TEACHERS’ CLASSROOM ASSESSMENT PRACTICES IN TWO SELECTED SENIOR SECONDARY SCHOOLS IN THE OSHIKOTO REGION

A THESIS

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BY

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This research has been examined and approved as meeting the required standards for partial fulfilment of the requirements of the degree of Master of Education (Mathematics Education) of University of Namibia.

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DEDICATION

This thesis is dedicated to my sister, Selma Kayoko and my late best friend Rauha Iyambo - Uutsi who offered me unconditional support.
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It was because of many people, that this study has been completed. I therefore express my profound gratitude to the following people. Firstly and foremost, I would like to recognize and sincerely appreciate my supervisors, Professor Choshi Kasanda and Dr. Shiwana Naukushu for their guidance and continuous support in conducting the study. I feel very fortunate to have been under their supervision.

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Abstract

Assessment is a vital ingredient for effective teaching and learning. Current educational policies in Namibia call for teachers to adopt formative assessment in their classrooms, since there are reasons to believe that formative assessment could enhance learners’ performance particularly in mathematics. Teachers however, have difficulties in implementing formative assessment in their classrooms. This study sought to investigate the classroom assessment practices of Grade 11 and 12 mathematics teachers in the Oshikoto Region. A mixed methods research paradigm guided the study. An embedded research design was used to address the research questions. This study used classroom observation schedules, interview protocol and document analysis sheet as research instruments. The analysis of data was guided by embedded concurrent strategy.

Findings of the study revealed that Grade 11 and 12 mathematics teachers used various assessment methods. The common methods observed were oral questioning, class work, home work, class tests, practical investigations and projects. Findings however, showed that mathematics teachers used more traditional assessment methods than authentic assessment methods. Findings further revealed that Grade 11 and 12 mathematics teachers are faced with a number of challenges in conducting assessment, such as high numbers of learners in the classrooms, absence of assessment policy guidelines, lack of teaching and learning materials, lack of commitment among learners and insufficient instructional time to carry out formative assessment activities. The respondents had suggested ways to improve the current formative assessment practices such as reducing teachers’ teaching load, provision of assessment policy guidelines, strengthening parental involvement, increasing instructional time, motivating learners to take assessment earnestly and provision of adequate resources. This study recommends that Mathematics teachers should be encouraged and supported to use authentic assessment methods in order to enhance the learners’ conceptual understanding of the mathematics content and consequently improve learners’ academic performance. Finally, continuous professional development for senior secondary mathematics teachers should be put in place for teachers to gain adequate pedagogical knowledge of formative assessment.
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<tr>
<td>ACE</td>
<td>Advanced Certificate in Education</td>
</tr>
<tr>
<td>BETD</td>
<td>Basic Education Teacher Diploma</td>
</tr>
<tr>
<td>BED</td>
<td>Bachelor of Education</td>
</tr>
<tr>
<td>MASTEP</td>
<td>Mathematics and Science Teachers Extension Program</td>
</tr>
<tr>
<td>MBESC</td>
<td>Ministry of Basic Education, Sport and Culture</td>
</tr>
<tr>
<td>MOE</td>
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<td>DNEA</td>
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<td>SDG4</td>
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CHAPTER 1: INTRODUCTION

1.1 Orientation of the study

Assessment has become a fundamental element in improving quality education. Assessment determines to what extent learning has taken place with learners and how successful the teaching method was (Carl, 2012). Classroom assessment encompasses a range of activities such as setting assessment activities, administration, marking, interpretation of the results and providing feedback to the learners and parents (Ndalichako, 2015a). Teachers need to understand these activities in order to conduct assessment in their classrooms effectively and successfully for improved academic performance.

The Ministry of Education [MOE] (2009b) urges teachers to assess how well each learner achieves the basic competencies prescribed in the syllabus. A variety of assessment methods should, therefore, be used in order to cater for the diversity of abilities among learners (Kivunja, 2015a). The Ministry of Basic Education Sport and Culture [MBESC] (1999) stresses that different assessment methods enable a teacher to assess different learning objectives and get a clear understanding about what learners know and can demonstrate. Teachers should therefore use different assessment methods in their classrooms so that all learners benefit.

The frequency of assessment is considered vital in the assessment process. Frequent assessment helps to facilitate retention of materials learnt (Ndalichako, 2015a). Frequent formative assessment enables a teacher to see how learners are progressing while there is still time for improvement in teaching and learning process. Therefore, learners should be
assessed frequently over a period of time in order to ensure continuous monitoring of their learning.

The shift to learner-centred approach to teaching (MEC, 1993) requires a shift of approaches to assessment. Teachers are expected to use learner-centred approaches in both teaching and assessment. “Preparation for a knowledge-based society requires a learner-centred approach to teaching and learning” (Ministry of Education [MOE] 2009b p. 4). Learner-centred approach calls for teachers to align assessment with critical knowledge, skills and dispositions to guide each learner towards mastery of competencies (Castellano, 2016). Castellano further argues that in learner-centred assessment learners reflect, analyse and critique assessment activities. Kivunja (2015a) also supports the view that learners should be given an opportunity to play an active role in assessment mostly when it comes to interpretation of assessment information. Hence, teachers need to adopt formative assessment practices whereby learners have to be actively involved in the assessment process.

Junpeng (2012) stresses, that classroom assessment in mathematics is the most essential tool in improving academic performance. He further argues that when classroom assessment is properly developed and implemented it can improve learners’ performance. However, in Namibia much attention and support to assessment is accorded to primary education and junior secondary education phases only. At senior secondary phase, Grade 11 to 12 assessment is not given its due attention. Teachers teaching the senior phase are not fully guided by policies on how to conduct assessment in their classrooms. This is probably due to the fact that continuous assessment of Grade 11 and 12 does not contribute to final examinations result (Ministry of Basic Education, Sport and Culture
[MBESC] 1999). This raises a concern of whether assessment is relevant in Grade 11 and 12 especially in mathematics.

The Namibian senior secondary education is however examination oriented and its emphasis is on outstanding passing of examinations especially in mathematics to enable learners to secure admission at tertiary institutions. Therefore, the pressure to increase the pass rate in national examinations particularly in mathematics is enormous. Assessment is predominantly used to increase the pass rate in national examinations rather than to improve the teaching. The majority of teachers are teaching for the test. This may restrict learners’ learning opportunities since teaching might focus on what is being assessed in external examinations rather than on what learners should know. Consequently, assessment may not fully enhance learning and does not really support good instructional practice.

The way teachers assess in their classrooms might not fully support teaching and learning as the performance of learners is not pleasing. As a result, the learner’ attained symbols in mathematics may remain poor. Junpeng (2012) found that mathematics teachers’ assessment tasks were not based on educational standards and assessment instruments used were of poor quality. Teachers may be assessing but if assessment is not aligned with basic competencies in the syllabus, learners may not reach maximal learning since goals may not be clearly stated and feedback to be provided would not be constructive. It is therefore imperative for teachers to set assessment activities that are of high quality and aligned with the curriculum.
In a research study Ndalichako (2015a) found that senior secondary teachers in Tanzania use more traditional assessment methods than authentic assessment methods. Even though teachers are encouraged to espouse the learner-centred approach, some teachers still do not apply this approach in their classrooms particularly when it comes to assessment. One to improve student achievement is to integrate formative assessment in teaching and learning. (McGatha, Bush & Rake, 2009) indicated that if formative assessment is implemented with fidelity, it produces significance and often sustained learning goals. They however, argue that implementing formative assessment that results in improved student’s achievement requires a lot of time and need sustained professional development and growth.

The poor performance in Grade 11 and 12 Mathematics could be partly attributed to the use of inappropriate assessment methods. More still needs to be done with regard to the school based assessment mathematics especially at Grade 11 and 12 levels. An effective assessment practice is one that could be used in mathematics to improve learners’ performance. This study therefore investigated how the Grade 11 and 12 Mathematics teachers conducted formative assessment in their classrooms.

1.2 Statement of the problem

Mathematics is accorded the highest position amongst of all the subjects in the Namibian education system. Mathematics is regarded an essential tool for the development of science, technology and commerce (Ministry of Education, 2009b). Despite the significant role that mathematics plays in the society, the Grade 12 mathematics national examination results have been poor over the years. Only 40% and 42% of learners
obtained D symbol or better in national examinations in mathematics in 2014 and 2015 respectively (Ministry of Education Arts and Culture, 2016).

Van den Berg, Bosker & Suhre (2018) indicate that there is a reason to believe that formative assessment consisting frequent assessment and timely instructional feedback is effective in enhancing learners’ performance. Dibbs, Rios & Christopher (2017) however argued that in order for the formative assessment to have positive effect on learners’ achievement, instructors must view formative assessment as something an instructor does for learners rather than something done to learners.

Klute, Apthorp, Harlacher & Reale (2017) express that teachers have difficulty in finding time to use formative assessment. Van den Berg et al., (2018) also contented that teachers find it very challenging to use the three aspects of formative assessment in a coherent manner. They further indicated that teachers assess learners’ knowledge without setting clear learning goals and success criteria and do not provide sufficient feedback based on the information gathered during assessment. This seems to indicate that teachers do not have adequate skills to effectively implement formative assessment in their classrooms. Van den Berg et al., (2018) suggest that in order for teachers to effectively implement classroom formative assessment, they should be provided with adequate training and coaching. One example of challenges South African teachers face in working towards quality teaching and learning is aligning assessment with basic competencies stated in the syllabus (Reddy, Grange, Beets, & Lundie, 2015). This is particularly the case in grades 11 and 12 Mathematics in Namibia where continuous assessment is not mandated (Ministry of Education, 2009b). Hence, no learning objectives are specified for school-based assessment in grades 11 and 12 mathematics syllabus. In addition there are no
assessment manuals and assessment forms for grades 11 to 12 mathematics. The ministry however indicated that “as from the beginning of 2009, schools will be provided with copies of the continuous assessment manual for Grade 5-7 and Grade 8-10 to ensure quality assessment for all learners at different schools” (National Institute for Educational Development [NIED] 2008 p. 6). NIED further stressed that continuous assessment manuals guide teachers on how to use rubrics in assessment and how to cater for individual learners.

The absence of formal assessment in Senior Secondary mathematics could have an effect on how mathematics teachers conduct assessment in their classrooms. It is against this background that this study was conceived. Hence, this study investigated the classroom assessment practices of Grade 11 and 12 mathematics teachers in the Oshikoto Region.

1.3 Research questions

The following questions guided the study:

1. What assessment methods are used by Grade 11 and 12 mathematics teachers to assess their learners in the Oshikoto Region?

2. How do Grade 11 and 12 mathematics teachers mark and give feedback to their learners in the Oshikoto Region?

3. What challenges do Grade 11 and 12 mathematics teachers experience when conducting assessment in their classrooms in Oshikoto Region?
1.4 Significance of the study

Quality assessment is a cornerstone of education. The findings of this study might benefit various stakeholders in education. The results of this study provided information on Grade 11 and 12 mathematics teachers’ assessment practices. Firstly, the results might help Grade 11 and 12 mathematics teachers in Oshikoto Region by providing them with formative assessment methods, which positively influence learners’ academic achievement.

Moreover, the Education Officers in the Oshikoto Region might use the findings of the study to devise strategies that might be used to guide Grade 11 and 12 mathematics teachers on how to conduct effective formative assessment in schools. In addition, the findings of the study might also help educational planers to revise assessment manuals to fit the current Grade 11 and 12 mathematics teachers’ needs.

Furthermore, the findings from this study might add to the existing literature on formative assessment practices in mathematics and act as a framework for developing mathematics teachers’ continuous professional development training manuals on formative assessment practices for senior secondary mathematics. Finally, the findings might be useful to the Ministry of Education, Arts and Culture in formulating assessment policies and manuals with respect to improving the quality of formative assessment for senior secondary school mathematics teaching.

1.5 Limitations of the study

The time to collect data was a limitation, because there was prescribed duration to complete the course. Financial resources were also inadequate, because transport and
accommodation required money. The other limitation of this study was the sample size. The study was only conducted in two schools in the Oshikoto Region.

1.6 Delimitations of the study

The study was restricted to the Grade 11 and 12 mathematics teachers from two selected senior secondary schools in the Oshikoto Region. Therefore, the findings of the study might not be generalized to the whole region.

1.7 Definition of terms

In this study the following terms are used as defined below:

Assessment: “Is the process that teachers use to tailor make their teaching in the context of their learners’ zones of proximal development” (Reddy et al., 2015, p. 44). In this study, assessment refers to how teachers gather information on learners’ learning.

Assessment Method: The manner in which assessment approached (Clarke, 2012). In this study methods of assessment are approaches used by grade 11 to 12 mathematics teachers to gather information about learners’ progress in learning.

Authentic Assessment: An assessment where learners have to complete an assignment which is based on real life and has to be solved within the authentic context (Carl, 2012). In this study, authentic assessment refers to assessment methods in mathematics which focus on learners’ investigative skills and ability to solve mathematical problems.

Formative Assessment: Refers to all activities that are directed at supporting, encouraging, motivating and enhancing learning (Clarke, 2012). In this study, formative
assessment refers to how Grade 11 and 12 mathematics teachers collect information about learners’ learning in order to improve teaching and learning in their classrooms.

**Feedback**: is the process through which learners learn from their teacher or more knowledgeable peers how well they are achieving the learning objectives and what they need to do to improve their performance (Isaac, Zara & Herbert, 2013). In this study feedback refers to how mathematics teachers communicate the assessment outcomes to their learners in order to improve the learners’ learning.

**Summative Assessment**: an assessment based on the accumulation of the progress and achievements of the learner throughout the year in a given subject (MBESC, 1999). In this study summative assessment refers to assessment that are activities meant for grading purposes.

**Marking**: is the process of scoring learners’ work against a marking scheme or assessment rubric with a distinctive colour (MBESC, 2001). In this study marking refers to how Grade 11 and 12 mathematics teachers score the learners’ written work.

**Moderation**: is a quality assurance process undertaken to ensure validity, consistency and fairness of assessment activities against the competencies provided in the syllabus (Nel, 2011a). In this study moderation refers to how assessment activities are checked by the supervisor or a colleague with the aim of correcting, guiding and supporting the teacher in order to improve the practice of formative assessment.
1.8 Summary

This Chapter discussed the orientation of the study and contextual view of formative classroom assessment in Mathematics in Namibia and world-wide. The statement of the problem and the research questions which guided the study were also outlined. Significance of the study and the key concepts used in the study were clarified. The next chapter discusses the theoretical framework and literature review.
CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

This Chapter describes the theoretical framework on which this study was based. It also reviews relevant literature on teachers’ formative assessment practices. Specific focus was placed on assessment methods, marking, provision of feedback as well as the challenges faced by teachers in their mathematics classrooms particularly when they were conducting assessment.

2.2 Theoretical framework

This study was based on Sadler’s (1989) Theory of Formative Assessment and Feedback. Sadler used Ramaprasad definition as a basis of his theory (Taras, 2005). “Feedback is information about the gap between the actual level and the reference level of a system of parameter which is used to alter the gap in some way” (Ramaprasad as quoted by Taras, 2005 p.470). Sadler developed his complex and coherent rationale theory from Scriven skeletal framework of assessment (Taras, 2005). Sadler theory therefore conforms to Scriven principles of assessment. Both Sadler and Scriven claim the following principles: setting goals or reference level, gathering data to compare actual level with standard and taking appropriate action to close the learning gap (Taras, 2005). The key premise of Sadler theory is learner’s improvement requiring the capacity to monitor the quality of their own work during actual production (Taras, 2005).

The theory is about the nature and the functions of the formative assessment and feedback in development of expertise. It focuses on how teachers should judge the quality of learners’ work and how judgments can be used to shape learning for improved
learners’ performance. The theory is pertinent to a range of instructional systems in which learners’ learning outcomes are assessed using multiple criteria.

Klute et al (2017) highlighted three phases of formative assessment theory which related to Sadler theory, these phases are: establishing learning goals, determining where learners are and deciding how to help learners to improve. McGatha et al (2009) stress on William and Thompson key strategies of formative assessment as: clarifying, sharing and understanding learning goals, engineering effective classroom discussions, questions and activities that elicit evidence of learners’ learning, providing feedback that move learning forward, activating learners as owners of their own learning and activating learners as learning resources for one another.

Sadler theory of formative assessment and feedback calls for the transition from teacher-supplied assessment to an assessment where learners play active role. Sadler’s theory (1989) claims that, the teacher’s role in formative assessment is to help the learners understand the learning goals and assist them to develop skills of making judgments about their own learning. Sadler (1989) stresses that teachers need to assess the quality of students’ work. Therefore, the teachers have to possess the concept of quality, appropriate to the task and be able to judge the student’s work in relation to that quality. Taras (2005) supports Sadler’s theory that teachers require knowledge of standard skills in making multi-criteria comparisons. Clark (2011) content that for teachers to implement formative assessment practices in their classrooms, it is necessary for them to poses instructional skills of formative assessment. The need for students to judge the quality of their own work is also central in Sadler’s Theory. Sadler (1989) emphasized the three necessary conditions that learners need to have in order to evaluate their own work.
These conditions are: to possess a concept of the standard of work being assessed, to compare the actual level of performance and to engage in appropriate action which leads to the closure of the gap in learning. Clark (2011) asserts that in formative assessment classrooms learners should be able to build knowledge for themselves, take more responsibility of their own learning and participate more in formative assessment process. Sadler (1989) stressed that the conditions should be satisfied simultaneously and not sequentially. Sadler (1989) also highlighted that multiple criteria should be used in assessing the quality of performances.

The theory also puts emphasis on communicating standards to learners. Sadler (1989) indicated two approaches to specifying the standards. The approaches are through descriptive statements and by using exemplars. Thus, the combination of verbal descriptions and associated practical examples provides efficient means of expressing the learning goal which lead to the closure of the learning gap.

Sadler (1989) further noted that feedback is a key element of formative assessment. Feedback is information given to learners about the quality of their performance. He further claimed that both teacher and learner need feedback. The teacher uses feedback to make decisions about readiness, diagnosis and remediation of learning. Learners on the other hand use feedback to monitor the strengths and weaknesses of their performances.

Taras (2005) acknowledged Sadler’s theory and added that, formative assessment requires feedback which shows the existence of the gap between actual level of the work being assessed and the required standard. The role of formative feedback is to help both
the teacher and learner to improve the teaching and learning process. In simple terms, formative feedback aims to enhance student’s learning for understanding.

2.3 Literature review

2.3.1 Mathematics education in Namibia

The basic education in Namibia consists of four major phases. These phases are junior primary, senior primary, junior secondary and senior secondary phases. Mathematics has been a compulsory subject in the first three phases of basic education and learners shall only be promoted to the next grade if they obtained at least 40% in mathematics (Ministry of Education, 2015). In 2012 mathematics was made a compulsory subject up to grade 12 (Ministry of Education, 2009b). The system is centralized where all schools in a specific grade across Namibia use the same mathematics syllabus and are assessed on the same basic competencies (NIED, 2008).

Senior secondary school mathematics syllabus is a two year course covered in Grade 11 and 12. Learners write external examinations at the end of Grade 12. There are two syllabi of mathematics at senior secondary phase. These syllabuses are Namibia Senior Secondary Certificate Ordinary (NSSCO) level Mathematics and Namibia Senior Secondary Certificate Higher (NSSCH) level mathematics (NIED, 2008). The NSSCO mathematics syllabus is available into core and extended mathematics. The examinations in these two syllabuses (NSSCO and NSSCH mathematics) are different. Furthermore, the examinations of NSSCO core level and extended level are also different, in terms of both the content and the level of difficulties.
The senior secondary mathematics curriculum strives to prepare learners to function effectively in the 21\textsuperscript{st} century by providing the basis to use mathematics in their personal and professional lives (Ministry of Education, 2009b). MOE further indicated that mathematics is crucial to success in the world where economic growth needs workers who are equipped to absorb or generate new ideas, perceive patterns and solve conventional problems.

Mathematics is accorded a high number of periods in senior secondary curriculum. Seven out of 49 (14.3\%) periods in a seven day cycle is for mathematics (NIED, 2008). This is to provide sufficient time to mathematics teachers to teach and assess effectively. Schools are also advised to allocate double periods for mathematics to give adequate time to teachers to do proper assessment (NIED, 2008).

The majority of Grade 11 and 12 mathematics teachers are professionally qualified to teach senior secondary school mathematics. These teachers are either having Bachelor of Education Honours Degree (B. Ed Hon.), Bachelor Degree in Education (B. Ed), Basic Education Teacher Diploma (BETD), Mathematics and Science Teachers Extension Program (MASTEP) or Advanced Certificate in Education (ACE) (Ministry of Education Arts and Culture, 2015). A Bachelor degree or equivalent qualification should be a minimum requirement for teachers in Secondary schools (Ministry Education Arts Culture [MEAC], 2018).

In an attempt to improve this situation, the Ministry of Education, Arts and Culture [MEAC] put up the strategic initiatives, by 2022 the performance of learners in NSSCO mathematics examinations will have improved by 20\% (MEAC, 2018). The improved
performance requires abundant understanding of mathematics assessment approaches by teachers particularly formative assessment.

2.3.2 Assessment methods

A holistic and coherent curricular approach requires alignment between curriculum content and assessment practices (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2015). In order to cater for the diversity of abilities among learners, a range of assessment methods should be used. Some methods of assessment should be formal while others are informal. The use of a specific method of assessment as the only method of assessment is improbable. Therefore, teachers are encouraged to use different assessment methods. The Ministry of Education (2009b) indicated that for a teacher to get a complete picture of learners’ progress and achievements in all subjects, a variety of assessment methods should be used. Learners must be given tasks to do every day, as this helps teachers to ascertain the extent to which learners have understood and mastered the content of the topic presented (NIED, 2008).

Leung, Leung and Zuo (2014) are of the view that in order to develop learners’ critical thinking and problem solving skills in mathematics, a diversity of assessment methods should be applied. Assessment should be made up of different activities so that learners are given fair chances of showcasing their capabilities (Reddy et al., 2015). Hence, the nature of learning tasks should determine which assessment method is most suitable. Ndalichako (2015a) also stresses that the use of multiple methods of assessment is recommended because it yields valuable information regarding students’ strengths and weaknesses. There are various assessment methods that teachers can use in order to
assess learning. The core aspect is that teachers must be aware and understand different assessment methods in order to use them in ways that improve teaching and learning.

Summative assessment and formative assessment are two modes of assessment recommended in Namibian schools (Ministry of Education, 2009b). “Learners shall be assessed through both formative and summative methods to determine the extent to which they achieve subject competencies in terms of knowledge, skills and attitudes” (Ministry of Education, 2015, p. 3). Thus, assessment in Namibia serves both formative and summative purposes.

2.3.2.1 Summative assessment

Summative assessment is an assessment done at the end of the school year or end of the course of study in a form of examinations, based on the accumulation of the progress and achievements of the learner in a given subject (MOE, 2009b). The goal of summative assessment is to evaluate students’ learning at the end of instruction by comparing it against the required standards. The results of summative assessment are used as an end of the year promotion grade. Thus, summative assessment serves a promotional purpose and leads to certification. Summative assessment is meant to determine the effectiveness of the whole learning course at its completion (MBESC, 1999). However, information from summative assessments can be used formatively, as it can improve teaching and learning.

Carl (2012) indicated that summative assessment allows teachers to sensitize learners with regard to their accountability for their own learning and make teachers accountable for their teaching. Summative assessment ensures that both teachers and learners do what is expected of them. On the contrary, Sadler (1989) noted that summative assessment is
basically passive and does not normally have immediate impact on learning. He further noted that summative assessment often influences profound educational decisions since they are often high stakes assessment. Summative assessment can provide information at classroom level which makes instructional adjustments and interventions during the learning process. Therefore, summative assessment can be formative.

2.3.2.2 Formative assessment

Formative assessment is an indispensable tool in improving the quality of teaching and learning. Formative assessment is key in learning and serves a number of important functions to both teaching and learning. The word continuous assessment is sometimes used to signify formative assessment. All continuous assessments are formative (MBESC, 1999). However, most continuous assessment tasks set by teachers are not formative. Heritage (2010) argues that formative assessment should be treated as a process that is fundamental and indigenous to the practice of teaching and learning.

Formative assessment plays an important role in teaching and learning. Educational policies have placed more emphasis on school based assessment. The Education and Training Sector and Improvement Programme (ETSIP) made provisions to improve school based assessment, as ETISIP allocates budget to cater for assessment programmes. “The procedures for using continuous assessment as both formative and summative tool will be strengthened” (Ministry of Education, 2005, p. 24). MOE further argues that examination and test data will be analysed to improve teaching and learning and examination and test results will be made available to parents and other stakeholders.
This shows that the Ministry of Education has recognized that assessment plays a fundamental role in teaching and learning.

MBESC (1999), Nel (2011a) and Heritage (2010) defined formative assessment as an assessment that takes place during the process of teaching and learning and its purpose is to diagnose students’ strengths and weaknesses. Taras (2005) stresses that for an assessment to be formative, it requires feedback which indicates the existence of the gap between the actual level of the work being assessed and the required standard. Teachers should continuously assess the students’ mastery and provide instructional feedback in order to prevent students from developing knowledge gaps (Van den Berg, 2017). Therefore the ultimate goal of formative assessment is to help both the teacher and the learner to identify their weaknesses and strengths so that strengths can be sustained and weaknesses are remediated for improved academic performance.

Sadler (1989) stated that formative assessment is done on a continuous basis in order to provide feedback on the progress of students and helps in identifying additional student needs that the teacher needs to address. Kivunja (2015a) asserts that formative assessment is used to provide information which helps students to know how they are performing and how they can improve their learning outcomes. Formative assessment merges with cognitive and socio-cultural theories of learning in various ways. Heritage (2010) argued from a cognitive perspective that, formative assessment enables teachers and learners to consistently work in the zone of proximal development whereby teachers are involved in a continuous process of collecting and interpreting evidence in order to structure learning that builds on learners’ maturing functions. Through formative assessment teachers can determine what is within the learners reach and provide learners
with experiences to support and extend their learning. Heritage further argued that formative assessment takes into account the role of interaction and joint collective action of the teacher and learners in the learning process.

MBESC (1999) stresses that the purpose of formative assessment is to inform teaching and improve learning while there is still time for improvement. Formative continuous assessment provides regular information about teaching, learning and the achievement of learning objectives and competencies taught (MBESC, 1999). MBESC further maintains that formative continuous assessment allows teachers to assess the performance-based activities that cannot be assessed in examinations. Nel (2011b) outlines the importance of formative assessment in education as to provide information about learning that can be used to diagnose learners’ strengths and needs, provide feedback to teaching and learning, motivate learners and provide practice of applying knowledge and skills. Therefore, formative assessment provides information which allows learners to learn and improve in the future.

Marynowski (2013) found that mathematics teachers find formative assessment beneficial to both teachers and students as it provides immediate feedback to teachers and learners about learning, it opens up students’ communication about mathematics and it makes it easier for teachers to see where students are at. Through formative assessment teachers obtain crucial information that they use to improve learners’ academic achievement. This motivates teachers and learners to work hard in improving academic performance. However, determining what assessment methods to be used and how it should be used effectively is a complex process and requires knowledge of different
assessment methods. There are two types of formative assessment namely: traditional and authentic assessment and they are discussed next.

2.3.2.2.1 Traditional methods of assessment

Traditional assessment methods refer to formative conventional methods of testing which usually produce a written document. The purpose of traditional assessment is to find out whether the students have learnt the content and to determine whether or not the students are successfully acquiring knowledge (Daizeabdao, 2015). Traditional assessment methods are preferred by most teachers because, they are easy to set and easy to score (Daizeabdao, 2015). The most common conventional methods of assessment that teachers use particularly in mathematics include: topic tests, class work, home work, oral questioning and classroom observations. Teachers need to use diverse assessment methods in order to cater for different competencies in the syllabi.

2.3.2.2.1.1 Topic tests

Topic tests are the most common assessment methods used by many mathematics teachers. Topic tests are formal assessment tasks set by the teacher which are limited to competencies covered in several lessons, a topic or a theme (MBESC, 1999). A topic test is administered in order for the teacher to do a comprehensive evaluation of the learners in a topic. Teachers assign grades to the learners for the topic. The MOE (2015) stresses that tests should consist of both short questions and more structured questions.
2.3.2.2.1.2 Class work

Class work is a diagnostic tool for analysing learners’ strengths and weaknesses in classrooms. Class work is set of activities that teachers use in their day to day teaching (MOE, 2015). The concept topic task is sometimes used to signify class work (NIED, 2008). Class works are written works given to learners to complete during the lesson. Class work allows learners to practice what they have learned in the presence of a teacher. Patterson (2005) found that class work provides reinforcement of skills and concepts taught. He further indicated that without class work it is difficult for teachers to monitor students’ growth.

2.3.2.2.1.3 Homework

According to MBESC (1999) homework is the way learners practice what they learned during the lesson at home or outside the classroom in order for learners to reinforce their leaning. NIED (2008) argued that homework strengthens the teacher’s efforts in the class and enhances the learning process. Quality homework is a very important tool for academic success (NIED, 2008). Homework enhances both teaching and learning. Homework also keeps learners engaged after lessons. Teachers are therefore urged to give well planned homework to learners on a daily basis. This helps the teacher to determine the extent to which learners have understood and mastered the content of the topic presented. Homework also help the teacher to know if learners are ready the next and new concepts.

National standards and performance indicators call for teachers to give homework continuously in order to identify aspects that are giving learners’ difficulty and adjust
their teaching approach for improved learning. The purpose of homework is to make learners to be more involved in their learning and subsequently improve learners’ academic performance. Homework also needs to be planned, marked and provided with feedback so that learners can continue making efforts in doing the homework for learning.

2.3.2.2.1.4 Oral questioning

Oral questioning is one of the most common assessment methods used in mathematics classrooms. Oral questioning is a process which requires learners to respond to questions by responding verbally (MBESC, 1999). Oral questioning is one of the informal formative assessment methods used by almost every teacher in mathematics. In oral questioning, a teacher asks learners while he/she is teaching and interacting with learners during the lesson (MBESC, 1999). Oral questioning allows a teacher to ask learners questions about the content presented to determine whether learners understand (MBESC, 1999). In oral questioning learners also ask questions especially when they do not understand or where they need further explanations. Oral questioning also helps the teacher to identify learners’ prior knowledge at the beginning of the lesson.

According to Tolley (2016), teachers use questioning to assess students’ knowledge quickly. He further argued that questioning allows students to share ideas and hear the thinking of others which helps them to develop strategies of solving problems. Oral questioning stimulates general discussion which determines the status of many students at once (Tolley, 2016). Oral questioning can also tell whether the learners are paying attention to the discussions at hand.
2.3.2.2.1.5 Classroom observation

Classroom observations may be formal or informal formative continuous assessment that teachers use every day of their teaching (MBESC, 1999). MBESC further indicated that classroom observations enable teachers to conduct assessment in a natural environment in order to acquire important information about the learners’ learning of the content (MBESC, 1999). Ndalichako (2015a) affirmed that classroom observations can be conducted through formal or informal assessment where teachers are able to closely observe students in the process of learning.

2.3.2.2 Authentic assessment methods

Authentic assessment methods are formative assessment that could be used to enhance effective teaching and learning. Effective learning and acquisition of relevant knowledge and skills need a review of the existing assessment frameworks (UNESCO, 2015). One of the key imperatives to improved learners’ achievement in education is the use of authentic assessment methods. Authentic assessment refers to assessment wherein students are asked to perform real world tasks that demonstrate meaningful application of what they have learnt (Daizeabdao, 2015). The foundation of authentic assessment revolves around evaluating learners’ ability to apply what they have learned in the classroom to a real world context. In authentic assessment learners complete assignments which are based on life situations and have to be resolved in reference to authentic contexts (Carl, 2012). Kivunja (2015b) concurs with Carl as he argues that authentic assessment activities should require students to apply what they have learned in classroom to new contexts.
With rapid technological developments there is a need to adopt authentic assessment methods to assess both the learning process and the learning outcomes (Dandis, 2013). Thus, teachers should use alternative assessment methods that would help learners to cope in the 21st century. Kivunja (2015a) stresses that assessment strategies used by the teachers should capture diverse dimensions of learning and encourage students to engage in higher order thinking, critical thinking and problem solving. The premise of authentic assessment is therefore to enrich the learners’ high level of cognitive development. Authentic assessment in mathematics focuses on learners’ analytical skills and ability to integrate what they have learned along with creativity with written and oral skills.

According to Daizeabdao (2015) authentic assessment improves learners’ thinking and reasoning skills. Daizeabdao further noted that authentic assessment allows learners to be persistent, self-regulating and enthusiastic towards learning. There are a number of authentic assessment methods that can be used in mathematics such as performance based assessment, projects, practical investigations, portfolio assessment and self-assessment. Teachers need to be aware of these and should make use of them in assessing the learners.

2.3.2.2.1 Performance-based assessments

Performance-based assessment is one of the significant authentic assessment methods. Performance-based assessment is an assessment which involves activities that directly assess learners’ understanding and proficiency in a subject (MBESC, 1999). Nel (2011a) defines performance-based assessment as the application of knowledge, skills and work habits through the performances of the meaningful tasks. Nel further argues that during
performance-based assessment learners are engaged in activities that require them to demonstrate specific skills which may include creating a specified product in order to show understanding.

Performance-based assessment requires learners to demonstrate what they have learned and how to solve problems through collaborative efforts in solving a complex problem together. MBESC (1999) argues that performance-based assessment allows learners to demonstrate what they have understood and can do. Performance-based assessment provides teachers with information about how learners understand and apply knowledge (Nel, 2011a). Nel further noted that performance-based assessment provides opportunities for learners to explain their works and make learners involved in the assessment process. Performance based assessment taps into the learners’ higher-order thinking processes and problem solving skills to enable them accomplish the assigned tasks. Some examples performance-based assessments are projects and practical investigations.

2.3.2.2.1.1 Projects and practical investigations

Projects and practical investigations are also performance-based assessment methods. Projects are longer assignments that assess the ability of learners to solve problems and apply mathematics processes in life situations. Practical investigations on the other hand are short tasks that assess the learners’ ability to think and reason independently and reflect critically on what they have learned (Ministry of Education, 2015). Creating models and carrying out a mini research are some example of project and practical investigations. There is no formal requirement to carry out projects and investigations
with learners in senior secondary mathematics in Namibia. However, through investigations and projects learners can learn to appreciate true beauty of mathematics (Quinnell, 2010).

Projects and practical investigations help teachers to assess learners’ abilities to use higher order thinking such as using knowledge in a realistic situation and making connections and inferences between concepts (MBESC, 1999). According to Quinnell (2010) mathematical investigations have a more holistic approach to learning whereby mathematical concepts and skills are treated concurrently and links are made to other topics and social contexts. Quinnell further stresses that mathematical investigations foster curiosity and exploration in children, focuses on real life problems and community issues and encourages debates where students can overcome misunderstandings. Through projects and practical investigations, learners understand the content better and deeper.

2.3.2.2.2 Self-assessment

Self-assessment is part of formative assessment and considered the most important authentic assessment method. Nel (2011b) defines self-assessment as an assessment that involves learners making judgments about their own learning process and its outcomes. Carl (2012) stresses that for learners to take responsibility of their own learning; self-assessment should be a core component of teaching and learning. Self-assessment is the process by which the students gather information and reflect on their own learning (Sharma, Jain, Gupta, Betta and Dhir, 2016). In self-assessment learners should be encouraged to evaluate their own work and identify the next steps in learning (Ministry of
Education, 2004). Learners should be taught what their roles in self-assessment are to ensure that they adopt an upward learning path (Nel, 2011b).

According to Sharman et al., (2016) self-assessment increases the interest and motivational levels of learners for the subjects which leads to enhanced and better academic performance and development of critical thinking skills. Nel (2011) indicates that self-assessment gives learners opportunity to learn how to assess themselves objectively which enhances self-efficacy. “Self-assessment empowers learners to assess their own progress and reflect on how they could improve their learning”, asserts UNESCO (UNESCO, 2004 p.157).

2.3.2.2.3 Portfolio assessment

Portfolio assessment is mandated in some subjects at Junior Secondary Phase in Namibia. Portfolio assessment is a purposeful collection of learners’ work that exhibits the students’ efforts, progress and achievements in one or more areas (Nel, 2011b). Nel further indicates that the collection must include the criteria for selection and evidence of students’ self-reflection. Portfolio assessment requires a learner to collect a limited and selected work that are used to present the learner’s best work and demonstrate the learner’s educational growth over a given period of time (MBESC, 1999). Nel (2011b) noted that for the portfolio to help learners to improve in learning, the teacher needs to assist learners in preparing portfolios. Therefore, in portfolio assessment learners learn concepts throughout the school year, document what they learn and reveal progress and improvements.
The characteristic of portfolio assessment is that it highlights student efforts, development and achievement over a period of time and emphasizes the application of knowledge rather than memorization (Ndalichako, 2015a). Ndalichako further indicates that the advantage of portfolio assessment is the engagement of students in assessing their own progress and achievement and strengthening collaboration with the teacher through establishing on-going learning goals. Portfolio assessment also encourages self-reflection and self-awareness among students as they review the previous work and assess their strengths and weaknesses.

### 2.3.3 Moderation of assessment activities

One of the most important aspects of effective assessment is moderation. Moderation is normally done by the experts with sound knowledge and experience in the subject, usually the subject heads or the Head of Departments (MBESC, 2001). Nel (2011a) indicates that moderation is a quality assurance process by which an individual or a group not involved in setting of an assessment task confirms that the assessment is continuously conducted with accuracy, consistency and fairness.

Moderation in schools serves a number of advantages. MBESC (2001) indicates that moderation ensures that assessment tasks are well balanced regarding the coverage of levels of Blooms ‘taxonomy, the difficult levels of the questions as well as the content validity. MBESC further argues that moderation also checks whether the instructions to the learners are clear and no grammar or spelling errors are contained in an assessment tool. Moderation of marked assessment task is also crucial, as it ensure that marking was done fairly and consistently. Nel (2011a) stresses that moderation ensures that the
assessment methods and instruments used are appropriate for the task being assessed. Ndalichako (2015a) supports the view that moderation of an assessment task is a crucial step in ensuring that assessment tasks used are valid, reliable and fair. Nel (2011a) affirms that moderation ensures that learners are being assessed in a consistent, accurate and well-designed manner. Moderation contributes to the continuous improvement of assessment practices and to the sharing of good practices among teachers. Without moderation, assessment might lack important aspects such as quality, validity, reliability and fairness.

2.3.4 Marking of assessment activities

Marking of an assessment task is central to formative assessment. NIED (2008) emphasizes that marking of projects and assignments should be done by the teacher and handed back to the learners as soon as possible. For marking to be precise and consistent, a marking scheme or rubric should be developed when an assessment task is set. MBESC (2001) stated that the marking scheme should give an indication of the main points required in the learner’s answer and acceptable alternatives given. Rubrics provide a measure of quality performance on the basis of established criteria. Rubrics should contain the criteria used to evaluate student performance (Reddy et al., 2015).

Marking is often done by the teacher using a red pen. MBESC (2001) emphasized that marking should be done in distinctive colour and non-erasable ink pen. In most cases a teacher puts a tick for the correct answer and a cross for the wrong answer. If the question is worth a number of marks, it is helpful for the marker to record a series of ticks and crosses to show this. In a research Komba (2015) also found that teachers in Tanzania
were largely marking using a red pen by putting ticks and crosses beside correct and wrong answers respectively. Komba further noted that teachers wrote correct answers when learners responded to a question incorrectly and gave comments which would help learners to improve. MBESC (2001) indicates that teachers should provide constructive feedback to help learners to correct errors and to understand how their work has been marked. Komba (2015) however, argued that some teachers made brief comments that did not provide sufficient information to allow learners to learn and improve in the future. Often this is not done due to the pressure of time and the large number of learners in most classrooms in Namibia.

### 2.3.5 Provision of feedback

Feedback is a key element in formative assessment. It is a decisive element to assist learning. Effective feedback is formative and constructive, in a way that learners take steps to move forward in their learning. The Ministry of Education (2004) emphasizes that teachers should give constructive and appropriate feedback to the learners. MOE (2009b) also indicates that learners should be given feedback about their strengths and weaknesses, where they need to improve and how they should improve.

Feedback is the process through which learners learn how well they are achieving the learning objectives and what they need to do in order to improve their performance (Isaac, Zara & Herbert, 2013). “Feedback is information about the gap between the actual level and the reference level of a system of parameters which is used to alter the gap” (Taras, 2005, p. 470). Good feedback includes explanations of how and why a student
achieved against the criteria or still needs to work toward achieving the criteria (Isaacs et al., 2013).

Heritage (2010) cautioned that information only becomes feedback when it is actively used to alter the learning gap. Isaacs and Herbert (2013) argue that, effective feedback helps a learner to close the gap between his/her current knowledge and his/her learning goals. Reddy et al., (2015) concur that through feedback, students learn how well they are achieving the learning objectives and what they need to do in order to improve their performance. Heritage (2010) added that feedback is more effective when it is focused on the task and provides the students with suggestions and hints on how to improve rather than being offered in the form of praises and comments. Ticks and marks are not sufficient to improve learners’ performance. Hence, feedback needs to be accompanied by recommendations on how learners should improve so that it encourages learners to continue making efforts to improve their work. Nel (2011a) noted that through positive feedback from the teacher, students can develop self-esteem and confidence in their learning development. Teachers also need to make use of feedback in order to improve the ways they teach. Heritage (2010) stresses that teachers should make use of feedback information for them to make changes in their teaching.

Frequent feedback is vital to learning prevent learners from developing learning gaps. Kivunja (2015a) states that learners should be given regular feedbacks to enable them to reflect on their own performance. It also gives them opportunities to improve throughout the learning process. Teachers are therefore encouraged to give frequent feedback to the learners in order to enhance teaching and learning, and consequently improve academic performance.
2.3.6 Challenges faced by mathematics teachers in implementing formative assessment

Namibia is faced with various challenges in the education sector. “Namibia is faced a number of challenges in reforming and aligning its school curriculum and assessment systems” (Iipinge & Kasanda, 2013, p. 437). There are various obstacles in smooth implementation of effective assessment in many Namibian schools particularly in senior secondary school mathematics. Angula (2015) also found that senior secondary school mathematics classrooms in Otjozondjupa region were overcrowded, textbooks and other furniture were inadequate and time to complete the syllabus was limited.

The situation has not improved greatly over the years particularly in some senior secondary schools in Namibia. Maemeko; Nkengbeza and Ntabi (2017) found that Grade 12 learners are not motivated, classes were overcrowded and recourses were insufficient. MEAC (2018) affirms that most classrooms are still overcrowded and teaching and learning materials especially textbooks are still inadequate. Lack of resources, lack of skills, teachers’ heavy work load and time constraints are some of the challenges that are faced by Mathematics teachers and are discussed next in this thesis.

2.3.6.1 Lack of Resources

One of the key challenges for teachers, especially mathematics teachers is the unavailability of relevant resources for effecting assessment effectively. The ideal situation is that every learner should have a mathematics textbook (NIED, 2008). However, many learners in most schools are sharing textbooks and sometimes have no
textbooks at all. Angula (2015) found that learners do not have enough mathematics textbooks and have to share one textbook between two or more learners.

Iipinge and Likando (2012) affirm that the Ministry of Education has decided that due to lack of resources and expertise, school based assessment should be used only for subjects for which it is compulsory. Unfortunately, grades 11 and 12 mathematics is one of the subjects where school based assessment is not done (MBESC, 1999). The Ministry of Education acknowledges that “The provision of learning and teaching materials is highly inadequate” (MOE, 2005, p. 9). This has made it difficult for teachers to adopt formative assessment where teachers can use multiple opportunities to assess learners’ learning. Izci (2016) argues that teachers cannot find all appropriate materials to construct formative assessment tasks. UNESCO (2004 p. 17) stresses that “the quality and availability of learning materials strongly affect what teachers can do” Therefore, due to limited resources, assessment is not effectively implemented in many schools and by most teachers.

2.3.6.2 Lack of Skills

Effective service delivery requires extensive knowledge and expertise. Mateya, Utete and Ilukena (2016) found that mathematics teachers lack pedagogical content and teaching strategies skills, as a result they do not teach topics that they do not understand. Uiseb (2009) argues that teachers’ lack of skills is a challenge in implementing continuous assessment in many schools in Namibia. This could be reason why the majority of teachers are hesitant and need guidance in implementing continuous assessment with
confident (MBESC, 1999). Mathematics teachers in particular need adequate skills of formative assessment in order to implement it successfully.

MOE (2009) claimed that assessment must be anchored in learner-centred principles. “This requires teachers to have a good and common understanding of what type of assessment activities and techniques can go along with learner-centred education” (Iipinge & Kasanda, 2013, p. 438). The new approach has introduced a new set of demands that some teachers may find difficult to address.

Most teachers in Namibia have insufficient understanding of the learner-centred approach and how it should be incorporated in assessment. Iipinge and Kasanda (2013) indicate that some Namibian teachers are not well trained to set better assessment tasks that assess all levels of Bloom’s taxonomy and do not have good knowledge of assessment rubrics. Iipinge and Kasanda further found that the national policy on assessment is seen as unclear by teachers. This shows that there are no clear guiding documents on how teachers should conduct assessment in their classroom particularly in senior secondary school mathematics classrooms.

Dandis (2013) notes that teacher education programmes skim over classroom assessment, leaving teachers to assess in the way they were assessed when they were in school. Teachers are not fully trained on how to use different assessment methods, consequently they may not conduct meaningful assessment and fail to offer regular feedback to learners that may be instrumental in improving teaching and learning. Izci (2016) also supports the idea that, teachers leave teacher education programmes without a full
understanding of formative assessment since, there is no adequate time to apply and reflect on assessment practices during their training.

2.3.6.3 Teachers’ teaching workload

The other challenge teachers faced in conducting effective formative classroom assessment in schools is the teaching workloads. The ministerial teacher-learner ratio in senior secondary phase is one teacher for thirty learners (MOE, 2005). However, many grade 11 and 12 classes have more than thirty learners. Angula (2015) found that due to overcrowded classes teachers might not conduct assessment effectively. Amutenya (2016) indicates that teachers leave the teaching profession because they are overloaded with administrative tasks, despite the fact that they need more time to prepare for lessons. Izci (2016) notes that class sizes and the number of periods taught by teachers affect the use of formative assessment. Izci adds that it is hard for teachers to assess learners in large classes since, classroom management and effective individual feedback are extremely difficult. Learner-centred education sometimes requires that learners have space to move around or work in small groups but, has become challenging in overcrowded classes (NIED, 2008). As a result, many teachers are not able to assess in ways that could cater for each individual learner’s learning progress (Iipinge & Kasanda, 2013). Big classes could prevent teachers from giving quality assessment tasks due to lack of time to monitor assessment activities. Ndalichako (2015a) notes that teachers have quite a high teacher-student ratio. Ndalichako further argues that only few class groups have less than 41 learners and most teachers have up to five class groups to teach and assess. Having a high number of learners in a class requires maximum effort and extensive skills in order
to bring about meaningful formative assessment. Dandis (2013) also claims that teachers would like to use alternative assessment methods in mathematics; however it is impossible due to the large number of students in their classes.

2.3.6.4 Time Constraints

Time related issue is another challenge facing teachers particularly in mathematics. Amoonga (2008) found that mathematics teachers teaching time was limited and the syllabus were lengthy. This often forces some teachers to use assessment methods that are less time consuming. Angula (2015) also found that mathematics teachers felt that time allocated to mathematics lessons was inadequate. She further claimed that allocating sufficient time to subjects would ensure effective teaching, learning and assessment.

Izici (2016) noted that though teachers have appropriated knowledge and skills to practice formative assessment they do not adopt it due to the insufficient time. He further argued that the pressure teachers feel to cover the whole syllabus for learners in order to write the end of the year and external examinations negatively affects teachers’ use of formative assessment. Marynowski (2013) also argues that mathematics teachers would like to incorporate formative assessment strategies in their teaching but they take too long and that they feel the time crunch with the curriculum. Teachers would like to use formative assessment methods in their lessons but due to limited instructional time, some teachers are forced to use traditional or conventional methods of assessment.

2.4 Summary

This Chapter provided the theoretical framework, which was based on Sadler (1989) theory of formative assessment and feedback. The chapter also reviewed relevant
literate to the study. Literatures showed that there are different assessment methods that can be used in mathematics. Literatures also revealed that traditional assessment methods are used more frequently than authentic assessment methods. Literatures further revealed that feedback, moderation and marking play crucial roles in assessment, as they improve the teaching and learning process. Literatures however showed that there is a need for teachers to adopt authentic assessment methods in mathematics classrooms for improved learners’ academic performance. The next chapter discusses the methodology used in this study.
CHAPTER 3: METHODOLOGY

3.1 Introduction

This Chapter discusses the methodology used in the study. It outlines the qualitative research design, describes the case study research design and how the research site and study participants were chosen. It further discusses the instruments and methods used to collect data from the sample. Data analysis, trustworthiness, rigour and research ethics are also discussed.

3.2 Research design

This study employed mixed methods approach. Mixed methods approach is a combination of both qualitative and quantitative which provides a better understanding of a research problem (Mertler, 2009). Mixed method approach was chosen since it enabled the researcher to use both qualitative and quantitative designs in analysing data. The study was guided by the embedded design. Embedded design is a mixed methods design in one phase only whereby one data set provides supportive information especially when the single data set is not sufficient (Creswell & Clark, 2011). The primary aim of embedded design is to collect qualitative data and have other form of quantitative data to provide supportive information (Creswell, 2009). Creswell further stresses that embedded design can be used when the researcher need to include quantitative data to answer the research questions within a largely qualitative study. Embedded design allowed the researcher to gain in-depth understanding of the phenomena. The study sought to investigate the Grade 11 and 12 mathematics teachers’ formative assessment practices in Oshikoto Region.
3.3 Population

The population is the large pool from which the sample is drawn and to which the researcher wants to generalize the sample results (Blanche, Durreheim & Painter, 2012). The population of this study consisted of all Grade 11 and 12 mathematics teachers in the Oshikoto Region. There were 16 senior secondary schools in 2016 in the Oshikoto Region with an average of four mathematics teachers per school. Thus the total population comprised 64 mathematics teachers. The study was conducted in Oshikoto Region because, the researcher is from Oshikoto Region and this made the study cost effective in terms of transport and accommodations.

3.4 Sample and sampling procedure

A sample is a small group of cases drawn from the population (Blanche et al., 2012). Two schools were purposefully selected to participate in the study. They further argue that sampling involves the decisions about which people, settings, events or behaviours to observe. A convenient sampling technique was used to select the sample of the study. “Convenient sampling involves choosing the nearest individuals to serve as respondents” (Cohen, Manion & Morrison, 2011 p. 155). The schools were selected due to the highest number of Grade 11 and 12 mathematics teachers. Schools are also located in different circuits, this allowed the researcher to collect more data and understand the case more broadly and comprehensively. All seven Grade 11 and 12 mathematics teachers from both two selected senior secondary schools were part of the sample.
3.5 Research instruments

Data collection instruments are basic materials which are used collect data from the sample (Blanche et al., 2012). In this study, three instruments were used to collect data from the sample. These instruments were: Classroom observation schedule, interview protocol and document analysis sheet. The researcher used these instruments in order to get a full understanding of the teachers’ formative assessment practices in two selected senior secondary schools in the Oshikoto Region.

3.5.1 Classroom observation schedule

The researcher used the observer-as-participant approach in classroom observation. Observer-as-participant spends a limited amount of time observing group members and tells members they are being observed (Johnson & Christensen, 2012). The researcher collected qualitative data by observing teacher-learner assessment interactions particularly the assessment methods used in the mathematics classrooms and did not take part in any lesson activities. The teacher was observed for three lessons at school A and the length of each lesson was 40 minutes. Whereas, each teacher at school B was observed for four lessons and each lesson was 45 minutes.

3.5.2 Interviews protocols

This study used interview protocol to collect data from the respondents. Interview protocol is a data collection instrument that includes the items, the response categories and the instructions to the respondent (Johnson & Christensen, 2012). Standardized open-ended interview approach was used to collect data that could not be observed directly such as teachers’ understanding of formative assessment in mathematics classrooms. The
researcher opted for the standardized open ended option because data could be easily analysed and compared. In a standardized open-ended interview approach, a set of open-ended questions are asked in a specific order and exactly as worded (Johnson & Christensen, 2012). The same open-ended questions were asked to all seven interviewees in the same order. Qualitative data of views on what is formative assessment, assessment methods used challenges faced when conducting assessment as well as suggestions on how to improve current assessment practices at senior secondary school mathematics were collected from interviews. Each respondent was interviewed alone and the length of each interview session was between 20 to 30 minutes. All the interview sessions were not recorded.

3.5.3 Document Analysis sheet

The researcher used document analysis sheet to collect data from the sample. Document analysis sheet enables the researcher to collect data from secondary data that were collected and recorded at an earlier time usually by different people and often for entirely different purpose than current research purposes (Johnson & Christensen, 2012). The researcher used document analysis sheet because documents provided information on how mathematics teachers conduct assessment as from the beginning of the school year in their classrooms. The researcher reviewed teachers’ timetables, class lists as well as learners’ exercise books.

3.6 Data collection procedures

After securing the permission from The Permanent Secretary of the Ministry of Education, Arts and Culture and the Director of Oshikoto Region to conduct the study in
the Oshikoto region, the researcher gave a brief overview of the study to the school principals, mathematics and science heads of department and Grade 11 and 12 mathematics teachers. The principals, teachers and learners’ parents were requested to complete the consent forms. Consent forms gave permission to the researcher to conduct the study at the two selected senior secondary schools in different classrooms.

The teachers who agreed to take part in the study were observed as they interacted with learners in the mathematics classrooms. The classroom observations involved seven Grade 11 and 12 mathematics teachers from two the selected schools in Oshikoto region. School A has three teachers while school B has four teachers. Each teacher was observed for three lessons in school A and four lessons at school B. The variation in the number of lessons observed at the two schools was caused by the home weekend for learners at school A (learners were released at ten in the morning on home weekends). Therefore, only three lessons were observed for every teacher at school A. Every lesson was 40 minutes and 45 minutes long for school A and school B respectively. The focus of the observation was on assessment methods used, marking and provision of feedback. The researcher took notes during classroom observations.

The researcher then interviewed the observed teachers. Interview sessions were scheduled from the third day of the observation at each school. Interview sessions took place in the afternoon, after lessons. Each respondent was asked the same twelve questions (See appendix M). The same questions were asked because it was believed that this would to have increase the validity of the results and make data analysis easy (Johnson & Christensen, 2012). The consent to record videos or audio for the interview sessions were not given by the participants. Hence, the researcher take wrote down the
responses for the interview sessions in an interview guide. The researcher then analysed all the observed teachers’ timetables and class lists in order to find the number of periods each teacher teach in a seven day cycle and the number of learners in class groups. The Grade 11 and 12 learners’ mathematics books mainly learners’ written work particularly learners’ exercises, homework and test books. Document analysis chiefly focused on assessment methods used, marking and comments written by the teachers in the learners’ books in the first eight written assessment activities administered in 2017 academic year.

3.7 Data analysis

Data analysis is a process of making sense of and making meaning of the data collected (Gay, Mills & Airasian, 2006). Data analysis in this study began when the researcher started collecting data. Data analysis in mixed method research relates to the type of design chosen (Creswell, 2009). Data analysis in this research was guided by embedded concurrent strategy whereby researcher quantified the qualitative data by creating codes and themes qualitatively then counting the number of times they occur in the data presented. The data were then categorized under the following themes: assessment methods, marking learners’ written work, provision of feedback, challenges faced by mathematics teachers when conducting assessment and suggestions on how to improve the current formative assessment practices. Further, descriptive statistics including tables and graphs were used. Descriptive data were obtained from the lesson observations and document analysis. Data from lesson observations and document analysis were then enumerated. Enumeration is the process of quantifying qualitative data. “Enumeration helps qualitative researchers to communicate concepts such as amount or frequency when writing up the results” (Johnson & Christensen, 2012, p. 528). Learners’ written work
was analysed and presented in frequency tables and bar graphs. Creswell and Clark (2011) indicate that quantification of qualitative data enable the researcher to compare quantitative results with qualitative data.

3.8 Trustworthiness, validity and reliability

Trustworthiness seeks to establish the credibility of the research (Mertler, 2009). Credibility in qualitative research refers to extent which the data and data analysis are believed and trusted. This study used the multiple methods of collecting data. The researcher observed the respondents, analysed their documents and interviewed all the respondents. This was done to ensure that conclusions made are accurate.

Validity of the research deals with the extent to which the data that have been collected accurately measure what purport to measure (Mertler, 2009 p.114). Gray (2004) explains that validity is ensured if the research instruments measure what it intend to measure. To enhance validity in this study, the data obtained from the research instruments were triangulated by comparing codes and themes were developed. The interview transcripts and summaries of observations as well as document analysis were given to a critical friend in order for him to verify the responses.

Reliability of the research refers to the extent to which the research instruments consistently measures what it supposed to measure (Creswell, 2010). He further asserts that a test is reliable to the degree that it measures accurately and consistently yielding comparable results when administered a number of times. To ensure reliability of data collected in this study, the content of the research instruments used went through a verification from an independent body who is knowledgeable in mathematics education.
to ascertain the degree to which the content of instruments were in congruence with the intended purpose. The suggestions and inputs from the independent body enabled the researcher to edit the content of the research instruments.

3.9 Research ethics

Research ethics are set of guiding principles that assist the researcher in conducting ethical studies (Johnson & Christensen, 2012). Research ethics put an emphasis on humane and sensitive treatment of the research participants who may be placed at risks by research procedures (Mertler, 2009). In this study the researcher took into account several ethical issues.

Firstly, the researcher sought the ethical clearance from the University of Namibia Centre for Research and Publications. The researcher then obtained permission from the Permanent Secretary of the Ministry of Education, Arts and Culture and the Director of Education in the Oshikoto Region to carry out research in schools in this region. Consent from the school principals, Grade 11 and 12 mathematics teachers and learners’ parents were also obtained.

Secondly, the researcher explained the purposes of the study to the participants so that, participants knew what the study aims were. The respondents were assured of anonymity and pseudonyms were used for both schools and the participants. The respondents were given the right to confidentiality and the right to withdraw from the study at any time without penalty. The respondents were then given consent form prior to the commencement of data collection as an agreement to take part in the study.
The researcher did not disrupt the normal school activities because observations were made in a peaceful manner and interviews were conducted after normal lessons. The researcher respected the cultural values, norms and beliefs of the schools by adhering to the school internal policy. The collected data were stored in a password protected computer accessible to the researcher only. Data on hard copies are locked in the steel cabinet whereby only the researcher has access to the key. Data will be kept for five years, after which it will be shredded and data in the computer will be deleted from the computer.

3.10 Summary

This Chapter discussed the methodology used in the study. The study used mixed methods approach and employed embedded research design. The population of the study comprised of 64 senior secondary mathematics teachers. A sample of seven teachers participated in the study. The researcher used classroom observation schedules, interview protocols as well as document analysis as research instruments. Data analysis was guided by embedded concurrent strategy. Data collection procedures and the research ethics were also clarified. The next chapter present and analyse the research data.
CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

In this Chapter, the data collected from classroom observations, document analysis and interviews are presented. Data are presented according to the headings and the research instruments used in the study. Data are presented in descriptive statistics, frequency tables, pie charts and bar graphs were used. The study sought to determine the Grade 11 and 12 mathematics teachers’ formative classroom assessment practices in the Oshikoto Region.

4.2 Respondents’ biography information

Seven Grade 11 and 12 mathematics teachers from two senior secondary schools in the Oshikoto Region participated in the study. School A was represented by three teachers while school B was represented by four teachers. Gender, highest professional qualifications and teaching experience were sought and are presented in Figure 1, Figure 2 and Figure 3 respectively.

4.2.1 Gender of the respondents

There were four male and three female senior secondary mathematics teachers who participated in the study. The gender distribution is illustrated in Figure 1.
Figure 1: Gender of the participants

4.2.2 Highest professional qualifications of the Mathematics teachers

Teachers were asked to state their highest professional qualifications. Their responses are given in the Figure 2.
The results showed that Grade 11 and 12 mathematics teachers possess different teaching qualifications. One respondent had Mathematics and Science Teachers Extension Program (MASTEP), another one has Advanced Certificate in Education (ACE), while two respondents had the Bachelor of Education Degree (B. Ed) and three respondents had the Bachelor of Education Honours Degree.
4.2.3 Teaching Experiences of the respondents

Figure 3 gives the teaching experience of the seven mathematics teachers in this study.

![Years of teaching experience](image)

**Figure 3: Teaching experiences of the respondents**

The results showed that Grade 11 and 12 mathematics teachers in this study had varied number of years of teaching experience. Only one respondent had less than three years teaching experience, two respondents had between four to seven years teaching experience, two respondents had eight to eleven years teaching experience and two respondents had more than eleven years of teaching experience.

4.3 Teachers’ teaching workload

The researcher observed the number of learners taught in various Grade 11 and 12 class groups. The numbers of periods taught per seven day cycle by senior secondary
mathematics teachers were also observed. The findings are presented in the Tables 1(a) 1(b) and Tables 2(a) and 2(b).

Table 1(a) shows the number of learners in different class groups at school A.

**Table 1(a): The number of learners in different Grade 11 and 12 class groups at School A**

<table>
<thead>
<tr>
<th>Class group</th>
<th>Number of learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>41</td>
</tr>
<tr>
<td>C2</td>
<td>43</td>
</tr>
<tr>
<td>C3</td>
<td>38</td>
</tr>
<tr>
<td>C4</td>
<td>39</td>
</tr>
</tbody>
</table>

The findings in Table 1(a) showed that, Grade 11 and 12 Mathematics teachers at school A had a substantially large number of learners in their classrooms (i.e. ranged from 38 to 41).

Table 1(b) shows the number of learners in different class groups at school B.
Table 1(b): The number of learners in different Grade 11 and 12 class groups at School B

<table>
<thead>
<tr>
<th>Class group</th>
<th>Number of learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>40</td>
</tr>
<tr>
<td>D2</td>
<td>41</td>
</tr>
<tr>
<td>D3</td>
<td>39</td>
</tr>
<tr>
<td>D4</td>
<td>43</td>
</tr>
<tr>
<td>D5</td>
<td>40</td>
</tr>
</tbody>
</table>

The results in Table 1(b) showed that teachers at school B had a large number of learners in their classrooms (i.e. ranged from 39 to 41).

Table 2(a) shows the number of periods taught by teachers in a seven day cycle at school A.

Table 2(a): The number of periods per teacher in a seven day cycle at School A

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Total number of periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>47</td>
</tr>
<tr>
<td>A2</td>
<td>46</td>
</tr>
<tr>
<td>A3</td>
<td>47</td>
</tr>
</tbody>
</table>

The results in Table 2(a) showed that at school A, two teachers were teaching 47 periods and one teacher was teaching 46 periods each in a seven day cycle. There are 56 periods in a seven day cycle.
Table 2(b) shows the number of periods taught by teachers in a seven day cycle at school B.

**Table 2(b): The number of periods per teacher in a seven day cycle at School B**

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Total number of periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>27</td>
</tr>
<tr>
<td>B2</td>
<td>31</td>
</tr>
<tr>
<td>B3</td>
<td>29</td>
</tr>
<tr>
<td>B4</td>
<td>33</td>
</tr>
</tbody>
</table>

Table results in 2(b) showed that teachers in school B were teaching a maximum of 33 and a minimum of 27 periods in a seven day cycle.

### 4.4 Assessment methods used by Grade 11 and 12 Mathematics teachers

The assessment methods used by the Grade 11 and 12 mathematics teachers were emergent from the classroom observations, interviews and document analysis.

#### 4.4.1 Quantitative data

Table 3(a) shows the common assessment methods that have emergent from classroom observation at school A.
Table 3(a): The frequency of assessment methods observed at School A.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Frequency of assessment methods used in three lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class work</td>
</tr>
<tr>
<td>A1</td>
<td>3</td>
</tr>
<tr>
<td>A2</td>
<td>2</td>
</tr>
<tr>
<td>A3</td>
<td>3</td>
</tr>
</tbody>
</table>

The results in Table 3(a) indicated that at school A, all teachers used classwork, homework and oral questioning assessment methods in the mathematics classrooms. Test was not observed as tests were written during evening studies. The results also showed that class work and oral questioning were predominantly used.

Table 3(b) shows the common methods that have emergent from classroom observation at school B.

Table 3(b): The frequency of teaching methods observed in four lessons at School B.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Frequency of assessment methods used in four lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class work</td>
</tr>
<tr>
<td>B1</td>
<td>1</td>
</tr>
<tr>
<td>B2</td>
<td>4</td>
</tr>
<tr>
<td>B3</td>
<td>3</td>
</tr>
<tr>
<td>B4</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
</tr>
</tbody>
</table>
The findings in Table 3(b) showed that at school B, class work and oral questioning were observed in all respondents’ classes, while tests were observed in two respondents only. Home work was not only observed in one lesson. The results showed that oral questioning was mostly used while test was least used by the respondents.

Table 4 shows the common methods that have emergent from document analysis.

**Table 4: Frequency of assessment methods used by the respondents (N=7)**

<table>
<thead>
<tr>
<th>Participants</th>
<th>The frequency of the first eight assessment methods given in 2017 academic year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class work</td>
<td>Home work</td>
</tr>
<tr>
<td>A1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>A2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>A4</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>B1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>B2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>B3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>B4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

The results in Table 4 showed that Grade 11 and 12 mathematics teachers used different assessment methods. Class work, home work and class tests were noted as assessments methods used in the first eight written assessment activities given in 2017 academic year.
The most frequently used assessment method was class work and test was the least assessment method used.

4.4.2 Qualitative data

The mathematics teachers were also asked to report on the assessment methods they used. Three participants stated that they use class works and class tests. Three respondents stated that they used class work, home work and tests. One Mathematics teacher indicated that he used projects in addition to class work, home work and class tests. One respondent indicated that he also used oral questioning in addition to other methods.

With regards to why different assessment methods were used, the Mathematics teachers reported a number of reasons. Specifically reasons were sought on class work, home work, class tests, projects as well as oral questioning. Table 7 gives their responses.

Table 5: Reasons why different assessment methods are used by Mathematics teachers

<table>
<thead>
<tr>
<th>Method of assessment</th>
<th>Reasons why assessment method is used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class work</td>
<td>One respondent stated that he used class works. <em>Class works allow learners to share ideas, some learners learn best from their peers</em> (Teacher A3). Two respondents used class work to enable instantaneous feedback. Teacher A3 indicated that <em>class work enable immediate feedback by the teacher as marking was sometimes done in the class</em>. Three Mathematics teachers used class work to save time. <em>Class work are fast and easy to...</em></td>
</tr>
</tbody>
</table>
administer (Teacher B4). However, four respondents gave class work so that learners cannot copy from each. *I monitor the class works so that I am sure it’s a learner him/herself that does the work* (Teacher A1). Teacher B1 added that *I give class work to make sure no one get assistance from others and the result to be obtained is a true reflection of what a learner really knows.*

<table>
<thead>
<tr>
<th>Home work</th>
<th>Only three Mathematics teachers indicated that they used homework to assess their learners. <em>Home works allow learners to practice what they studied in class after lessons. You know practice make perfect</em> (Teacher A2). Another respondent indicated that, <em>I give home works to keep my learners busy</em> (Teacher B2). One other Mathematics teacher stated that, <em>home works enable learners to do researches and discover new knowledge</em> (Teacher A3). However, four respondents stated that they did not give home work because learners did not complete the homework and to avoid copying. <em>I do not give home works because learners only copy and paste</em> (Teacher B4). One other Mathematics teacher added that <em>I do not give home works, because not all learners submit the home works</em> (Teacher B1).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic tests</td>
<td>All Mathematics teachers indicated that topic tests allowed teachers to know if learners had really mastered the topic</td>
</tr>
</tbody>
</table>
content. One teacher noted that, *I give tests in order to know what learners know without the support materials. The test determines if a learner has mastered the basic competencies taught* (Teacher B2). Teacher B3 added that *topic tests encourage competition among learners.*

**Projects**

Only one Mathematics teacher stated that he used projects. He indicated that, *I give projects because when learners have done a project they understand the content deeper and hardly forget* (Teacher A3). He however argued that *projects require a lot of time and commitment from the teacher and learners.*

**Oral questioning**

Only one Mathematics teacher indicated that he used because, *oral questioning allows me to interact with my learners every minute of the period, it keeps the lesson alive* (Teacher B1).

### 4.5 Marking of assessment activities

Marking of assessment activities by the Grade 11 and 12 mathematics teachers were emergent from the classroom observations, interviews and document analysis.

#### 4.5.1 Quantitative data

The researcher observed the provision of marking learners’ written work during the mathematics lessons. The results are presented in tables 6(a) and 6(b).

Table 6(a) shows the frequency of marking observed at school A.
Table 6(a): Frequency of marking observed at School A.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>A2</td>
<td>×</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>A3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Key: ✓ = Marked during the lesson  × = Did not Mark during the lesson*

The findings in Table 6(a) indicated that all mathematics teachers at School A marked during the mathematics lessons. Teacher A1 marked in lesson 1 and 3 only. Teacher A2 marked in lesson 2 only. While teacher A3 marked in all the three lessons.

Table 6(b) shows the frequency of marking observed at school B.

Table 6(b): Frequency of marking observed at School B.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
<th>Lesson 3</th>
<th>Lesson 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>B2</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>B3</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>B4</td>
<td>✓</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

*Key: ✓ = Marked during the lesson  × = Did not mark during the lesson*
The results in Table 6(b) showed that, in School B marking was observed amongst all respondents during the lessons. Teacher B1 marked during lesson 2 and lesson 3. Teacher B2 marked in lesson 1, 2 and 4. Teacher B3 marked in lesson 2 and 3. Teacher B4, marked in lesson 1 only.

4.5.2 Qualitative data

The respondents were asked to indicate the time they marked learners’ written work. All seven respondents stated that they marked in the class during the lesson, during free periods in the staff room and at home after working hours. Two respondents added self-marking and peer-marking. Teacher B3 noted that, *self-marking and peer-marking reduced teachers’ marking load*. Respondents were further asked to give their views on weather marking of learners’ written work was important in formative assessment. All seven respondents indicated that it was necessary. *Marking is needed because through marking you will get to know whether learners have understood the topic or not* (Teacher A1). Teacher B3 emphasise that *marking is necessary for the teachers to know if learners have achieved the objectives or not*. Three respondents indicated that marking enable feedback. *In order to give feedback to the learners and parents, a teacher has to mark* (Teacher B4). Three other respondents indicated that marking motivates learners. *Marking motivate learners to work hard and take assessment seriously* (Teacher B1).

4.6 Provision of Feedback

The provision of feedback by the Grade 11 and 12 mathematics teachers were emergent from the classroom observations, interviews and document analysis.
4.6.1 Quantitative data

The researcher observed the provision of oral and written feedback on assessment activities given to the learners in the mathematics classrooms too. Tables 7(a) and 7(b) illustrate the frequency of providing feedback during the three lessons observed at School A and four lessons observed in School B.

Table 7(a) shows the frequency of providing feedback by senior secondary mathematics teachers at school A.

**Table 7(a): Frequency of providing feedback observed at School A.**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lesson 1</td>
</tr>
<tr>
<td>A1</td>
<td>✓</td>
</tr>
<tr>
<td>A2</td>
<td>✓</td>
</tr>
<tr>
<td>A3</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Key: ✓ = Feedback given during the lesson  × = Feedback not given during the lesson*

The results in Table 7(a) indicated that, at School A, as indicated in all teachers gave feedback in all the lessons observed.

Table 7(b) shows the frequency of providing feedback by senior secondary mathematics teachers at school B.
Table 7(b): Frequency of providing feedback observed at School B.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lesson 1</td>
</tr>
<tr>
<td>B1</td>
<td>✓</td>
</tr>
<tr>
<td>B2</td>
<td>✓</td>
</tr>
<tr>
<td>B3</td>
<td>✓</td>
</tr>
<tr>
<td>B4</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Key: ✓ = Feedback given during the lesson  ✗ = Feedback not given during the lesson*

The findings in Table 7(b) indicated that, three mathematics teachers gave oral and written feedback in all the lessons observed.

4.6.2 Qualitative data

The Mathematics teachers were asked to report on whether they give feedback on assessment activities to the learners and in what form do they give feedback. All respondents reported that they gave feedback to the learners. Teacher B1 stated that *I give feedback on assessment activities to the learners by writing on the chalk board and explained what they wrote*. Another teacher added that, *I also ask some learners to give feedback because some learners understand their peers better* (Teacher A1). Two other respondents further indicated that they sometimes paste the marking scheme on the notice boards. *I sometimes put answers on the notice board especially when I do not have enough time to explain the answers or when learners have done well in a task* (Teacher B2).
The mathematics teachers were then asked to give their views on why they think it is essential for the learners to be given feedback on assessment tasks. Three respondents indicated that they gave feedback for learners to know their strengths and weaknesses. *I give feedback for learners to know their strengths and their weaknesses* (Teacher B4). *Feedback allows learners to know their strengths and weaknesses* (Teacher A2). Two other respondents noted that they gave feedback for learners to know their mistakes and to correct them. *I give feedback for learners to know how to improve where they did not do well* (Teacher A3). Other two Mathematics teachers stated that they gave feedback to emphasize on where learners did not understand. *I give feedback to emphasize on where learners are struggling to understand* (Teacher A1). *Feedback helps to highlight on the main points of the topic* (Teacher B1).

4.7 The Grade 11 and 12 mathematics teachers’ understanding of formative assessment

The teachers’ understanding of formative assessment were emergent from interviews.

In response to how respondents defined formative assessment, two respondents defined formative assessment as an assessment which is done on daily basis. According to Teacher B3, *Formative assessments are short assessment activities conducted in the classroom daily in order to know if lesson objectives are met or not*. Four respondents defined formative assessment as formal assessment activities. Teacher A3 defines *Formative assessments are formal assessments that a teacher records in a class list*

However, one respondent stated *I have no idea* (Teacher B4).
4.8 Importance of formative assessment to Mathematics teaching

In response to why Mathematics teachers administered assessment in their classrooms, the respondents stated various reasons. For example, Teacher B3 indicates that I assess to know if learners have understood the content I taught or not. I assess to know what learners understand and what they do not understand (Teacher A2). The mathematics teachers also assessed learners in order to evaluate the effectiveness of the teaching methods used. I assess to check if my teaching methods are effective (Teacher A1). The respondents also assessed learners to identify learners’ misconceptions and mistakes. I normally assess to spot mistakes and misconceptions that learners could have (Teacher A3). Thee mathematics teachers also indicated that they assessed learners in order to provide remedial teaching to low achieving learners. To identify and assist slow learners while there is still time to improve (Teacher A3). In addition respondents assessed learners to give feedback to both learners and parents. I assess so that my learners and their parents can know where they stand (Teacher B1). Teacher B1 further noted that assessment motivates learners to work hard. Respondents also reported that they assessed learners in order to assign grades to learners at the end of the term. I assess to assign grades (Teacher A3).

4.9 Moderation of assessment activities

During interviews, mathematics teachers were asked if their formative assessment activities were moderated and whether moderation was necessary. All seven respondents stated that their assessment activities were not moderated. However, they indicated that there was a need for assessments activities to be moderated by the supervisors or
colleagues teaching the same subject. Three respondents noted that moderation ensured validity of the assessment task. Teacher A3 stated that moderation would help him/her to see if assessment informs teaching. Teacher A1 expressed the view that, if assessments tasks are moderated, errors can be detected and tasks can be evaluated if they match the basic competencies in the syllabus. Teacher B4 noted that moderation would make sure that activity is in line with the syllabus. The respondents also noted that moderation ensured that learners were given adequate assessment activities. Teacher A2 argued that moderation enabled the supervisors to see if teachers are giving enough activities to the learners. Teacher B2 said, Moderation is needed so that teachers can give enough works to the learners. One respondent noted that moderation guides and assists teachers on how to assess effectively especially the novice and veteran teachers (Teacher B2).

4.10 Challenges faced by Mathematics teachers in conducting formative assessment

In an attempt to find out the challenges faced Grade 11 and 12 mathematics teachers, the Mathematics were asked to indicate the challenges they encountered when conducting formative assessment in their classrooms. The respondents reported several challenges they faced (see Table 8).

Table 8: Challenges faced by Mathematics teachers in conducting formative assessment

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absence of assessment policies</td>
<td>There is no document which guides teachers on how to assess and no assessment manuals with samples of</td>
</tr>
</tbody>
</table>
assessment tasks for senior secondary subjects; this has made it difficult for us to assess effectively (Teacher A3). Teacher B1 added that, there are no latest policies on assessment. We need to be guided with contemporary ways of assessment.

<table>
<thead>
<tr>
<th>Lack of Resources</th>
<th>Two respondents noted lack of teaching and learning aids. The only learning material that we have at school are textbooks, which are not even enough for every learner (Teacher B4). He further added that internet connections are also poor, when you want to get information from the internet it takes time and it is very discouraging. Teacher A3 also claimed that some learners do not have calculators and even pens (Teacher A3).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of support from school management and regional officers</td>
<td>Three respondents noted that they do not get adequate support. The principal and HoDs do not really help teachers on how to assess effectively (Teacher A2). One Mathematics teacher indicated that, the education officers do not come to schools or conduct workshops to discuss with teachers assessment issues (Teacher B1).</td>
</tr>
<tr>
<td>Overcrowded classrooms</td>
<td>All seven respondents stated that classes were full. Learners are too many I have more than forty</td>
</tr>
<tr>
<td><strong>Learners’ lack of commitment</strong></td>
<td><strong>Teachers noted that learners are not committed. Learners are not committed because they know there is no continuous assessment in their final examination</strong> (Teacher A2). Teacher B1 added that since CA is not added to the final examination, learners do not want to write assessment tasks. Some even submit incomplete tasks.</td>
</tr>
<tr>
<td><strong>Learners’ absenteeism</strong></td>
<td>Mathematics teachers also indicated learners’ absenteeism. <em>Learners are often absent, when you want to assess not all learners are present and if that particular learner is not assessed you will not know if he/she understand or not</em> (Teacher B3).</td>
</tr>
<tr>
<td><strong>Time constraints</strong></td>
<td>Mathematics teachers reported insufficient time. <em>Syllabus is thick but time is limited, especially when you have to teach higher level and ordinary level</em></td>
</tr>
</tbody>
</table>
learners in one class (Teacher B2). I find time so scarce to give works to the learners (Teacher B4).

4.11 Preventive measures to mitigate the assessment challenges

In an attempt to find out what Mathematics teachers do to ameliorate assessment challenges in their classrooms, were asked how they overcame the challenges. The measures given by the respondents are presented in eight themes which are: using past question papers, motivating learners, self-marking and peer-marking, punishing learners, seeking help from supervisors and colleagues, group work, compromising leisure time and giving less work to learners. The Mathematics teachers’ responses are given in Table 9.

Table 9: Preventive measures to mitigate the assessment challenges

<table>
<thead>
<tr>
<th>Preventive measures</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using past question papers</td>
<td>Two Mathematics teachers reported the use of past question papers. I take questions from past question papers to save time (Teacher B2).</td>
</tr>
<tr>
<td>Motivating learners</td>
<td>Four Mathematics teachers indicated motivation. I talk to my learners to take assessment seriously (Teacher B3).</td>
</tr>
<tr>
<td>Self-marking and peer-marking</td>
<td>Two Mathematics teachers indicated the use of self-marking and peer-marking. Self-marking and peer-</td>
</tr>
<tr>
<td><strong>Punishing learners</strong></td>
<td>Two Mathematics teachers stated punishment. <em>I gave learners punishment if they do not submit my work on time</em> (Teacher B1).</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Seeking help from the supervisors and colleagues</strong></td>
<td>One Mathematics teacher noted colleagues. <em>I ask help from my colleagues, especially the Head of Department</em> (Teacher A3).</td>
</tr>
<tr>
<td><strong>Group work</strong></td>
<td>Teachers also mentioned group work. <em>I give group works so that I can mark few papers</em> (Teacher A2).</td>
</tr>
<tr>
<td><strong>Compromising leisure time</strong></td>
<td>One respondent reported that, <em>I compromise my time to mark and set activities</em> (Teacher B2).</td>
</tr>
<tr>
<td><strong>Giving less work to learners</strong></td>
<td>One Mathematics teacher reported that, <em>I give few works to the learners to avoid a lot of marking</em> (Teacher B1).</td>
</tr>
</tbody>
</table>

### 4.12 Suggestions to improve the current formative assessment practices

In an attempt to find out ways to improve the current formative assessment practices, respondents were asked, what should be done to improve formative assessment practices in Grade 11 and 12 mathematics classrooms. The Mathematics teachers suggested different solutions such as reducing teacher-learner ratio, reducing teaching load, revising current assessment policies, motivating learners to take assessment seriously, creating social groups by mathematics teachers, provision of adequate teaching and learning resources by the Ministry of Education, Arts and Culture, abolition of automatic
promotion, recording learners’ work and supervision of teachers by the principals and Heads of Department. The respondents’ suggestions are presented in Table 10.

Table 10: Suggestions to improve the current formative assessment practices

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer learners</td>
<td>All seven respondents suggested that the number of learners in the classrooms should be fewer. <em>The number of learners in our classes must be reduced to make marking easy</em> (Teacher A2). Teacher B2 added that <em>teacher-learner ratio should be adhered to.</em></td>
</tr>
<tr>
<td>Less work</td>
<td>Two Mathematics teachers suggested less work for teacher. <em>The number of teachers’ lessons should be reduced so that teachers can have enough time for assessment</em> (Teacher A1). A <em>reasonable number of lessons per teacher are needed</em> (Teacher B3).</td>
</tr>
<tr>
<td>More assessment</td>
<td>Four Mathematics teachers suggested more assessment guidelines. <em>There should be a national assessment guideline to ensure standard assessment in all schools</em> (Teacher A1). (Teacher B3) added that <em>there should be an assessment manual for senior secondary phase.</em></td>
</tr>
<tr>
<td>More learners efforts</td>
<td>Two respondents suggested more efforts from learners. <em>Inspectors and Education Officers should visit schools to motivate learners</em> (Teacher B2). <em>Learners need to be motivated</em></td>
</tr>
<tr>
<td>Topic</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>More teachers’ interactions</strong></td>
<td>One respondent suggested that, <em>mathematics teachers need to interact more often in order to share important ideas regarding teaching and assessment</em> (Teacher A1).</td>
</tr>
<tr>
<td><strong>Contribution of continuous assessment towards final examination marks</strong></td>
<td>Five Mathematics teachers suggested that continuous assessment marks. <em>Continuous assessment should weigh 50% of final examination marks to motivate learners to take assessment seriously and encourage teachers to assess effectively</em> (Teacher B1).</td>
</tr>
<tr>
<td><strong>Provision of Resources</strong></td>
<td>Two respondents suggested that schools should be provided with adequate resources. <em>Resources need to be made available to teachers and learners</em> (Teacher B1). Teacher A2 noted that; <em>parents should provide stationeries especially calculators.</em></td>
</tr>
<tr>
<td><strong>Abolishment of automatic promotion from grade 11 to grade 12</strong></td>
<td>One respondent suggested that <em>automatic promotion for Grade 11 learners needs to come to an end in order for learners and teachers to work hard</em> (Teacher B2).</td>
</tr>
<tr>
<td><strong>Recording learners’ works</strong></td>
<td>One teacher suggested that, <em>learners’ mark should be recorded</em> (Teacher B1).</td>
</tr>
<tr>
<td><strong>Supervision of teachers</strong></td>
<td>One respondent indicated that, <em>the principal and the Heads of Department should make sure that teachers give quality</em></td>
</tr>
</tbody>
</table>
4.13 Summary

This Chapter presented and analysed the data. The findings indicate that senior secondary school mathematics teachers used different assessment methods, findings further revealed that oral questioning was predominantly used and test was least used. Findings also show that teachers mark learners’ written works and give feedback to the learners. Findings further show that teachers are not implementing classroom formative assessment methods fully due to amongst others, lack of resources, overcrowded classrooms and time constrain. The next Chapter discusses the finding.
CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

This study attempted to examine teachers’ formative classroom assessment practices in two selected senior secondary schools in the Oshikoto Region. The discussion in this Chapter includes providing answers to the research questions of the study. The discussion is presented according to the following headings, teachers’ understanding of formative assessment, importance of formative assessment in Mathematics, assessment Methods used by Grade 11 and 12 mathematics teachers, moderation of assessment tasks, marking of assessment tasks, provision of Feedback, challenges faced by Grade 11 and 12 mathematics teachers when conducting assessment in their classrooms, preventive measures to ameliorate assessment challenges as well as suggestions to improve current formative assessment practices.

5.2 Teachers’ understanding of formative assessment

It is apparent that only some teachers had a better understanding of formative assessment. These teachers viewed formative assessment as an assessment which is done on daily basis and meant to improve the teaching and learning processes. This definition coincided with that by Clarke (2012) who defined formative assessment as all activities that are directed at supporting, encouraging, motivating and enhancing learning. Some mathematics teachers however, indicated that formative assessments were formal assessment activities. While one teacher had no idea of what formative assessment was.

It is evident that some teachers had narrow or no understanding of formative assessment, though, teachers are encouraged to use assessment formatively. The presence in the
classroom of these teachers that have limited or no understanding of formative assessment shows that formative assessment is not given its due attention by all the teachers. Kivunja (2015a) asserts that, in order to achieve rigor and high standards expected in education, assessment needs to be predominantly formative. If teachers cannot define formative assessment, they possibly cannot meaningfully implement it. In overly simple terms, teachers can only use assessment formatively if they understand what it means.

Izci (2016) stressed that teachers understanding of assessment affects their decision making which impacts the use of formative assessment. Izci further claims that, teachers who comprehend formative assessment are more likely to adopt it in their teaching. UNESCO (2004) also argues that operative formative assessment needs teachers to be proficient in formative assessment techniques. It is obvious that knowledge is one of the powerful tools in empowering teachers to adopt formative assessment methods in their classrooms. Therefore, mathematics teachers need to understand formative assessment in order to espouse it in their classrooms.

5.3 Importance of formative assessment in Mathematics

The results of this study revealed that Grade 11 and 12 mathematics teachers assessed for various reasons. The reasons given by the teachers were: to know if learners have understood the content taught, to evaluate the effectiveness of the teaching methods used, to identify learners’ misconceptions so that remedial teaching can be offered to those in need, to provide feedback to both learners and parents, to motivate learners and to assign grades. The results seem to support those by Nel (2011a) indicates that assessment
enables both the teacher and the student to check the progress against the set criteria. Nel further argued that assessment provides feedback which helps students to develop self-esteem and confidence in learning. The findings are also aligned with Ndichakako’s (2015b) results who found that teachers carried out assessment to improve teaching and learning processes and also to assign grades. It is however evident that the majority of mathematics teachers in this study emphasized upon checking the understanding of the learners rather than improving the learning process and consequently the academic performance of learners which is the cornerstone of formative assessment.

5.4 Assessment methods used by Grade 11 and 12 Mathematics teachers

The findings of this study show clearly that Grade 11 and 12 mathematics teachers used numerous assessment methods. The common assessment methods used were class works, home works, oral questioning, topic tests and projects. All seven mathematics teachers used class work and topic tests, three mathematics teachers used homework, and only one mathematics teacher indicated that he used oral questioning. Only one mathematics teacher indicated that he also used projects in addition to other assessment methods. The use of projects as an assessment method however, was not observed during classroom observations and neither noted in the documents reviewed. It is apparent that projects were less frequently used by seven mathematics teachers in this study.

The findings further revealed that teachers used different assessment methods for various reasons. Specific reasons were sought on class work, homework, oral questioning, class tests as well as projects. The results showed that class work were are used because they allowed the teacher to give immediate feedback to the learners and for the learners to get
help from the teacher or their peers. It is however disappointing that most class work were invigilated like examinations and the majority of mathematics teachers used class work to avert learners from copying from each other. As a result teachers did not allow learners to discuss answers with their peers when they were given class work to do. This was contrary to Haimbodi’s (2014) study results. Haimbodi found that cooperative learning increased motivation and consequently improved the academic performance of the learners. Teachers need to explore the principles and benefits of class work so that it is applied in manners that benefit learners.

The mathematics teachers also indicated that they gave homework for learners to have opportunities to practice what they had learned during the lesson(s). It is however unfortunate that some teachers did not give homework to learners to avoid copying from each other or to get help from parents. This signifies that although NIED (2008) stresses that quality homework is a very important tool for academic success, some mathematics teachers had not recognized that vital role that homework plays in improving learning. Therefore, there is need for teachers to understand the role and the significance of homework in formative assessment. The mathematics teachers have also noted that they give class tests in order to determine the overall performance of the learners in a certain topic. They further argued that class tests determine what learners know without the external support. This finding tends to suggest that class tests are accorded the highest significance by the mathematics teachers in this study. It is also apparent that the explicit aim of the class tests is to identify who knows and who does not know. The grading function is however over-emphasized while the learning function is under-emphasized.
The mathematics teacher also revealed that they use oral questioning method because it allows on-going interaction between the teacher and the learner. A teacher can ask many questions in order to know if learners are following during the lesson and understand the concepts taught. The findings coincide with those by Dandis (2013) who found that teachers use oral questioning to see if learners understood the content presented or not.

One mathematics teacher noted that he use projects for learners to understand the content better and deeper. Six respondents however indicated that they do not give projects or practical investigations because projects and investigations require much time resources to be administered. Quinnell (2010) noted that investigations encourage students to do mathematical inquiries and provide mathematically gifted children with challenging learning environments which keep them self-motivated. Quinnell however, cautioned that investigations need to be prepared carefully and the teacher needs to provide individualized support to students during the investigations so that students can be interested in and learn from investigations. This could be one of the reasons why mathematics teachers did not use projects and investigations in their classrooms.

The results of this study appear to suggest that all mathematics teachers use traditional assessment methods more than authentic assessment methods. The findings support Mupupa’s (2017) results. Mupupa found that there was little or no evidence of teachers giving projects and practical investigations. The findings also coincide with Ndachako’s (2015a) results, who found that traditional methods of assessment were predominantly used by secondary school teachers whereas the assessment methods that required extensive involvement of students were not used frequently. However, Amoonga (2008) asserts that teachers should engage learners in thoughtful and thought provoking
activities that would help them to learn mathematics for understanding. Such activities should be embedded in alternative assessment methods. It is evident from the results of this study that, the mathematics teachers did not incorporate alternative assessment methods in their teaching.

5.5 Moderation of assessment activities

The results of this study showed that the assessment tasks for all the mathematics teachers that participated in this study were not being moderated by their supervisors or colleagues. The respondents however, noted that moderation was essential for effective assessment in schools since, moderation ensured quality standard of assessment tasks. The findings also concur with Mupupa’s (2017) results. His study revealed that some of the teachers’ assessment activities were not being moderated. The results tended to suggest that school management did not accord high significance to facilitating classroom assessment especially when it came to moderation of assessment activities. It seemed that school managements tended to take it for granted that each teacher was conducting assessment at the expected standard. However, Tolley (2016) stresses that school management needs to strengthen the process of formative assessment rather than inspecting only the end product of assessment.

5.6 Marking of assessment activities

The results showed that all Mathematics teachers marked learners’ written work. The results also indicated that mathematics teachers did not always write comments on learners marked work. The findings are in support of Komba’s (2015) results. Komba argues that teachers focus on marking rather than commenting. Komba further indicated
that making comments would allow learners to identify their strengths and weaknesses which help them to improve. The results further indicated that some mathematics teachers gave learners to mark their own written work (self-marking) and mark work of their peers (peer-marking) in order to reduce teachers’ marking load. The Mathematics teachers further noted that marking enabled a teacher to see if learners understand the basic competencies assessed, it motivates learners and gives immediate feedback to both learners and parents. It became apparent that mathematics teachers had recognized the significance of marking learners’ written work. It is however disappointing that, some mathematics teachers engaged learners in self-marking and peer-marking only to reduce their work load. However, Ndalichako (2015a) stresses that self-marking and peer-marking allow students to see their weaknesses and correct their mistakes honestly. Ndalichako further argues that self-marking made learners feel more involved in the learning process. Teachers need to explore the features and advantages of self-marking as well as peer-marking so that they can use them in ways that benefit the learners and improve academic performance in mathematics.

5.7 Provision of Feedback

The results showed that all seven mathematics teachers provided feedback to the learners. In addition, the results showed that learners were also given opportunities to give feedback to their peers. The results further revealed that some teachers pasted the memorandum of tests and class activities on the notice boards. The results further indicate that feedback is necessary for learners to be aware of their strengths and weaknesses and consequently improve learning outcomes.
The findings concur with Reddy et al (2015) who stress that through feedback, students learn how well they are achieving the learning objectives and what they need to do in order to improve academic performance. Tolley (2016) supports the view; that feedback should be used to refine and revise the works of the learners for improved performance. The findings are also in support of Torrance’s (2012) results. Torrance argues that provision of quality feedback to students during a course on what they have achieved and how they might improve will facilitate learning and improve learning outcomes. Sadler (1989) stresses that information become feedback when it is actively used to alter the learning gap. The results signify that teachers valued the role of feedback in improving learners’ academic performance.

5.8 Challenges faced by teachers when conducting formative assessment

The mathematics teachers who participated in the study revealed that they were faced with many challenges when conducting assessment in their classrooms. They noted that the absence of assessment guidelines in senior secondary phase at school, regional and national levels had made it difficult for them to conduct assessment effectively. The findings of the study are aligned with those by Izci (2016) who discovered that most schools did not have policies on formative assessment and this discouraged teachers to adopt the formative assessment culture.

The findings also revealed that school management and education officers were not providing adequate support to mathematics teachers. The results are aligned with Angula, (2015) and Amoonga, (2008) whose studies found that regional officers are not providing sufficient support to Grade 11 and 12 mathematics teachers. Izci (2016) emphasizes that
teachers need and want support and external motivation from the school management in order to embrace the formative assessment culture.

The respondents argued that there was a shortage of teaching and learning materials including textbooks for mathematics learners at schools. The respondents further indicated that some learners did not have stationeries such as pens, mathematical sets and scientific calculators. These findings support Amoonga’s (2008) study which found that mathematics teachers were faced with insufficient teaching and learning materials. UNESCO (2004) argues that “the quality and availability of learning materials strongly affect what teachers can do” (p. 17). It is therefore necessary that for teachers to assess efficiently and frequently they need a wide range and availability of teaching and learning materials that will help them in assessing their learners.

Moreover, the findings showed that teachers had a large number of learners to teach in their classrooms and they were teaching up to 6 class groups. All classes were above the ministerial teacher-learner ratio. However Vision 2030 makes a demand from the Ministry of Education that by 2015 there should be at least one teacher for every 30 learners at Secondary schools this has not been achieved in most secondary schools in Namibia as yet. The results support those by Angula (2015) whose found that there was a high teacher-learner ratio in senior secondary mathematics classrooms. Ndalichako (2015a) also argues that due to the scarcity of teachers particularly in mathematics and science, teachers are expected to teach many class groups. Izci (2016) also contends that it is hard for the teacher to use formative assessment in large classes since classroom management, effective individualized feedback and paying attention to individual
learners needs is be extremely difficult in large classes. It is clear that overcrowded classrooms made it very difficult for teachers to embrace formative assessment.

Additionally, the Mathematics teachers in this study argued that learners were not committed to do assessment activities. Some learners were hesitant in completing assessment tasks given by the teachers. The results concur with Kapenda’ (2010) whose study revealed teachers indicated that learners were not serious with their studies and they want to be spoon-fed. In this study the findings also revealed that learners’ absenteeism was also a challenge. Izci (2016) similarly noted that, students’ poor attitudes and excessive absenteeism discouraged teachers in using formative assessment.

The seven mathematics teachers in this study further indicated that time to teach and assess is inadequate. Therefore assessment was often compromised. The mathematics teachers also argued that teaching higher, extended and core levels in one class was time consuming and made assessment ineffective. The results are in line with Amoonga; (2008), Kasanda and Lipinge (2013) and Angula (2015) who found that syllabi were lengthy and time to cover the content is limited. UNESCO (2004) argues that instructional time was a crucial correlate of achievement. UNESCO further argues that the agreed benchmark of 850 to 1000 hours per year is not reached in many countries. Namibia is no exception in this regard. Even though the school calendar has more than 1000 hours annually, some these are used for extracurricular events such as sports and examinations particularly Grade 12 external examinations. The examination results tend to suggest that teachers do not have enough time to teach and give quality assessment activities to the learners. Subsequently, teachers skim over the syllabus and compromise on formative assessment.
5.9 Preventive measures to mitigate assessment challenges

It is evident from the research findings that Grade 11 and 12 mathematics teachers employed different strategies in order to mitigate against assessment challenges. The respondents indicated the use of past question papers to save time, invigilating class work or avoiding giving home works to ensure that learners did not copy from each other, motivating learners to understand the importance of education and assessment thereof, punishing learners to take assessment seriously, compromising leisure time to do the marking and setting assessment tasks, giving learners to mark their own written work (self-marking) and mar the work of their peers (peer-marking) in order to reduce teachers’ marking load and making use of group work to mark few papers.

5.10 Suggestions to improve current formative assessment practices

It is apparent that mathematics teachers saw the need to improve the current formative classroom assessment practices. The respondents suggested that the number of learners in the classrooms to 30 as per ministerial policy. Ndalichako (2015) also recommends that the government should address the scarcity of teachers so that the number of learners they teach is manageable for them to teach and assess productively.

Moreover, the Mathematics teachers suggested that the Ministry should ensure provision of adequate teaching and learning resources in the schools. Adequate resources such as mathematics sets, graph books, textbooks and scientific calculators are imperative to effective teaching and assessment particularly in mathematics. UNESCO (2004) claims that increasing spending to provide more textbooks and improving school facilities impact positively on learners’ cognitive achievement. Indeed provision of teaching and
learning materials plays a crucial role in providing quality education, hence quality assessment.

Furthermore, the mathematics teachers suggested that continuous assessment marks should contribute towards the final examination marks; to force learners to take formative assessment seriously. Ndalichako (2015) affirms that students’ commitment tend to correlate highly with the stakes associated with the decision to be made based on assessment they undertake. The results of this study seemed to suggest that learners tended to concentrate and paid keen attention to their studies if they knew that in the end their marks will contribute to their final grade.

Another suggestion made by the mathematics teachers was encouraging active parental involvement in learners’ learning. Studies have shown that engaging parents in schools improve learners’ achievement. MOE (2005) stressed that parents should be encouraged to be actively involved with learners’ progress in all aspects of the curriculum. MOE further urged that schools should build and sustain parental involvement and support.

In addition, the respondents suggested that, Education Officers should visit schools more often to assist and guide teachers on current and effective assessment methods. The respondents also indicated that regular workshops should also be conducted for teachers to be updated with contemporary assessment skills and share best assessment practices. The Ministry of Education (2005) however, claims that the Inspectors of Education and Advisory Teachers should make time to assist teachers and arrange in-service training.

The Mathematics teachers further suggested that learners should be motivated to make them understand the importance of attending school and being engaged actively in
assessment activities. Motivation has several effects on learners’ learning and behaviours. Izci (2016) suggests that for the student to adopt formative assessment, teachers need to establish a trust environment between themselves and learners. Cerdan (2017) noted that motivation improves persistence efforts and cognitive process skills. It is clear that motivated learners are more likely to take assessment seriously.

Finally, the mathematics teachers suggested that mathematics teachers should create and maintain social groups whereby issues concerning education particularly assessments will be shared and discussed. Social groups are becoming popular important platforms where people can interact and share ideas. Mathematics teachers can have social groups in the circuit or in the region. Izci (2016) supports the establishing of learning communities among teachers to promote formative assessment help teachers to learn and reflect on different formative assessment strategies, have time to share the challenges and getting support from each other with regard to the teaching of mathematics.

5.11 Summary

This Chapter discussed the findings. The results of this study revealed that some Grade 11 and 12 mathematics teachers had a comprehensive understanding of formative assessment. The results also showed that the mathematics teachers used different assessment methods in their mathematics classrooms. However, the teachers used more traditional assessment methods than authentic assessment methods. The results further showed that the teachers were faced with various challenges such as overcrowded classrooms, absence of assessment policies, inadequate learning materials and learners’ lack of commitment towards assessment. The teachers however, suggested that class
sizes should be reduced, continuous assessment marks should contribute towards final the examination marks, assessment policies should be made available, regional and circuit officials should support teachers, workshops should be conducted and social groups should be created and maintained. In the next Chapter, the summary, conclusion and recommendations are presented.
CHAPTER 6: CONCLUSION, RECOMMENDATIONS AND SUMMARY

6.1 Introduction

This Chapter provides the conclusion, recommendations as well as the summary of the study. This study was aimed at investigating the classroom assessment practices of Grade 11 and 12 mathematics teachers in the Oshikoto Region. The study specifically investigated the formative assessment methods, marking, and provision of feedback as well as challenges that Grade 11 and 12 mathematics teachers faced.

6.2 Conclusion

The results of this study seem to suggest that only two mathematics teachers have knowledge of formative assessment. The Mathematics teachers also used various assessment methods. However, the mathematics teachers used more traditional methods than authentic assessment methods.

The results of this study seem to indicate that the mathematics teachers’ assessment activities were not moderated. The results further seem to indicate that the mathematics teachers in this study marked learners’ written work and gave feedback. Furthermore, the findings also seem to suggest that the mathematics teachers were faced with challenges in adopting formative assessment in their classrooms. Some of these challenges were: inadequate assessment skills, absence of assessment guidelines, lack of support from education officers, inadequate teaching and learning materials, overcrowded classrooms and high teachers’ teaching load.
Moreover, the results of this study showed that, in an attempt to curb challenges associated with assessment in mathematics classrooms, the mathematics teachers employed different strategies. These strategies included: using past question papers as assessment tasks, motivating learners to take assessment seriously, using group work, doing self-marking and peer-marking to reduce teachers’ marking load. The mathematics teachers, also suggested solutions to improve the current formative classroom assessment practices such as making assessment policies available to mathematics teachers, mathematics teachers should be supported by school management and regional officials, provision of adequate teaching and learning resources, reducing teachers’ teaching load and motivating learners.

6.3 Recommendations

The following recommendations are made based on the findings of this study.

1. Mathematics teachers should be encouraged and supported by school management and education officers to use authentic assessment methods in order to enhance the learners’ conceptual understanding of the mathematics content and consequently improve learners’ academic performance.

2. Schools should be provided with a variety of mathematical teaching resources and equipment for active engagement of learners.

3. Latest information on formative assessment methods in senior secondary mathematics should be disseminated by education officers via educational circulars to mathematics teachers for them to know and use formative assessment methods with confident.
4. Continuous professional development for senior secondary mathematics teachers should be put in place by the circuit and the region for teachers to gain adequate pedagogical knowledge of formative assessment.

**6.4 Recommendations further research**

The following are the areas for possible future research

1. This study was conducted on a small sample of mathematics teachers from one educational region. A larger sample and comprising more educational regions should be carried to find out the formative classroom assessment practices in mathematics and other subjects.

2. A study should be conducted to investigate the effects of using authentic assessment methods on the performance of learners in mathematics and other subjects.

**6.5 Summary**

The study sought to investigate the Grade 11 and 12 mathematics teachers’ classroom assessment practices in the Oshikoto region.

The study addressed the following research questions:

1. What assessment methods are used by Grade 11 and 12 mathematics teachers to assess their learners in the Oshikoto Region?

2. How do Grade 11 and 12 mathematics teachers mark and give feedback to their learners in the Oshikoto Region?
3. What challenges do Grade 11 and 12 mathematics teachers experience when conducting assessment in their classrooms in Oshikoto Region?

The study was based on Sadler’s Theory of Formative Assessment and Feedback. The researcher used qualitative research paradigm using a case study research design to collect data from the respondents. The study used three research instruments namely: lesson observation schedule, document analysis and interview protocol. The population of the study comprised all Grade 11 and 12 mathematics teachers in the Oshikoto region. The researcher chose Oshikoto region because Oshikoto out performed all other 13 regions in the Junior Secondary (JSC) national examinations. However, it has been performing below average in senior secondary examinations. Therefore, Grade 11 and 12 mathematics teachers in the Oshikoto region provided rich information to answer the research questions. Two secondary schools were selected purposefully from the population to form the sample of the study. All seven Grade 11 and 12 mathematics teachers from the two selected senior secondary schools were part of the sample for the study.

For ethical considerations, the researcher first sought ethical clearance from the University of Namibia and permission from both the Permanent Secretary of the Ministry of Education, Arts and Culture and the Director of Education in the Oshikoto Region. The respondents were then provided with information about the purpose of the study and were informed that they could withdraw from the study at any time without penalty. The respondents were also told that the information they provided would be treated with utmost confidentiality and anonymity. The consent of the respondents was then obtained.
The schools names as well as the respondents’ names did not appear in the research instruments and in the research report.

All seven respondents were observed as they interacted with learners in three or four lessons particularly when assessing learners. Learners’ written work was also reviewed. The respondents were then interviewed using semi-structured interview method. Data collected from the three research instruments used in the study were analysed using typological analysis. Descriptive statistics, frequency tables, pie charts and bar graphs were used to present the results. The findings of the study showed that some of the Grade 11 and 12 mathematics teachers had an extensive understanding of formative assessment and the importance of formative assessment. It also emerged that all seven mathematics teachers used various assessment methods in their classrooms. However, traditional assessment methods such as class work, homework and class tests were predominantly used than authentic assessment methods. Moreover, the results revealed that the teachers’ assessment tasks were not moderated. However, the mathematics teachers felt that assessment activities needed to be moderated to ensure quality assessment. The results further showed that teachers marked learners’ written work and make provision for both oral and written feedback.

The findings also showed that Grade 11 and 12 mathematics teachers are faced with a number of challenges. These challenges amongst others included: teachers’ lack of assessment skills, absence of assessment guidelines, insufficient teaching and learning materials, overcrowded classrooms, inadequate time allocated to mathematics lessons and high teachers’ teaching load. The results also suggested that teachers used different strategies in order to curb assessment challenges. The strategies included: using past
question papers to set assessment tasks, motivating learners to take assessment seriously, using group work, self-marking and peer-marking to reduce marking load. The mathematics teachers suggested that in order to improve the current Grade 11 and 12 formative assessment practices, teaching load need to be reduced, assessment policies should be made available, shortage of learning materials needed to be addressed, education officials should guide and support mathematics teachers, learners should be motivated to take assessment seriously and teachers needed to have social groups where they could discuss and share assessment issues.
REFERENCES


Kivunja, C. (2015a). Redesigning the 3R’s and core academic subjects to improve learning, teaching and assessment in the new learning paradigm. *International Journal of Humanities and Social Science, 5*(1), 30 - 42.


Appendix A: Ethical clearance certificate

UNAM UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: FOE/180/2017 Date: 24 April, 2017

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia’s Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Center/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: Teachers' Formative Classroom Assessment Practices in Two Selected Senior Secondary Schools in The Oshikoto Region

Nature/Level of Project: Masters

Researcher: Benita Ndauvite Kayoko

Student Number: 200009958

Faculty: Faculty of Education

Supervisors: Prof. C D Kasanda (Main) Dr. S T Naukusho (Co)

Take note of the following:

d) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary.

b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC.

c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Center/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC.

d) The UREC retains the right to:

(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected.

(ii) Request for an ethical compliance report at any point during the course of the research.

UREC wishes you the best in your research.

Prof. P. Odonkor: UREC Chairperson

Ms. P. Chanka: UREC Secretary
Appendix B: Letter to the Permanent Secretary of the Ministry of Education, Arts and Culture

Benita Nduuvite Kayoko

Email: benitanduuvitekayoko@gmail.com

P.O.Box 15043

Ondangwa

28 April 2017

To: The Permanent Secretary

Ministry of Education, Arts and Culture

Private Bag 13186

Windhoek

Dear Mrs. Steenkamp

Re: Request for permission to conduct Research in Ekulo Senior Secondary School and Hans Daniel Namuhuya Senior Secondary School in Oshikoto Region on the topic: “Teachers’ classroom assessment practices in Oshikoto Region”

I am a registered student for a Master’s degree in mathematics Education at University of Namibia. In partial fulfilment to qualify for my masters’ degree, I am required to conduct research on the topic stated above.

I have selected Oshikoto Region because it is the best performing region in National examinations in Namibia and would like to investigate their best practices. The two schools were selected on basis that they have high number of Grade 11 and 12 mathematics teachers. Attached is a copy of ethical clearance from the University of Namibia and the Research proposal.

I therefore kindly, request your good office to allow me to use the two schools in Oshikoto as my research sites for the research project. I will conduct the study with all
grade 11 to 12 mathematics teachers. The data will be collected using observation schedules, document analysis and interview.

I hope to collect the data before the end of July 2017. The schools and the participants will be assured of confidentiality and anonymity in the final research report. A time table with dates and time of visits will be provided.

For any clarification, please contact me at +264 81 283 7705 or my main supervisor Professor Kasanda at +264 61 206 3726.

Yours Sincerely

……………………

Benita Nduuvite Kayoko

UNAM Student
Appendix C: Letter of approval from the Permanent Secretary of the Ministry of Education, Arts and Culture

File no: 11/1/1

Ms. Benita Nduuvite Kayoko
P O Box 15043
Ondangwa
Cell: +264 81 283 7705
Email: benitanduuvitekayoko@gmail.com

Dear Ms. Kayoko

SUBJECT: PERMISSION TO CONDUCT RESEARCH IN OSHIKOTO REGION

Kindly be informed that permission to conduct research for your Master’s Degree in “Teachers’ Formative Classroom Assessment Practices in Oshikoto Region” is herewith granted. You are further requested to present the letter of approval to the Regional Director to ensure that research ethics are adhered to and disruption of curriculum delivery is avoided.

Furthermore, we humbly request you to share your research findings with the ministry. You may contact Mr C. Muchila/ Mr. G. Munene at the Directorate: Programmes and Quality Assurance (PQA) for provision of summary of your research findings.

I wish you the best in conducting your research and I look forward to hearing from you soon.

Sincerely yours,
Office of the Permanent Secretary

Sanet L. Steenkamp
Permanent Secretary

All official correspondences must be addressed to the Permanent Secretary
Appendix D: Letter to the Director of Oshikoto region

Benita Nduuvite Kayoko

Email: benitanduuvitekayoko@gmail.com

P.O.Box 15043

Ondangwa

06 May 2017

To: The Regional Director

Directorate of Education, Arts and Culture

Private Bag 2028

Ondangwa

Dear Mr Kafidi

Re: Request for permission to conduct Research in Oshikoto Region on the topic: “Teachers’ classroom assessment practices in Oshikoto Region”

I am a registered student for a Master’s degree in mathematics Education at University of Namibia. In partial fulfilment to qualify for my masters’ degree, I am required to conduct research on the topic stated above.

Oshikoto is the best performing region in National examinations in Namibia. I therefore would like to investigate their best practices. The two schools were selected on basis that they have high number of Grade 11 and 12 mathematics teachers. Attached is a copy of ethical clearance from university of Namibia and a Research proposal.

I therefore kindly, request your good office to allow me to use Hans Daniel Namuhuya Senior Secondary School and Ekulo Senior Secondary School as my research sites for the research project. Attached please find the proof of permission to conduct the research in Oshikoto Region, granted by the office of the Permanent Secretary for the Ministry of Education, Arts and Culture. I will conduct the study with all grade 11 to 12 mathematics teachers. The data will be collected using observation schedules, document analysis and interview protocol. I hope to complete this study before the end of July 2017. The schools and the participants will be assured of confidentiality and anonymity in the final research report. A time table with dates and time of visits will be provided.
For any clarification, please contact me at +264 81 283 7705 or my main supervisor Professor Kasanda at +264 61 206 3726.

Yours Sincerely

Benita Nduuvite Kayoko

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UNAM Student
Appendix E: Approval letter from the Director of Oshikoto region

[Image of the approval letter from the Director of Oshikoto region]
Appendix F: Letter to school A

Benita Nduuvite Kayoko
Email: benitanduuvitekayoko@gmail.com
P.O.Box 15043
Ondangwa
1st June 2017

To: The Principal

Ekulo Senior Secondary School

Omuthiya Circuit

Dear Mr Hamutenya

Re: Request for permission to conduct Research at Ekulo Senior Secondary School on the topic: “Teachers’ classroom assessment practices in Oshikoto Region”

I am a registered student for a Master’s degree in mathematics Education at University of Namibia. In partial fulfilment to qualify for my masters’ degree, I am required to conduct research on the topic stated above.

I therefore kindly, request your good office to allow me to use Ekulo Senior Secondary School as my research site for the research project. Attached please find the proof of permission to conduct the research in Oshikoto Region, granted by both office of the Permanent Secretary, the office of the Oshikoto Regional Director of Education, Arts and Culture. I will conduct the study with all Grade 11 and 12 mathematics teachers. The data will be collected using observation schedules, document analysis and interview protocol.

I wish to collect data from 26 June to 30 June 2017. The school and the participants will be assured of confidentiality and anonymity in the final research report.

For any clarification, please contact me at +264 81 283 7705 or my main supervisor Professor Kasanda at +264 61 206 3726.

Yours Sincerely

..........................
Benita Nduuvite Kayoko

UNAM Student
Appendix G: Letter to school B

Benita Nduuvite Kayoko

Email: benitanduuvitekayoko@gmail.com

P.O.Box 15043

Ondangwa

1st June 2017

To: The Principal

Hans Daniel Namuhuya Senior Secondary School

Oshigambo Circuit

Dear Mr Shipena

Re: Request for permission to conduct Research at Hans Daniel Namuhuya Senior Secondary School on the topic: “Teachers’ classroom assessment practices in Oshikoto Region”

I am a registered student for a Master’s degree in mathematics Education at University of Namibia. In partial fulfilment to qualify for my masters’ degree, I am required to conduct research on the topic stated above.

I therefore kindly, request your good office to allow me to use Hans Daniel Namuhuya Senior Secondary School as my research site for the research project. Attached please find the proof of permission to conduct the research in Oshikoto Region, granted by both office of the Permanent Secretary, the office of the Oshikoto Regional Director of Education, Arts and Culture respectively. I will conduct the study with all Grade 11 and 12 mathematics teacher s. The data will be collected using observation schedules, document analysis and interview protocol.

I wish to collect data from 3rd July to 7th July 2017. The school and the participants will be assured of confidentiality and anonymity in the final research report.
For any clarification, please contact me at +264 81 283 7705 or my main supervisor Professor Kasanda at +264 61 206 3726.

Yours Sincerely

.....................

Benita Nduuvite Kayoko

UNAM Student
Appendix H: Consent form for the school principals

Consent form for the school principal

Ms Benita Nduuvite Kayoko is hereby granted permission to use ............................................................ as the research site for the research study titled “Teachers’ classroom assessment practices in Oshikoto Region” she is required to conduct in partial fulfilment of the requirements for degree masters in Mathematics Education at the University of Namibia.

I understand that:

1. The data for the research will be collected by means of observing, interviewing and document analysis.

2. The information from the research instruments will be used in the final report of the study.

3. I have been assured that the name of the school and teachers will not be revealed in the final report and information collected will be used for the sole purpose of the study.

.................................................. ..................................................

Signature Date

Principal
Appendix I: Consent form for mathematics teachers

Consent Form for Mathematics teachers

Instruction: Please fill out this form.

I ……………………………………………………………………………………………………………………………….., the
Grade 11 and 12 mathematics teacher at
………………………………………………………………………………………………………………………………
hereby agree be a be the subject in the study titled “Teachers’ classroom assessment practices in Oshikoto Region” and be observed and interviewed during the conduct of the said research.

I understand that:

1. I am not under any obligation to participate, and may withdraw from the study at any point prior to the publication or presentation of research results.

2. Anonymity will be maintained through the use of pseudonyms. My name will not be revealed at all.

3. The research results will only be used for academic and professional presentations and publications purposes only.

……………………….                                                              ……………………….
Signature                                                                                               Date

Mathematics teacher
Appendix J: Consent form for learners’ parent

Consent Form for learners’ parent

Instruction: Please fill out this form.

I …………………………………………………………………………….. parent of at
…………………………………………………………………………. a grade …… learner at
…………………………………………………………………………. hereby give consent for my child to
be the subject in the study titled “Teachers’ classroom assessment practices in Oshikoto Region” by having her mathematics books reviewed and analysed.

I understand that:

1. I am not under any obligation to participate, and may withdraw from the study at any
point prior to the publication or presentation of research results.

2. Anonymity will be maintained through the use of pseudonyms. My name will not be
revealed at all.

3. The research results will only be used for academic and professional presentations and
publications purposes only.

………………………..                                                                                   …………………………….

Signature                                                                                     Date

Parent
Appendix K: Lesson observation schedule

Lesson observation schedule

This observation will be conducted for the research purpose only. The purpose of this study is to investigate teachers’ classroom assessment practices in the Oshikoto Region. I will therefore observe the lesson, please just assess the way you normally assess. The information that will be collected will be treated with utmost confidentiality and anonymity.

1. Biographical Information

School: ……………………… Date: …………………………….
Teacher: ………………….. Lesson: ……………………
Class: …………………….. Number of learners: …………
Topic: ………………………………………………………………………………………………

2. Assessment method(s) used:

………………………………………………………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………
……………………………………………………………………………………………………

3. Assessment task given:

(a)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Comments

…………………………………………………………………………………………
…………………………………………………………………………………………

4. Marking done during the lesson:
(a)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

(b) Comments:

………………………………………………………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………

5. Feedback given during the lesson:

<table>
<thead>
<tr>
<th>Oral feedback</th>
<th>Written feedback</th>
</tr>
</thead>
</table>

(b) Comments:

………………………………………………………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………

6. General comments

………………………………………………………………………………………………………
………………………………………………………………………………………………………
Appendix L: Document analysis sheet

Document Analysis sheet

This analysis will be conducted for the research purpose only. The purpose of this study is to investigate teachers’ classroom assessment practices in the Oshikoto Region. The information that will be collected will be treated with utmost confidentiality and anonymity.

School: ……………………..              Date: ……………………..
Teacher: ……………………..        Total number of lessons in a timetable: …………

The first eight written tasks given by the teacher in 2017

<table>
<thead>
<tr>
<th>Assessment Task No</th>
<th>Assessment methods used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
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<tr>
<td>7</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

General comments

........................................................................................................................................
........................................................................................................................................
Appendix M: Interview protocol

Interview Protocol

Dear respondent,

This interview will be conducted for the research purpose only. The purpose of this study is to investigate teachers’ classroom assessment practices in the Oshikoto Region. The information that will be collected will be treated with utmost confidentiality and anonymity. Please note that there is no right or wrong answer, just answer the way you understand. Thank you.

Bibliographical Information

(a) Highest teaching qualification: .................................................................

(b) Years of teaching experience: .................................................................

<table>
<thead>
<tr>
<th>Interview questions</th>
<th>Respondent responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In your view, what is meant by formative assessment?</td>
<td></td>
</tr>
<tr>
<td>2. Give reasons, why do you assess your learners, particularly in Grade 11 and 12 mathematics?</td>
<td></td>
</tr>
</tbody>
</table>
3. What assessment methods do you use when assessing your learners in Grade 11 and 12 Mathematics?

4. Why do you use those assessment methods?

5. Are your written assessment tasks moderated? If yes, who does the moderation and how often are tasks moderated?

6. Do you think it is necessary for assessment tasks to be moderated? Motivate your answer.

7. What time do you mark your learners’ written works? What is the frequency of your marking?
8. Do you think it is necessary for learners’ written works to be marked? Motivate your answer.

9. In your views, do you think it is necessary for learners be given feedback on assessment tasks given? Motivate your answer.

10. What challenges do you experience when conducting assessment in your Grade 11 and 12 mathematics classrooms?

11. How do you overcome the challenges you experience?

12. In your views, what should be done in order to improve the assessment in Grade 11 and 12 Mathematics?

13. Any other comments you would like to make?