the three selected schools could be common to other schools as well regarding the use of formative assessment during teacher-learner interactions.

DECLARATION

I, Nkanyezi Hills Cele, declare that this case study entitled **'An investigation into the implementation of formative assessment in Grade Seven Natural Sciences: A case study of the three primary schools in Umlazi District'**, is my original piece of work. All the sources that I have used have been properly acknowledged by means of unexpurgated references.

SIGNATURE: _____

DATE: 1 DECEMBER 2009

SUPERVISOR: Dr M. Combrinck

SIGNATURE: _____

DATE: 1 December 2009

DEDICATION

This dissertation is dedicated to my late parents, Mr V. V. Cele and Mrs W. J. Cele (MaDlamini). A special dedication to my late wife, Gugu Angela (MaMgoza) Cele, who was vitally inspirational through my studies but could not reap the fruits of her patience and co-operation. To my children, Lungisani, Nkululeko and Ntokozo, may this dissertation inspire you to make a mark in educating our nation in whatever good way and better your lives so that you can pass the torch to my grand-children. Blessed love!

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Transformation in education in South Africa brought about drastic changes in all the structures, levels, contexts, formations and other aspects in the educational institutions where teaching and learning takes place and /or is organised. As a result, there have been curriculum changes in terms of philosophical underpinnings of education itself, of professional development, of human resource capacitation, of pedagogic and assessment practices that are expected to produce competent learners for the new democratic dispensation. Among the changes that were effected, are the classroom practices. Pedagogic flexibilities became necessary in order for teachers to provide sound teaching and learning environments that could promote effective management of learning programmes and mastering of content by learners. Coupled with teaching and learning are the assessment strategies that could help diagnose inefficiencies and help teachers adjust their teaching methods to suite the learners' needs.

Since the current National Curriculum Statement (NCS) puts more emphasis on core developmental learning areas like Maths, Science and Technology, it is vital for teachers as classroom practitioners to ensure that these learning areas are mastered right from primary level. This will lay the foundation for outstanding learners' performances at higher levels of their educational careers.

Among the things that could help teachers achieve their goals of providing effective instruction to their learners, is the clear and progressive assessment programme that would help facilitate understanding of the learned content. Progressive assessment programme will advance from the first leaning outcomes to the last learning outcomes, addressing the related assessment standards and assessing learners' performances in line with specific standards. It is recommended in the National Policy on Assessment and Qualifications for Schools in the General Education and Training band, that public schools from Grade R to 9 should conduct Continuous Assessment to facilitate learner progression. Among the different types of assessment mentioned in this document, formative assessment is the one that I shall investigate in this study.

I shall focus on this type of assessment because it could be applied by every teacher in any learning field without having to compromise time as it is conducted concurrently with pedagogic interaction between the teacher and the learners. The use of formative assessment presumably leads to a condition where learners attain better results during summative assessment. In order to establish the validity and reliability of this curricular aspect, I shall conduct a case study research to find out if teachers in the sampled schools implement it or not. Research is essentially an attitude of mind - a way of thinking. It is the mental approach that we bring to the quest for the answer to a problem that differentiates research from other forms of truth-seeking attitudes (Leedy, 1981).

1.2 Statement of the problem

The Department of Education, through its National Curriculum Statement (NCS) Guidelines for General Education and Training documents (2006), recommends that teachers should use various forms and strategies of assessment in order to facilitate learners' understanding and ensure that they achieve the learning outcomes for the grade within a particular phase. These assessment types are the ones described below.

Most teachers that I used to have informal conversations with during our cluster meetings usually complained about learners' poor performances especially in Maths, Science and Technology, which are the core subjects that are currently given greater attention as they lay the foundation for skills development. Teachers complained that learners were failing to complete the tasks assigned to them and, even the projects and home-works were not done satisfactorily. Most of the learners struggled and consequently failed to accumulate sufficient marks that would enable them to progress to the next grade. Many of the learners experienced difficulties in managing these learning areas at secondary level, probably due to poor foundation they had at primary level. This does not suggest that teaching is poor at primary level. There could be many contributing factors to such difficulty, but my focus will be to investigate whether Natural Science teachers implement formative assessments in their classrooms.

The National Curriculum Statement (NCS) document on *Assessment Guidelines for Natural Sciences: Intermediate and Senior Phases* (2006) describes five types of assessment that could help achieve some general purposes of assessment in schools. These general purposes are to:

-Develop learners' knowledge, skills and values
-Identify learners' strengths and weaknesses
-Identify the needs of the learners
-Provide additional support to learners through feedback
-Revisit or revise certain sections where learners seem to have difficulties
-Motivate and encourage learners
-Enable teachers to reflect on their practices
-Demonstrate the effectiveness of the curriculum or a teaching strategy
-Provide information or data to a variety of stakeholders

The five types of assessment that are described in the Assessment Guidelines document are:

* *Baseline assessment* which is used at the beginning of a phase, grade or learning experience to establish what learners already know. It assists educators with the panning of learning programmes and learning activities.

* *Formative assessment* which serves to improve learners' ability to learn. It is also called 'assessment for learning' and is planned so that it provides information about learners that they can use to deepen their understanding and the teacher can use to shape future learning. The information obtained must be used by both the teacher and the learner in a process of reflection and self-assessment. It therefore improves aching and learning by giving teachers direction and enables them to adapt to learners' needs.

* *Diagnostic assessment* which is often baseline assessment and its application will lead to some form of intervention or remedial action or programme. It shows either learners' strengths and weaknesses or inappropriate teaching methodology. When it is used to find out about the nature and cause of medical barriers to learning, it should be administered by specialists and is followed by expert guidance, support and

intervention strategies. It is different from baseline assessment in that it is not necessarily always at the beginning of a learning experience but it may occur in the middle or near the end of learning experience.

**Summative assessment* which gives an overall picture of learners' progress at a given time, for example, at the end of a term. It usually results in judgement about learner performance and can involve high stakes for learners (e.g. Senior Certificate). It normally occurs after learning has taken place through good formative assessment.

* *Systemic assessment* which is an external way of monitoring the education system by comparing learners' performance to national indicators of learner achievement. It involves monitoring of learner attainment at regular intervals, using nationally or provincially defined measuring instruments. This form of evaluation compares and aggregates information about learner achievements so that it can be used to assist in curriculum development and evaluation of teaching and learning. It is conducted at the exit levels in the G. E. T. band, i.e. Grade 3, 6 and 9.

I want to focus my study on one of these types of assessment strategies, namely, formative assessment. I choose formative assessment because it is applicable in all instructional activities. Formative assessment could be conducted at the beginning, in the middle, or at the end, of a lesson. So, it makes it imperative that educators apply formative assessment in their instructional activities. This does not suggest that other types of strategies are not important, but simply means that formative assessment will supersede other types of assessment strategies in my study.

To investigate the implementation of formative assessment in Natural Science classrooms, I shall observe teachers in practice during teaching and learning and also interview them at the convenient time. I shall also conduct document analysis to find out if there is any improvement in the learners' performances. These qualitative methods of data collection will help me find out if formative assessment is being implemented in Natural Science classes or not. If not, what could be the possible problems that lead to a lack of its implementation.

1.3 Statement of purpose

The purpose of my study is to investigate the implementation of formative assessment in the classroom, and whether teachers in the sampled schools use it at all. My study focuses on the implementation of formative assessment in Grade Seven classes, giving special attention to Natural Sciences, which is the learning area I teach currently. Among the various types of assessment strategies, constructive feedback is one form of upliftment strategies that influences learning (Le Grange & Reddy, 1998). A proper implementation of formative assessment can influence learning by raising the levels of motivation to learn, deciding what to learn, learning how to learn and evaluating learning during classroom interaction between a teacher and a learner (Lambert & Lines, 2000).

1.4 Rationale for the study

There has always been an outcry by various political parties and social groupings about the inequalities in educational institutions as a result of the uneven distribution of material resources by the Apartheid government. Numerous commissions, like the South African Native Affairs Commission (1905) and the Eiselen Commission (1949), have conducted a number of studies around the distribution of financial resources and teaching and learning materials that was based on racial discrimination of the majority by the then ruling minority. A lack of resources in former non-White areas like the homelands, i. e. Transkei, Bophuthatswana, Venda and Ciskei (TBVC) and self-governing territories, i. e. KwaZulu, KwaNdebele, Gazankulu, Qwaqwa and KaNgwane, made it impossible for schools to achieve excellency in learning programmes. Hence, they produced unemployable youths who lacked skills and expertise in the field of Science and Technology, in particular.

Educational reforms did not only affect buildings and personnel in educational institutions, but also influenced instructional behaviours of teachers, learning mode of learners, as well as the learning matter itself. Reforms meant a re-definition of terms applicable in the education fraternity as well as the re-conceptualisation of structures

and functions in the education bureaucracy. Micro-changes at local level included the teaching and learning programmes.

After the first democratic election of 1994, the new government put more emphasis on skills development to empower the disadvantaged sections of our South African society. In order to accomplish its transformational endeavours and democratisation processes, the new government had to embark on a series of transformational programmes in all sectors of life from social security to economics, from policing to education, from health to industry, etc.

Since I started teaching Natural Sciences in Grade Seven a few years ago, I have been noticing that teachers tend to focus largely on summative assessments that normally take place at the end of a lesson, a unit, a course, a chapter, term, semester or a year (Van der Horst & McDonald, 2003; Kyriacou, 1991; Swearingen, 2002). Most of the learners do not adequately complete the tasks given to them during the Natural Science period. They fail to complete the group projects assigned to them, let alone the individual tasks. They experience perennial problems in science projects. I learned that from the discussions we had with other Natural Science teachers during our cluster meetings. They use to complain about poor responses when they asked their learners questions during lessons. Their responses to tasks made them wonder how these learners are going to learn new things in an ever-developing area like Natural Sciences.

During my early years of Natural Science teaching in grade seven I used to experience similar problems with my learners. As time went on, I started to question myself as to what I could do to improve the level of performance by my learners. Among the strategies I used was providing constant feedback to the learners after I had marked their scripts or I had assessed their projects. To my surprise, I was very pleased to see the performance level grow in an unexpected way. I then realised that what is proposed in our National Policy document on Assessment and Qualifications for school in the General Education and Training Band (NDE, 2006), is quite imperative.

It is usual practice that once learners are assessed summatively by the end of a term or semester, teachers tend to concentrate more on their daunting task of marking and recording the scores, which gives them no time to provide feedback on the tasks that

the learners have completed. Even if some do give feedback at the beginning of the next term, there is not enough time to concentrate on specific theme or heading so as to cater for the learners' individual needs. Summative assessment identifies the standard of achievement at a particular moment in time (Kyriacou, 1991), at the end of a learning experience for a purpose outside learning experience (Le Grange & Reddy, 1998). Maki (2004) defines summative assessment as 'a process that is designed to capture students' achievement at the end of their program of study and their undergraduate or graduate education based on criteria and standards of judgement. This is consistent with Suskie's (2004) definition that summative assessment evidences are those obtained at the end of a course or program. Their purpose is usually to document student learning for transcripts and for employers, donors, legislators and other external audiences. Students may not receive any feedback on their performances other than possibly an overall grade or score. Dunn, et al (2004) emphasise the same point that summative assessment takes place when learners undertake a task that measures the sum of their performance. In short, the allocation of a final grade on an assessment task or an entire course is known as summative or terminal assessment.

Natural Sciences as a learning area has very interesting themes and practical knowledge content that are applicable to social life on a daily basis. Seeing that there is a lack of support regarding the tasks completed by learners, I started to question myself as to what is lacking in order to assist learners perform better than they do.

Among other options to uplift the standard of learners' performances, I considered the use of formative assessment that could help conscientise learners of their responsibilities towards their academic development. I considered formative assessment because it does not require an extensive use of resources nor does it require separate time to be allocated for its implementation as it takes place during teaching and learning in the classroom.

Though formative and summative assessments are two facilitative features of classroom interaction, the latter is informed by the former in the sense that when learners have received constructive feedback during formative assessment, they are more likely to perform better during summative assessments.

The assessment policy states that the performances of learners should be measured against the assessment standards of the learning outcomes in a grade. It also states that assessment should be authentic, continuous, multi-dimensional, varied and balanced (NDE, 2006b). It prescribes that assessment should take into consideration the diverse needs of learners and context. Various assessment strategies should therefore be used as an on-going integral part of teaching and learning process, which means that formative assessment should be used to inform and evaluate teaching and learning (Le Grange & Reddy, 1998; NDE, 2006b; Popham, 2005). The policy further asserts that assessment should be accurate, objective, valid, fair, manageable and time-efficient. It should be free from bias and sensitive to gender, race, cultural background and abilities (NDE, 2006b). Due to the fact that the policy documents also recommend the use of formative assessment, which emphasises regular feedback, I then developed an interest in knowing whether this important curricular aspect is being implemented in the real classroom situation.

I assume that once educators understand and begin to use formative assessment in the form of constructive feedback for the tasks they give during their engagement with learners, performances might improve considerably. Also, if Natural Science educators in my sampled schools do provide constructive feedback to their learners, and the learners' performances improve, it could be of benefit to other educators elsewhere if those skills are diffused to other teaching and learning institutions. The efficacy of formative assessment at the lower levels could build up strong foundations for supreme achievement at the higher levels of education.

1.5 Research Questions

Key research question

- How is formative assessment implemented in Grade Seven, Natural Science classrooms?

Subsidiary questions

* What kinds of formative assessment strategies do educators use when teaching Natural Sciences?

- What are the challenges facing educators in implementing formative assessment in their Natural Science classrooms?

1.6 Scope of the study

The research study is designed to focus on the implementation of formative assessment strategies in three primary schools within Umlazi District. The schools from one cluster were purposively selected as the research sites. The study is confined to the teaching of Natural Sciences, as it is taught in Grade Seven classes and the concurrent implementation of formative assessment during lessons in the three sampled primary schools.

The research will also confine its findings and discussions within the context of the teaching and formative assistance given to the learners in these schools. Since this is a case study research, the data elicited from the study during data collection may not necessarily reflect the conditions of all schools within the cluster or outside it. Some contextual aspects of these schools may, indeed, be transferable to other settings. This view is consistent with Neuman's (1997) assertion that, 'as in any case study, while we can accurately specify the causal process within the case, generalising is very difficult'. So, the study will only focus on the three selected schools.

1.7 Theoretical location of the study

This case study research is located within the interpretive paradigm since the researcher is trying to understand how Natural Science teachers implement formative assessments in the classrooms. A qualitative approach will be used to investigate the implementation of formative assessment, and qualitative methods will be used to collect data. Since case studies fall under the umbrella of 'naturalistc' research which

is conducted in the real-world contexts, I shall be able to collect data from the real-world in the three sampled schools. Case studies limit generalisability and allow the use of multiple indicators from multiple sources using multiple methods (Babbie & Mouton, 2001). In this study I shall be able to use different data collection methods to elicit data from various sources that will help me discover the real practices during the Natural Science periods in the classrooms, with regard to the implementation of formative assessment.

Vygotsky's theory of constructivism will form basis of my study because all is done for the sake of construction and development within a classroom situation. I shall elaborate more on this theory in Chapter three.

1.8 Limitations to the study

The study has limitations in terms of the time available to observe lessons and the progress of learners on a continuous basis. Though prolonged existence on the research site is not compulsory in case study researches, it would nevertheless contribute even more if I had to spend more time observing participants in action. There are probably more things I would find out during the teachers' interaction with the learners. However, it was sufficient for the case study to observe three lessons in each school as I would complement my observation with interviews and document analysis.

1.9 The structure of the dissertation

Chapter 1

This chapter introduces the whole project by stating the problem and the purpose of the study that influenced the researcher to undertake it. Main research question and its subsidiary questions have been stated, and the scope of the study is defined. The theoretical location of the study is described, with the limitations thereof being explained.

Chapter 2

This chapter introduces the theoretical and conceptual frameworks that underpin the entire study, namely, Vygotsky's theory of constructivism. The researcher relates and constantly refers to local and international literature extensively. The researcher defines what assessment is, in general, and specifically explores formative assessment and its facets as defined by various scholars. The researcher reveals the links between various strategies and formative assessment and establishes a rapport between Vygotsky's theory of constructivism and formative assessment.

Chapter 3

In this chapter the researcher explains the research methodology that he used when conducting the study. He explains how he piloted the study. The researcher describes the research design and consistently refers to the relevant literature to further elucidate and justify each step that he took to collect data through the use of various data collection methods.

Chapter 4

The researcher presents all the data that he obtained during the interviews with participants, during observations in the Natural Science classrooms, as well as the data elicited during document analysis.

Chapter 5

The researcher concluded on the findings that he elicited from data presented in chapter 4. The researcher concludes on the data obtained during interviews with participants. To substantiate a particular view, the researcher occasionally quotes the participants' responses verbatim. The researcher also elaborates on the findings from observations and the implications thereof. Numerous recommendations are given with regard to the implementation of formative assessment in Natural Science classes

1.10 Summary

This case study research is aimed at discovering what is happening in the Natural Science classrooms with regard to the assessment of learners. The focus of the study lies on the implementation of formative assessment, which could probably help teachers to improve their learners' performances and also adjust their teaching strategies to suit the learners' needs. It is therefore necessary to investigate whether teachers in the sampled schools do provide formative assistance to their learners to ensure that formative assessment is implemented and its techniques are properly applied. This investigation has been triggered by the poor performance of Natural Science learners in general, which most teachers have acknowledged. Even the current government emphasises good performance in Science so that the country can catch up with the current trends in the world's scientific development.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This study investigates the implementation of formative assessment in Grade Seven, Natural Sciences. It relates to other studies like that which was undertaken by a UKZN student (2004), on the implementation of continuous assessment in Grades eleven and twelve, Physical Science classrooms in Inanda schools in the Durban area, KwaZulu-Natal. Formative assessment is one form of assessment that is aimed at motivating learners to do better. Teachers use formative assessment to adjust their instruction quickly and learners use it to adjust and improve their own learning (Chappuis & Chappuis, 2008). It is defined by local and international scholars as a form of assessment that is used to inform educators and learners about a learner's progress in order to improve learning (Sieborger & Macintosh, 1998), and is conducted as the learning takes place, and is used to inform the learning process (Le Grange & Reddy, 1998), by giving learners regular feedback (Kyriacou, 1991).

Formative assessment operates on a relatively short cycle and stays close to the classroom rather than reporting for school (Siebörger & Macintosh, 1998). This implies that formative assessment takes place in a short while, that is, in a classroom situation and does not operate beyond the said situation. If it were to be applied beyond classroom situation, it becomes known as the remedial work. It is connected to change in practice and is directed to both adjusting instruction and enhancing pupil motivation and self-regulation (Black & William, 1998). Formative assessment provides teachers with educative feedback on learners' progress, motivates pupils and is used to assess readiness for future learning (Kyriacou, 1998), and verifies that learning is occurring and the curriculum is appropriate (Orlich, et al, 2004).

Cowie & Bell (1999) define formative assessment as the bi-directional process between teacher and student to enhance, recognise and respond to learning. A study conducted by Black & William (1998) showed that learners who had become more actively involved in their learning are able to assess their own learning and show

increased confidence and self-esteem. Formative assessment, therefore, is an on-going dynamic process that involves far more than frequent testing and measurement of student learning, but learning is just one of its components (Chappuis & Chappuis, 2008).

2.2 Theoretical and conceptual framework

This study rests on social development theory and the conceptual understanding that learning takes place in various forms but assessment has always been a cornerstone for every quality achievement in a learning situation. The concepts of scaffolding, dynamic assessment, the Zone of Proximal Development (ZPD) and the More Knowledgeable Other (MKO), mediated and mastery learning come to the fore. These concepts are defined in the discussion below, and they give light to what teachers should consider in their effort to lead learners to manage the learning programmes and activities thereof.

2.2.1 Vygotsky's theory of constructivism

Lev Vygotsky's social constructivist theory postulates that instruction should precede development. Vygotsky's theory relates to other social development theories like those of Jean Piaget's (1896-1980) stage theory of cognitive development, John Dewey's (1859-1952) learning theories and Jerome Bruner's (1915 to date) theory of discovery learning, etc. Social development theory argues that social interaction precedes development, whereas consciousness and cognition are the end product of socialisation and social behaviour. Vygotsky's social constructivist theory emphasizes good learning and asserts that actualisation of the mind through assisted learning and mediation could facilitate the attainment of supreme intellectual capacity that is far ahead of physical development. This theory focuses on social interaction that plays a fundamental role in the process of cognitive development. Learning process facilitates mental functioning, and Vygotsky's constructivist theory focuses on the process rather than the product (Mace, 2005). This implies that to apply formative assessment strategies during classroom interaction subscribes to the process rather than the product that is attainable on completion of summative evaluations.

Lev Vygotsky (1896-1934) advanced the notion of the Zone of Proximal Development (ZPD), wherein he studies mental processes of maturation and not-yet-matured. The Zone of Proximal Development is a distance between the actual development level as determined by independent problem-solving ability and the level of potential development as determined through problem-solving ability under the guidance or in collaboration with more capable peers (Daniels, 1993). Vygotysky's social constructivist theory reveals that a learner needs to be assisted by an adult or teacher, the More Knowledgeable Other (MKO) until the learner reaches the level of development when she is able to work independently. The More Knowledgeable Other (MKO) refers to anyone who has a better understanding or a higher ability level than the learner, with respect to particular task, process or concept (Mace, 2005). The MKO is normally thought of as being a teacher, a coach, or any knowledgeable adult, but could also be a younger person, peer or even a computer.

Once a learner reaches proximal level of development, she is able to assess her own work, that is, self-assessment. Self-assessment is a process through which people learn to monitor and evaluate their own learning strategies and achievements (Pollard, 1997; Mace,2005). Self-assessment is one strategy of formative assessment that involves learners in their own learning process by giving them opportunities to explain their understanding of an assessment activity, and give constructive feedback after a task has been completed. (Siebörger & Macintosh, 1998). Vygotsky's theory for dynamic assessment therefore implies that in order to gain a complete picture of a child, it is necessary to assess a child at the level of proximal development when she is able to assess her own work and determine her own strengths and weaknesses. Social context and culture for cognitive development are largely emphasised by this theory. Scaffolding, reciprocal teaching and guided instruction are effective strategies that implement Vygotsky's theory (Mace, 2005).

The social constructivist theorists perceive a teacher as a reflective agent who makes judgements about a learner and provides appropriate teaching input in a scaffolding model so that a child realises her potentials and learns to tackle learning tasks independently. Learners in Grade Seven might need formative assistance from the teacher, the MKO. This requires warm interpersonal relationships between a teacher and a learner. Relationship with children is a key. If you get on well with them,

discipline problem do not emerge and you get more done (Pollard, 1997). Teacher-pupil relationships must therefore be kept on a sound footing in order to promote formative assessment, which is based on social interaction. Peer assessment is when a competent peer of a learner evaluates the work of a fellow peer, and is regarded as a source for understanding and checking for quality work against previously established criteria (Garrison & Ehringhaus, 2007).

2.3 What is assessment?

The term 'assessment' has been used so frequently that many teachers, if not all, claim to know its meaning. To some teachers, this term has become synonymous to 'testing' or 'measurement of a learners' performance'. Mitchell (1989) defines assessment as the process of getting hold of evidence by one or a number of means and making judgements of the evidence in order to make inferences about an individual's competence. The Department of Education defines assessment in its document, *Assessment Policy in the General Education and Training Band Grade R to 9* (2001), as 'the process of identifying, gathering and interpreting information about a learner's achievement, as measured against nationally agreed outcomes for a particular phase of learning'. Assessment is also defined in the Department of Education's *Assessment Guidelines for Natural Sciences (Intermediate and Senior Phases)* as 'the process of making decisions about a learner's performance'.

Suskie (2004) defines assessment as the ongoing process of establishing clear, measurable expected outcomes of student learning, while ensuring that students have sufficient opportunities to achieve those outcomes. It is a process of systematically gathering, analysing and interpreting evidence to determine how well student learning matches our expectations, using the resulting information to understand and improve student learning.

Assessment is different from 'evaluation', though the two terms are often used interchangeably. Much confusion has results with regard to the use of the two terms. The term 'evaluation' refers to a judgement about the quality, value, effectiveness or impact of something, for example, a product, process, person, organisation or

collection (Cangelosi, 1991). It is a decision about the amount or value of something (Oxford Advanced Learner's English Dictionary, 1974).

Van der Horst & McDonald (2003) concur with Cangelosi (1991), as they define it as a process of making a decision about the learning of the learner, using information gained to make a judgement about learners' knowledge, learners' behaviour or performance, or learners' values or attitudes. Dunn, et al (2004) argue that assessment is a subjective process and not an exact science. They indicate that science is perceived as a concrete, objective, demonstrable and able to be generalised from a sample (assessment task) to the broader population. They assert that learners' assessment is not concrete and not always demonstrable because it involves professional judgement that is not confined to deductive logic or objectivity measures. They indicate that due to the element of subjectivity, there has always been a level of uncertainty about learners' assessment. Assessment is defined by Race, Brown & Smith (2005) in terms of validity, authenticity, reliability and transparency. In fact, Race, Brown & Smith (2005) do not define assessment but merely elaborate on the values or qualities of good assessment practices. They further maintain that assessment should be motivational, fair, equitable, formative, timely, incremental, redeemable, demanding, efficient and manageable, promote deep learning and enable the demonstration of excellence. The Department of Education released its publication 'Assessment is an integral part of teaching and learning in two educational newspapers, The Teacher (2008) and Educators' Voice (2008), where this vital part of teaching and learning, with its various forms and strategies, is defined.

Race (1999) argues that if 'assessment is the engine that drives learning', then the ways in which we give feedback are important in gearing the engine so that maximum effect is achieved from the effort put in by all concerned. He puts forward many suggestions for optimising the usefulness of feedback. He suggests that feedback should be targeted to enhance learning. He is complemented by Suskie (2004) in the idea that assessment should be given timely. I also concur with them because untimely feedback, that is, the feedback that is given after a long time since the project, test, assignment or any kind of task was completed, is irrelevant and does not address the learners' current needs. Race (1999) further advises us to consider the emotions of learners when they get their marked work back. He is not satisfied with

the common trend of putting ticks where the answer is correct or crosses where the answer is wrong, but suggests that feedback comments be used as they do much more to motivate learners than just ticks and crosses.

2.4 What is formative assessment?

Just as the National Department of Education (1998) defines formative assessment as an 'assessment for learning' that 'serves to improve learners' ability to learn', Maki (2004) defines formative assessment as 'a process that is designed to capture students' progress toward institution- or program-level outcomes based on criteria and standard of judgement'. Suskie (2004) defines it as those activities undertaken while learning is taking place - perhaps midway through the course or program. Their purpose is usually to improve teaching and learning. Teachers can give learners prompt feedback on their strengths and weaknesses and make immediate modifications to classroom activities and assignments. Dunn, et al (2004) argue that if there is an opportunity for learners to improve their performances on the same task, then the assessment is essentially formative. The key is that students know that the assessment is directed towards providing information about how to improve their performance before the point where a final assessment of achievement is made. It involves giving constructive feedback to learners that may have a combination of three purposes of formative assessment, namely, diagnosing student difficulties, assessing improvement over time, and providing information about how to improve their learning. This process is also called scaffolding, and indicates that the main purpose of formative assessment is diagnostic for formative purposes. Scaffolding is a temporary supportive structure that the teacher creates to assist a learner to accomplish a task that a learner cannot complete alone. Scaffolding is when the interweaving of formative assessment tasks towards a summative event is formalised in a course (Dunn, et al, 2004).

In fact, scaffolding, reciprocal teaching and guided instruction are effective strategies that implement Vygotsky's theory. Reciprocal teaching is an instructional strategy that is used to teach reading, in particular, where learners take turns being the teacher for a pair or a small group of learners. Guided instruction involves the teacher and learners exploring Mathematical problems and then sharing their different problem-

solving strategies in an open dialogue (Mace, 2005). Reciprocal teaching and guided instruction are not paramount in this regard but scaffolding is.

Lev Vygotsky supports the notion of dynamic or interactive assessment that is alternative to traditional assessment procedures. Dynamic assessment, also referred to as mediated or assisted assessment, involves a dynamic interaction between a tester (teacher) and a testee (learner) with a focus on the process rather than the product. Formative assessment, like dynamic assessment, focuses on the process of developing a learner by providing formative assistance rather than testing the learned information in order to report to the relevant audience, as summative assessments do.

This means that dynamic assessment is a prospective rather than retrospective form of assessment, and places much emphasis on an understanding of how a learner learns rather than what a learner has already learned. Vygotsky is of the view that learning precedes development because he suggests that instruction is only useful when it moves ahead of development. A learner learns more on his own but may not master all learning activities in a grade, hence formative assistance becomes necessary. This is where the teacher comes into play. Vygotsky's theory is consistent with the tenets of formative assessment since the latter advocates formative assistance by an adult-teacher in order to adjust the learning programmes to suit the learner's needs. Vygotsky's theory advocates mediation by an adult once a child reaches a level of development where working independently becomes difficult. This level is called the Zone of Proximal Development (ZPD).

2.5 Relationship between Vygotsky's theoretical underpinnings and formative assessment

My study is relevant to the theory of social constructivism as echoed by Vygotsky's theory of the zone of proximal development. My investigation into the implementation of formative assessment in Grade Seven Natural Science is informed by the general performances of learners and the role a teacher needs to play to ensure maximum benefit for all learners during classroom interaction. My study is relevant to this theory as it proclaims the pivotal role of mastery learning that is the cornerstone of formative assessment. Mediation of learner's learning by an adult teacher is the one

displayed in the application of formative assessment, which is consistent with Vygotsky's theory of mediated learning where the more knowledgeable other (MKO) renders assistance to the child in order to develop the child's cognitive abilities.

It is therefore vital that a teacher, as the more knowledgeable other, gives guidance and formative assistance to the learner, who is less knowledgeable in terms of logical reasoning and independent working habits. A teacher is there to assist a learner to reach that level of proximal development. Formative assessment plays a vital role in that regard. It was imperative that before I engage in the actual study of this curriculum aspect and collect data that would respond to my research question, I needed to test the data collection instruments by conducting a pilot study with a small sample that reflect the characteristics of the targeted population under study.

2.6 Relationship between formative assessment and pedagogic interaction

Formative assessment is consistent with the theory of social constructivism as it involves an interaction between a teacher and a learner during a learning process. Formative assessment appears to take a more positive, dynamic and forward-looking approach to the relationship between assessment and teaching and learning in order to establish what learners might learn in the immediate future with appropriate help from a teacher or competent peer (Torrance, 1993a).

Formative assessment informs effective instruction by providing information on a student's needs and progress. It is said to have four elements, namely, identifying a gap (in student's knowledge), feedback, learner involvement and learning progression (Heritage, 2007). In the United States of America (USA), the use of formative assessment emanates from the legislation called *No Child Left Behind Act*, while in South Africa it rests on the assumption that *Every Learner Can Pass*, as echoed by Curriculum 2005. Formative assessment is further described as a teaching method in which the students are provided with information during the course of instruction, and the future student assessment is based on decisions made by the student and the teacher (Chappuis & Chappuis, 2008). By using formative assessment, whether formal or informal, teachers might be able to determine what standards learners already know and to what degree. Teachers can create appropriate lessons and

activities for groups or individual learners, and they can inform learners about their current progress in order to help them set goals for improvement (Boston, 2002).

Formative assessments are on-going assessments, reviews and observations in a classroom. Teachers design formative assessment strategies in order to improve instructional methods and student feedback throughout the teaching and learning process. Formative assessments help teachers sequence their teaching processes in a spiral form from simple and specific to complex and general or vice versa. Formative assessments help teachers determine the next step during the learning process as the instruction approaches the summative assessment of student learning (Garrison & Ehringhaus, 2008). Formative assessment is a self-reflective process that intends to promote student attainment and is valuable for day-to-day teaching when it is used to adapt the teaching activity to meet the learners' needs. It is even more valuable since it helps teachers to monitor their students' progress and modify instruction accordingly.

The National Council of Teachers of Mathematics (NCTM, 1989) recommends that assessment should be more than merely a test at the end of instruction to see how students perform under specific conditions, rather, it should be an integral part of instruction that informs and guides teachers as they make instructional decisions. Formative tests are not graded and are used as an on-going diagnostic tool, hence, the instructor employs the results of formative assessment solely to modify and adjust his or her teaching practices to reflect the needs and progress of his or her students (Swearingen, 2002).

However, Black & Williams (1998) consider an assessment 'formative' when the feedback from learning activities is actually used to adapt the teaching to meet the learners' needs. This is consistent with our National Department of Education's assertion that formative assessment, through self-reflection and self-assessment, improves teaching and learning by giving teachers direction and enabling them to adapt to learners' needs (NDE, 2006).

Formative assessment is much more relevant to the new curriculum dispensation because currently, in the South African context, teaching is targeted on the learner and the principles of learning. This learner-centred approach focuses on factors that are

under the control of the learner, while taking into account their interaction with the environment and context (Kaftan, Buck & Haack, 2006).

Due to the multi-functional nature of formative assessment, various authors have assigned different names to it. For example, the terms ‘assessment for learning’ (Stiggins, Arter, Chappuis & Chappuis, 2006; Atkin, Black & Coffey, 2001), ‘mastery learning’ (Zimmerman & Dibenedetto, 2008), ‘educative assessment’ and ‘classroom assessment’ (Black & William, 1998), have become synonymous with formative assessment.

Furthemore, the Revised National Curriculum Statement, Grade R-9 (Schools) Natural Science policy document (NDE,(2002), reiterates that formative assessment monitors and supports the process of learning and teaching, and is used to inform learners and teachers about learners’ progress so as to improve learning. Constructive feedback is given to enable learners to grow. Since the progression of learners in the Senior Phase is purely based on continuous assessment, constructive for and from learning is highly emphasised as a crucial element in formative assessment. Methods of feedback include appropriate questioning, focusing the teacher’s oral and written comments on what was intended to be achieved by an assessment activity, and encouragement to a learner. Feedback is said to be more effective when it is combined with comments. There is more likely to be an improvement in achievement when learners are given written feedback rather than marks only (NDE, 2002). Due to the extensive use of the word ‘assessment’ in the current dispensation, most of education practitioners, particularly teachers, claim to know what it really means. It is therefore necessary to explore its meaning so that when one refers to this concept, one specifically portrays a correct picture of its meaning as it is used in this text.

2.7 Principles of good assessment and feedback practices

It is imperative to note that assessment is inseparable from feedback if it is to be proper. Due to the indispensable position held by feedback in assessment activities, it becomes unavoidable to mention feedback when assessment is defined or conceptualised. Various institutions and organisations have promulgated their own principles that aim at defining and conceptualising good assessment practices. The

way each defines what 'good assessment practices' really mean, depends largely on the kind of sectors that applies them and on the views of the theorists. Most of the definitions appear to have some commonality. I shall refer to a few of these principles as expressed by different authors.

Good assessment needs to be grounded on good practices. To give clear guidelines on how to follow good practices, Suskie (2004) has developed six principles of good assessment practices, namely, that good assessment give us useful information that corresponds to the key learning goals and curriculum. Good assessments give reasonable, accurate, truthful information and are fair to all students or learners. They are ethical and protect the privacy and dignity of those involved. They are systematised and are cost effective, yielding value that justifies the time and expense we put into them. These principles are echoed by Mills College in the USA, which adopted and further elaborated on them in its Statement of Principles of Good Practice (Suskie, 2004).

Nicol (2007) lists ten principles of good assessment and feedback practices that reveal his views of this practice. He views good assessments and feedback practices as those that should clarify what good performance is in terms of the related goals, criteria or standards. They should encourage time and effort on challenging learning tasks. They should deliver high quality feedback information that helps learners to correct themselves. Good assessments and feedback practices encourage positive motivational beliefs and self-esteem. They also encourage interaction and dialogue around learning, while facilitating the development of self-assessment and reflection in learning.

Good assessment and feedback practices involve learners in decision-making about assessment policy and practice. They support the development of learning communities and help teachers adapt their teaching to learners' needs. MacFarlane-Dick & Nicol (2007) reiterate the same points about good assessment and feedback practices in a shortened form that is presented as the *Seven Principles of Good Feedback Practice.*

2.8 Traditional assessment versus Alternative assessment

Traditional assessments are often completed in a controlled, timed-examination settings and are usually designed only to collect assessment information, not to give students a learning opportunity. Traditional assessments include objective tests, 'blue book' essay questions and oral examination (Suskie, 2004).

Alternative tests, sometimes called performance assessments, came as an alternative to traditional assessments that have been in use for centuries. Alternative assessments require learners to demonstrate their skills rather than relate what they have learned through traditional tests. Alternative assessments include field experiences, laboratory and studio assignments, projects, performances, term papers and other writing assignments (Suskie, 2004). Alternative assessments are subjective as they require learners to demonstrate their skills and do have advantages since they assess skills directly. For example, subjective assessments may assess writing skill of a learner, then written text provides good and sufficient evidence that a learner has mastered the skill of writing. Performance assessments that require learners to do real life tasks, such as conducting experiments in a laboratory, are also called authentic assessments and they provide much information in a relatively short time. Maki (2004) is of the same idea with Suskie (2004) as she claims that performance-based methods of assessment provide direct alignment with learners' learning experiences, representation of integrated learning.

2.9 Criterion-referenced assessment versus Norm-referenced assessment

Criterion-referenced assessment takes place when learners are given a task to accomplish, and their achievement is compared against preset standard of proficiency. Van der Horst & McDonald (2003) assert that criterion-referenced assessment refers to testing in which learners' scores (results) are compared to a set standard. They further clarify that the scores are not compared to those of other learners, but to a given or set criterion or standard of performance. Dunn, et al (2004) indicate that this approach to assessment involves subjective judgement but specifies the norms in advance, that is, it depends entirely upon informed professional judgement of performance against articulated standards of performance or criteria. Criterion- or

standard-based assessment is appropriate to the practice of formative assessment since it can be used to adapt the instructional process and with great effect, particularly in an Outcomes-Based classroom as it forms part of the comprehensive assessment strategies.

Norm-referenced assessment, on the other side, takes place when the score of a learner is compared to the scores of other learners. That is why it is sometimes referred to as the 'peer-referenced assessment' or 'benchmarking' (Suskie, 2004). This form of assessment involves objective measurement of a learner's performance in a cohort that is graded according to a pre-conceived notion of how the distribution of scores will turn out. Usually, the distribution takes a bell-shaped structure when graphically expressed. That is called a 'normal distribution of scores or grades'. Dunn, et al (2004) claim that norm-referenced assessment is suitable for subjects where the nature of knowledge is concrete, and where answers are objectively right or wrong.

Norm-referenced assessment objectively award scores to learners for each answer in numerical grades or percentages. In an essay-type assignment, norm-referenced measurement takes a subjective judgement and entails highly professional expertise of a teacher rather than objectively assigning scores as it is done in criterion-referenced assessment. When scores are expressed after they have been compared with those of peer, they take the following shape:

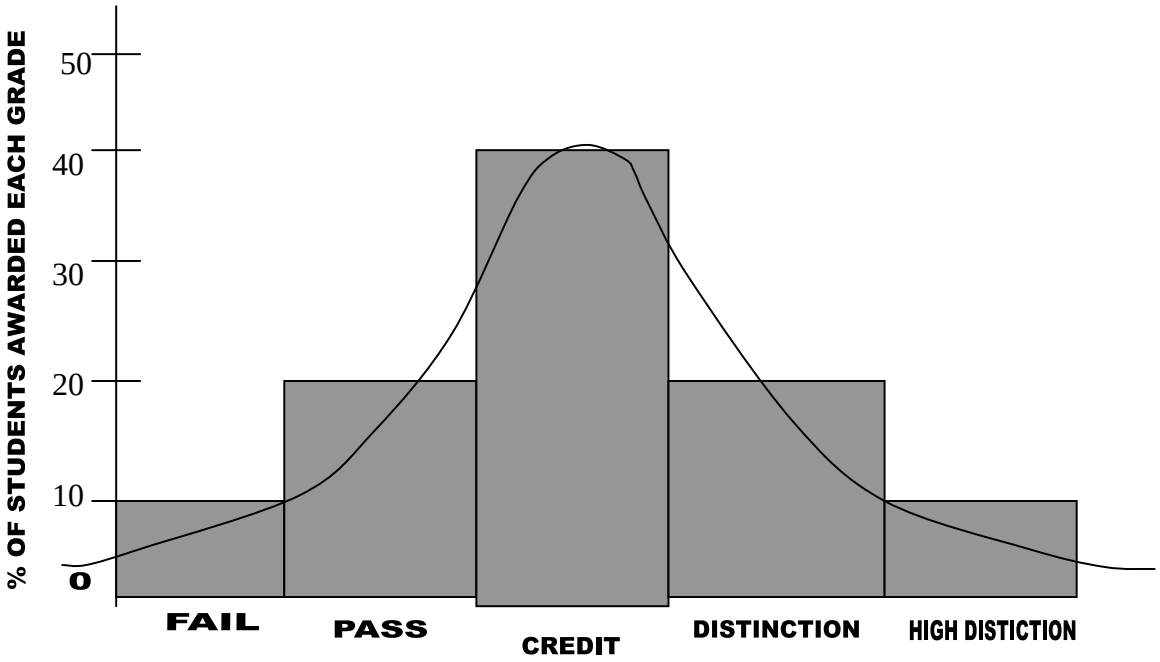


Figure 1: Normal (Bell-shaped) distribution of assessment results (Adapted from Rowntree, 1987)

2.10 Quantitative assessments versus Qualitative assessments

Quantitative assessments are those assessments that provide quantitative evidence (results) that can be summarised into meaningful numbers and analysed statistically. Quantitative assessments use structured, predetermined response options and are far more common because most assessors are familiar with quantitative assessment techniques, and their audiences feel more comfortable with quantitative results as they find them more convincing (Suskie, 2004). Quantitative assessment evidences like the test scores, rubrics and survey ratings seem much more convincing to some audiences and are still common in assessing learners on a number of learning areas in a school situation.

Quantitative assessments are not necessarily objective assessments, though the two are often confused. In fact, quantitative assessment evidence (result) is informed by subjective professional judgements of assessors. For instance, rubric scores are subjective ratings of learners' work that can be quantified and analysed statistically.

Qualitative assessments, on the other hand, use flexible naturalistic methods that are analysed by looking for concurring patterns and themes (Suskie, 2004). Qualitative assessments allow assessors to explore possibilities that have not been considered as they give fresh insight and help discover problems and solutions. Forms of qualitative assessment such as reflective writing, interview transcripts, notes from focus groups, field notes and online class discussion threads, all can be assessed qualitatively to gain more insight into the topic, theme or phenomenon under scrutiny.

2.11 Links with formative assessment

All the different kinds of assessment, whether traditional, alternative, criterion-referenced, norm-referenced, qualitative or quantitative, can be used in a formative way to enhance learners' understandings of concepts and processes in Natural Sciences. This implies that formative assessment is none other than the formalised assistance that is given by a knowledgeable person (teacher, parent, peer, etc) to a less knowledgeable person (learner, child, etc.) to help him or her achieve the desired goals (learning outcomes). In using formative assessment, a teacher identifies and rectifies the errors in a learner's body of knowledge, and fills the gaps that exist in this knowledge. This idea links with Vygotsky's theory of social constructivism as it also postulates the same ideas, with specific reference to the concepts of the Zone of Proximal Development (ZPD) and the More Knowledgeable Other (MKO). I alluded more to these concepts in the preceding text.

2.12 The practice of formative assessment

Formative assessments could be implemented in a very intense manner for the benefit of learners in a number of situations. Constructive feedback could take many forms, namely, as written comments and as an oral discussion between the assessor and the learners. Hereunder are a few strategies in which feedback could be provided.

2.12.1 Provision of written feedback to learners

Providing learners with written feedback is a practical engagement with learners' activities and requires careful consideration so that an assessor writes comprehensible comments that will have a developmental effect on the assessed (learner). Amongst the methods that can be used, Brown & Race (1995) mention the use of red pens as having a detrimental effect on learners because many learners associate red with criticism of an unconstructive nature. Legible handwriting makes it easy for the learners to understand what an assessor is telling them. Brown & Race (1995) are of the idea of using assignment attachment sheets to avoid repetition, and, correcting errors in learners' work that is not in a position to demoralise learners. Feedback comments should be sufficient so that learners get a realistic picture of how their work is going and how they can improve where necessary.

Learners need to be given an opportunity to discuss informally with their assessor so that they can reveal their reactions to written feedback. Due to diversities among learners, not all learners prefer written feedback. So it would be wise to instruct learners to indicate what sorts of feedback they would particularly like to receive. Keeping copies or records of particularly important instances of written feedback to learners is advantageous in reminding an assessor of what was involved. I also subscribe to these ideas with a view that they can raise the standard of performance of our learners if they are meticulously followed.

2.12.2 Provision of written feedback on marked work

Learners should not only experience positive comments about their assessed work, but negative criticism should also be included. Brown & Race (1995) advise that learners should be provided with clues and references showing where learners can get more information to help them develop their work. Acronyms and symbols that were used when marking learners' work should be explained so that their meanings are clarified. Written feedback should be purposeful and valuable rather than just critical, by explaining why things are wrong instead of just identifying things that are wrong without giving reason for their wrongfulness. Written feedback need not be lengthy, just brief and concise comments will do. The use of phrases like 'good point',

‘definitely’, ‘I agree’, etc. serves a good purpose rather than just putting ticks (Brown & Race, 1995).

2.12.3 Provision of face-to-face feedback to learners

When one gives face-to-face feedback to learners, one should ensure that one is visible to all learners by standing or sitting on an elevated surface where one can see the cues and facial expressions of learners and thus, avoid overloading them with information. Face-to-face feedback should begin with positive comments before getting on with negative criticisms, and it should end on a positive note. One should avoid patronising learners, for instance, one should not finish off their sentences when one knows what they are going to tell. An assessor should drive learners to tell during the verbal discussions what they feel about the work as such.

2.12.4 Assessing large groups

It is imperative for the Natural Science teachers I interacted with to know how to provide constructive feedback to large groups as they are faced with the same situation on a daily basis. Brown & Race (1995) provide some hints on how one can go about providing feedback to larger groups of learners. They assert that the nature of the assessment criteria to be employed in formal assessments need to be clarified so that learners can prepare appropriately for the assessment. Learners should be alerted to know whether the purpose of each assessment is for them to gain feedback (is formative) or whether the assessment is summative.

A teacher-assessor needs to gain feedback from colleagues to ascertain the appropriateness of choices when formulating the assessment criteria. One should seek feedback in terms of the clarity of the wording for each question and the standard of the questions when setting the examination questions. This is called moderation. Mostly, in our General Education and Training (GET) band, moderation of examination papers is done by the Education Specialist (commonly known as the Head of Department), or the Examinations Committee (sometimes called Assessment Committee). Where Learning Area Clusters (LAC’s) have been formed, moderation

of common papers is done at the level of clusters, with the involvement of the Learning Area Co-ordinator and the Subject Advisors from the District Office.

Handouts containing specimen answers and discussion commentaries would serve to maximise the feedback that large groups of learners receive on the assessed work. It is advisable that a feedback report for learners be written after testing, indicating common problems that were encountered by the candidates.

2.13 Summary

The preceding chapter tries to draw attention to the main aspects of assessment, formative assessment in particular, with specific reference to literature. Vygotsky's theoretical postulations are discussed and the connections between them and formative assessment are clarified. This chapter elaborates more on the principles of good assessment and feedback practices that govern the implementation of formative assessment. Different kinds of assessment strategies are discussed and linked to formative assessment. A discussion on the practice of formative assessment is given, with specific dimensions that help teachers to apply formative assessment during pedagogic interaction with learners. The researcher engages in extensive discussion, with reference to literature on assessments, in trying to explain what assessment, and formative assessment in particular, really is. Views on assessment that various authors put forward, as well as types and modes of assessment are explained and compared in terms of similarities.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter I shall describe the instruments and the process followed in conducting this research activity. I shall employ different methods of data collection and compare them with the collected data that I shall be investigating. I shall use data collection instruments, namely, semi-structured interview schedule, semi-structured observation sheet and analyse teachers' assessment documents, to gather 'in-depth, rounded and reliable data' (Cohen, Manion & Morrison, 2007; Henning, 2004). Pilot testing of data collection instruments is described and the entire research design is discussed. I shall also explore the issues of trustworthiness and reliability that I followed in this case study research with due attention to the three methods of data collection mentioned above.

3.2 Pilot testing

In order to ensure that the data I was going to collect answer the research questions satisfactorily, the data collection instruments had to be valid and reliable. Validity means that the instrument, in fact, measures what it purports to measure (Cohen, Manion & Morrison, 2007). In other words, validity is a characteristic that refers to the appropriateness of the inferences, uses and consequences that result from methods of collecting assessment data (McMillan, 1997). Two research instruments were going to be used during the actual data collection process, namely, the semi-structured interviews and semi-structured observation sheet. After I had designed the two data collection instruments, I piloted them in my neighbouring school with a participant who has been teaching Natural Sciences for more than eight years at Grade Seven level. The way in which she responded to the interview questions assured me that the instrument was indeed, valid and reliable.

To improve the validity of my pilot study, I also applied the principle of triangulation. Triangulation is the technique of using multiple data collection methods in the study

of some aspect of human behaviour (Cohen, Manion & Morrison, 2007). I piloted the first instrument by having a semi-structured interview with the afore-said Natural Science teacher. While we conversed, I made use of the radio-cassette recorder to capture the data I sought to obtain. The instrument proved to be valid in terms of the responses it generated from my respondent (See Appendix E), because it directly responded to my research question.

I also asked my participant to allow me to pay her a visit during teaching time. After we had made the necessary arrangements, I was able to observe her in practice. Consequently, I was able to capture the data I sought to obtain with regard to what was taking place in the classroom during my presence. Once more my semi-structured observation sheet proved to be valid and reliable as it directly responded to my research questions (See Appendix F).

3.3 Research design

The research design is a plan of how the researcher will systematically collect and analyse the data that are needed to answer the research questions. This is a qualitative case study research that is located within the interpretive paradigm and it pertains to the three primary schools in Umlazi District as the research sites. The three sampled schools are purposively selected for the sake of convenience. Qualitative data collection methods were used to collect data. I chose qualitative forms of inquiry because they hold promise for providing a more complex and complete picture of educational practice and its consequences. Eisner (1978) asserts that qualitative forms of inquiry have the potential to expand the conception of the way in which we come to know, and tend to focus on processes that animate classroom life, hence the possibility of locating the antecedents to educational success and failure are more likely. Eisner further indicates that one of the potential contributions of qualitative forms of inquiry is something that it least aims to achieve, that is, qualitative methods and artistic or humanistic assumptions complement quantitative and scientific ones to the benefit of both. Qualitative forms of inquiry have a potential in education in that they provide intellectual equity to those whose aptitudes reside in qualitative and artistic forms of expression in contrast to quantitative ones. Moreover, qualitative forms of inquiry offer no panaceas for educational problems (Eisner,1978).

I observed the teachers' documents to establish the extent to which teachers prepare for this assessment model, viz. formative assessment. Documents that would be analysed involved projects that were given to the learners, as well as the formally recorded marks obtained by the learners in Natural Sciences. Document analysis would shed light on whether the projects that teachers give are consistent with the learners' level of development and understanding, whereas the marks obtained by learners would indicate whether there is any improvement in terms of achievements in the tasks given to learners.

3.3.1 Description of the population

I selected my sample from the population of Natural Science teachers in Umlazi District. Population is the total number of all cases from which a representative sample is drawn for research investigation (Cohen, Manion & Morrison, 2007). The population in this study includes all Grade Seven Natural Science teachers in public schools in the two circuits of Umlazi District, which is located in Ethekwini region in the province of KwaZulu-Natal (R. S. A). In my study I purposively selected one circuit in Umlazi District, namely, Phumelela Circuit. Phumelela circuit has three wards, viz. Wards 114, 115 and 116, each under the jurisdiction of a Ward Manager. Schools from the three wards have grouped together to form learning area clusters. Teachers of each of the eight learning areas came together to design their teaching programme and set their common papers in order to ensure quality and uniformity. So, I selected three primary schools from the cluster as my research sites.

3.3.2 Sample selection

Due to factors such as expense, time and accessibility, to mention a few, a researcher is usually prevented from gaining information fro the total population s/he wishes to study. To overcome these problems, a sample is selected on the basis of similar characteristics to represent the entire population.

I used purposive sampling to select them on the basis of proximity. My sample includes three participants, one from each school. A sample is a small group or subset of a larger population from which the knowledge gained is representative of the total

population under study (Neuman, 1997). The participants were selected purposively on the basis of them teaching Natural Sciences). I refer to them as Teacher A, Teacher B and Teacher C. My sampling procedure is consistent with what Cohen, Manion & Morrison (2007) indicate when they assert that purposive sampling is a feature of qualitative research, and the cases are handpicked to be included in the sample on the basis of their typicality or possession of the particular characteristics being sought.
My cases in the sample are the teachers of Natural Sciences at Grade Seven level. Moreover, Ball (1990) argues that purposive sampling, in many cases, is used in order to access 'knowledgeable people', i.e. those who have in-depth knowledge about particular issues, by virtue of their professional role, power, access to networks, expertise or experience. I selected Natural Science teachers because of the same reasons. Fortunately, it came out that not one of them has less than five years' experience in teaching Natural Sciences. Their ages range between thirty and forty-five years, and include two female-teachers and one male.

3.3.3 Permission to conduct research

I asked for permission from the University of KwaZulu-Natal(Edgewood Campus) by submitting the Research Proposal with the Ethical Clearance which could help me observe all the ethical restrictions and regulations binding the scholarly research activities. As soon as I obtained the ethical clearance, I wrote a letter to the District Director, requesting permission to conduct a research in the schools within the district under his jurisdiction (See Appendix A)

I also requested permission from the principals of sampled schools to conduct interviews with Grade Seven Natural Science teachers. My requests were in the form of consent letters (See Appendix B). The principals gave me positive responses and advised me to negotiate with the teachers themselves.

Firstly, I made appointments with Natural Science teachers so as explain what it was all about in order to alleviate all sensitivity and clear up misconceptions and confusion with regard to the activity we were going to undertake with them. After we had met, I made formal requests to them to participate in the research activity. The requests were in the form of a consent letter (See Appendix C).

I pleaded with them (Natural Science educators) to sign the declaration of consent (See Appendix D), so that I could also feel secure with their voluntary participation in the research activity as per agreement with them.

3.3.4 Interviews with the participants

I conducted three semi-structured interviews with three purposively selected Natural Science educators, one from each school. I would use qualitative approaches to elicit in-depth knowledge about the implementation of formative assessment by the participants. I preferred this data collection instrument because I would be present during the interview session, therefore I could clarify my questions and even rephrase them to elicit more descriptive data. Moreover, interviews are simpler because it is easier for an interviewee to talk than to write down very lengthy responses in a questionnaire, for example. I would be very cautious to avoid interviewer bias at all cost. The participants had condescended to my request to use a tape-recorder to capture the interviews by signing a declaration of consent (see Appendix D).

Teaching Natural Sciences at Grade Seven was one criterion for selection. The interviews with the sampled teachers would help me to know whether formative assessment is conducted by these teachers in their classrooms and would inform me about the challenges that teachers experience in implementing formative assessment during the course of their lessons. Each interview session would not last more than thirty minutes and would be held at the place that the participant is comfortable with. Since we share the same profession with the participants, I did not anticipate any threat in as far as the economic status of the researcher is concerned. Interview data are analyses in the following chapter.

3.4 Trustworthiness and dependability of the study

Among the things that I observed with regard to the authenticity of this activity is the issue of trustworthiness and dependability of the whole exercise. It is prerogative that a research activity has to be authentic in all respects. To explore this aspect, I looked at trustworthiness and dependability as relevant aspects of a qualitative study. These aspects are referred to as validity and reliability, respectively, by quantitative researchers.

3.4.1 Trustworthiness

To increase the level of trustworthiness I triangulated the data collection methods. Triangulation is the use of various data collection methods in order to increase the level of validity and reliability. Validity, as equated with trustworthiness, is a characteristic that refers to the appropriateness of inferences, uses and consequences that result from methods of collecting assessment data (McMillan, 1997). In simple terms, validity refers to the extent to which something is sound or can be justified or trusted. Dunn, et al (2004) argue that validity in assessment tasks is referring to assessment tasks that actually measure the performance of the intended learning outcomes specified, and so meaningfulness and usefulness are central. I had piloted the data collection instruments to ensure trustworthiness of the data I sought to collect. The methods of collecting data that I employed in the study can be justified by my research questions. I used semi-structured interviews, observation and document analysis to ensure that the data I collected is a true reflection of what is really happening in the Natural Science classrooms in the sampled schools. Since I have used different data collection methods I believe the findings are also valid.

Validity refers to the extent to which a specific measurement provides data that relates to commonly accepted meanings of a particular concept. There are numerous yardsticks for determining validity, namely, face validity, criterion-related validity, content validity and construct validity (Neuman, 1997). On the other hand, (Lubisi, 1998) describes it as referring to the extent to which the research is trustworthy, sound or justifiable.

3.4.2 Dependability

The selection of data collection methods is vital in the sense that appropriate methods elicit reliable data from the participants, the primary and/or secondary sources. Once the data that have been collected are reliable, it becomes conclusive that the findings also become reliable. Reliability, as equated with dependability in qualitative studies, refers to the ability to generalise from a sample to a domain, that is, the level at which something can be trusted (Salvia & Ysseldyke, 1995). The methods that I have used fit the purpose of the research activity as they are determined by the type of my research questions. So, the purpose of my case study research to find out how Natural Science educators implement formative assessment in their classrooms fits the data collection methods I have used.

Reliability refers to the likelihood that a given measurement procedure will yield the same description of a given phenomenon if that measurement is repeated. There are three types of reliability, namely, stability reliability which addresses the stability of an instrument across time, representative reliability which represents activity across subpopulation or groups of people, as well as equivalence reliability where the researcher uses multiple indicators (Neuman, 1997). In short, reliability refers to the extent to which the research can be replicated and still expect to find similar results (Lubisi, 1998).

3.5 Observation of classroom contexts

I also observed the three sampled Natural Science teachers in practice. The use of semi-structured observation schedule would guide me through and help me focus on predetermined aspects of the lesson and the environment in which teaching and learning takes place. Semi-structured observations would help me determine the kinds of formative assessment strategies that teachers apply consciously or unconsciously during teaching and learning.

3.6 Document analysis

I observed the teachers' documents to establish the extent to which teachers prepare for this assessment model, viz. formative assessment. Documents that would be analysed involved projects that were given to the learners, as well as the formally recorded marks obtained by the Natural Science learners. Document analysis would give light whether the projects that teachers give are consistent with the learners' level of development and understanding, whereas the marks obtained by learners would indicate whether there is any improvement in terms of achievements in the tasks given to learners. I give more detail on this aspect in the following chapter where I analyse the data extensively.

3.7 Summary

Vygotsky's theory of constructivism form basis for this case study research. It lays the foundation on which further study could be made. The concept of the Zone of Proximal Development (ZPD) informs a teacher as to when a child needs formative assistance in order to master the tasks s/he is given. The theory is consistent with the current dispensation when learners are expected to perform well and compete globally with the skills they receive from schools from primary to tertiary level. To ascertain the validity and reliability of my instruments, I piloted my study with a teacher from my neighbouring school, and she happens to be very experienced in the subject.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

Hereunder I shall give an analysis of the collected data in the form of themes under which I have grouped some common aspects of our discussions with the respondents. The three interviews I conducted with the three respondents who teach Natural Sciences in Grade seven classes of three different schools were semi-structured. I used a tape recorder to capture all the data that the respondents yielded. I also used field notes to record what was happening and relevant to my study. The themes that I shall allude to include overcrowding in the Natural Science classrooms, lack of resources, experience of Natural Science teachers in Grade seven, response of learners to given tasks, as well as the implementation of formative assessment during teaching and learning in the classrooms. All these factors somehow hinder the implementation of formative assessment as explained below. Such themes attempt to address the question as to 'what challenges are facing teachers in implementing formative assessment in their Natural Science classrooms?'

4.2 The interview analysis

In the following text I am analysing the data that I elicited from the participants during the interview sessions. I have grouped common ideas into themes and discussed them at length. I have quoted some very important ideas verbatim. Since we conducted these interview using English and IsiZulu, some responses are expressed in both languages. I also interpreted the sentences into English where I feel the idea will be obscured for the reader's convenience.

4.2.1 Challenges facing educators in implementing formative assessment

From the interviews I had with the participants, it became apparent that the sampled participants do experience problems in implementing formative assessment due to various factors that impact negatively on their teaching practice. Hereunder I mention

those factors with particular attention to the provision of formative assistance in the form of feedback to the learners.

4.2.2 The impact of overcrowding in the Natural Science classrooms

In spite of the new buildings having been erected in all three schools during the early years of this decade, congestion is still prevalent and plays a prohibitive role in teaching and learning. It is problematic for teachers to move through the groups and to give individual attention to learners due to overcrowding. Each group consists of more than eight learners in all classes, and each classroom consists of more than sixty learners in all three schools. This hinders the teachers from efficiently reaching all learners, and limits the number of assessment tasks to only the prescribed ones. This limitation is due to a large-scale marking that teachers are faced with after the tasks like tests and assignments have been completed. It takes a longer time for the teacher to mark each task. Consequently, regular constructive feedback is hampered in the process. Poor implementation of formative assessment is further exacerbated by the fact that each school has five Grade seven sections, which makes it a daunting task to render formative assessment to all individual tasks within the projected time frame.

Overcrowding means a lack of physical space in the classroom, which in turn, limits the forms of assessment to tests and assignments. Group projects seem to get little attention from teachers because of a lack of working space and the resources available. None of the schools I researched has a laboratory, which contributes to the problem of space that is conducive to the teaching and learning of Natural Sciences, as well as the completion of practical projects as planned in the teachers' work schedules. This discourages Natural Science teachers from assigning tasks in the form of projects as they would not be efficiently done and produce valid and reliable results. Even if a project has been given to a group, it does not yield valid results because not all learners in a group partake equally in its completion. Others just look on passively and end up doing nothing at all. Tasks that are supposed to be done at home do not receive the necessary attention from the learners.

Overcrowding causes somewhat 'a pedagogic dilemma'. This dilemma comes from the incompatibility between the policy and practice. In the new curriculum

dispensation the education authorities are very cautious about teacher-learner proportions. The Post Provisioning Norm (PPN) determines the number of teachers as against the number of learners in a school. This practice emanates from the provisions of the Employment of Educators Act No. 76 of 1998, which focuses on equitable distribution of both human and material resources. Consequent to this Act, staffing of teachers is influenced by the fluctuations of enrolments. The more learners a school enrols, the more teachers get employed or retained in their respective post in that particular school. Schools have therefore developed a tendency to enrol more learners than necessary, in order to keep their teachers employed in those sites.

This causes a dilemma because teachers are caught in a difficult position where they have to keep enrolments high in order to maintain their employment. They sacrifice their classroom capacities in order to retain their posts. This practice eventually leads to overcrowding that hinders pedagogic interaction between teachers and learners. It is no surprise that all the respondents complained about high enrolments in their classrooms, ranging from sixty to eighty-five learners in each classroom. Congestion in the classroom does not only have managerial problems but also has functionality problems. Formative assessment also suffers because individual attention cannot be efficiently given to all learners in large classes.

4.2.3 The impact of a lack of resources in Natural Science classrooms

Many schools still experience the same problems of a lack of teaching and learning material. The scarcity of resources hinders classroom activities like completing the projects, conducting experiments in Natural Science, etc. Nevertheless, the Department of Education has put more effort in trying to address this problem by introducing packages in the form of Norms and Standards for public schools under Section 20 category. This allows schools to requisite items they require from the department. These items range from purchase of furniture and stationery to paying electricity, water and security services bills. The problem lies with the delivery of these services. When I enquired Teacher A about the efficient delivery of items they requisite from the department's Norms and Standards section, she said, 'Most of the time siya-oda kodwa akufiki. Njalo uma si requisita lokhu esiku expectile asikutholi' (Each time we requisite from the department, we do not always receive the items we

expected). It is common in all researched schools that whenever some items have been requisited from the department through Norms and Standards, few or no items will reach the schools. Even if they do reach their destinations, they are not delivered timeously. However, Teacher C indicated some degree of improvement with regard to delivery of materials for the forthcoming year in his school as it was delivered before the new academic year, 2009, began.

All sampled schools fall within Section 20 category of schools, and therefore charge school fees from parents of learners enrolled in them. These schools cannot rely on the schools fees charged because most of the parents do not pay the fees as expected. Non-payment of school fees causes a lack of funds to help purchase teaching and learning materials. Lack of resources impacts negatively on the teaching and learning activities since a teacher needs to explain or describe unknown concepts or processes without reference to any model or facilitative device to help reinforce understanding in learners' cognitive processes. This also impacts negatively on the implementation of formative assessment as it leaves no better option to describe or explain abstract concepts and processes. As a result, teachers do not often apply formative assistance because they spend most of their time explaining processes and concepts.

Though my respondents partially attributed the non-use of formative assessment in their classrooms to a lack of resources, I cannot condescend to their perception. Formative assessment merely requires a teacher to sequence his or her instructional activities in a meaningful way, in line with the pre-set learning outcomes and assessment standards. A teacher is then required to provide continuous feedback and constructive assistance to the learners on the work that they have done. This does not have much to do about the availability of resources in particular.

4.2.4 Lack of supervision over teaching and learning material

In school where there are some teaching and learning materials the problem lies with supervision. There seems no one who takes responsibility for the acquired materials. This was evident at Watermelon S. P. school where I was conducting an interview with Teacher A. In the midst of our conversation, a lady teacher who had been occupied with the marking of test exercise-books during break, came in to have her

meals. I noticed that her meal was contained in a plastic container that comes with the science-kit. It might not have been the first time the teacher used that apparatus because it is used to contain even the harmful substances. The inappropriate use of apparatuses due to a lack of supervision indicates a particular degree of mismanagement or irresponsible handling of science materials. Even though my respondent blamed the lack of resources largely on the act of vandalism by the local communities, I also learned that there was a lack of supervision over the little materials that the school had acquired through Norms and Standards.

4.2.5 Teachers' experience in implementing formative assessment

Experience in teaching a particular learning area should provide a teacher with expanded opportunities to explore various methods of facilitating understanding in his or her learners. Among the things that educators need to explore are the policy documents governing the teaching of the subject and assessment practices thereof.
None of the respondents has less than eight years' experience in teaching Natural Science at Grade Seven level. In spite of the vast experience that my respondents, i.e. Teacher A, Teacher B and Teacher C, have accumulated over the years, it is still not clear to what extent they give formative assistance to their learners because none of them was able to show me his or her assessment programme that spells out the formative tasks clearly. Assessment programme should give clear guidelines that could help learners achieve particular learning outcome (s).

When I enquired Teacher A about the problems she experienced in implementing formative assessment she indicated that some learners do not complete the tasks they are given, which makes it even more difficult to determine how much they know or how much strength they have in completing the assigned tasks. Their failure to respond to tasks cerates a stalemate as the teacher becomes sceptical about where to begin in assisting them. She even said that homework activities are only completed by a few learners, most of whom from the middle-class families. This claim probably implies that the non-completion of tasks relates to the level of poverty that engulfs particular families from which these learners come, and seemingly assumes that the more poverty there is in a family, the less response to tasks there will be. Well, that requires its own investigation to establish the truths behind the claim.

4.2.6 The quality of feedback

Feedback is the most important exercise that every teacher should give to his or her learners, especially as it does not require extra-time to conduct. In fact, feedback should be targeted to enhance learning and should be timely. Feedback that is not timeous is irrelevant. Race (1999) suggests that teachers should try and give feedback before they start assessing. He maintains that feedback should be efficient, realistic, fair, honest and motivating. Quality feedback should let students argue. Race, Brown & Smith (1996) further maintain that feedback should be personal and individual. This means that feedback needs to tally with the student's achievement, individual nature and personality. They also maintain that feedback has to be articulate, that is, learners should not struggle to make sense of the feedback. Confusion needs to be avoided at all cost in our feedback.

Race, Brown & Smith (1996) are of the view that feedback should be empowering, manageable and developmental. It is common understanding that feedback should strengthen and consolidate learning because it entails positive thinking. Positive feedback motivates and encourages learners to do even more. It is therefore empowering. Developmental feedback is expressed in a clear language and is realistic. Feedback is developmental when it clarifies misconceptions. Using words such as *'weak'*, *'excellent'*, *'good'*, etc. is not good-enough when feedback is to be developmental. They may cause confusion to a learner as they are sometimes loosely assigned as a comment on the learner's performance, especially in for the tasks that require subjective judgement like projects, essays, etc. Something that is just 'good' can be labelled as 'very good', and that which is 'very good' can be labelled as 'excellent'.

Manageable feedback is the one that can be accommodated within the time available. This notion has two facets, that is, designing and delivering feedback could be time-consuming for a teacher, and on the other side, too much feedback can result in learners failing to discern the important feedback from routine feedback.
From the documents I analysed, there was no evidence of any constructive feedback being given in the form of written comments. Also, from the three unstructured

observations I conducted in each of the three schools, there was no evidence of any effective oral feedback given to learners. Even though Teacher A claimed during the interview that she regularly gives feedback after a task has been completed, there was no evidence to back up the claim during my observation of the teacher in practice and no records were available concerning feedback on the learners' exercise-books.
All my participants to the interview do acknowledge the crucial role that formative assessment plays in facilitating learners' understanding of the concepts and scientific processes in Natural Science. They even assert that formative assessment serves to diagnose learners' problems and helps teachers to adjust their programmes by means of 'teach/re-teach' strategies. This indicated to me that teachers do have a basic understanding of what formative assessment is and requires. I therefore assume that the problem lies with the implementation of formative assessment due to various factors mentioned in the preceding text.

4.2.7 Lack of motivation among learners of Natural Sciences

Motivation of learners to complete assessment tasks is a cornerstone for effective learning. Giving constructive feedback motivates learners because once feedback is given, learners come to understand their tasks more deeper than before. Even those who could not complete tasks are encouraged to complete them because they know what to do. Learners who carefully complete their tasks are able to accumulate continuous assessment marks that will make them progress to the next grade. If they cannot complete the tasks they will not be able to collect sufficient marks for progression.

Even though the assessment policy does not recommend the use of marks or numbers to describe the strengths and weaknesses of a learner's performance, many institutions still rely on awarding the scores or numbers to precisely measure their learners' performances. Instead, the policy implicitly prescribes the use of scores as shown in the departmental exemplars of progress reports from Grades 4 to 9 (See Annexure C: 2 & 3 in the *National Policy on Assessment and Qualifications for Schools in the General Education and Training Band, 2001*). Here, percentages and codes reflecting the level of achievement need to be recorded. In other words, marks are translated into

percentages that are also translated into rating codes. Each rating code is described in terms of achievement in each of the assessed subject.

The policy stipulates that Continuous Assessment in Grade R to 8 will comprise one hundred percent (100%) of the assessment programme. Continuous Assessment is described as an assessment model that encourages integration of assessment into the teaching and development of learners through on-going feedback (NDE, 2001). This means that feedback is not just an optional exercise that a teacher can choose to give, depending on the conditions and time available to his or her class. It has been established that the development of learners is dependent on the integration of teaching and learning with on-going feedback (See Clause 22 and 23, Part 2: Assessment in the GET Band).

What I have learned from the sampled schools is that all three Grade Seven Natural Science educators do not regard constructive feedback as a prescription, but take it as an option that depends on the availability of time and the conduciveness of the conditions in their classrooms. Since all of their classrooms are congested, they just do not give sufficient feedback to their learners.

During the interview session with Teacher C from Litchi S. P. School, he put it frankly that he does not give feedback at all because of the tight programme in his school and that he teaches Technology as well in all Grade Seven classes. I also witnessed it during my observations in his classroom when he was returning the learners' tests exercise-books. He merely told the class that the performance was poor in spite of the fact that the year was nearing to an end. He, nevertheless, cautioned learners about the possibility of repeating the class if they did not improve on the marks they already had. Those were his general comments regarding the class performance. There were no individual comments that could specifically indicate the areas of weakness that caused the individual learners to attain the marks that he or she had.

During the interview session with Teacher A from Butternut S. P. School, I asked her if she gives feedback to her learners. Her response was, 'Ya. Siyakwenza lokho sibachazele ukuthi yini obekufanele bakwenze' (Yes. We do that and explain to the

learners what they should have done). On the contrary, during my second observation in her class, she returned the scripts the test scripts to the learners. She merely commented that their performances were not up to the expected level, particularly at that time of the year. There were no written comments specifying the areas of weaknesses for the individual learners. This does not suggest that comments always need to be written in order to serve the desired purpose. It simply means that the comments she gave were not sufficient to help individual learners identify specific problem areas in a test. Harris & Bell (1994) assert that 'in a face to face situation constructive feedback can involve more, from simple questions and answers about marked assessment to full negotiation of judgements'. They also indicate that 'a mark or short comment on an assignment is unlikely to have much of a formative effect, whereas using an assignment (be it written, discursive or practical) to open discussion about learning, about needs, about future learning, has a vast potential. From what I observed, feedback was not sufficiently given to learners.

During my second observation session, the teacher returned their projects and asked the learners to hang them onto the walls of the classroom. She did not explain how the two kinds of plants differ in areas where there was confusion among the learners' responses, namely seeds, flowers and leaves.

During my third observation of the same teacher in practice, I could not witness any continuation of rendering feedback because the teacher introduced a new theme to the class. I assumed that the teachers was done with all the feedback strategies regarding the marked test, and that no further comments would be made since she had started on a new theme.

I was expecting more clarifications and descriptions of the features where learners showed some confusion, but none took place. During my third and last observation session, the teacher went on to introduce another theme, namely the fungi kingdom, which is another theme of living organisms. To me, no sufficient feedback had been given regarding the project.

4.3 Document analysis

Among the documents I analysed during my visit at the research site was the mark schedules of one class in each school. Progression of learners to the next grade is dependent upon specific achievement in assessment activities on a continuous basis. The national codes, together with either the descriptors or the percentages are provided in the *National Policy on Assessment and Qualifications for school in the General Education and Training band (2001),* and should be used for recording and reporting learner performance. The following table (Table 1) presents the national rating codes, descriptors of competence and percentages that a learner is compared to in order for the teachers to decide whether a particular learner qualifies for progression to the next grade or not.

RATING CODE	DESCRIPTION OFCOMPETENCE	PERCENTAGE
7	Outstanding achievement	80 - 100
6	Meritorious achievement	70 - 79
5	Substantial achievement	60 - 69
4	Adequate achievement	50 - 59
3	Moderate achievement	40 - 49
2	Elementary achievement	30- 39
1	Not achieved	0 - 29

Table 1: Codes and percentages for recording and reporting in Grades 7 - 9

Specific achievement regulations with regard to the scores a learner should obtain are issued, mutatis mutandis, every academic year specifying progression requirements for a particular grade.

4.3.1 Analysis of assessment marks obtained by Grade Seven Natural Science learners of Watermelon C. P. School (pseudo-name)

The following are the results that learners obtained from the three quarters of the academic year 2008. In fact, this is the analysis of the Natural Science results that Grade Seven learners from Watermelon Combined Primary School obtained in the afore-said academic year. The analysis is in tabular form and further analysis is done

in graphical form. The class enrolment was sixty-five at the beginning of the year but four learners dropped out during the second term.

The following frequency table shows the number of learners who obtained a particular mark within a specified range in percentages. The letter (N) represents the total number of learners who completed the assessment tasks and obtained the specified mark.

1st Term: MARCH	**2nd Term: JUNE**	**3rd Term: SEPTEMBER**
RANGE IN %	RANGE IN %	RANGE IN %
0 ---29 : 25	0 ---29 : 21	0---29 : 17
30---39 : 15	30---39 : 18	30---39 : 16
40---49 : 12	40---49 : 10	40---49 ; 14
50---59 : 07	50---59 : 06	50---59 : 04
60---69 : 04	60---69 : 03	60---69 : 08
70---79 : 01	70---79 : 03	70---79 : 02
80---100 : 01	80---100 : 00	80---100 : 00
N = 65	N = 61	N = 61

Table 2: Natural Science assessment scores for Grade 7 learners at Watermelon C.P. School

The above analysis shows that there is very little improvement, if there is any, in the scores that learners obtained in the first quarter, through the second up to the third quarter. The majority of learners obtained less than fifty percent. None of the learners obtained more than eighty percent in the second and third quarter.

Hereunder is the graphical representation of Natural Science marks that learners obtained during the three terms.

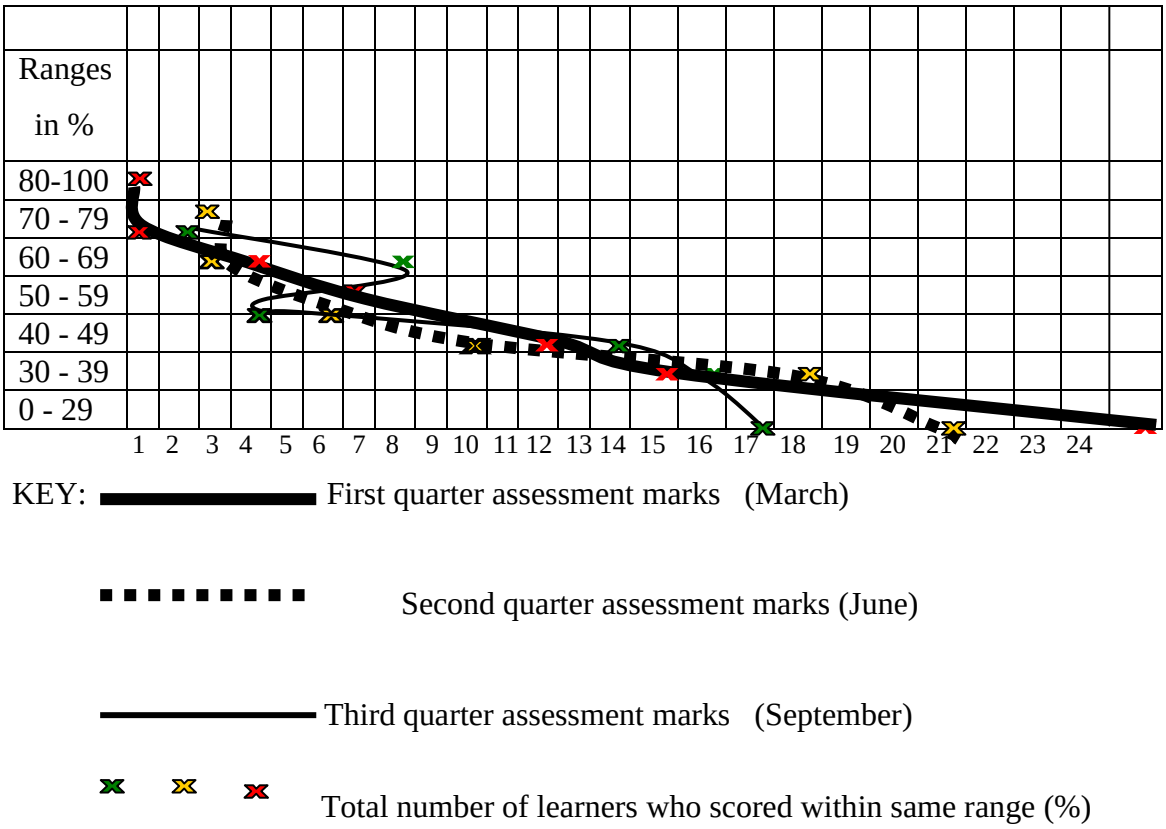


Figure 2: Graphical presentation of Watermelon C.P. School's Grade 7 learners' Natural Science marks

From the above graphical presentation it is clear that learner performances are deteriorating instead of improving. More than seventy-five percent of the class score below fifty percent in Natural Sciences in all three quarters of the year. This needs urgent attention because there should be some improvements each time learners write or complete their projects. In this case there is no positive correlation between all three set of assessment scores.

4.3.2 Analysis of assessment marks obtained by Grade Seven Natural Science learners of Butternut S. P. School (pseudo-name)

The following are the assessment scores for Grade Seven learners for the three terms of academic year 2008. At the beginning of the year the class had an enrolment of eighty-one, but one learner dropped out during the third term. The classroom is highly congested as shown by the total number of learners in it. The following frequency table shows the number of learners who obtained a particular mark within a specified range in percentages.

1st Term: MARCH	**2nd Term: JUNE**	**3rd Term: SEPTEMBER**
RANGE IN %	RANGE IN %	RANGE IN %
0 – 29 : 28	0 – 29 : 29	0 – 29 : 28
30 – 39 : 21	30 – 39 : 22	30 – 39 : 27
40 – 49 : 15	40 – 49 : 14	40 – 49 : 15
50 – 59 : 10	50 – 59 : 06	50 – 59 : 07
60 – 69 : 05	60 – 69 : 06	60 – 69 : 02
70 – 79 : 02	70 – 79 : 03	70 – 79 : 01
80 – 100 : 0	80 – 100 : 01	80 –100 : 0
N = 81	N = 81	N = 80

Table 3: Natural Science assessment scores for Grade 7 learners at Butternut S. P. School

The above table shows that there is no improvement at all. From the first quarter, through the second, up to the third quarter, learner's performances have been deteriorating. In the first quarter, seventy-nine percent got less than fifty percent. In the second quarter, eighty percent got less than fifty percent, and in the third quarter, more than eighty-seven percent got less than fifty percent. This means that as the year goes by, learners experience more difficulties in mastering Natural Sciences. In such a situation, formative assistance is increasingly required by the learners as one can see that when the going gets tough, the tough gets going.

Hereunder is the graph showing Grade Seven learners' scores that they obtained during the three terms, viz. first, second and third terms (March, June and September,

respectively). It shows the total number of learners who obtained a particular score on assessment during the three quarters of the year.

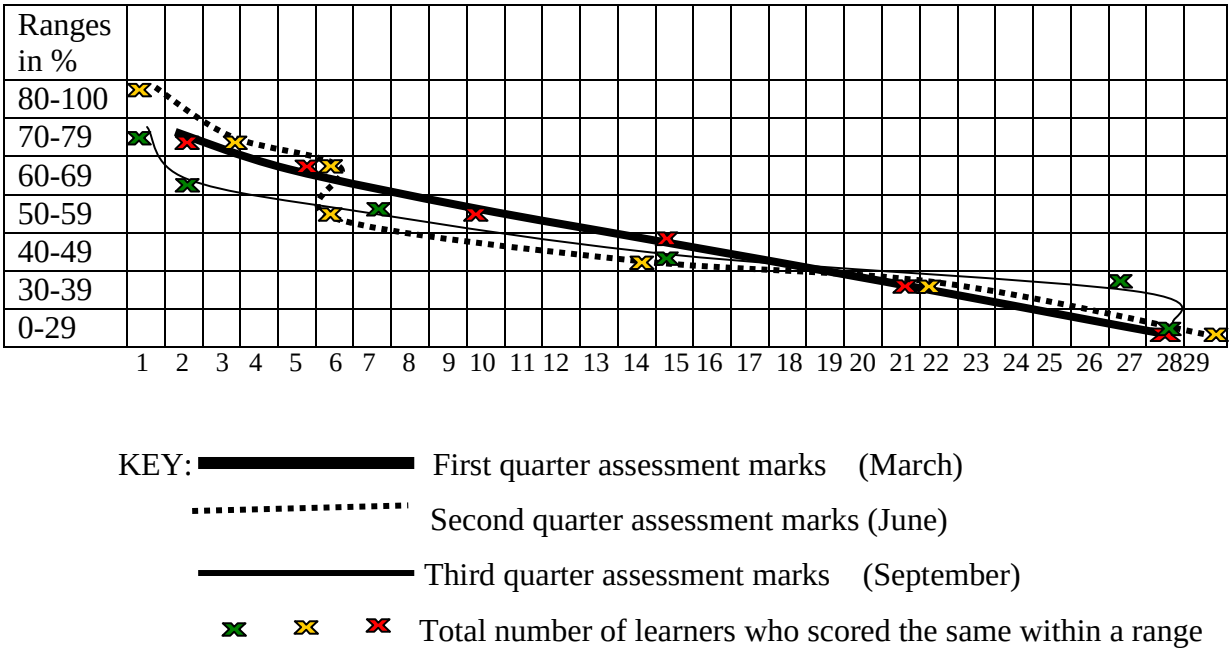


Figure 3: Graphical presentation of Butternut S. P. School's Grade 7 learners' Natural Science marks

The above graphical presentation indicates that there is a deterioration of learners' performances regard to the Natural Sciences in this class. All the lines of regression (lines of best fit) show that very few learners obtained more than fifty percent. In fact, if good performances would had been achieved by these learners, the lines of regression would point the other way, or would have a bell-shape to show normal distribution of scores. This is best illustrated in Figure 1 (page 30) where competencies range from very poor performance (labelled as *Fail*) to outstanding performance (labelled as *High Distinction*). This further necessitates a careful consideration of the use of formative assessment to assist the learners achieve better performances than the ones shown above.

4.3.3 Analysis of assessment marks obtained by Grade Seven Natural Science learners of Litchi S. P. School (pseudo-name)

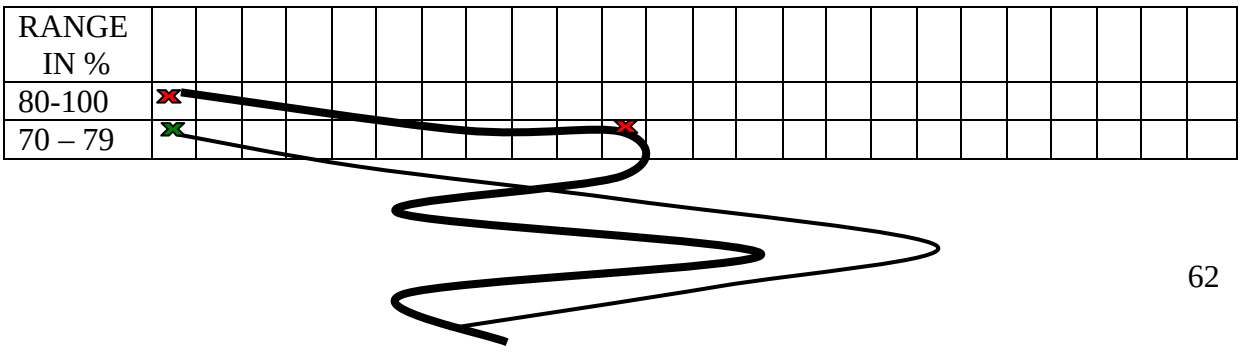
I also analysed the marks for Grade Seven learners from Litchi S. P. School (pseudo-name) where learners' performances appear very unstable. At the beginning of the first term, the distribution of marks give hope that mush goodness will follow after a while. As time goes on, one realises how serious learners' performances have been affected by various factors, some of which have been exposed during the interview sessions with educators. Hereunder is the frequency table showing the distribution of Natural Science scores of Grade Seven learners for the three terms.

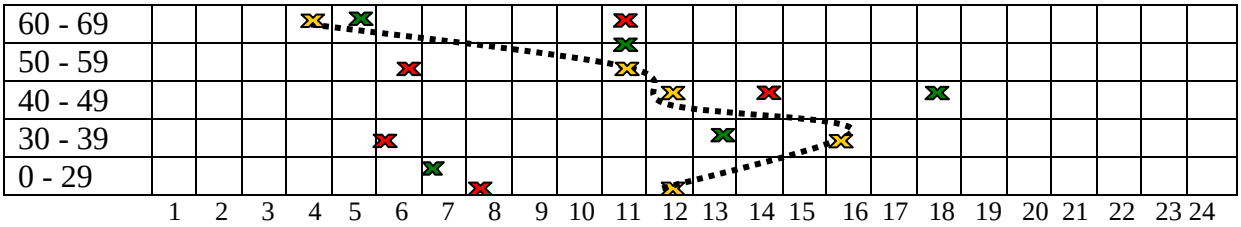
1st Term: MARCH	2ND Term: JUNE	3rd Term: SEPTEMBER
RANGE IN %	RANGE IN %	RANGE IN %
0 – 29 : 08	0 – 29 : 12	0 – 29 : 07
30 – 39 : 06	30 – 39 : 16	30 – 39 : 13
40 – 49 : 14	40 – 49 : 12	40 – 49 : 18
50 – 59 : 06	50 – 59 : 11	50 – 59 : 11
60 – 69 : 11	60 – 69 : 04	60 – 69 : 05
70 – 79 : 11	70 – 79 : 0	70 – 79 : 01
80 – 100 : 01	80 – 100 : 0	80 – 100 : 0
N = 57	N = 55	N = 55

Table 4:Natural Science assessment scores for Grade 7 learners at Litchi S. P. School

The distribution of scores during the fist term is promising since half of the class got more than fifty percent during assessment in Natural Sciences. During the second term the scores lowered considerably because seventy-two percent of the class got below fifty percent. Almost the same thing happened during the third term because sixty-nine percent of the class obtained less than fifty percent in Natural Sciences.

Below is the graph showing the distribution of learners' scores in Natural Sciences. All three terms, namely, first, second and third terms, are represented by means of a line of regression.





KEY: First quarter assessment marks (March)

Second quarter assessment marks (June)

Third quarter assessment marks (September)

Total number of learners who scored the same within a range

The preceding graph indicates that there was promising performance at the beginning of the year, i.e. during the first term. The lines of regression for the second and third terms indicate deteriorating performances of learners. The distribution here is far from normal. The performances of the second and third terms seem a little identical. They both sow how important to implement formative assistance in order for the learners to improve. These performances implicitly inform the Natural Science teacher that learners have probably reached what Vygotsky calls the Zone of Proximal Development where an adult plays a vital role of assisting the learner to master the learning content and complete task given in order to accumulate sufficient marks during assessments.

4.4 Analyses of Projects

All my participants had complained during the interview sessions I held with each of them that learners do not adequately complete their projects, especially if they had to do them at home. So they gave the following projects for learners to complete during the Natural Science periods.

Project I

Teacher A from Butternut S. P. School gave her learners some work-sheets which they had to complete in their respective groups. They had to recall and circle the

names of planets they had learned about, and number them according to their sequence in the Solar system. Hereunder is the format of the worksheet:

EARTH AND BEYOND: Circle the following words from the puzzle:

Mercury, Uranus, Pluto, Jupiter, Mars, Neptune, Earth, Uranus, Saturn, Planets

S	A	J	K	B	U	C	I	J	N	Z	O	Y
E	W	A	U	D	A	H	B	N	D	Q	R	A
O	T	U	L	P	R	R	A	X	P	U	S	J
D	K	G	S	G	I	W	V	O	C	E	W	R
X	C	G	K	G	Q	T	N	R	F	U	Z	S
P	B	O	A	H	S	F	E	C	R	T	U	R
Y	A	U	N	T	T	M	S	R	H	N	P	E
P	N	K	Z	R	E	U	A	O	A	K	F	T
J	N	S	F	A	N	Z	T	R	V	J	O	Q
D	Q	W	T	E	A	L	U	I	S	C	K	Z
I	Z	V	V	K	L	U	R	B	M	L	X	P
R	E	N	U	T	P	E	N	P	S	O	N	X
M	A	H	M	L	T	O	T	I	S	G	V	M

Some groups could not find all the names of planets while others could not sequence the planets according to their order in the solar system. The teacher interacted with the learners in marking the project by exchanging their worksheets so that one group marks the other's worksheet. The teacher checked the marked scripts and then awarded the marks.

In spite of the problems that learners exposed in terms of sequencing the planets, the teacher did not pay much attention to each individual worksheet, but merely praised the groups that got more answers than others. So, the problem of sequencing the planets and knowing their names perfectly remained unresolved.

Project 11

Teacher B from Watermelon Combined Primary School instructed her learners to compare monocotyledonous plants with dicotyledonous plants. They had to use an A3

size blank sheet of paper to establish different features of a plant and indicate whether they belonged to monocotyledons or to dicotyledons. They had to collect the two kinds of plants and dissect their flowers to determine whether they were monocots or dicots by counting the number of petals and sepals of each flower. Then they had to paste them in the appropriate space on the sheet of paper spaces provided for the different sections of both plants. They had to look at the leaves, root patterns, seeds and stems of these plants. Once they had pasted them, the teacher advised them to laminate their completed sheets with a plastic to protect them from falling or tearing off. Hereunder is the format of the project:

THE PLANT KINGDOM

THEME: Compare the features of monocotyledonous and dicotyledonous plants

FEATURE	MONOCOTYLEDONS	DICOTYLEDONS
Flowers		
Leaves		
Root pattern		
Seeds		

All the groups completed the tasks and the teacher collected the projects and marked them by determining whether a group had put the correct feature in the space provided. Some groups had confused flowers and leaves of the two kinds of plants. It seemed to me that they all had similar understanding of the root patterns and stems. Some groups could not differentiate between the types of seeds of monocotyledons and dicotyledons and hence, confused the seeds of the two kinds of plants. They probably had not comprehended the determining features of the two kinds of seeds.

During my second observation session, the teacher returned their projects and asked the learners to hang them onto the walls of the classroom. She did not explain how the two kinds of plants differ in areas where there was confusion among the learners' responses, namely seeds, flowers and leaves.

I was expecting was expecting more clarifications and descriptions of the features where learners showed some confusion, but none took place. During my third and last observation session, the teacher went on to introduce another theme, namely the fungi kingdom, which is another theme of living organisms. To me, no sufficient feedback had been given regarding the project.

Project III

Teacher C from Litchi S. P. School gave his learners some worksheets to complete by comparing the effects of Bromothymol Blue (BTB) on different bases. Learners had to determine whether each base had more acid or alkaline, using the pH-scale. He gave them the following table:

THEME: Acids and Bases

Grade: 7 Name: _____

CHEMICAL	INDICATOR	COLOUR	ACID & its pH	BASE & its pH	NEUTRAL & its pH

Using the Chemistry Science Kit that the school got from the Toyota Teach Project, learners had to use different substances and fill in the spaces provided, by determining the chemical reactions and indicating the colour change. Some of the groups managed to complete the project but others had some difficulty in determining whether the substance was acidic, alkalinic or neutral. The teacher marked the sheets and awarded scores. On returning the worksheets, the teacher announced and appreciated the effort of the groups that got more. He then encouraged the poorly performed groups to ask the well-performed groups how they determined acidity and alkalinity of the substances. No interactive feedback took place between the teacher and the learners.

During my last observation of the teacher in practice, the teacher embarked on a new theme, namely, Forces. This implicitly informed me that he was done with giving feedback to learners about the project. This confirmed what the teacher had told me during our interview session a few days before the project was given to learners. The teacher had frankly admitted that he does not regularly give feedback due to large numbers of learners in the classes that he teaches. For assessing to be of maximum value to learners, the teachers need to be involved in the assessment process and this must include active involvement in feedback, and may well include involvement with the design and judgement of assessing (Harris & Bell, 1994). To me, the feedback that was given about this project was not sufficient to facilitate learners' understanding about acids and bases, and the chemical reactions thereof.

4.5 Teachers' work schedules

The work schedules of Natural Science teachers are developed collaboratively during cluster meetings. What is going to be taught is decided upon by all teachers in their learning area cluster meetings. It is therefore expected that teachers within the cluster teach the same theme during a particular term, as per cluster's decision. By the end of a term teachers are expected to have covered a certain amount of work because clusters have introduced the new practice, viz. that of letting learners write a common paper, that is set by the cluster under the auspices of a learning area advisor, formerly known as the Subject Advisor.

Natural Science has four themes that correspond to the Learning Outcomes as set in the policy document. The themes are Matter and materials, Energy and change, Planet

Earth and beyond, as well as Life and living. I was quite disturbed to find out that teachers were teaching different themes in spite of the fact that they belong to the same cluster. So, they should be teaching similar themes during the quarter in question. To be specific, Grade Seven learners at Watermelon C. P. School were dealing with the plant kingdom (Monocotyledons and Dicotyledons) which fall within a major theme called Life and Living. At Butternut S. P. School they were dealing with aspect of Planet Earth and Beyond, while at Litchi S. P. School they were dealing with Acids and Bases which fall within a theme called Matter and Materials. I wondered how come they teach so much different aspects yet clusters were formed to see to it that schools teach the same things in a given term so they could write a standardised common paper.

When I enquired informally about this inconsistency I was told by the respective teachers that it was because other schools joined the cluster later in the year due to poor dissemination of information regarding the formation of these clusters. So, many schools had already embarked on their programmes that could not be changed since planning was done the previous year. Teachers intended to rectify the mistake so that during the following year they would ensure consistency in teaching similar themes.

4.6 Teachers' assessment programmes

When I requested to see the teachers' assessment programmes I could not find any except for the formal assessment on their work schedules. When I enquired about a specific programme that spells out how formative assistance would be rendered, I could not get any and the teachers argued that theirs only appear on their work schedule as per cluster's recommendations.

4.7 Observation schedule

I used a semi-structured observation schedule to note some remarkable incidents that could give evidence or substantiate what the claims that participants lay before me during the interviews (see Appendix G). My observations could not last longer because of time constraints. In each of the three sessions that I observed, I found some interesting incidents that gave me a picture of what was going on with regard to the issues we discussed during the interviews.

4.8 Summary

Due to a number of problems that affect teaching and learning in the classroom, it becomes necessary to see to it they are addressed so that learners' performances will not also be adversely affected. Some of the problem could be addressed by the school, like the few mentioned above. Teachers can supervise the use of science material for the benefit of learners. Lack of resources is still the stumbling block in achieving the desired outcomes. Lack of proper supervision over the teaching and learning material causes another problem. The experience that teachers get should assist them in understanding the new dispensation. The quality of feedback also impacts on the learners' ability to understand concepts and processes. I have also analysed some documents that I deemed important as they could respond to my research questions in one way or the other.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The purpose of this case study research is to investigate how Natural Science educators implement formative assessment in their Grade Seven classes. The study aims at providing clarity with regard to the extent to which this form of assessment is implemented as recommended by the National Department of Education in its National Curriculum Statement (NCS) titled National Policy on Assessment and Qualifications for schools in the General Education and Training band (2006).

5.2 Findings from the interview sessions

It was clear from the interview data that some of the participants do not have programmes of implementing formative assessment in their daily operations. Despite the fact that they do not have clear assessment programmes, they do have a limited understanding about the value of formative assessment. When I asked Teacher A whether she thinks giving feedback to learners helps them better understand the tasks that she gives to them, she said “Kukhona obonayo ukuthi kuyabasiza kanti futhi kukhona obonayo ukuthi uhleli nje. You can’t understand ukuthi kahle kahle uyalalela noma uzwile, noma uyithola kanjani lento kodwa abanezwi yibona abalandelayo”. (There are those you can guarantee that it helps them, and there are those you can see that they are just passive. You can’t tell whether they understand or not, but the extroverts are the ones who follow what is happening). The teacher’s response informs me that even if she implements formative assessment in her class, it is very shallow and is non-diagnostic. If it was diagnostic, the teacher would have found out why these learners just sit passively without engaging themselves in classroom activities.

When I Asked Teacher B the same question she said, “Kakhulu. Yikho nje ukuthi akwenzeki njalo. Khona kuyabasiza ngoba uke ubone ukuthi lowomsebenziabanikezwe ifeedback ngawo sebeyawu understanda, bafisa ngisho ukuphinda bawubhale.” (Definitely. It’s only that it is not frequent. It helps them

because you can see that they understand the work on which they given feedback, and they even wish to repeat it). This response implies that Teacher B does witness improved performance by learners after she had given them feedback on the task. Yet, she does not constantly given feedback. I would assume that she underestimates the value of giving feedback to her class.

When I asked Teacher C the same question he said, "Hundred percent. Kodwa manje. The main important thing ukuthi: Are they highly motivated? One more problem esinayo thina ukuthi noma singayibheka ibackground yengane ngeke silokhu sithi ibackground yazo iyabheda uma sezifikile lapha esikoleni. Into ekhona ukungasebenzi organically siyisikole esisodwa. Uthole ukuthi we are fragmented. For instance, we do not sit down and identify the common problems and then try to address those problems, or devise a common strategy. The teacher acknowledges the fundamental benefit of formative assessment to the learners. His problem lies with a lack of cooperation within the school. He argues that if they had an opportunity to sit down and discuss learners' problems, they would have devised a common strategy to address them. In fact, it is not about having a common strategy or planning the work together that could help teachers implement formative assessment. His suggestions are, indeed, genuine in the management of learning programmes but he can make a difference in his learning area by employing certain formative strategies to assist his learners master the concepts and processes in Natural Sciences.

The new curriculum dispensation under the National Curriculum Statement (NCS) stipulates that the teacher-learner ratio in the classroom is the maximum of forty learners per teacher. In the researched schools all classes range from sixty to eighty-five learners. This means that there is overcrowding in the classrooms, and Teacher A confirmed that they experience a shortage of physical space in the classroom which makes it difficult to operate and move freely between groups.

When I asked Teacher B about the challenges she experiences during teaching and learning, she indicated that all Grade Seven classes are congested. They have eighty to eighty-five learners in each classroom. She quickly asserted that the shortage of physical resources is her main problem. Apart from the lack of scientific apparatuses the shortage of space is the basic one since they do not have a laboratory at school.

Teacher C also echoed the same condition, that of congestion and the shortage of resources. He indicated that they have about sixty learners in each classroom and most of the parents do not pay the school fees, which makes it even more difficult to purchase scientific equipment he could use in teaching scientific experiments. Over and above the shortage of physical space in the classroom, Teacher C also indicated that the poor background, from which most learners come, has a great influence in de-motivating learners to do their work. He contended that most parents are not scientifically literate, which makes it difficult for them to assist their children in completing homework activities. Learners frequently fail to complete homework activities because they lack support from parents who seem to be passive and are not actively involved in the education of their children.

Teacher A confirmed the same view when I asked her whether she gives homework activities and what kind of tasks she gives to her learners. She said, 'There are very few ama projects esithi umuntu uzozenzele wona ekhaya ngoba sibalekela ukuthi, ngokujwayelekile, umuntu uzongazitholi izinto zokwenza. Okujwayelekile kuba ama projects esizowenza together lapha esikoleni ukuze sikwazi uku improviser, mhlambe ngifike nalezozinto abazozidinga'. This confirms that most learners do not do the work at school.

When I asked Teacher B whether her learners complete their projects sufficiently, she confirmed that not all learners do the work conscientiously. She said, 'Abayenzi bonke. Kubangcono uma beyenza lapha esikoleni. Uma ngithe abayenze emakhaya kuba yilabo nalabo abayenzayo. Futhi kuxake ngoba labo abayenzayo kuba yilabo vele abenza kangcono eklasini. Laba vele okungabahambeli kahle bavele bazihlalele nje, bagcine bengenawo ama marks ukuze phela baphase'. (Not all of them. It's better if they do it here at school. Very few will do it at home, and those who do it are the same advantaged learners who do better in class. Others would just sit passively and end up having no marks to let them progress to the next grade. It is notable that the learners in all the three sampled schools need constant monitoring when they have to complete their tasks.

5.3 Implications of the findings

From the interview data I could deduce that the participants are faced with tremendous difficulties in implementing formative assessment in their classrooms due to numerous problems they encounter, ranging from a lack of physical space to a lack of motivation of learners, from non-cooperation of households to a lack of resources. Moreover, I also realised that there is a lack of understanding with regard to the use of formative assistance, using a variety of strategies that sometimes do not require the availability of the afore-mentioned aspects.

5.4 Findings from observations at Watermelon S. P. School

I conducted three observations per school, using the semi-structured observation sheet (see Appendix G). When I was observing at Watermelon C. P. School (pseudo-name), I could witness some of the things we talked about during the interview session. For instance, I could see the overcrowding of learners in the classroom. Specifically, there were sixty-one learners during the first observation, fifty-nine during the second, and sixty-one during the third observation. The class is arranged in groups and there are seven groups with three learners in each desk. This makes writing a very difficult task as all learners need space. There is serious congestion in the classroom such that learners' books have no place but are put on the leaning parts of desks. The space between the desks is narrow and makes it uneasy for the teacher to move between groups, hence monitoring is negatively affected.

Though the class looks disciplined, it is not always the case because during my third and last observation, some learners were not attentive. One had a toy and so disturbed his desk-mates while the teacher was explaining a particular task.

5.5 Findings from observations at Butternut C. P. School

Learners had been given a task on the two kinds of plants, namely, monocotyledons and dicotyledons. They had to make a collage that they were to divide into four parts, namely, roots, stem, leaves and seeds. They had to put the real parts of these plants under the related topic.

During my first observation the teacher continued with her teaching as usual. There was good interaction between the teacher and her learners. During my second observation, when the teacher was returning the collages that learners had completed. I was expecting her to clarify what was expected because most groups had confused the seeds of monocotyledons with those of the dicotyledons.

To me it appeared as if they had not understood the differences between the two kinds of seeds. They also had problems with differentiating the leaves of the two kinds of plants but the teacher did not explain as to what she expected. I assume that no further feedback ever took place because during my third and last observation the teacher went on to introduce a new theme.

5.6 Findings from observations at Litchi S. P. School

I had three observations at Litchi S P. School. During my first observation the teacher returned the marked project on Acids and Bases. He had no interactive feedback with the learners. Instead, he only passed on verbal remarks and advised the groups that performed poorly to enquire from the well performing ones about how to determine the acidity and alkalinity of the substances.

During my second observation, the teacher went on with his normal teaching, which also had no formative interaction between him and his learners. During my third observation, the teacher introduced a new theme, that is, Forces. I was expecting that the teacher would give a little explanation as to what was expected of the learners when they did the groupwork. I could see that there were gaps that needed to be filled in the learners' knowledge, and that could be done by giving a well considered written or verbal feedback to assist them better understand more about Acidity and alkalinity.

5.7 Implications of the findings

I witnessed that teachers employ almost the same strategies when they interact with learners. It is particularly noticeable that the participants appear to be ignorant about the value of formative assessment in the form of constructive feedback to their learners. In fact, the tasks that they give to their learners do not reveal the problems

that learners experience. They serve a diagnostic purpose, but teachers do not capitalise on those diagnoses so that they can develop their lessons from there.

5.8 Recommendations

From the interview data I elicited from the participants it was clear that overcrowding creates a problem of space in all the schools, as well as increased workloads, especially during marking. To overcome this problem a teacher can use proctoring where experienced learners support the learning of less experienced learners, which is a way of capitalising on the benefits of peer group teaching and learning (Brown & Race, 1995). Here learners who attain the best results in the respective learning areas can assist the poor performing learners achieve better.

To overcome the pedagogic dilemma that is caused by the incompatibility between policy and practice, the Provincial Department of Education should construct more classrooms in order to address the latest Post Provisioning Norm (PPN) proposals that stipulate the number of learners in class. The proposed PPN is forty-five learners in a class at primary school level and thirty learners at secondary level.

To address the problem of a lack of resources the Department's Norm and Standards Section that supply material resources to schools under Section 20 should increase its level of efficiency by monitoring the requisitions and delivery processes. For maximum benefit of schools, especially in previously disadvantaged communities, the Department must convert all schools into Section 21 schools. Allocated funds for Section 21 schools are deposited into schools' bank accounts. This will ensure prompt and correct delivery of requisited material at reasonable costs. This too will require constant monitoring in order to curb potential misuse of allocated funds.

A clear programme needs to be set up to empower teachers through workshops on the implementation of different assessment strategies. The Provincial Department must create opportunities to ensure that specialists in assessments conduct workshops for teachers and clarify how these various assessment strategies can be implemented in different learning areas. Teachers in schools, particularly natural Science teachers, need to devise a plan as to how they are going to safeguard the materials they have acquired by any means. A head of department (Education Specialist) or the Learning

Area Committee (LAC) must ensure that equipments, like the science-kit, are kept safely but available to all the users in the school.

The LAC or the Education Specialist should keep a record of all the items that have been borrowed from the kit for use in the classroom, as well as the record of all perishable items so that the school can repurchase the depleted items. This would prevent the misuse of school property like the incident I witnessed during the interview with the participant from Watermelon S. P. school where a colleague came to have her meal that was contained in the plastic container, which is one of science items that come with the science-kit.

All schools must have a tight security in terms of paid personnel, installation of burglar alarms and proper fencing. This would prevent vandalism of schools' property and therefore the loss of valuable teaching and learning materials.

All schools need proper infra-structure to function effectively and to produce the desired results. This makes important to have facilities like the laboratory, library and a resource centre, to mention a few. The availability of a Natural Science laboratory in a school will help with the storage of science equipments and the utility by learners during Natural Science periods, which would in turn, address the problem created by the shortage of physical space in the classroom. These facilities will also help learners to complete the assigned projects.

It would be advantageous to have a clear framework of assessment that specifies the forms and strategies of assessment that the teachers can use in their daily executions of learning programmes. Below is the framework of evaluation that teachers can use to set their assessment tasks.

When I studied the teachers' work schedules and assessment profiles, there was no evidence indicating how feedback was going to be conducted to ensure that adequate comprehension of the tasks given is attained by all learners.

The following framework of evaluation (Table 1), as proposed by Freiberg & Driscoll (1996), could be of benefit for the teachers in appropriating their feedback activities to learners.

Framework of Evaluation

DIAGNOSTIC		**FORMATIVE**		**SUMMATIVE**	
Formal	**Informal**	**Formal**	**Informal**	**Formal**	**Informal**
Standardised tests	Observations	Checklists	Journals	Inquiry	Informal discussions
Pre-tests	Discussions	Quizzes	Observations	Work projects	Observations
Placement tests	Journals	Questions-answers	Questions-answers	Standardised tests	Work projects
Inquiry		Assignments	Student comments	Classroom Tests	Student feedback
Questionnaires		Standardised tests	Assignments	Interviews	
		Classroom tests		Portfolios	
		Portfolios		Performance tasks	
		Performance tasks			
		Interviews			

This table, adapted from Freiberg & Driscoll, (1996), could be used to ascertain the modes of assessment and the types of feedback that the teacher could give to the learners in support of the learners' learning efforts.

5.9 Conclusion

There are numerous strategies that teachers could use to ensure that learners master their tasks. It is vitally important that teachers employ formative assessment strategies

because they have proved to be productive in terms of raising the level of performances of learners, and helping teachers to adjust their programmes in order to suit the learners' needs.

By conducting this case study I sought to find out how teachers implement formative assessment in their classrooms. I wanted to find out what formative assessment strategies do they use to implement it and also to find out what challenges hinder them from implementing this vitally important aspect of classroom interaction if there are any. To respond to these questions I designed data collection instruments that could help me elicit information from the participants. I piloted them in my neighbouring school and I was assured about their validity and reliability. That assurance gave me a green - light to engage in field - work after I had obtained the ethical clearance. I made all the necessary arrangements with different structures within the Education Department and the participants. I then collected data by means of the interviews, observations and document analysis. I analysed the data and came to the conclusion about the whole exercise.

I made recommendations as to how the various problems that emerged from the study can be addressed in order to allow good assessment practices where this does not take place, particularly in the schools I investigated.

Summary

The implementation of formative assessment in Natural Science classrooms is hampered by various factors that directly or indirectly affect teachers, classrooms or the entire schools due to systemic challenges that exist in the teaching and learning fraternity. If these challenges could be addressed by all the structures and individuals concerned, there could be considerable improvement with regard to this curricular aspect.

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APPENDIX A

W 1123 Pioneer Park

P. O. Umlazi

4031

30 September 2008

The District Director

Umlazi District Office

Emaweleni

UMLAZI

4031

Dear Sir/Madam

RE: Conducting a scholarly research in your district

I hereby request you to allow me to conduct a scholarly research in your district's three primary schools, namely, Butternut S. P., Watermelon C. P. and Litchi S. P. schools. I am currently doing a Masters degree in Education, specialising in Curriculum Studies at the University of KwaZulu-Natal. I shall conduct this study with teachers who teach Natural Sciences in Grade Seven, and I shall be investigating the implementation of formative assessment strategies in Grade Seven, Natural Science classes.

I have also asked for permission from the principals of these schools and the participants themselves. Participants in this study involve Natural Sciences teachers and a few Grade Seven learners. This study will not benefit the participants only, but other Natural Science educators in your district will be empowered from this project. Ethical issues shall be meticulously observed throughout the study, and any material that might lead to traceabillity of the participants will be destroyed on completion of

my dissertation. Should you have questions regarding this matter, please write to me on the above address or contact me on the following numbers:

Cell. No.: 076 872 0785
072 510 2583
Tel. No. (Work): 031-906 7791

Should you wish to verify the above information concerning my research activity, I refer you to my supervisor, Dr M. Combrinck, on the following address:

UKZN (Edgewood Campus)
FACULTY OF EDUCATION
Tel. No.: 031-3688 (O/A)
Cell. No.: 083 787 3688
E-mail: Combrinckm@ukzn.ac.za

I am looking forward to your kind co-operation in this matter. Thanking you in anticipation.

Yours faithfully
Nkanyezi Cele
Student No.: 201504875

APPENDIX B

W 1123 Pioneer Park
P. O. Umlazi
4031
30 September 2008

The Principal
Butternut S. P. School
P. O. Box 36230
NTOKOZWENI
4066

Dear Sir/Madam

RE: Conducting a scholarly research in your school

I hereby request for your permission to conduct a scholarly research with your teacher/s who teach Natural Sciences in Grade Seven. I shall visit your school on particular days that we may agree upon with the participant/s in the project, and conduct classroom observations as well as interviews with Natural Science educator/s. The study will assist your educator/s to gain a better understanding on the practice of formative assessment in Natural Sciences.

I am currently doing Masters in Education at University of KwaZulu-Natal, specialising in Curriculum Studies. I am investigating the implementation of formative assessment strategies in Grade Seven, Natural Sciences.
I promise that the information elicited from the participant/s will be treated with great confidentially, and their anonymity will be observed. Should you have questions regarding this matter, please contact me on the above address or on the following numbers:

Cell. No.: 076 872 0785
072 510 2583
Tel. No. (Work): 031-906 7791

For further verification on this matter, I refer you to my supervisor, Dr M. Combrinck, on the following details:

UKZN (Edgewood Campus)
SCHOOL OF EDUCATION
Tel. No.: 031-260 3688
Cell. No.: 083 787 3688
E-mail: Combrinckm@ukzn.ac.za

I am looking forward to your kind co-operation in this matter. Thanking you in anticipation.

Yours faithfully
Nkanyezi Cele
Student No.: 201504875

APPENDIX C

W 1123 Pioneer Park
P. O. Umlazi
4031
30 September 2008

The Natural Science Teacher
Butternut S. P. School
P. O. Box 36230
NTOKOZWENI
4066

Dear Prospective Participant

RE: Conducting a scholarly research in your class

I hereby request you to allow me to visit you in your class during teaching time. I am conducting a case study research on formative assessment with due attention to Natural Science teaching. I therefore need your consent to visit you while teaching so that I can observe you in practice and conduct an interview with you on the same subject.

I am currently doing Masters in Education at University of KwaZulu-Natal, specialising in Curriculum Studies. I promise that the information elicited from you will be treated with great confidentiality, and I shall not reveal your identity throughout the study. I further promise that I shall destroy the audio-tapes that we shall use once I complete my dissertation.

May I assure you that you will also benefit some knowledge on assessment from this study. However, you are not obliged to participate in this activity, and if you decide to participate, you are free to withdraw at any stage and for any reason.
Should you have questions regarding this matter, please contact me on the above-named address, or on the following numbers:

Cell. No.: 076 872 0785
072 510 2583
Tel. No. (Work): 031-906 7791

Should you wish to verify the above information concerning my research activity with you, I refer you to my supervisor, Dr M. Combrinck, on the following address:

UKZN (Edgewood Campus)
FACULTY OF EDUCATION
Tel. No.: 031-260 3688
Cell. No.: 083 787 3688
E-mail: Combrickm@ukzn.ac.za

I am looking forward to your kind co-operation in this regard. Thanking you in anticipation.

Yours faithfully
Nkanyezi Cele
Student No.: 201504875

APPENDIX D

DECLARATION BY A PARTICIPANT

I, _____ (full names of participant) hereby accept to be part of the research that will be conducted in my school. I confirm that I understand the contents of this letter as well as the nature of the research activity that shall be undertaken. Furthermore, I understand that I am free to withdraw from this exercise at any stage and for any reason.

(Ngiyakwemukela ukuba yingxenye yocwaningo olwenziwayo esikoleni sami. Ngiyaqinisekisa ukuthi ngiyakuqonda okushiwo yilencwadi mayelana nocwaningo oluzokwenziwa. Ngaphezu kwalokho, ngiyaqonda futhi ukuthi nginelungelo lokushiya noma nini ngoba akuphoqwe muntu).

_____ _____

Participant's signature Date

APPENDIX E

INTERVIEW SCHEDULE (Semi-structured)

SCHOOL:_____

GRADE: _____ DATE: _____

LEARNING AREA: _____

NAME OF TEACHER: _____ (Pseudonym): _____

TOPIC: An investigation into the implementation of formative assessment in Grade Seven, Natural Sciences.

1. How do your learners do the tasks you give them in your learning area? Do they all show adequate understanding of the concepts and enthusiasm in completing tasks?

_____

_____

_____

_____

2. Do you always ensure that the tasks/activities that you set for your learners align to the assessment standards and/or learning outcomes?

_____

_____

_____

_____

3. What kind of assessment strategies do you normally use in your class?

_____

_____

_____

_____

_____

4. Do you give feedback on each assessment task that you give to your learners?

_____

_____

_____

_____

5. Do you think giving regular feedback helps them? In what way?

_____

_____

_____

_____

_____

6. What challenges/problems do you encounter in assessing your learners on during your daily teaching?

_____

_____

_____

_____

_____

_____

APPENDIX F

OBSERVATION SHEET (Unstructured)

SCHOOL:_____

GRADE:_____ DATE:_____

LEARNING AREA:_____ NO. OF LEARNERS:____

TOPIC: An investigation into the implementation of formative assessment in Grade Seven, Natural Sciences.

_____

1. CLASSROOM ARRANGEMENT:

_____

_____

2. TEACHING METHODS:

_____

_____

3. ASSESSMENT PRACTICES:

_____

_____

_____

4. INTERACTION:

_____

_____

_____

5. GENERAL CLASSROOM CONTEXT:

_____

_____

_____