UNIVERSITY OF CAPE COAST

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN PERCEPTIONS OF MATHEMATICS TEACHERS TOWARDS ASSESSMENT AND THEIR ASSESSMENT PRACTICES IN THE BINDURI DISTRICT

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature: ……………………. Date: …………………..…

Name: Issah Joseph Awinyam

Supervisors' Declaration

We hereby declare that the preparation and the presentation of the thesis were supervised in accordance with the guidelines on thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature: ……………………… Date: …………...…

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ABSTRACT

The study sought to identify the relationship between the perception of mathematics teachers about assessment and their assessment practices. Descriptive survey was adopted as a design for the study. Questionnaires were administered to a sample of 63 teachers in the Binduri District after which their lessons were observed to gather data for the study. A multi-stage sampling technique was used to get the sample for the study. Data was analysed based on the research questions and hypotheses that guided the study. The descriptive statistics and inferential statistics were used to present results for the study. From the study, although the perception of teachers about assessment in mathematics is not generally in line with the current thinking of assessment, teachers generally had positive perceptions about what should be assessed, how it should be assessed and the feedback to give to students. This implies that teachers generally have inadequate training in assessment. It was also found that, teachers generally perceive and profess positive assessment practices but their practice is not generally positive. It was also found that, there was a significant difference between the professed assessment practices of teachers and their actual assessment practices. It is therefore recommended the Ghana Education Service should organise In-Service Training and Education course on current trends in assessment in mathematics. It is further recommended that heads of schools should conduct regular needs assessment and provide adequate support to enable teachers practice what they professed.

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DEDICATION

To my family

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CHAPTER ONE

INTRODUCTION

Background to the Study

Education is perceived across the world as perhaps the most vital public service of all. As Asare (2011) succinctly puts it, "A sound education structure leads to an enlightened society and manpower development, which is able to lead a crusade for social transformation and economic progress" (p. 43). To indicate the importance of education, Tefera (2014) also asserted that the main objective of education is to cultivate the individual capacity for problem-solving and adaptability to the environment by developing the necessary knowledge, ability and attitude. The implication of these statements is that, education is at the forefront as far as the development of a nation is concerned. This probably accounts for nations and parents worldwide investing huge sums of money and other resources into the education of its citizenry and wards respectively.

One important discipline in education is undoubtedly mathematics. Mathematics is a household name to many students and other stakeholders in education and nation building. It manifests itself in our immediate and remote environment. To Mereku (2000), mathematics is a science of patterns that involve problem solving, search for relationships, imaginings, creativity, and critical and logical thinking. This explains the usefulness of mathematics to our everyday living as it is seen as a problem solving tool. Mathematics forms the basis of all subjects and possibly all professions. As a vital tool for the understanding and application of science and technology, mathematics serves as a precursor to the much needed technological development which is the pursuit of every nation including Ghana. Mathematics has had an influence on man's life that it has now become everyman's everyday concern. The importance of mathematics is so immeasurable that it is a prerequisite subject in most levels of Ghanaian education.

The importance of mathematics to every nation is so glaring that Legner (2013) argues that, it is very hard to come up with an area of mathematics which has no application in life. Legner argues that we regularly use mathematics in our everyday life: from measuring distances and weights to reading timetables, estimating how much money we spent while shopping and interpreting percentages in newspapers. Many of these skills are taught at the basic school level including Ghana. Mefor, (2014) cited in Sa'ad, Adamu & Sadiq (2014) summarized it all by saying that mathematics relates to everything in the universe from the smallest to the largest. Sa'ad, Adamu & Sadiq (2014) further asserted that mathematics is intimately connected to daily life and everybody's life-long planning. Therefore, mathematics is a subject that education and human life cannot function effectively without it. This justifies the compulsion of the study of the subject by all students who go through basic and secondary education in most countries including Ghana. Mathematics undoubtedly plays a vital role in the development of individuals and nations.

Indeed, the potential success in the world today and in the future can be realized if mathematics education is effective and is well understood by its learners. It is no wonder that a strong foundation in mathematics is a prerequisite for professions and careers in today's changing world. This claim is supported by a report by the Ministry of Education (2001) which claimed that, strong Mathematical competencies development at the Junior High School level is a necessary requirement for study in Mathematics, Science, Commerce, Industry and a variety of other professions and vocations.

In Plato's view (2000), mathematics has a philosophical importance. Mathematics is a tool that helps and trains the mind to think. This process of thinking will then help the mind to understand and acquire the idea of good, which is the ultimate aim of philosophy. Plato did not deny the important applications of mathematics in people's daily life. But, to Plato, the philosophical importance of mathematics is more important and more rewarding as it may affect one's understanding of his being.

Mathematics is also linked with power. Since mathematics is behind most of society's inventions, it tends to give those who succeed in it access to wealth and power. It thus acts as a gatekeeper studies around the world of which a large part of the world's population is denied access to its 'power' (Ernest, Greer, & Sriraman, 2009; Secada, 1995). While power and wealth may not seem to be of immediate concern to pupils at the basic level, the foundations of mathematical proficiency are established during these years.

Umameh (2011) in Tshabalala and Ncube, (2013) was of the view that mathematics is the bedrock and an indispensable tool for scientific, technological and economic advancement of any nation. Adetunde (2009) also asserted that, Mathematics is a tool for science and technology. The rich and more advanced countries of the world have attained their affluence through the advancement which they made in mathematics which links sciences and technology. This implies that mathematics education is a very important input in the scientific and technological development of any society. It is therefore not out of place if more efforts are put in place by interest groups including researchers to make mathematics teaching and learning easier and more meaningful.

In addition, Davies and Hersh, (2012) see mathematics as an important subject not only from the point of view of getting an academic qualification at school or college, but also is a subject that prepares the students for the future irrespective of which work of life they choose to be a part of. This explains that, mathematics gives its learner(s) not only job opportunities but also fine-tune their skills in order to succeed in other areas of work. In Ghana, Mathematics has become one of the prerequisite subjects for students to pass to progress from one stage of the academic ladder to the next. To a greater extent, failure in mathematics results in failure to get access to a tertiary institution which prepares the individual to the world of work. Competencies in mathematics also expose the individual child to myriad and varied job opportunities including becoming teachers, engineers and statisticians.

Having established the fact that mathematics plays a key role in the development of the learner and a nation at large, it stand to reason that a country that does not attach importance to educating most of its citizenry in mathematics risks lagging behind as far as development is concerned. Rightly so in Ghana, mathematics has been given the premium it deserves in education. Mathematics like other subjects contributes partly to the realization of our national aspirations and goals. The main rationale for the mathematics curriculum in Ghana is focused on attaining one crucial goal: to enable all

Ghanaian young people acquire the mathematical skills, insights, attitudes and values that they will need to be successful in their chosen careers and daily lives (Ministry of Education, Science and Sport, 2007). At the basic level in Ghana, mathematics aims at developing the numeracy skills of the students. It is as a result of this aim that the mathematics syllabus is based on the notion that an appropriate mathematics curriculum results from a series of critical decisions about three inseparable linked components: content, instruction and assessment. This means that the content, instruction and assessment work in tandem to ensure the desired outcome. If one fails to work properly, then the entire system will be faulty and the aspirations of the nation in terms of mathematics will suffer. It is assessment that determines whether the aims of mathematics is been achieved or not. Invariably, assessment tells whether the content was properly taught and learnt or not. To Tefera (2014), just as education and development never separate from each other, quality education also go in line with assessment.

Assessment is very vital in helping the learners and teachers become effective and efficient. Assessment denotes the collection of different information to produce effective and competent teachers and learners. Without assessment it is difficult to identify the students' achievements or their failure to achieve their learning. To this end, Airasian (2001) sees assessment as a process of collecting, interpreting and synthesizing information to help teachers understand their students, plan and monitor instructions and establish a conducive classroom atmosphere. In effect, assessment is essential to allow individuals to get the educational support they need to succeed, to see the effectiveness of different educational methods, and to ensure that education budgets are being spent effectively. Inevitably, assessment mirrors the successes and failures of teachers, learners, the institutions and educational policies or programmes.

Classroom assessment has been found to be a critical factor in promoting quality education and as such has become the pivot of various educational improvement efforts (Oduro, 2015). This is because assessment results provide information on pupils' achievement, identify learning problems, and indicate the remedial actions that need to be taken (Black, Harrison, Lee, Marshall, and Wiliam, 2004). To ensure that the national aims of mathematics are achieved, the syllabus provides an assessment procedure through which what is taught and learnt can be determined and the appropriate action taken to remedy any unrealized aim. It is expected that if these procedures are followed to the latter, then it should reflect in the performance of students even in standardized examinations and the general application of mathematical ideas in the daily activities of the basic school graduate. As to whether these procedures of assessment are being followed by teachers is an issue that needs further studies.

It is worthy to note that, assessment score in itself is not enough to validate the performance of a pupil in mathematics but the assessment procedure adopted by assessor also counts. Teachers adopt several assessment practices that can positively or negatively affect the performance of pupils. Some assessment methods are sometimes more emphasized than others. These practices if appropriate will help validate the performance of pupils otherwise we cannot interpret any performance as the actual performance of the said pupil. However, since mathematics is crucial to the development of the country, the need to provide a valid picture of progress of pupils is necessary and the assessment practices of classroom teachers plays a key role in this respect. After all, it is the assessment of these instructional goals that contributes to the appropriate assessment of the ultimate aim of the mathematics curriculum and by extension the effectiveness of the entire educational system.

Assessment practices denote what teachers do to monitor and improve teaching and learning in the classroom. Several studies on teachers' assessment practices in the classroom have been carried in different parts of the globe with divergent findings. Zhang and Burry-Stock (2003) reported that teachers differ in their assessment practices due to the nature of classroom assessment delineated by teaching levels. While secondary teachers rely mostly on paper-pencil tests and were concerned about the quality of assessment, elementary teachers often use performance assessment as an alternative. Suurtamm, Koch and Arden (2010) also found that Canadian mathematics teachers use variety forms of assessment to improve student learning with emphasis on the use of test, homework and classroom exercise to elicit pupils understanding as well as journals, observation, questioning, self-assessment and unique forms of 'quizzes'. In Ghana, teachers tend to use traditional methods of assessment (test, class exercise and home work) rather than alternative assessments (oral presentation, observation and project work) (Nabie, Akayuure and Sofo, 2013) and mainly asked facts-eliciting questions that demanded students to make simple logical mathematical deductions from procedures and not that which challenged them to investigate (Hattori and Saba, 2008).

It must be noted that the assessment procedures practiced by teachers in the classroom is informed by several factors. One of such factors is the how the teacher perceives assessment (Brown, 2004). Chester and Quilter (1998) believed that studying teachers' perceptions of assessment is important in the sense that it provides an indication of how different forms of assessment are being used or misused and what could be done to improve the situation.

From the above, it can be elicited that, teachers' assessment practices represents what teachers do in the classroom as far as assessment is concerned whereas the perception of teachers indicates what teachers think assessment is all about. The question then is whether teachers really put into action what they think should be done in assessment to ensure improved teaching and learning especially in the Ghanaian context. The answer to this question needs further research.

Statement of the Problem

Mathematics continues to play a central role in the development of every country including Ghana. Despite the priority that Ghana places on mathematics education, students continue to perform poorly in mathematics in national and international examination. According to the Ministry of Education (2013), the National Education Assessment results for 2013 indicates that primary three and primary six pupils could only respond appropriately to only 19.6% and 12.3% of the test items on proficiency as against national target of 55% which is even lower than the international standard of 70%. Also, Oduro (2015) using a 2007 report in the Trends in International Mathematics and Science Study (TIMSS), indicates that, in 2007, Ghana scored 309 which was lower than all the countries that participated in the assessment. The performance of students in the Binduri district is not different as personal observation of the 2014 BECE result indicates a pass rate of between seven and thirty two percent in mathematics across the schools. Previous years performance is not different. This abysmal performance of students has implications for the country's development.

There is the need to offer support to the teacher who has a great influence on the performance of the students. One key area of teacher classroom practices which have proven to be a pedagogical potential of raising the performance of pupils is assessment (Coffey, 2003; Hattie & Timperley, 2007; Clark, 2012). According to Kitta (2014), the relationship between learning and assessment is positive and very strong. Kitta asserts that students learn more in classes where assessment is an integral part of instruction than in those where it is not. There is the need for us to have teachers who can ably conduct classroom assessment to inform teaching and learning. This makes knowledge of what teachers perceive assessment to be and what they do during assessment important. Also, Allen, et al (2013) posited that findings on the perception and assessment practices have provided educators with the requisite knowledge and skills needed to better understand the impact of classroom assessment practices on students' learning and progress in the classroom. However, there seem to be no studies on the relationship between the perception and assessment practices of teachers in mathematics lessons especially in the Ghanaian context. Most studies have concentrated on only the assessment practices of which they seem to agree that Ghanaian teachers use test and other forms of traditional methods in assessing pupils and also ask questions that require the application of low order thinking skills (Hattori and

Saba, 2008; Nabie, Akayuure and Sofo 2013 and Oduro, 2015). It is against this background of literature gap that this study sought to establish the relationship between the perception of teachers about assessment in mathematics and their assessment practices.

Purpose of the Study

The purpose of this study was to investigate the assessment practices of mathematics teachers in the classroom and how they relate to what teachers say about assessment in mathematics. Specifically, it focused on the perception of teachers about assessment in mathematics, what teachers claimed they do in assessing their students and their actual assessment practices in mathematics. It further investigated how the assessment practices of teachers relate to their perception. It also looked at the differences between the professed assessment practices of teachers and their actual assessment practices in the classroom.

Research Questions

The study was guided by the following research questions and hypotheses:

1 What are the perceptions of teachers about assessment in mathematics in Binduri District?

2 What are the professed assessment practices of mathematics teachers in Binduri District?

3 What are the actual assessment practices of teachers in mathematics in basic schools in the Binduri District?

Research Hypothesis

H_0: There is no significant relationship between the perception of teachers and their professed assessment practices in mathematics.

H_0: There is no significant relationship between the perception of teachers and their actual assessment practices in mathematics.

H_0: There is no significant difference between the professed assessment practices of teachers and their actual assessment practices in mathematics.

Significance of the Study

The study is expected to be useful to educational managers, teachers, the researcher and potential researchers.

The study will enlighten teachers and redirect their attention on the need to effectively use the profile dimensions for mathematics as a guide in the teaching and learning process and more especially assessment procedures.

Again, the study will provide evidence to support the need for the Ghana Education Service to organize In-Service Training and workshops for mathematics teachers at the basic level on proper assessment practices in mathematics in our schools.

It will also provide data and information to the Ghana Education Service, Teacher Education Division and the University of Cape Coast on the state of assessment in mathematics in our basic schools. This will help them see the need to redesign the mathematics curriculum for teacher trainees in order to adequately prepare them to adequately teach and assess in the subject.

The study will also serve as a reminder to supervisors to put emphasis on what teachers do rather than relying on what teachers say they do. In other words, is not all that teachers say that they do.

From the review of related literature and results of field survey, the study will give the researcher more insight into the assessment practices of teachers and the ones that promote effective teaching and learning. This will enhance the researcher assessment practices in the classroom.

Finally, the study will add to literature which will provide valuable information for researchers who might want to undertake a study in a related topic.

Delimitation

The study was restricted to mathematics teachers at the basic level in the Binduri district of the Upper East Region of Ghana. It only focused on their assessment practices in mathematics and their perception about assessment in mathematics.

Limitations

The sample size and sampling method made it difficult to generalize the results to the whole population of teachers and schools in Ghana. However, the results are generalizable to the schools within the District.

Definition of Terms

Assessment: It is the process of gathering information for making decisions about the teaching and learning process and other related activities.

Assessment Practice: A manner of conducting assessment. These are teachers actual application or use of idea, belief, or method of assessment as opposed to what is meant or believed to happen.

Perception about Assessment: Perceptions for the purpose of this study, relate specifically to teachers' interpretation or understanding of classroom assessment practices.

Classroom Assessment: Any planned method or strategy used in the classroom to gather information and establish the strengths and weaknesses of pupils about a particular concept with the purpose of helping students to succeed.

Basic Education Certificate Examination: It the examination that is used to select suitable candidates for Senior High School education.

Organisation of the Study

Chapter Two reviewed literature relating to assessment practices of mathematics teachers and their perception about assessment in mathematics. It looked at the theoretical underpinnings of assessment with special reference to the Ghanaian context, empirical review of assessment practices of mathematics teachers, the assessment practices teachers employ in assessing the mathematical ability of their students, the perception of teachers about assessment in mathematics and the relationship between perception and practice.

Chapter Three provides the methodology used in the study. It looks at the methods the researcher used to gather data and to address the research questions that guided the study. Issues covered included the research design, the population, the sample and sampling procedures, the instruments used to gather the data and the data collection procedure. It also presents the various procedures adopted by the researcher in analyzing the data gathered.

Chapter Four presents the results of the study, the analysis and the discussions. Chapter Five provides the summary of the whole study. The findings of the study and the conclusions drawn from the findings are provided. Recommendations for policy and practice, and suggestions for further studies are also provided.

CHAPTER TWO

LITERATURE REVIEW

Overview

This chapter reviews literature that relates to the assessment practices of basic school teachers in mathematics. It captures issues including the theoretical framework, the basic school mathematics curriculum, assessment in basic schools in Ghana, the profile dimensions, purpose of assessment, forms of assessment, assessment in mathematics, teachers perception about assessment in mathematics, empirical review of teachers' classroom assessment practices and the relationship between the perception and practices of mathematics teachers in assessment.

Theoretical Framework

The concept of classroom assessment is a fundamental part of teachers' practice. Classroom teachers are now expected to use classroom assessment strategies in a variety of ways to enhance the quality of teaching and learning (Cheng, Rogers, & Hu, 2004). Consequently, mathematics teachers are expected to incorporate classroom assessment strategies in their lessons in order to effectively monitor the levels of progress made by students and inform instruction. Aside the study being rooted on the sociocultural constructivist theory, Bandura's Social cognitive theory and Skinner's theory of operant conditioning also act as firm supports.

The sociocultural constructivist view of learning and assessment borrows ideas from the cognitivist, constructivist and sociocultural theories about how children learn mathematics and can be assessed to ensure improved learning (Heritage, 2010; Shepard, 2000). Proponents of the socio-cultural constructivists postulate that many current approaches to classroom assessment have shifted from a view of assessment as a series of events that objectively measure the acquisition of knowledge toward a view of assessment as a social practice that provides continual insights and information to support student learning and influence teacher practice (Suurtamm, Koch and Arden, 2010). From this theoretical perspective, learners are seen as actively constructing knowledge and understanding through cognitive processes (Piaget, 1954) within a social and cultural context (Greenfield, 2009 and Vygotsky, 1978); as building new knowledge on what they already know (Bransford, Brown, & Cocking, 2000); and as developing the metacognitive skills necessary to regulate their own learning (Bruner, 1985; Vygotsky, 1978). These understandings about learning and development have implications for the use of formative assessment in classroom instruction.

The work of Vygotsky (1978) forms the sociocultural aspects of this theory. This theory emphasises the importance of the social context in the construction of knowledge. To Vygotsky, students develop knowledge and understanding in a domain over time in an interactive social context under the guide of a more experienced individual like the teachers. Ash and Levitt (2003) elaborated the views of Vygotsky by arguing that learners learn best not only as individuals but in a collaborative manner with teachers in a social setting. In this wise, teachers and students are working jointly to ensure that the learning goal is accomplished (Ash & Levitt, 2003). The role of the teachers in this direction is a mediator between the student and the learning goal, providing learning support to aid attainment of the goal (Black & Wiliam, 2009; Walqui & van Lier, 2010). This means for a given task, the child can do it independently to some extent before needing the assistance of a more experienced person to complete. This creates a gap in the child's process of learning a particular skill. This particular developmental gap between what the child can do independently and what he can do with assistance from a more competent person is what Vygotsky (1978) refers to as "zone of proximal development" (ZPD). This concept has been invoked by formative assessment theorists as useful for understanding the gap between a student's actual understanding and the student's targeted or potential learning. In this process, the teacher uses classroom assessment information to give feedback to the student and/or modify instruction so as to improve the performance of the pupils. This makes the teachers assessment in the classroom imbedded in the instructional process. This will put teacher in a position where he/she can quickly remedy any misconception about a particular concept. It also makes assessment an interactive activity where the child can also ask questions and answer questions during the instructional process.

Heritage (2010) asserts that, the socio-cultural point of view about formative assessment includes the role of interaction between and among teacher- student(s) and students-students as well as joint collective action in the learning process. He opines that, assessment is not unidirectional but diverse in nature that rather involves both teachers and students in reciprocal activity to take learning forward and meet the desired goal within a community of practice. This reciprocal activity is characterized by teachers and students engaged together in responding to evidence about learning, minute-by-minute, day-by-day (Leahy, Lyon, Thompson, & Wiliam, 2005). It is through assessment that this evidence of learning can be derived.

The sociocultural constructivist theory believes that intelligent thoughts involve metacognition or self-monitoring of learning and thinking and as such assessment should provide an opportunity for pupils to develop these metacognitive skills (Shepard, 2000). To this end, Heritage (2010) advocated for a classroom where teachers and students share responsibility for learning thereby becoming a community of learners. Meanwhile, formative assessment which provides this opportunity has been found to be useful in developing the metacognitive skills of students. Aside helping the teacher to determine whether students have learned something and to probe students' ways of thinking to get their learning gaps to plan future instruction, formative assessment provides teachers the opportunity to use it to help students judge the state of their own knowledge and understanding, identify the demands of a learning task, judge their own work against a standard, grasp and set learning goals and select and engage in appropriate strategies to keep their learning moving forward (Black & Wiliam, 2009; Heritage, 2010b; Stiggins, Arter, Chappuis, & Chappuis, 2009). According to Bransford et al. (2000), these metacognitive skills are critical to the development of intentional learning and of independent, self-propelled learners who can regulate their own learning and self-correct as needed.

Constructivism is the idea that learning is an active process of building meaning for oneself. Thus, students fit new ideas into their already existing conceptual frameworks. As such, students are expected to be active agents in their own learning by engaging in increasingly independent ways (Clark, 2012). Assessment based on constructivist theory must link the three related issues of student prior knowledge (and misconceptions), student learning styles (and multiple abilities), and teaching for depth of understanding rather than for breadth of coverage. Meaningful assessment involves examining the learner's entire conceptual network, not just focusing on discreet facts and principles (Heritage 2010). This calls for the use of hands-on problem solving task in the assessment of the child which calls for the use of higher order thinking skills rather than assessment tasks that require mere recall of facts. To promote this, constructivism calls for the elimination of grades and standardized testing and rather projected an assessment culture that embeds assessment in the teaching and learning process and “focuses on the assessment of the process of learning in addition to that of its products” (Birenbaum in Segers et al., 2003). This means that assessment becomes part of the learning process so that students play a larger role in judging their own progress.

Formative assessment is underpinned by the constructivist view of learning that learners construct their own understanding of their experiences, and that these ideas may contradict the widely held views about events (Black & Lucas, 1993) cited in Harlen (2005). It is further argued by Harlen (2005) that the way learners come to revise and reconstruct their understanding to be in consonance with widely agreed ideas is by interaction with their environment and the ideas of others. This is elaborated by socio-cultural theories of learning. Tharp and Gallimore (1988) and Reveles, Kelly, & Durán (2007) cited in Heritage (2010) argue that while learning is owned by students, since no one else can learn for them, others can engage them through social and interactive processes that support the learning which is their property.

Albert Bandura's social cognitive theory suggests that children learn by observing or by imitating others within the social environment (Bandura, 2001). Bandura's social cognitive theory consists of three components: person, environment, and behaviour. The person refers to the observer, the environment refers to the social settings, while the behaviour refers to the improved learning conditions (Bandura, 2001). Bandura's social cognitive theory further suggests that by creating a positive learning environment, teachers are better able to challenge students and provide frequent feedback (Boyce, 2011).

From this perspective, social cognitive theory provides the basis for frequent and effective use of classroom assessment strategies. Through this type of interaction students might be able to learn the desired behaviour and practice the required skills at the appropriate level. This type of behaviour can be learned either through observation or by modelling. Through observation students can learn the desired behaviour provided by the teacher or by modelling the desired behaviour provided by a peer functioning at a higher level on the required skills (Boyce, 2011). A study conducted by Blair (2004) demonstrates the importance of social learning theory in the classroom. The article suggests that peer interaction in mathematics enhances faster progress through collaborative interaction within mathematics lessons. Through this type of interaction students are better able to model the required behaviour within the social setting (Blair, 2004).

Skinner's theory of operant conditioning also forms the basis of this study. According to Skinner, operant conditioning is the use of consequences to modify the occurrence of a particular behaviour (Pitts, 1971). The use of classroom assessment in the classroom promotes the use of consequences through dialogue and feedback. Teachers in the mathematics classroom can use consequences to monitor students' progress towards the targeted outcomes. Furthermore, classroom assessment strategies should be used to break down more difficult and challenging learning tasks into simpler, student friendly and more meaningful tasks (Isaken & Holth, 2009). Consequently, this approach to the use of classroom assessment in mathematics can help students to identify the link between different mathematical concepts, thereby achieving their age related and predicted targets.

Skinner further stated that through constant dialogue and use of feedback, the desired behaviour can be achieved by learners (Isaksen & Holth, 2009). This theory supports the use of assessment for learning and differentiated learning in the classroom. Through this approach complex tasks can be broken down into simpler ones where regular interventions and support are provided to monitor progress. In addition, praises and rewards may be provided as a means of providing incentives for achievement of smaller tasks and a motivator for higher tasks (Jones & Jones, 2013).

These theories have therefore been considered because of the role they play in ensuring effective learning and improved performance of pupils through assessment in contemporary society. As a result, the theories will provide a framework for assessment in mathematics to arrest to some extent the poor performance of pupils in the Binduri District especially in mathematics. It also served as a framework through which the assessment practices of teachers will be measured against their perceptions of assessment in mathematics.

Basic School Mathematics Curriculum

In Ghana, the Curriculum Research and Development Division (CRDD) of the Ghana Education Service is the body mandated to develop the curriculum for all subjects including mathematics. They produce the teaching syllabus of which both public and private basic schools use to guide their day to day instructional and assessment activities. As a guide, the curriculum provides a framework through which private publishing houses produce other curriculum materials in mathematics including pupils' book and teachers' guide. Aside the framework that the curriculum provides to private publishing houses to produce textbooks, the CRDD also assesses all textbooks and consequently reserves the right to amend, delete or and reject a part or the whole of any textbook. In view of such control, the contents of textbooks are more or less the same in all the regions though this may have been published by different private publishing houses. The Ghana Education Service (GES) is the implementing body of the national curriculum (Oduro, 2015). One key person that plays a key role in the implementation process is the classroom teacher and his /her assessment practice which ought to be imbedded in the instructional process is worth investigating.

It must be emphasized that each subject partly contributes to the achievement of the collective aspirations of the nation. As a result, each subject studied at the basic level has its rationale and aims. The rationale for the mathematics curriculum at the primary school includes the development in children basic numeracy competence to be able to function effectively in society. Modern life demands that young people should be able to use numbers competently, read and interpret numeral data, reason logically, solve problems involving calculations and mathematical reasoning, as well as communicate effectively with other people using accurate mathematical data and interpretations. These are the necessary skills required of young people to enhance their chances for taking advantage of the numerous opportunities in the fields of science, engineering, technology and in other areas in manufacturing. The mathematics curriculum also seeks to help the pupils to develop interest in the use of mathematics and the ability to conduct investigations using mathematical ideas. It is the acquisition of these qualities and the important quality of functional mathematics that education in Ghana aims to emphasize in the teaching and learning programmes in the school system. The syllabus hence puts a great deal of emphasis on the development and use of basic mathematical knowledge and skills (Ministry of Education, Science and Sports, 2007). The main rationale for the Junior High School mathematics syllabus is focused on attaining one crucial goal: to enable all Ghanaian young people acquire the mathematical skills, insights, attitudes and values that they will need to be successful in their chosen careers and daily lives (Ministry of Education, Science and Sports, 2007). It can be elicited from the rationale of the mathematics curriculum that, the study of mathematics should have meaning and value beyond school life of pupils. This requires an assessment procedure that requires problem solving and critical thinking rather than mere recall of facts.

In Ghana, the school curriculum is designed in terms of profile dimensions. According to Ministry of Education (2007), the profile dimensions can be seen as the cumulative psychological units used for describing the underlying behaviours for teaching, learning and assessment. They consist of a set of quite general and specific categories that encompass all possible learning outcomes that might be expected from instruction. Teachers are expected to teach using a progression from one stage to the next, starting from the recall of facts to higher levels of their application, that is, synthesis and evaluation. Regrettably however, the instructional activities including assessment of teachers seem not to move beyond the recall of facts (Hattori and Saba 2008; Ministry of Education, 2013). As to the reasons that influence teachers not assessing the higher order thinking skills is unknown. Meanwhile, Oduro (2015) posited that it is these higher order skills that lead towards learning process skills that have been highlighted as relevant to 21st century education. The implication of this phenomenon is that, performance of pupils in the classroom may seem to be above average but when students are examined in the higher order thinking skills within the concept(s) by an independent body, pupils' performance are likely to be low. Another implication is that, pupils will not be able to apply their mathematical knowledge in real life situations thereby defeating the purpose of the mathematics curriculum. In the same vein, if mathematics teachers' assessment practices elicit higher order thinking skills from pupils, it has the potential improving their performance in external examinations as well. It is in line with this that the mathematics curriculum encourages to teachers to provide opportunities for pupils to work co-operatively in small groups to carry out activities and projects both during class time and out-of-school time when necessary.

Assessment in Basic Schools in Ghana

Classroom assessment is considered as a critical factor in promoting quality education and has become the pivot of various educational improvement efforts (Oduro, 2015). Assessment results provide information on pupils' achievement, identify learning problems, and indicate the remedial actions that need to be taken (Black and Wiliam, 1998). In fact, no educational effort can overlook the importance of assessment as formative assessment has been identified as having the potential to improve learning outcomes (Hattie and Timperley, 2007).

Assessment in Ghana has over the years been used mostly for placement decisions. It has been used to select candidates to progress through the levels/ stages of the educational system and for employment (McWilliams and Kwamena-Poh, 1975 cited in Oduro, 2015). The implication here is that, little attention and value has been attached to formative assessment.

In providing the historical narrative of assessment in Ghana, Oduro (2015) reported that, in 1970, the Middle School Leaving Certificate Examination (MSLCE) was introduced. Alongside this, there was the British-Originated General Certificate of Education (GCE) Ordinary and Advanced level examinations for secondary schools. These forms of assessment were abolished in 1993 and 1996 respectively, and replaced by the Senior Secondary School Certificate Examination (SSSCE). With this system, pupils in primary grades 1 to 5 enjoyed automatic promotion to the next grade until completion of primary six. Up to the 1970s, there was a Common Entrance

Examination for selecting qualified and a privileged few for secondary school education. The rest continued up to middle school form 4 where they wrote an examination for the Middle School Leaving Certificate (MSLC).

Oduro (2015) continued that, Continuous Assessment was introduced from primary one to JHS in 1987 as part of the 1987 educational reform to complement the Basic Education Certificate Examination (BECE) which is a one-shot end of year and external examination. Junior High School (JHS) teachers have since practiced a system of Continuous Assessment (CA) in which 30% of the score complements that of the external Basic Education Certificate Examination result. Such CA includes class exercises, tests, quizzes, homework and projects that are set throughout the school term. Teachers are expected to conduct these assessments systematically and aggregate the results. Aside the reported cumbersome nature in computing CA marks by teachers, there has been persistent disparities between West African Examinations Council (WAEC) results and those obtained in schools (Oduro, 2015). If this is the situation, there is the need to review the assessment practices of mathematics teachers in basic schools.

To provide standardization of assessment of teachers and to reduce the workload of teachers, the School Based Assessment (SBA) was introduced by the Ghana Education Service in 2008. School- based assessment (SBA) refers to assessments administered in schools and marked by the classroom teacher. According to Mereku, Nabie, Appiah and Awanta (2011), Continuous Assessment (CA) was replaced with the SBA with the aim of making assessment more comprehensive (specifically to cover more applications profile dimensions). Ministry of Education (2012) contends that the School

Based Assessment (SBA) should focus both on what children know and can do, and on how they think about mathematics. It should involve a broad range of tasks and problems and requires the application of a number of mathematical ideas. Skills assessed should include the ability to communicate findings, to present an argument and to exploit an intuitive approach to a problem. It requires assessment to be an integral part of the normal teaching and learning programme. It should involve multiple techniques, including written, oral and demonstration formats. Group and team activities should also be assessed. In SBA, teachers are advised to avoid carrying out only tests which focus on a narrow range of skills (or profile dimensions) such as the correct application of standard algorithms (procedures). While such skills are important, a consequence of a narrow assessment procedure, which isolates skills or knowledge, is that children tend to learn in that way. Mathematics becomes for them a set of separate skills and concepts with little obvious connection to other aspects of learning or to their world. SBA should also be undertaken to provide children and their parents with an indication of the child's progress. When marking children's work and giving feedback (oral or written) teachers should indicate what the children have done well and what they need to do to improve and to act on feedback given to them. In summarising the results of evaluations of children's achievement, teachers should report what the children have achieved and how well they achieved it. A grade or mark alone is insufficient. As part of SBA, children are expected to take an National Minimum Standard (NMS) test namely School Education Assessment (SEA) to determine whether or not they have reached the minimum standards for Primary 2, 4 and 6. Another NMS test namely

National Education Assessment (NEA) is given at the end of Primary 3 and 6 to all children to determine whether or not they have reached the NMS stated for the two key stages of the educational system. The NEA is given to 5% of all pupils across the country in Primary 3 and Primary 6 (Ministry of Education, 2012).

The new SBA system is important for raising pupils' school performance. For this reason, the 60 marks for the SBA will be scaled to 50. The total marks for the end of term test will also be scaled to 50 before adding the SBA marks and end-of-term examination marks to determine pupils' end of term results. The SBA and the end-of-term test marks will hence be combined in equal proportions of 50:50. The equal proportions only affect assessment in the school system. It will not affect the SBA mark proportion of 30% used by WAEC for determining examination results at the BECE. Pupils at Lower and Upper Primary Levels are expected to undertake assignments that may involve investigations and use of mathematics as part of the SBA work. The SBA recommends that, the tasks assigned pupils should include individual test, group exercise and projects. Apart from the SBA, teachers are expected to use class exercises and home work as processes for continually evaluating pupils' class performance, and as a means for encouraging improvements in learning performance (Ministry of Education, Youth and Sports, 2007). As to how these are perceived and practiced by the mathematics teacher in basic schools in Binduri are not known.

Purpose of Assessment

Assessment is an inextricable element of education. Stiggins (2005) describes classroom assessment as "the process of gathering evidence of student learning to inform instructional decisions" (p. 5). While it serves various purposes, its core function is to support and enhance student learning (Rust, 2002). The National Council of Teachers of Mathematics (NCTM, 2005) classified the purposes of assessment into four broad categories: monitoring pupils' progress towards learning goals, making instructional decisions, evaluating pupils' progress at a particular time, and evaluating programmes. Jones & Tanner (2008) rather had three general aims for classroom assessment which include pedagogical, managerial and communicative.

The pedagogical purpose of assessment relates to the use of assessment in facilitating the teaching and learning process. For instance, assessment provides feedback to the students about how they are approximating the learning goals. This serves as a motivation to the learners which enhances learning and improves performance. According to Boud (2000), assessment is integral to teachers in interpreting pupils' learning and can serve as a motivation for pupils in the learning process. Katz and Earl (2007) added that the information obtained from assessment may be used not only to motivate learners to learn more but also for teachers to teach with greater force. Furthermore, teachers can use and interpret assessment to gauge whether teaching has been successful in achieving its objective(s). Assessment may also be used to reinforce learning as it indicates which concepts or processes pupils have not assimilated. The teacher may then use assessment results as the basis for advice on learning or reviewing teaching (Black and Wiliam, 2010). The overarching purpose of assessment therefore, is to give teachers the information needed to provide quality instruction (McMillan, 2001).

It is an undisputable fact that, the basic reason why teachers conduct classroom assessment is to collect evidence about the performance of learners (Nitko and Brookhart, 2007; Bennett and Gitomer, 2009). However, teachers are not the only end-users of information collected from the process. Yes, learners also require feedback (Mbelani, 2008) where the results of the assessment process need to make learners know how close they are to the learning target and pointing out their strengths and weaknesses. Parents too are interested in understanding how their children are performing (Popham, 2008). It is the assessment results that will communicate this to parents. Teachers therefore use assessment results to communicate to students and parents about how the pupils are approximating the learning goal.

Assessment also provides information for managerial purposes. School management including the Ghana Education Service requires assessment results to appropriately plan the curriculum and possibly provides in-service training to teachers. It also serves as evidence of the work done by the teacher. School administrators also use assessment results to appropriately place students in the activities of the school.

Forms of Assessment

There are myriad and varied forms of assessment. It may be deliberately planned or casually delivered. Examples of assessment techniques include exercises, class test, examinations, observations, interviews, performance assessment, authentic assessment and projects. These enumerated assessment techniques can be carried out in a formal setting or an informal setting. This informed McAlpine (2002) to broadly categorise assessment into formal and informal. An assessment becomes formal when it is deliberately planned by the teachers or other examining bodies to ascertain the level of achievement of pupils against a specified unit or concept Marsh (2004). This means that the student is being assessed in an altered environment where he/she is aware that he/she is being assessed. Examples of assessment techniques that are mostly formally used include test, examination and quizzes. Informal assessment however, is neither deliberate nor planned but occurs as part of teacher day-to-day practice (Marsh, 2004). These include the teacher posing questions during lessons and their general observation of the pupils. In this direction, pupils are less aware that they are being assessed and as such answer the questions in their natural self without any form of anxiety. Examples of assessment techniques that best fit informal assessment are authentic assessment, performance assessment, observation, interview and peer assessment.

Be it formal or informal, an assessment technique may be used to evaluate the teaching and learning process in the course of teaching a mathematical concept or for judging the performance of pupils against a spectrum of mathematical concept. These two scenarios connote formative and summative forms of assessment. Gareis (2007) sees formative assessment as any means by which a teacher finds out what pupils are getting and what they do not understand in the classroom to inform teaching and learning but excludes grading. To Popham's (2008), formative assessment is a process not a test which requires the use of more qualitative than quantitative insights into pupils' approximation of mathematical concepts (Shepard, 2008). This suggests the use of qualitative feedback when assessing pupils work in the classroom. It also calls for teachers to use probing questions to find out the reasons behind the rules in learning mathematical concepts. This lends itself to the current thinking of mathematics assessment where the child is put at the centre of evaluating his/her own work and constructing knowledge for himself/herself. Formative assessment is important as it provides information about pupils' learning processes which is used to make informed decisions on how to design the classroom learning so that learning can be optimized (Wiliam, 2011). Formative assessment is also used for diagnostic purposes (Oduro, 2015). A special form of formative assessment in which assessment is used to obtain detailed information about individual pupils' prior knowledge, ways of reasoning, use of strategies, and misconceptions (Keeley and Tobey, 2011; Crisp, 2012; Sach,2012). All these help the teacher to structure his/her lesson in such a way that children learn from known to unknown. This is also in tandem with the constructivists' view of assessment which requires the use of prior knowledge in learning a new or related mathematical concept.

Two concepts have been used by Gipps (1994) to describe what summative assessment entails. These are 'summing-up' and 'checking-up'. According to her, these two concepts conveys summative assessment as gathering and accumulating information that was previously formative that presents the performance of pupils over a period of time. According to Black and Wiliam, (1998) summative assessment is an 'overview of previous learning' either by accumulating evidence over time or by testing at an end-phase or other transition time. In simple terms, summative assessment seeks to measure the level of performance of pupils at the end of a session or programme. They serve the purpose of reporting to parents about the performance of pupils. They can also be used for selection and placement purposes due to the presence of grading.

Assessment in Mathematics

The National Council of Teachers of Mathematics (NCTM, 2005) defines assessment in relation to mathematics as the process of gathering evidence about the student's knowledge of, ability to use, and disposition towards mathematics and making inferences from that evidence for a variety of purposes. From this definition, assessing the mathematical competence of students goes beyond mere grading of students in a regular classroom setting but extent to observing how the pupil uses mathematics in concrete situations. It also connotes the values and attitudes that pupils develop towards the learning of mathematics which plays a crucial role in the performance of pupils. These aspects of the pupil's mathematical development cannot adequately be measured through grading but through observation and interview. Pupils can only adequately apply mathematical concepts in novel situations if they really understood the concept deeply and not being able to reproduce a fixed body of knowledge that has been taught. This calls for an assessment procedure where the teacher probes further to elicit the reasoning of pupils regarding a particular concept.

According to Lesh (2000), mathematics is not simply about doing what you are told rather it is based on students need to learn mathematics as social knowledge which is meaningful. Lesh added that this meaning must be coherent with those socially recognized and related to the existing problems with mathematics learning perceived as related to students' perceptions of mathematics, ability to communicate mathematically and enhancing critical problem solving abilities. This calls for independent work supported by the teachers as facilitating agents. This is in line with the argument of recent researchers who conducted a study on how assessment in mathematics should be carried out in order to produce pupils who can fit well into this technologically driven society (Boaler, 2008 and Shepard 2005). They posit that assessment in mathematics should incorporate problem-solving activities to promote pupils' reasoning and communication skills. Suurtamm et al. (2010) suggested that teachers should use authentic tasks that focus on a wide range of cognitive behaviours (lower and higher order) aimed at eliciting expertise, encouraging learners to make predictions and to constantly reflect on discrepancies between their predicted answers and those found. As they do so they refine their thinking about what they already know and then assimilate the learned concept into their conceptual structures.

To this end, Oduro (2015) concluded that assessment in mathematics needs to go beyond focusing on how well a student uses a memorised algorithm or procedure and elicit, assess and respond to pupils' mathematical understanding and problem-solving skills. To do this, Oduro reviewed the work of Shepard (2005) and Stobart (2008) and posits that, assessment strategies need to include more than the traditional practice of relying on end-of-unit tests and mid-unit quizzes, both of which tend to focus on knowledge recall and procedural learning.

For assessment in mathematics to be learnt appropriately and be applicable in new situations, assessment should be streamlined in the instructional process where it constantly prompts pupils' thinking (Stobart, 2008). The mathematics teacher therefore needs to listen attentively and probe further to elicit pupils thinking about a mathematical idea. This will make the child an active constructor of knowledge which brings in its wake a lasting learning in children and its subsequent use in society.

Wiliam (2009) argues strongly that mathematics teachers should use a multiple and varied assessment technique in assessing the mathematical competence of pupils. These multiple techniques and activities include observations, interviews, performance tasks, projects, portfolios, presentations and self-assessments. These activities according to Wiliam would help the teacher elicit the mathematical understanding and insights into pupils' mathematical thinking. The implication of this to the teacher is that, the use of test and other forms of traditional assessment is not strong enough to assess the mathematical reasoning behind the answers that pupils give in response to the tasks they do. This is in line with the current position of teaching and assessment in mathematics which shun activities that yield just procedural learning and mere memorization/recall of facts.

Despite the clarion call to use diverse assessment technique to assess pupils' mathematical ability, Campbell and Evans (2010) cited in Jarrett (2016) reported that most teachers lack the relevant experience with classroom assessment practices as they have never previously taught or received training in the field. This lack of experience, knowledge, and skills according to Akos, Cockman and Strickland (2007), poses a problem to the education system as these teachers are not adequately prepared to meet the diverse learning need s of students in the classroom.

What Teachers Assess in Mathematics

The purpose of teaching mathematics is to make the learner numerate. By being numerate, the learner develops mathematical competencies to enable him or her apply in his/her daily activities. The National Research Council (NRC) (2001) suggested five strands in mathematics which when properly taught and assessed will lead to mathematical proficiency. These strands include conceptual understanding, procedural fluency, strategic competence, adaptive reasoning, and productive disposition. The NRC noted that the five strands are interwoven and interdependent in the development of mathematical proficiency.

a. **Conceptual understanding:** This is defined as the comprehension of mathematical concepts, operations, and procedures (NRC, 2001). People with conceptual understanding have their mathematical knowledge organized in such a way that they can easily use it in appropriate contexts. Moreover, their knowledge is not in separate, disconnected pieces, but rather their knowledge builds from their old conceptions to newer ones. Hiebert and Lefevre (1986) emphasized the importance of the relationships in conceptual understanding. It can be thought of as a connected web of knowledge, a network in which the linking relationships are as prominent as the discrete pieces of information. The NRC (2001) contends that relationships pervade the individual faces and propositions so that all pieces of information are linked to some network. These connections are important, for if a person forgets a fact or procedure, he/she can recreate it by building on her previous understandings, making mathematical knowledge easier to use and easier to remember and providing a basis from which to build new understandings. According to the National Research Council (2001), a significant indicator of conceptual knowledge is being able to represent mathematical situations in different ways and knowing how different representations can be useful for different purposes. According to the council, the more connections to different representations a person has, the richer his/her conceptual understanding is. For example, suppose that the decimal .45 was given to a student with strong conceptual understandings of place value and number sense. She may know that .45 is 4 tenths and 5 hundredths, which is the same as 45 hundredths (or 450 thousandths). She might be able to connect it to her knowledge of fractions and see .45 as the same as 45/100 or 9/20. It is all these connections among differing representations that constitute conceptual understanding.

b. **Procedural Fluency:** This is the knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently (NRC, 2001). The procedural knowledge referred to is any and all methods one might use to solve a mathematical problem, including but not limited to written procedures, mental procedures, computer or calculator use, and modeling with manipulatives. Procedural fluency is not in opposition to conceptual understanding; indeed, the two work together to help build mathematical proficiency. Procedural knowledge without conceptual understanding leads to learning algorithms by rote, without understanding the underlying mathematics and the constraints on their appropriate use (NRC, 2001).

c. **Strategic Competence:** This is the ability to formulate mathematical problems, represent them, and solve them (NRC, 2001). Having strategic competence enables one to formulate a problem mathematically and then use his or her knowledge to solve it. Strategic competence is invoked in deciding which strategies might be useful in solving the problem and in finding connections to previous mathematical experiences in which similar problems were solved. This skill is important not only for the mathematics classroom but also for problematic situations in real life. Unlike the classroom, the real world lacks neatly set-up problems with well-defined procedures for solving them, so one must be able to construct a model of the situation, find the relevant mathematical terms, and think flexibly about which approach to use in a solution. Numerous factors affect one‘s use of strategic competence. In trying to develop strategic competence in a group of fifth-grade students, Townsend, Lannin, and Barker (2009) found that students who were given opportunities to generalize algebraic tasks used recursive and proportional reasoning and were explicit in their choice and use of strategies. These students differed from students taught to focus on ‘key words’ and to use those words to determine the operations needed (Mayer & Hegarty, 1996).

d. **Adaptive Reasoning:** This is the capacity to think logically about the relationship among concepts and situations (NRC, 2001). Ability in adaptive reasoning enables one to consider alternative approaches, to follow the mathematical logic of a proposed proof, to note logical inconsistencies or contradictions, and to justify any conclusions. The justifications need not be formal proofs, but rather, as the NRC (2001) noted, would provide sufficient reasons. People with adaptive reasoning know when their solutions are correct, not because of the particular procedures they used but because they could follow the steps they used to solve them in a logical manner and justify their solutions.

e. **Productive Disposition:** This is the tendency to see sense in mathematics, to perceive it as both useful and worthwhile, to believe that steady effort in learning mathematics pays off, and to see oneself as an effective learner and doer of mathematics (NRC, 2001). This suggests that students who have productive dispositions see mathematics not as a set of arbitrary rules that one must memorize but as a system of connected conceptions that, with diligent effort, can be understood. This strand is very different from the other strands; it encompasses issues such as a person‘s affect, beliefs, and identity, whereas the other four strands focus mainly on cognitive processes. However, productive disposition is needed to build the other four strands (NRC, 2001). Moreover, the strengthening of the other four strands helps to build one‘s productive disposition. This indicates that productive disposition should be seen not as a fixed characteristic but as a quality that can be changed and does change through interaction with novel mathematical tasks. Resnick‘s (1987) conclusion that the term disposition should not be taken to imply a biological or inherited trait, but that a disposition is more similar to a habit of thought, one that can be learned and, therefore, taught has the important implication that humans are not born predisposed to liking or disliking mathematics. Productive dispositions in mathematics can be developed in all learners, and teachers can play active roles in the construction.

The Profile Dimensions in Mathematics Instruction and Assessment

The concept of profile dimensions has gained a place in the basic education syllabuses since 1998 (Ministry of Education, 2007). The concept is closely related to the taxonomies of educational objectives as formulated by Benjamin Bloom (1956) and other researchers in the field of education. According to Ministry of Education (2007), the profile dimensions can be seen as the cumulative psychological units used for describing the underlying behaviours for teaching, learning and assessment. They consist of a set of quite general and specific categories that encompass all possible learning outcomes that might be expected from instruction. But for the percentage weight assigned to each dimension and the differences in categorization, the profile dimensions is synonymous to the taxonomies of educational objectives.

The profile dimensions have varying percentage weights assigned to the various dimensions of learning. These percentage weights indicate the relative emphasis that the curriculum developers expect to be placed on a particular dimension of learning and assessment. They differ across subjects as well as across levels of education (Ghartey-Ampiah, 2006).

Ghartey-Ampiah (2006) noted five major dimensions that are catered for across the various subjects that make up the curriculum. They include; knowledge and understanding, use or application of knowledge, attitudes and values, practical skills and process skills. Depending on the subject, two or more of these dimensions listed above may be incorporated which influence the teaching and assessment of such a subject. In the mathematics teaching syllabus for Junior High Schools and primary schools in 2007, the profile dimensions for mathematics are grouped into two dimensions. Knowledge and understanding takes 40% and application of knowledge takes 60% for the lower primary. From the upper primary to the junior high school level, the profile dimensions takes 30% knowledge and 70% application of knowledge. The percentage weightings suggest the relative emphasis that mathematics teachers need to put in the teaching and assessment of mathematics. Juxtaposing the profile dimensions to bloom taxonomy of educational objectives, knowledge and understanding corresponds with first two low levels of educational objectives. Application of knowledge also relates to the last four higher levels of educational objectives including application, analysis, synthesis and evaluation. It stand to reason that if teachers emphasise the higher levels in their assessment, students will be adequately equipped with a lot of competencies in mathematics and this will help them apply mathematical concepts in new situations. This will also enhance their performance in external examinations like the Basic Education Certificate Examination.

Assessment Methods and Tools used in Mathematics Classroom

Assessment plays a crucial role in the success or otherwise of both teachers and pupils. Critical to teachers is the use of assessment to both inform and guide instruction (Rahim, Venville and Chapman, 2009). When engaging in classroom assessment, the teacher is confronted with many tasks, choices, and dilemmas. Hyde (2013) posits that, using a wide variety of assessment tools allows a teacher to determine which instructional strategies are effective and which need to be modified. The implication of this is that, assessment can be used to improve classroom practice and plan curriculum. Similarly, assessment also provides information about performance to learners, parents, and administrators (Brown and Hirschfeld, 2008). In order to determine how the child is approximating the learning targets, teachers adopt several assessment tools and method. Studies have revealed that most mathematics classrooms in the world use testing and grading most frequently to assess the performance of pupils (Van de Walle, 2001; Lissitz and Schafer, 2002). Senk, Beckmann and Thompson (1997) and Susuwele-Banda (2005) reported that the most frequently used assessment tools adopted by teachers are tests and quizzes. They however found that the test items used by teachers are of low order thinking questions that require very little reasoning. Meanwhile Oduro (2015) argues that it is the higher order questions that have the potential to improve pupils thinking skills with a subsequent improvement in the performance of the pupils.

It has also been reported that teachers employ both written and oral questioning in their attempt to elicit how pupils think mathematically. However, in a review of literature Oduro (2015) found divergent views about how different oral questioning assesses the thinking skills of pupils from written. According to her, whiles Stiggins, Frisbie, and Griswold (1989) found out that there was a difference between oral and written questioning in mathematics in terms of the thinking skills assessed Chitsonga’s (2010) found no differences in the thinking skills required for answering between oral items and written questions that the teachers used in mathematics lessons. Both oral and written items assessed the same low order thinking skills which requires recall of factual information and engagement in routine procedures.

Dandis (2013) in a study reported that, the methods adopted by mathematics teachers to assess their pupils are either traditional and/or alternative method. The traditional method is basically centered on paper and pencil tests in which students must demonstrate their mastery of facts, skills and definitions which are the most basic and simple mathematical knowledge. A lot of studies on the methods that mathematics teachers employ in assessing their pupils seem to suggest that most teachers using the traditional method of examination with few teachers incorporating the alternative forms of assessment (Dandis, 2013; Watt, 2005; Buhagiar, 2007; Rico, 1993; Black, 1998; Berenson and Carter, 1995 and Susuwele-Banda (2005). Dandis (2013) found that most mathematics teachers in Spain evaluate their students with written exams during the whole year and that they do not change. According to him, the teachers said they do not know anyone that uses other forms of assessment even though they admitted that other teachers in other subject areas may be using other forms of assessment method. If Spanish teachers assess their pupils who are more exposed to a lot of mathematics learning materials through written tests, how do teachers in Ghana, a developing nation, assess their students' mathematical skills? It is this answer that this study seeks to find using respondents in the Binduri district of the Upper East Region. Dandis (2013) reported that mathematics teachers were relatively satisfied with the traditional methods of assessment as they claim examination is the best way to help the students to assimilate the concepts and that using more than one evaluation method will get pupils lost. Other teachers according to Dandis expressed dissatisfaction with the traditional method but that they are obliged to evaluate their students with the numerical grades by exams. Those who expressed dissatisfaction are of the opinion that there is no one method of evaluation that is perfect and suitable for all the students, every group of student has their own way of learning, then the teacher has to follow the learning way of his students, as there are a lot of diversity among the students then one certain method is not enough for all the students. The teachers also expressed misgivings to the idea of putting a numerical grade for the students advance in learning as it does help the teacher to see the effort that the student put and if you have acquired at least some of what have been taught. Rico (1993) argues that the traditional method rarely puts students in creative activities or assesses their competence to deal with tasks not previously tested.

After years, Dandis (2013) also found that Spanish teachers' evaluation system had not changed. It was similar to characteristics of the evaluation system reported by Rico (1993). According to Dandis, despite the clarion call for reforms in assessment, there is a rigid pattern of timing since the assessment is centered on one or two written tests each term, with some weeks dedicated exclusively to carrying out examination or reexamination; the explicit aim of the tests is to give a course mark; the overall character of the marks given to the students is that of a summary of different aspects and information obtained with different exercises; the complexity of the learning achieved by the pupils is masked by assessment that yields one item of information; the level of an accepted command of the knowledge is indicated by an arbitrary line, which is called the "pass level" or to have a five (i.e. to get 5 out of 10) and neither the students' mistakes nor their unanswered questions are in any sense evaluated. How different or similar the assessment system of Ghanaian teachers is to these features as outlined by Dandis (2013) is not known which needs further research.

Current thinking about assessment and how it can be used to promote learning contends that alternative assessment methods should replace the traditional method of testing (Buhagiar, 2007; Dandis, 2013; Janisch, Liu, and Akrofi, 2007; Dogan, 2011 and Popham, 2000). Dandis reported that teachers use the alternative methods such as observation, peer-assessment, interview, interim assessment, portfolios and student journals. He argues that when the students are involved in the evaluation process, they can see their weaknesses. Also the students can correct honestly, sometimes they are stricter than the teacher, which is good because it makes them aware and feels more involved in the education process, and these things are good for the students' character. According to him, despite the efficacy of the alternative forms of assessment, teachers pointed out large class size as making it impossible to implement to the latter these assessment methods.

Popham (2000) contents that "If educational measurement does not lead to better education for students, then we should not be doing it … the only reason educators ought to assess students is in order to make more defensible educational decisions regarding those students. That is really why educators should be messing around with measurement to improve student learning" (p.1). This requires assessment techniques that focus on assessing what students know as well as what they do not know, and the use of multiple and complex assessment tools including written, oral, and demonstrations formats. Therefore, alternative assessment tools, such as rubrics, concept maps, portfolios, student journals, self-assessments, and peer/group assessments are necessary to determine what students actually know and where they are in the learning process (Birgin, 2011).

Buhagiar (2007) argued that in order to provide every student with the best learning opportunity, traditional ways of assessment should be replaced by alternative forms of assessment. Alternative assessment is based on the constructivism philosophy. Piaget's and Vygotsky's emphasize the importance of students constructing and supplying responses rather than selecting or choosing them (Dogan, 2011). Janisch, Liu, and Akrofi (2007) in clarifying the importance of using alternative assessment methods in the classrooms stated that "the theoretical framework for using alternative assessment in the classroom includes considering learners as constructors of knowledge; finding authenticity in materials and activities; employing dynamic, ongoing evaluation tools; and empowering students. By putting these ideas into practice, individual attributes of initiative, choice, vision, self-discipline, compassion, trust, and spontaneity can be promoted in students" (p.221).

Berenson and Carter (1995) said that traditional assessments have contributed to students' pursuits of grades rather than pursuits of learning. They suggest that broadening the system to include alternative assessments that provide an opportunity for students to make conceptual connections and reflect on understanding can refocus students towards the pursuit of learning.

Assessment Feedback

There are various definitions presented about feedback in the literature. Ramaprasad (1983) describes feedback as a tool that provides information that has an impact on the performance, stating, "feedback is information about the gap between the actual level and the reference level of a system parameter which is used to alter the gap in some way" (p. 4). In addition, Black and Wiliam (1998) point out the importance of oral feedback provided by the teacher, enabling students to reflect on their learning. They write, "the dialogue between pupils and a teacher should be thoughtful reflective, focused to evoke and explore understanding… so that all pupils have an opportunity to think and to express their ideas" (p. 8).

Given the definitions and characteristics of formative feedback, it is an important component of instruction that occurs while the instruction occurs and enables the instructor to adjust instruction based on students' suppositions respectively. In addition, the literature advocates for appropriate use of assessment aiming to improve learning and enhance the instruction (Birenbaum, 1996 cited in Mussawy, 2009). In educational assessment approach, called formative assessment, the instructor provides descriptive feedback for the student thus indicating progress and guidance for future performance or remedial form, detailed so that students could improve their older work (Black & Wiliam 1998, Birenbaum & Dochy 1996).

Student involvement in the process of assessment has been established as an influential tool in augmenting student learning. Wiliam and Thompson (2008) indicate that, contrary to the traditional forms, learners and their peers play a considerable role in assessment process in formative assessment. Chappuis and Stiggins (2002) reinforce the above point, stating, "classroom assessment that involves students in the process and focuses on increasing learning can motivate rather than merely measure students" (p. 40). However, a concern remains as to whether the students have acquired sufficient skills and a clear picture of the targets of their learning. Assessment for learning, when accompanied by students' involvement in the process of development and implementation, appear more similar to teaching than to measurement (Davis, 2000).

Along with other authors, Chappuis and Stiggins (2002) emphasize the importance of student involvement in assessment, helping them to project their future plans and learning goals. They explain, "Student involved assessment means that students learn to use assessment information to manage their own learning" (p. 41). Furthermore, Black and Wiliam (1998), and Birenbaum (1996) observe that involving students in the process of assessment not only reduces the burden of work for the instructor, but also assures students that they are viewed as active members who are responsible for their own progress.

Literature raises the issue of formative feedback by closely examining teachers' responses to student's work. For example, if the teacher asks students to provide more details about a written work, the practice is characterized as formative; however, a concern arises as to whether the student know what the instructor meant when he or she asks for elaboration and more details (Wiliam & Thompson, 2008). Formative feedback contradicts the traditional evaluative comments teachers frequently use, such as "well done", "good", or "great work" and more. Chappuis and Stiggins (2002) argue that judgmental feedback not only holds less for value for improvement and student learning, but it also discourages students from learning. Black and Wiliam (1998) assert that formative feedback illuminates students' strengths and weaknesses, provides some suggestion for improvement, and avoids comparing one student with his or her peers.

Empirical Review of Assessment Practices of Mathematics Teachers

Several studies on teachers' assessment practices in the classroom have been carried in different parts of the globe with each approaching the issue with different objectives and methods. Divergent findings and conclusions have been posited by these different researchers.

Suurtamm, Koch and Arden (2010) investigated Canadian Teachers' assessment practices in mathematics classrooms in the context of assessment reforms in Canada with the purpose of suggesting areas of implementation that might need further support and highlights the types of supports that teachers find most useful. From their study, they found out that teachers use variety of forms of assessment to improve student learning with emphasis on the use of test, homework and classroom exercises to elicit pupils understanding. They further reported that Canadian teachers went beyond tests to include the use of journals, observation, questioning, self-assessment and unique forms of 'quizzes'. They opined that teachers were constantly assessing students during the instructional tasks that they had planned and that assessment was not a discrete event but was a continual process of understanding students' mathematical thinking. According to them assessment activities were integrated with instructional activities to such an extent that it was not always easy to distinguish between the two. To this end, they concluded that teachers' assessment practices were in line with the current thinking about mathematics and as such was appropriate for quality understanding of mathematical concepts by students. This study raises some curious minds resulting in series of questions in the researchers mind. How different or similar will the assessment practices of mathematics teachers in Ghana, a developing nation, be from that of Canada, a developed nation? Do the assessment practices of Ghanaian teachers in mathematics classrooms in tandem with current thinking of assessment in Ghana and support quality learning in mathematics? These questions can be answered when further research is carried out to ascertain the assessment practices of mathematics teachers in mathematics classroom in Ghana.

Another study on teachers' assessment practices in mathematics was done by Black, Harrison, Lee, Marshall and William (2004). They sought to unravel how classroom assessment could be used to monitor and improve student learning. They undertook a qualitative study to explore the assessment practices of teachers in mathematics and science and of course offer advice on how assessment could be used to improve student learning. Through observation and interview with teachers and students, they found that many teachers do not plan and conduct classroom dialogue in ways that might help students to learn. They also reported that teachers' feedback procedures are dominated by grades rather than comments. They opined that using grading in assessing pupils work rather put students in a situation where they compare their scores with other students instead of concentrating on their own strengths and weaknesses. This they argued that it does not encourage students to use their assessment results to promote their learning as even students who get low scores or grades will feel demoralized. They therefore concluded that students who have the benefit of having their feedback in the form of comments outperform those who were assigned grades. If this is the report for teachers in both science and mathematics classrooms, what will be the situation for teachers assessment practices in only mathematics classrooms? Further research is therefore needed to find out whether Ghanaian mathematics teachers use comments rather than grades in giving feedback to students in the Junior High Schools and to some extent whether their assessment practices are potent enough in improving the learning and performance of students in mathematics.

A study by Zhang and Burry-Stock (2003) investigated teachers' assessment practices and self-perceived assessment skills. With a sample of 297 teachers, they found a strong correlation between the assessment practices of teachers and their self-perceived assessment skills. They also reported that teachers differ in their assessment practices due to the nature of classroom assessment delineated by teaching levels. It was also found that a general difference emerges between elementary and secondary teachers in terms of the assessment methods used and teachers' concerns for assessment quality. While secondary teachers rely mostly on paper–pencil tests and were concerned about the quality of assessment, elementary teachers often use performance assessment as an alternative. They suggested that future studies may use multiple methods of data collection including classroom observation, analysis of teacher-made tests, teachers' grade books, and teacher interviews to validate teacher self-reports. In their conclusion, they argued that improving teacher' assessment practices and skills will improve classroom learning. It is against this recommendation that this study used multiple data collection instruments such as interviews, observation and content analysis to triangulate the assessment practices of mathematics teachers in Junior High Schools in

Ghana. This study also sought to establish how assessment practices of teachers in mathematics classroom differ or resemble across the levels in the basic school curriculum in Ghana.

Nabie, Akayuure and Sofo (2013) investigated 159 certificated Ghanaian teachers' assessment practices and the challenges of integrating problem solving and investigations in teaching mathematics spread across the basic schools, senior high schools and colleges of education of the country. From their study, they found that most teachers (79.9%) engaged their students in problem solving and investigation activities. They also reported that teachers used a wide variety of traditional and alternative assessment techniques. However, many teachers tended to use traditional (test, class exercise and home work) rather than alternative assessments (oral presentation, observation and project work)**.** Teachers' challenges in teaching and assessing problem solving and investigation activities in their lessons ranged from large class sizes, limited time, lack of materials and resources, lack of assessment model, deficiency in teacher knowledge, to the challenging nature of problem solving and investigations. They found that WAEC have had an influence on the assessment practices of teachers as teachers teach to have their students do well in WAEC examinations. According to Nabie, Akayuure and Sofo (2013), problem solving and investigations in the curriculum are as a result of paradigm shift from the behaviourist to the constructivist conceptions of learning. They argued that problem solving and investigations are central to developing skills and personal construction of mathematical knowledge. It was also concluded that a majority of teachers in the study integrated problem solving and investigations in their lessons. They further concluded that although teachers' assessments were purposeful, most of their choices (traditional techniques) lack the capacity to develop the desired skills outlined in the curriculum as they are challenged by lack of curricular resources, incompetence, and student attitudes. The study was quite extensive as the study involved almost all the levels of the educational sector in Ghana as well as across the different regions in the country. Little is known about the assessment practices of teachers in mathematics at the basic level hence the purpose of this study.

Hattori and Saba (2008) undertook a comparative study on the assessment practices of Ghanaian Junior High School teachers with their Japanese counterpart based on the National Council of Teachers of Mathematics (NCTM) assessment standards. The objective was to determine whether there were any differences and/or similarities in assessment practices between the two nations and how they measured up to the NCTM standards. With a sample of four Ghanaian and eight Japanese lessons, they reported that Japanese lessons promoted conceptual understanding and problem solving whereas the Ghanaian lessons remained essentially traditional in approach which views the teacher as the dispenser of knowledge. The teacher dominated and used tailored questions that elicited specific answers. Also, in the Ghanaian lessons contents were shallowly treated and obvious connections with other areas were not exploited. There were no prompts about alternative solutions neither were they elicited from or suggested by students. Ghanaian teachers mainly asked facts-eliciting questions that demanded students to make simple logical mathematical deductions from procedures and not that which challenged them to investigate. Unlike the Japanese lessons, the

Ghanaian teachers scarcely used the skill of observation to identify and exploit students' mistake and/or error to deepen and reinforce their understanding.

Hattori and Saba (2008) also reported that, Ghanaian mathematics teachers assessment practices do not let children to construct their own knowledge but rather are made to be passive recipients of knowledge. Also, most mathematics teachers in Ghana assess only on shallow content areas that requires little effort and less critical thinking from students. This scenario leads to rote learning where children cannot apply what they learn in new situations. Further questions need to be asked about the essence of the profile dimensions which require mathematics teachers to let 70% percent of the teaching and assessment to emphasise on the application of knowledge with the remaining 30% on knowledge and understanding. If this revelation is anything to go by, then most of teachers are either not aware of the existence and essence of the profile dimensions provided in the mathematics curriculum or they are refusing to use them. This has implications for the performance of our students in any standardized examination which requires the application of knowledge. It also has implications in the application of mathematics in their daily lives which further poses a threat to the development of the nation. This makes it necessary for further studies to be conducted to find out what mathematics teachers actually do when they are assessing their students and the implications these practices might have on the development of Ghana.

Oduro (2015) investigated and analysed mathematics teachers' views and practices of assessment with specific reference to the implication for learning. She also examined teachers' conceptions of the nature of mathematics so as to facilitate an in-depth understanding of teachers' views and practices. In her study, she found that teachers use both formal and informal assessments in mathematics classrooms although formal assessment dominates practice. Teachers' views about assessment and their conceptions of the nature of mathematics were also found to be related to their classroom practices. The study also revealed how teachers' assessment practices are affected by a number of contextual factors which are related to institutional policies, professional development and classroom conditions. One weakness about this study for which this study seeks to overcome is its silence in reporting any differing assessment practice across the levels in the basic level of our education.

In a review of literature Black and William (1998) found several common themes, and their overall conclusion was that teacher practice was not ideal: classroom evaluation practices generally encourage superficial and rote learning, concentrating on recall of isolated details, usually items of knowledge which pupils soon forget; the grading function is over-emphasised and the learning function under-emphasised; there is a tendency to use a normative rather than a criterion approach, which emphasises competition between pupils rather than personal improvement of each. The evidence is that with such practices the effect of feedback is to teach the weaker pupils that they lack ability, so that they are de-motivated and lose confidence in their own capacity to learn. (Black and Wiliam,1998).

Bachor and Anderson (1994) conducted an interview-based enquiry into the assessment practices of a small stratified sample of Canadian primary teachers. The most widely used form of assessment reported was observation. Other common practices included the use of work samples, tests, and student self-assessment. Tests were more commonly noted by the grade 6/7 sub-sample, and were most frequent for the areas of spelling and mathematics. This seems to suggest that, the more one moves higher in grade or class, the more traditional as assessment practice becomes. With different aspirations and curriculum in mathematics, will the assessment practices of Ghanaian mathematics teachers differ or be in tandem with their Canadian counterparts? Further research is needed to find an appropriate answer to this question.

Susuwele-Banda (2005) revealed that the teachers had limited ways and methods of assessing their students. These teachers mainly used tests to assess their students. Although teachers gave individual exercises toward the end of every lesson, the exercises were given to the students to practice and consolidate what the teacher had just demonstrated. This kind of approach encourages memorization of procedures and processes. This seems to suggest that assessment means testing.

Zhang and Burry-Stock (2003) identified communicating assessment results and using assessment information in decision-making constitute two other aspects of teachers' classroom assessment practice. To them, communicating assessment results effectively requires teachers to understand the strengths and limitations of various assessment methods, and be able to use appropriate assessment terminology and communication techniques. They therefore recommended specific comments rather than judgmental feedback (e.g., "fair") so as to motivate students to improve performance. When using assessment results, teachers should protect students' confidentiality (Airasian, 1994). Teachers should also be able to use assessment results to make decisions about students' educational placement, promotion, and graduation, as well as to make judgment about class and school improvement (Stiggins, 1992).

Teachers' Perceptions about Assessment in Mathematics

Teachers' perception about assessment refers to the level of understanding of, appreciation for, and judgment of assessment. Researchers have attempted to investigate teachers' perceptions of assessment in many different ways (Chester & Quilter, 1998 cited in Susuwele-Banda, 2005). According to Susuwele-Banda, Chester and Quilter believed that studying teachers' perceptions of assessment is important in the sense that it provides an indication of how different forms of assessment are being used or misused and what could be done to improve the situation. Cillessen and Lafontana (2002) also argued that investigating the perception of teachers in mathematics is critical because perceptions affect behaviour. Diene (1993) contends that teachers' beliefs, perceptions and practices are embedded within and tied to broader contexts, which include personal, social, and previous ideas about a particular aspect. This explains that, people including teachers will have differing perceptions about what assessment in mathematics entails. These differences may be emanating from their different experiences and background.

Evidence exist to suggest that teachers' perceptions differ from society to society in that, perceptions tend to be consistent with the policies and cultural practices of a particular area of jurisdiction (Brown and Harris, 2009; Brown, Lake and Matters, 2009). For according to Susuwele-Banda (2005), in an examination-driven environment, teachers believe that tests lead to better learning and enhance student motivation. This implies that, depending on one's environment, your perception about an issue including assessment will differ. Whichever perception that teachers have about assessment, Remesal (2011) argues that, teacher perception about assessment hinder innovation and affect pedagogical practices. It is to end that the need to investigate the perception and practices of teachers in mathematics is necessary.

Susuwele-Banda (2005), using a questionnaire, interviews and observations concluded that teachers perceive classroom assessment as tests that they give to their students at specific time intervals. Moreover, as they perceive classroom assessment as tests, they showed limited ability to use different methods and tools to assess their students. Also, such teachers seldom assess their students in almost every lesson. In contrast, Pacheco (2007) investigated primary teachers' assessment perceptions in Brazil and found that, although the participants are still implementing assessment for summative purposes, they recognise the importance of formative assessment and the use of diverse instruments and procedures to assess their students. It must be noted that these two researchers used respondents from different backgrounds. This contrasting findings leaves a gap as to how mathematics teachers in the Binduri District perceive assessment in mathematics and hence the need to undertake a study to ascertain their perception and practices about assessment in mathematics.

Pryor and Crossouard (2008) have also pointed out mathematics teachers perceive assessment as measurement. Measurement connotes assigning numbers to traits displayed by students. Assessment rather incorporates measurement where the assigned number informs the assessor the level of performance of the pupil and the appropriate decision to take about the performance of pupils. Teachers who hold this view to a greater extent will favour the use of written test to other alternative forms of assessment such as oral interview, observation and other authentic tasks. Also, such teachers are most likely to give feedback in numerical form rather than qualitative form. Meanwhile, current thinking about assessment in mathematics places much emphasis on the alternative forms of assessment.

Morgan and Watson (2002) reported that most teachers view classroom assessment as an added requirement to their teaching job and not as a tool to improve their teaching. This means that such teachers see assessment as independent of teaching and will require that they are rewarded by their employers for engaging in assessment. Teachers with this perception are likely to assess their students for assessment sake and not really to improve their practice and student learning. Diene (1993) contends that if assessment is not embedded within the teaching process, teachers will see it as a separate activity that demands extra time. It is also possible that they will forge continuous assessment marks for pupils which will be forwarded to WAEC. This may bring about inconsistencies in the performance of pupils as suggested by the teacher and what they get in their final external examination. Meanwhile, Vygotsky (1987) contends that teachers who embed assessment in their lessons become more effective in understanding their students' learning and in informing their teaching. Brooks and Brooks (1999) regard students' points of views as windows into their reasoning. This informs the current study as personal observation indicates that pupils' marks as presented by the teachers are higher than what they get at the final examination. It brings to question how the teacher assessed the child in the classroom and what they perceive assessment to be.

In addition, Jane (2013) found that most Teachers perceive the use of assessment for learning strategies as an onerous task and added responsibility to their teaching assignment. This has serious implications for the way some teachers' perceived practice classroom assessment and how assessment is carried out in the classroom. For this reason, it is believed that teachers' perceived practice on classroom assessment strategies are deeply rooted in their cultural, religious, sociological, and political perspectives on education (Lambert & Lines, 2000). This feature is evident in the way classroom assessment practices are carried out by most practitioners in the classroom. Igbalajobi (1983) evaluated the educational and training needs of elementary school teachers and found that training is needed for teachers in the area of classroom assessment practices. Such training will assist teachers in evaluating the skills that are needed in order to help students achieve their stated targets.

Teachers also perceive assessment as useful as it improves teaching and learning. In this view, assessment is a range of techniques, including informal teacher-based intuitive judgement of capability as well as formal assessment tools, designed to identify the manner of student learning, including impediments to learning and unexpected strengths. Consequently, the improvement view tends to reject formal testing if it simply means more multiple-choice tests of lower order cognitive skills, such as recall or knowledge of discrete facts. It has also been argued that improvement assessment is linked to a constructivist view of teaching which is inherently concerned with the teacher's modelling of how individual pupils are thinking and understanding. Consistent with this, various forms of assessments, such as projects, portfolios, observations, tests and examinations were recommended by the CRDD in 2008 to assess mathematics learning in Ghana. These forms of assessments were intended to be used in all stages of pupils' development, in line with modern global trends of assessment for learning. Though these reforms are laudable, there are concerns on implementation strategies as to how teachers actualise their assessment practices in Ghanaian schools (Akyeampong et al, 2007). This provides a better ground for a study on how teachers put to practice assessment in their classrooms especially during mathematics lessons.

A study conducted by Green (1992) on pre-service teachers with measurement training revealed that the pre-service teachers tend to perceive classroom assessment as less useful. Green argues that standardized tests address important educational outcomes and believed that classroom tests are less useful. This might be as a result of the seemingly non-usage of classroom assessment scores in the final grading and certification of the students. Kadyoma (2004) also reported that teachers who participated in Improving Educational Quality (IEQ) continuous assessment project claimed that continuous assessment was contributing to lowering of educational standards because students' performance was not being reported in the form of grades or positions. The traditional way of assessing students is to give a student a grade and a position on the tests they write (Kadyoma, 2004). Teachers with this perception have the tendency to report pupils' performance in terms of numerical scores and grades rather than in descriptive form. This has the tendency to conceal the strengths and weaknesses of the child relative to a mathematical concept(s).

It is believed that classroom assessment practice is the number one solution to students learning, enthusiasm, and interest in the classroom (Department for Education, 2012). In spite of their high expectations, a large number of classroom teachers' perceive classroom assessment as the assignment of grades and testing (Pyle & Deluca, 2013; Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007). There are many teachers who believe that children are empty vessels which need to be filled with required skills and knowledge. This assumption is precipitated by the pressure of ensuring that students perform well on state mandated standardized test (Dixon, 2011).

Many researchers such as Cheng, Rogers, and Hu (2004) contend that the focus of teachers should be on enhancing children's ability to think rationally and creatively rather than their ability to score correctly on state mandated standardized test. This, however, can only be achieved in situations where teachers are prepared to actively engage students in constructive dialogue informed by sound classroom assessment strategies. In order for teachers to challenge students and actively engaged them with meaningful classroom assessment activities they must be able to accurately assess students' learning needs. There is sufficient evidence to suggest that many teachers in schools refer to classroom assessment as grading of test and quizzes (Lambert & Lines, 2000; Campbell & Evans, 2000). This seems to be a common view held by many teachers, especially by teachers of mathematics and science education (Zacharos, Koliopoulos, Dokimaki, & Kassoumi, 2007).

Many researchers, such as Calculator and Black (2009) contend that our values and beliefs are shaped by our sociological and cultural circumstances. A prominent study was conducted by Jane (2013) who studied South African teachers' conceptions of classroom assessment. The study revealed that tests and quizzes were most frequently used as classroom assessment materials rather than any other forms of assessment materials used in classroom assessment. The study also revealed that teachers' knowledge, values, and beliefs also played a significant role in the type of items chosen for tests and quizzes.

Emberger (2007) contends that pre-service teacher education programmes pay very little attention to teachers' classroom assessment practices, thereby leaving many teachers to conduct classroom assessment in the same way they were assessed while in school. This perpetual practice needs to be challenged with a change in perceptions and practices towards classroom assessment. This view supports the point that teachers' assessment practices are closely linked to their values, beliefs, social, cultural, and environmental influences which have a direct impact on practice (Campbell & Evans, 2010 cited in Jarrett, 2016). Bond (2011) suggests that teachers' perceptions of classroom assessment are influenced by the quality of preparation received during training.

Most research studies have pointed out differing perceptions that teachers in mathematics have as to how mathematics should be learnt which has implications on how they perceive how assessment in mathematics should be carried out. According to Cathcart, Pothier, Vance and Bezuk (2001), some teachers are of the perception that mathematics is learned through the stimulus response which postulates that learning occurs when a bond is established between some stimulus and a person's response to it. They went further to say that, in the above scenario, drill becomes a major component in the instructional process because the more often a correct response is made to stimulus, the more established the bond becomes. With perception, children are given lengthy and often complex problems, particularly computations with the belief that the exercises will strengthen the mind. Teachers who however perceive that children learn mathematics by constructing their own knowledge employ different teaching approaches to enable the children construct their own understanding of mathematical ideas by means of mental activities or through interaction with the physical world (Cathcart, et al., 2001). Teachers with this perception see assessment as meant to guide instruction and to help the child have meaningful understanding of he/she does. The assertion that children should construct their own mathematical knowledge is not to suggest that mathematics teachers should sit back and wait for this to happen. Rather, teachers must create the learning environment for students and then actively monitor the students through various classroom assessment methods as they engage in an investigation. The other role of the teacher should be to provide the students with experiences that will enable them to establish links and relationships. Teachers can only do this if they are able to monitor the learning process and are able to know what sort of support the learners need at a particular point.

The differences in interpretation implies that teachers need to make a conscious effort to understand the technical meaning of what formative assessment is all about and how to implement its strategies in order to achieve desirable learning outcomes.

Relationship between Teachers' Perception and Assessment Practices in Mathematics

A study conducted by Chester and Quilter (1998) cited in Susuwele-Banda (2005) on in-service teachers' perceptions of classroom assessment, standardized testing, and alternative methods concluded that teachers' perceptions of classroom assessment affected their assessment classroom practices. Teachers that attached less value to classroom assessment used standardized tests most of the times in their classrooms. According to Susuwele-Banda (2005), Chester and Quilter went further to say that teachers with negative experiences in classroom assessment and standardized testing are least likely to see the value in various forms of assessment for their classroom. They recommended, therefore, that in-service training should focus on helping teachers see the value of assessment methods rather than "how to" do assessment.

Susuwele-Banda (2005) in a study using Malawian primary school teachers established that the teachers' perceptions of classroom assessment had influence on their classroom assessment practices. According to him, most of the teachers perceived classroom assessment as test and as such there was very little attempt to understand how the students were learning. To explain his claim, Susuwele-Banda reported that one teacher said that it was not possible to assess students on a daily basis as they learn mathematics. From this, it can be elicited that two broad categories within classroom assessment exist, and these are assessment of learning and assessment for learning

(Stiggins, 1998). Stiggins (1998) contends that, generally tests are good tools for assessment of learning while other methods and tools such as journal writing, diagnostic interviews and observations are good for assessment for learning. Since the teachers mentioned tests as the tools they use to assess their students, one could conclude that the teachers mainly emphasized assessment of learning. However, in as much as it is important to assess what students have achieved but it is more important also to assess how they are learning. Brooks and Brooks (1999) contend that emphasis on assessment for learning is likely to improve students' achievement. In summary, assessment for learning takes care of assessment of learning. If teachers in the Malawi perceive assessment in mathematics as test and consequently adopt assessment of learning practices, how will teachers in Binduri perceive assessment in mathematics and how would their perceptions influence their practices in the classroom?

In the same study, Susuwele-Banda (2005) reported that teachers who perceive assessment as meant to promote pupils put emphasis on ranking students and not to identify individual capabilities and weaknesses. He cited an instant where the assessment practices of teachers who perceive assessment as meant for promotion were limited, incomplete and not tied well to the learning activities. This explains that teachers who do not see the pedagogical influence of assessment practiced assessment as an isolated activity from teaching. Such teachers would not assess their students in almost every lesson. Such teachers are more likely not to give enough exercises and problem solving questions for students to practice and perfect in mathematics. Meanwhile, current thinking assessment requires that, information from assessment should help the teacher to discover areas where students have difficulties and modify teaching methods and strategies in order to support students' learning.

Chapter Summary

The socio-constructivist theory forms the major theoretical framework underpinning the study. It opines that assessment in mathematics should shift from the over-reliance of the traditional forms of assessment to the alternative forms. The mathematics curriculum for basic schools in Ghana requires that a greater percentage of assessment tasks should focus on the application of knowledge. Teachers have varying perceptions about assessment in mathematics. Whereas some see assessment as a tool for teaching and learning, others perceive assessment as the entire test that are given at the end of a topic or programme. It has also been found that how teachers perceive assessment influence their assessment practices.

CHAPTER THREE

RESEARCH METHODS

Overview

This chapter looks at the various methods and procedures used in gathering data in finding answers to the research questions that guided the study. In this chapter therefore, the research design, the population, the sample and sampling procedure, the instruments used for data collection, pilot testing of instruments, data collection procedure and data analysis procedure are presented.

Research Design

The design that was used to determine the perceptions of teachers about assessment in mathematics and how it relates to their assessment practices was the descriptive survey design. Descriptive survey design, according to Amedahe and Gyimah (2003), makes use of various data collection techniques involving collection of data by means of tests, questionnaires, observations, interviews, attitude scale and examination of teaching documents. Survey design is appropriate when a researcher seeks to explore a relationship (McMillan & Schumacher, 2006), as was the case in this investigation. According to Creswell (2008), in quantitative research, descriptive surveys are administered to the participants to gather data about perceptions, attitudes, opinions, behaviours, or characteristics of a sample as representative of population, and these data are considered primary data. A survey design also was selected for this study because it is considered an efficient and economical method of data collection. This study sought to explore the relationship between teachers' assessment practices and teachers' perception about assessment in mathematics.

The data collection for descriptive research presents a number of advantages as it can provide a very multifaceted approach and gives several angles on the information (Hale, 2011). It can also remove barriers of strict academic approaches so that researchers can witness how others experience an event. According to Fraenkel & Wallen (2009), descriptive research produces a good number of responses from numerous numbers of people at a time, provides a meaningful picture of events and seeks to explain people's perception and behaviour on the basis of the information obtained at the time. They added that, descriptive research design can be used with greater confidence with regards to particular questions which are of special interest and value to researchers.

However, one problem with descriptive design is that, respondents may not always be truthful. They give answers that they feel the researcher wants to hear. Descriptive research also carried with it an observer's paradox, if a participant knows that someone is observing them, they may change the way that they act. Additionally, surveys are often structured so that the participant's response is limited to those provided by the researcher. Although limited response parameters assist the researcher in data collection, they do not offer participants flexibility if their responses do not fit within the set provided. This may cause critical information to be left out of the data collection (Dickson & Mitchelson, 2007). To reduce the impact of the weaknesses, probing questions were used to clarify issues.

Population

According to Polit and Hungler (1999), population connotes the entire cases that meet a predetermined set of criteria. That is to say, the target group about which the researcher is interested in deriving information and upon which conclusions can be made. In effect, it represents the larger group that interests the researcher. For the purpose of the study, the target population included mathematics teachers in all the public basic schools in the Binduri District of the Upper East Region of Ghana. The Binduri District has a total of 66 public basic schools with an estimated teacher population of 244 teachers.

Sampling Procedure

A multi-stage sampling procedure was employed to select a sample of 63 teachers for the study. Firstly, stratified sampling technique was used to put the various schools (Junior High Schools) into various strata depending on their performance in the BECE for the previous three years. The primary schools were considered as one stratum because there was no standardized data to compare. JHS that consistently scored 20% and above in the BECE in mathematics were considered group A, those that scored between five percent and 20% were considered group B and those that scored below five percent were considered group C with all the primary schools considered group D. Group A had 6 schools, Group B 8 schools, Group C 9 schools and Group D 43 schools. Twenty-five percent of schools in each stratum were considered for the study. This means that, Group A had two schools, Group B had two schools, Group C had three schools and Group D had 11 schools participating. This was to ensure that the study incorporate teachers from varying backgrounds and schools so that the findings of the study will be representative of the entire basic schools in the Binduri District. Having identified the number of schools in each stratum that would participate in the study, simple random sampling technique was used to select the schools. Names of the schools were written on paper and drawn one after the other with replacement. This was done for each stratum. Once a school was selected, all the teachers in the primary school were selected for the study and the mathematics teacher(s) at the Junior High level were selected for the study.

Data Collection Instruments

Three instruments were used to gather data for the study. These were questionnaire, observation protocol and document analysis guide.

Questionnaire

The questionnaire was administered to teachers to ascertain their perception about assessment in mathematics, and their professed assessment practices. The study adapted the questionnaire of Susuwela-Banda (2005) which was originally developed by Horizon Research, Inc. (HRI). HRI is a private research firm located in Chapel Hill, North Carolina, specializing in work related to science and mathematics education. The instrument was adapted in order to make them relevant to the purpose of the study. Some of the modifications made to the original instrument included the insertion of the background information of the respondents such as the academic and professional qualifications of the teachers. Again, the questionnaire was organized based on what teachers assess, how they assess and the feedback teachers give to students which was not the case in Susuwela-Banda’s instrument. Items such as assessment tasks measuring the lesson objectives, assessment tasks taken from textbooks, Comprehensive assessment tasks use multiple assessment techniques to assess; an effective assessment provides enough tasks for pupils among others were added to items.

The questionnaire was made up of three parts and its structure consisted of series of semi-structured questions. Part one elicited the background data of the respondents. Part two elicited information about their perception on assessments in mathematics. The third section of the questionnaire measured the professed assessment practices of the teachers and was in a four-point likert scale. The perception of the teachers was organized under what assessment is, why teachers assess, what teachers assess, how teachers assess and teacher feedback. See Appendix A for details of the questionnaire.

The researcher chose questionnaire over other instruments because all the respondents can read and respond appropriately to the questions contained in it. It also provided the researcher the opportunity to generate numerical values needed to test hypothesis. Questionnaires have some advantages including the fact that they are cheap and can be used to gather data from a large population. One limitation of it is that respondents may skip some of the questions or may refuse to return them. Some of the respondents may misconstrue some of the questions thereby affecting the findings of the study. To overcome this weakness, the researcher explained key items to respondents and employed their frank responses. Also, those who were sampled for the study assured the researcher of their willingness to participate in the study thereby increasing the return rate.

Observation Protocol

Creswell (1998) postulated that a researcher can collect data by conducting observations as a participant observer or non-participant observer. The researcher adopted the non-participant observer role. The observation protocol served as a guide to observe and quantify the actual assessment practices of teachers.

The items to be observed and scored in the study were constructed to reflect the items contained in the questionnaire. For instance, the focus of the observation was whether the assessment tasks measure the assessment objectives; whether the tasks really assess the higher order thinking skills of the students; and the assessment techniques employed by the teacher. See Appendix B for details.

As an advantage, observation provides an opportunity to record information as it occurs in a setting, to study actual behaviour, and to study individuals who have difficulty verbalizing their ideas. Some of the disadvantages of observations are that you will be limited to those sites and situations where you can gain access. To minimize the effect of the shortcomings of observation the researcher took field notes and spent time in written reflection after every experience in the field.

Document Analysis Guide

Bertram (2004) points out that, researchers can use various documents as their source of data and analyze these documents using a method called content analysis. The document analysis guide was also used to gather data to ascertain the actual assessment practices of the teachers. The key documents analysed were the test items, the exercise books of the pupils, and homework books.

Teachers' test items were analysed to determine the type of questions they asked pupils. The exercise books of pupils, and homework books were analysed to see how often teachers use the various assessment techniques and the type of feedback teachers give to students.

Validity and Reliability

To ensure validity of the instruments, expert judgement was used. The instruments were sent to my supervisors for proof-reading. Based on their comments, the necessary corrections were effected to improve the validity of the instruments. A pre-test was conducted in the Pusiga District to ensure that the instruments were valid and reliable. Pusiga District was considered because Pusiga and Binduri share common features including language, commercial activities and were once part of the Bawku Municipality. The pre-test afforded the researcher an opportunity to fine-tune the instruments for data collection. For instance, the item "how often does your assessment reflect attention to issues of access, equity and diversity for students" was not understood by most of the teachers. Subsequently, this item was split as "How often do you cater for individual differences in the classroom during assessment?" and "How often do you provide equal access for all students to participate in your assessment?". Again, the footnotes explaining the meaning of abbreviations such as NA for "Not At all", "SU" for "Seldom Use"; "O" for "occasionally" and "VO" for "Very often" were added to the final instrument. Again, items such as the use of exercise, homework and class test as assessment techniques which were originally contained in the observation protocol were removed because it was realised that such assessment techniques could be well established using the document analysis guide. Similarly, items such as "Task probes students' reasoning; Teacher uses multiple assessment; Teachers' assessment caters for individual differences in the classroom; Teacher provides adequate time for reflection" were also removed from the document analysis guide. A Cronbach`s alpha reliability coefficient of 0.762 was realized which indicates that the instrument was highly reliable for data collection.

Data Collection Procedure

An introductory letter was collected from the Department of Basic Education, College of Education Studies of the University of Cape Coast to enable the researcher visit the schools. With the permission of the headmaster, the researcher interacted with the teachers. Teachers were first administered the questionnaires. Clarifications were given as and when necessary. Each person took about twenty five minutes to complete the questionnaire. After administering the questionnaire to the 63 teachers, the researcher observed one lesson from each of the teachers. Merriam (2001) intimated that observation can effectively be implemented only if it is planned deliberately, recorded systematically, and subjected to checks and controls on reliability and validity. Each observation took between thirty and seventy minutes to complete depending on the level and the number of periods for the mathematics lesson. Specifically, the observer focused on whether the tasks that the teachers use to assess the students really match with their lesson objectives; and the difficulty level of the tasks. The observer also looked out for the frequency with which teachers assess their students, the technique they employed and the kind of feedback they gave to the students. After every observation, the researcher looked at the exercise books of the students and other relevant documents to ascertain what each teacher has been doing as far as assessment is concerned.

Ethical Consideration

All the respondents were assured of their anonymity. Again, the respondents were given the chance to pull out if they wished. Finally, all authors cited have been duly referenced at the reference section.

Data Processing and Analysis

The questionnaire which was mostly on a four-point likert scale was coded and inputted into SPSS version 21.0. Items that were positive in nature were coded as follows: “Strongly Disagree” (1), “Disagree” (2), “Agree” (3) and “Strongly Agree” (4). Data from the observation protocol and document were coded as “1” for “No” and “2” for “Yes”. Again, the actual assessment practices of the teachers were scored with the help of a performance rubric and the total score for each teacher in both instruments converted to four.

The analysis of the data was in line with the research questions and hypotheses that guided the study. Both descriptive and inferential statistics were used to present the results of the study. The descriptive statistics used included frequency counts, percentages, means and standard deviations. The inferential statistical tools used included the Pearson product correlation and the dependent t-test. The descriptive statistics were used to report the results for Research Questions 1-3. Apart from the actual assessment practices of the teachers which was reported using only frequency counts and percentages, the research questions were reported using frequency counts, percentages, means and standard deviations. A mean between 1 and 1.5 was considered Strongly

Disagree, 1.51 and 2.50 Disagree, 2.51 and 3.5 Agree and 3.51 to 4.0 was considered Strongly Agree. The Pearson production correlation was used to test the hypotheses “There is no significant relationship between perceptions of teachers about assessment and their professed assessment practices” and “There is no significant relationship between perceptions of teachers about assessment and their actual assessment practices”. The dependent t-test was used to test hypothesis that there was no significant difference between the professed assessment practices of teachers and their actual assessment practices.

Chapter Summary

The research design employed for the study was descriptive survey. Sixty-three basic school mathematics teachers in the Binduri District was selected through multi-stage sampling procedure. Questionnaire, observation and document analysis guide were used to gather information for the study. All three instruments were pilot-tested in the Pusiga District of the Upper East Region.

CHAPTER FOUR

RESULTS AND DISCUSSION

Overview

The results and discussion of the study are presented in line with the research questions and hypotheses that guided the study. Specifically, the results and discussion of the study are presented under the following subheadings; the personal information of respondents, the perceptions of teachers about assessment in mathematics, professed assessment practices of mathematics teachers, actual assessment practices of teachers in mathematics, relationship between perceptions and practices of mathematics teachers in assessment and the difference between the professed assessment practices of teachers and their actual assessment practices.

Background Information of Respondents

The study sought some background information of the respondents which were relevant to the study. These included their sex, age, academic qualification, professional qualification and number of years in teaching. The results are provided in Table 1.

Table 1: Biographical Data of Respondents

Biographical Data	Category	Number	Percent
Sex	Male	49	77.8
	Female	14	22.2
Age	20-29years	25	39.1
	30-39years	24	38.1
	40-49years	11	17.5
	50-59	3	4.8

Table 1: Continued

Academic Qualification	O Levels	2	3.2
	WASSCE/SSCE	6	9.5
	Diploma	52	82.5
	1st Degree	3	4.8
Professional Qualification	Cert "A"	2	3.2
	DBE	53	84.1
	B.Ed	3	4.8
Years of teaching	Less than 4 years	19	30.2
	4-8years	22	34.9
	9-12	11	17.5
	13-16	7	11.1
	Above 16	4	6.3

Source: Field Data, 2017

Results from Table 1 show that 49 teachers representing 77.8% who participated in the study were males with the remaining 14 (22.2%) being females. This shows that, more males than females participated in the study. Significantly however, the findings of the study represent the ideas from both sex groups. Also, the age distribution of the teachers who participated in the study was such that most of them were within the youth. The teachers who constitute the youth (below 40 years) were 49 representing 77.2% of the respondents. Three (4.8%) of the teachers were in their final years of active service. This means that any intervention that will be put to enhance the assessment practices of teachers in mathematics will be very relevant since majority of them will still be in the service for at most twenty years. Also, 22 (34.9%) of the teachers have taught mathematics between four and eight years with another four representing 6.3% having taught more than 16 years. Nineteen teachers representing 30.2% of the teachers have taught less than four years. This means that these teachers were yet to receive their first promotion in the service. In the same vein, about 70% of the teachers who participated in the study had taught four or more years. This suggests that they have accumulated enough experiences about assessment. In effect, teachers with varying experiences in classroom practices participated in the study.

Results from Table 1 also show that 52 out of the 63 teachers said their highest academic qualification is at the Diploma level with two reporting O-Levels and another six saying they have completed Senior High Schools. Only three representing 4.8% said they have completed their First Degrees. The professional qualification of the teachers also showed similar results with 53 teachers representing 84.1% claiming that they possess Diploma in Basic Education Certificates. Only five teachers did not have a professional qualification in education. This means that, most teachers in the district are professionals and are expected to have indepth knowledge about assessment and therefore have relevant knowledge about assessment.

Research Question 1: What are the perceptions of teachers about assessment in mathematics in the Binduri District?

This question examined how teachers perceive assessment in mathematics. It asked respondents to indicate their perceptions about what assessment in mathematics is in the classroom and its relevance in the classroom. It further sought to find out what teachers perceive about what should be assessed in mathematics, how mathematics should be assessed and the feedback that is needed in assessing mathematical tasks completed by students. Tables 2 to 5 present the results.

Table 2: Perception of Teachers about Classroom Assessment

Item	Response	Freq.	Percent
Classroom Assessment is the ……	Process of administering test to assign grades and report to parents and officials	11	17.5
	Process which helps teachers to promote students	9	14.3
	All the test given at the end of a topic	19	30.2
	Tool that informs teaching and learning	24	38.1
Is assessment useful to teachers?	Yes	63	100
Why assessment is useful to teachers?	Identify strengths and weaknesses of students	24	38.1
	Helps in measuring students' performance	19	30.2
	Informs teaching	17	27.0
	Helps to promote students	2	3.2
	Helps to know fast learners and slow learners	1	1.6
Is assessment useful to students?	Yes	63	100
Why assessment is useful to students?	helps students to identify their strengths and weaknesses	26	41.3
	helps them to compete	5	7.9
	helps them to know the level of performance	18	28.6
	helps children effect corrections	10	15.9
	helps children to better monitor their own learning	4	6.3

Source: Field Data, 2017

From Table 2, 24 teachers representing 38.1% claimed that assessment is a tool that informs their teaching. This means these teachers believe that assessment helps them to take instructional management decisions and as such perceive assessment as assessment for learning. This conforms to current thinking about assessment which is aimed at making the learning of mathematics easier, meaningful and adaptable to new situations. Also, 19 (30.2%) of the teachers perceive assessment as being all test that teachers use to elicit the level of performance of students. A further nine teachers perceive assessment as being used to promote students. This suggests that 61.9% of the teachers' perception about mathematics do not conform to the current thinking about assessment.

Table 2 also points out that all the teachers perceive assessment as a very useful tool in the teaching and learning process. According to them, assessment helps them to identify the strengths and weaknesses of the students (38.1%), helps in measuring the performance of students (30.2%) and informs their teaching (27%). Teachers also perceive assessment as being helpful to students as 26 teachers representing 41.6% claimed it helps students to identify their own strengths and weaknesses. Another 18 (28.6%) thinks it helps students to measure their level of performance.

The study also sought to establish the perception of teachers about what aspects of mathematics learning should be assessed. Table 3 presents the perception of teachers on what should be assessed in mathematics.

Table 3: Perception about What should be Assessed in Mathematics

Statement	SD(%)	D(%)	A(%)	SA(%)	Mean (out of 4)	SD
Task should measure lesson objective(s)			7(11.1)	56(88.9)	3.89	.32
Mathematics tasks require recall of facts	2(3.2)	8(12.7)	31(49.2)	22(34.9)	1.84	.77
Mathematics tasks involve eliciting the conceptual understanding of students		4(6.3)	26(41.3)	33(52.4)	3.46	.62
Mathematics tasks involve eliciting students' problem solving skills	1(1.6)		34(54.0)	28(44.4)	3.41	.59
Assessment should probe reasoning	2(3.2)	3(4.8)	21(33.3)	37(58.7)	3.48	.74
What is assessed involve application of knowledge	3(4.8)	1(1.6)	23(36.5)	36(57.1)	3.46	.76
What is assessed enable students communicate solutions appropriately	3(4.8)	4(6.3)	27(42.9)	29(46.0)	3.30	.80
Assessment tasks should elicit higher order thinking skills	4(6.3)	4(6.3)	36(57.1)	19(30.2)	3.11	.79
Overall					3.24	0.61

Source: Field Data, 2017

SD= Strongly Agree; D= Disagree; A= Agree; SA= Strongly Agree

Results from Table 3 shows that, 56 teachers representing 88.9% strongly agreed that the assessment task of teachers should measure their instructional objectives and the remaining seven teachers representing 11.1% agreed. A mean score of 3.89 confirms that, on the average, teachers perceive that the assessment tasks that teachers use in assessing students’ mathematics learning should stem from their instructional objectives. Also, a standard deviation of 0.32 shows that, the teachers had very similar perceptions regarding the relationship between the assessment tasks and instructional objectives in mathematics. Table 3 also showed that the respondents agreed to the rest of the items measuring their perception about what should be assessed in mathematics. Also, 84.1% of the teachers perceive that mathematics assessment tasks should involve recall whereas the remaining 10 (15.1%) disagreed. The respondents had similar perception about assessment tasks measuring students’ conceptual understanding (Mean = 3.46), problem solving skills (3.41), reasoning (3.48), application of knowledge (3.46) and proper communication of mathematical solutions (3.30). An overall mean score of 3.24 and a standard deviation of 0.61 indicate a positive perception about what should be assessed in mathematics.

Table 4 indicates the perception of the respondents about how these varying mathematics tasks should be assessed in the classroom to enhance effective learning.

Table 4: Perception about how Mathematics is Assessed

Statement	SD(%)	D(%)	A(%)	SA(%)	Mean	SD
Comprehensive assessment use multiple assessment tasks		1(1.6)	36(57.1)	26(41.3)	3.40	.52
Traditional assessment techniques are better than the alternative.	4(6.3)	16(25.4)	24(38.1)	19(30.2)	2.08	.90
Effective assessment caters for individual differences in class		6(9.5)	10(15.9)	47(74.6)	3.65	.65
Effective assessment provides equal access for all students	2(3.2)	11(17.5)	17(27.0)	33(52.4)	3.29	.87
Adequate time should be provided for reflection during assessment		1(1.6)	25(39.7)	37(58.7)	3.57	.53
Well assessed lessons involve child-self assessment		11(17.5)	27(42.9)	25(39.7)	3.22	.73
Questioning method probe students' conceptual understanding			39(61.9)	24(38.1)	3.38	.49
Effective assessment provides enough tasks for students.		7(11.1)	31(49.2)	25(39.7)	3.29	.66
Students need to be assessed frequently	3(4.8)	5(7.9)	24(38.1)	31(49.2)	3.32	.82
Assessment items should be from textbook provided	6(9.5)	30(47.6)	18(28.6)	9(14.3)	2.52	.86
Assessment is effective when students are assessed in groups than individually.	14(22.2)	29(46.0)	16(25.4)	4(6.3)	2.16	.85
Overall					3.09	0.56

Source: Field Data, 2017

From Table 4, 36 respondents representing 57.1% agreed that, a comprehensive assessment in mathematics uses multiple assessment techniques. One respondent however disagreed. A mean score of 3.40 shows that, averagely, the respondents agreed that multiple assessment techniques should be used to assess students' mathematical learning. As to which group of assessment techniques was better, 24 (38.1%) 'agreed' and 19 (30.2%) 'strongly agreed' that the traditional assessment methods was better than the alternative methods of assessment. However, 16 (25.4%) 'disagreed' and 4 (6.3%) 'strongly disagreed' to this assertion. This means that, most of the teachers (68.3%) favour the traditional methods of assessment than the alternative forms. This is not line with the current thinking about assessment. Again, 47 teachers representing 74.6% strongly perceive that assessment in mathematics classrooms should cater for the differences that always exist in classrooms whiles six teachers representing 9.5% disagreed. This means that, approximately three in every four teachers perceive that assessment should cater for individual differences. A mean score of 3.65 suggests that, on the average, teachers strongly perceive that assessment should take into consideration the individual differences in the classroom. Another item that respondents strongly endorsed was the provision of adequate time for students during assessment. It recorded a mean score of 3.57 with only one respondent disagreeing with the rest either strongly agreeing, 37 (58.7%) or agreeing 25(39.7%). Results from Table 4 also suggest that respondents agreed that there should be equal access for all during assessment (Mean =3.29 out of four), involving students in assessing their own work (Mean= 3.22 out of four), using probing questions (Mean= 3.38 out of four), providing enough tasks (Mean= 3.29 out of four) and assessing students frequently (Mean= 3.32 out of four). Respondents were also asked their perception about the source of test items that can be used to assess students. Thirty (47.6%) and 6 (9.5%) disagreed and strongly disagreed respectively to the assertion that, teachers should rely on textbooks for their items. This suggests that 36 (57.1%) endorsed the use textbook provided test items whereas the remaining 27 (42.9%) were in opposition to the assertion. This implies that, most of the respondents believe that, teachers should not create their own assessment items. Similarly, 43 respondents representing 68.2% did not endorse the idea of assessing students in groups with the remaining 31.8% perceiving group assessment as productive. The overall mean teachers perception about how to assess in mathematics was 3.09 with a standard deviation of 0.56.

Another component of classroom assessment is feedback. Table 5 indicates the kind of feedback and feedback procedures that teachers perceive should be used during assessment in mathematics.

Table 5: Perception about the use of Feedback in assessing Mathematics Tasks

Statement	SD(%)	D(%)	A(%)	SA(%)	Mean	SD
Effective assessment requires teachers to give immediate feedback to students		3(4.8)	28(44.4)	32(50.8)	3.46	.59
Good assessment delivers high quality feedback that helps students self-correct			34(54.0)	29(46.0)	3.46	.50

Table 5: Continued

Good assessment encourages positive motivational beliefs and self-esteem			18(28.6)	45(71.4)	3.71	.46
Feedback should encourage students to compete		4(6.3)	26(41.3)	33(52.4)	3.46	.62
Feedback informs teachers about the effectiveness their instructional strategies			22(34.9)	41(65.1)	3.65	.48
Feedback should be in the form of a grade/numerical score only	6(9.5)	38(60.3)	17(27.0)	2(3.2)	2.76	.67
Feedback should be in written form only	13(20.6)	37(58.7)	10(15.9)	3(4.8)	2.95	.75
Feedback should be in oral form only	8(12.7)	26(41.3)	21(33.3)	8(12.7)	2.54	.88
Feedback should be in the form of a grade/numerical score and written.	3(4.8)	14(22.2)	34(54.0)	12(19.0)	2.87	.77
Feedback should be in the form of a grade/numerical score and oral		9(14.3)	37(58.7)	17(27.0)	3.13	.63
Feedback should be in the form of oral and written.	2(3.2)	5(7.9)	37(58.7)	19(30.2)	3.16	.70
Overall					3.20	0.38

Source: Field Data, 2017

SD= Strongly Agree; D= Disagree; A= Agree; SA= Strongly Agree

From Table 5, 32 respondents representing 50.8% strongly agreed and 28 (44.4%) agreed to the perception that an effective assessment requires teachers to give students immediate feedback when students need direction to proceed. Three respondents however disagreed to this assertion. A mean score of 3.46 shows that, averagely the respondents perceive that feedback needs to be immediate. From table 5, similar results are recorded for ‘good assessment deliver high quality feedback information that helps learners self-correct’ (mean = 3.46), ‘feedback should encourage positive motivational beliefs and self-esteem’ (mean = 3.71), ‘feedback should encourage competition in class’ (mean = 3.46) and ‘feedback should help teachers modify their instructional strategies’ (mean = 3.65). This shows that, the perception of the respondents about the nature of feedback that teachers should employ during assessment is very positive.

About the form of feedback, Table 5 reveals that majority of the respondents did not endorse the use of only one feedback technique when assessing students in mathematics. For instance, from Table 5, 70.2%, 79.3% and 54.0% did not endorse the use of numeral only, written only and oral only as feedback for students respectively. They however seem to endorse the use of multiple feedback techniques during assessment. From Table 5, 73%, 85.7% and 88.9% endorsed the use of numeral and written, number and oral, and written and oral as feedback techniques to be employed during assessment respectively.

The study reveals that the perception of most teachers do not conform to current thinking about what assessment in mathematics is as most of them do not see assessment as being used to inform their teaching. This confirms the findings of Susuwela-Banda (2005) and Pryor and Crossouard (2008) who opined that, most teachers perceived classroom assessment as test and measurement and as such there was very little attempt to understand how the students were learning. This implies that teachers with this perception will not opt for the alternative forms of assessment. They are also likely to report the performance of pupils using numbers. They however, claimed that assessment is helpful to the course of the teacher and the students. This represents a positive attitude towards assessment. However, this positive attitude might be informed by possibly the importance they attach to the use of assessment results to compare or to promote students. This is in contrast to the findings of Green (1992) who revealed that teachers tend to perceive classroom assessment as less useful. If teachers can maintain this positive attitude and modify their assessment techniques to favour more of the alternative approaches to assessment, the performance of the pupils would improve.

The perception of the teachers about what to be assessed was generally found to be positive with an overall mean score of 3.24 out of four and a standard deviation of 0.61. This presupposes that, the perception of teachers about assessment tasks in mathematics was that the tasks should include both lower order thinking skills and higher thinking skills. Invariably, it was perceived that, teachers instructional objectives should vary in terms of difficulty level after all, all respondents agreed that assessment tasks should measure the objectives of the lesson. It can also be deduced from Table 3 that 84.1% agreed that assessment tasks in mathematics should involve recall of facts whiles 87.3% perceive that assessment tasks in mathematics should involve higher order thinking skills. This perception of teachers are partly in line with the provisions of the profile dimensions which stipulates more emphasis should placed on application of Knowledge than knowledge and understanding (Ministry of Education, 2010).

Again, there was a positive perception about how mathematics should be assessed since it recorded an overall mean score of 3.09 out of four. However, majority of the teachers perception favoured the traditional forms of assessment which is predominantly paper and pencil test to the alternative form of assessment. This goes to confirm the assertion of Nabie, Akayuure and Sofo (2013) who argued that teachers use both forms of assessments but tends to favour the traditional forms of assessment than the alternative ones. This does not reflect the socio-constructivists view about assessment where the alternative forms of assessment are preferred as they ensure assessment for learning. This might be informed by the perception about assessment in mathematics. According to Susuwela-Banda (2005), teachers who do not perceive assessment as meant to inform instruction tend to cling to the traditional forms of assessment. This has implications on the performance of the pupils. Teachers also had a positive perception about the feedback in assessment as it recorded an overall mean of 3.20 out of four. For instance, most teachers perceive the use of multiple techniques as more effective than relying on the use of only one feedback technique.

Research Question 2: What are the professed assessment practices of mathematics teachers in the Binduri District?

This question examined what teachers said they did which constitutes their assessment practices. A four point Likert scale ranging from Not At all (NA) to Very Often (VO) was designed to elicit what they assessed, how they assessed and the nature and kind of feedback that they used during assessment. Also, respondents were required to provide comments on each of their responses. Tables 6 to 8 present the results of teachers professed assessment practices. The results are presented using frequency counts, percentages, means and standard deviations.

Table 6 presents what teachers said they assess in mathematics.

Table 6: What Teachers say they Assess in Mathematics

Question	NA(%)	SU(%)	O(%)	VO(%)	Mean	SD
How often do your tasks measure lesson objective(s)?		1(1.6)	4(6.3)	58(92.1)	3.90	0.35
How often do your tasks require recall?		12(19.0)	30(47.6)	21(33.3)	1.86	0.72
How often do your tasks involve eliciting the conceptual understanding of students?		5(7.9)	19(30.2)	39(61.9)	3.54	0.64
How often do your tasks involve eliciting students' problem solving skills	2(3.2)	4(6.3)	21(33.3)	36(57.1)	3.44	0.76
How often do your tasks probe students' reasoning?	2(3.2)	3(4.8)	23(36.5)	35(55.6)	3.44	0.74
How often does your assessment involve application of knowledge?		3(4.8)	17(27.0)	43(68.3)	3.63	0.58
How often do your assessment enable students communicate their solutions appropriately?	5(7.9)	7(11.1)	27(42.9)	24(38.1)	3.11	0.90
How often do your tasks elicit higher order thinking skills?		9(14.3)	37(58.7)	17(27.0)	3.13	0.63
Overall					3.26	0.62

Source: Field Data, 2017

NA= Not At All; SU= Seldom Use; O= Occasionally; VO= Very Often

Results from Table 6 show that 58 of the respondents said that what they assess in class very often measures the objectives of their lessons. Another four respondents said their tasks measure their objectives occasionally with only one respondent saying seldom does his/her tasks measure the instructional objectives of the lessons. A mean score of 3.90 out of four suggests that, most often the tasks that teachers assign to their students measure the instructional objectives. The fact that none of the respondents said they never gave tasks outside their instructional objectives suggests the important role teachers instructional objectives play in assessment. The teachers commented that, they ensure that their instructional objectives measure their instructional objectives so as to be informed whether their objectives have been achieved. Also, they said they do so in order to clear every misconception the students might have about a concept.

From Table 6, 43 (68.3%) said very often, the tasks they give to their students require them to apply their knowledge. Three respondents representing 4.8% said they seldom give application related tasks to their students. A mean score of 3.63 out of four shows that, teachers very often gave assessment tasks that require application of knowledge. Commenting on the use of application related tasks during assessment, teachers said they seldom use them because of limited time. This suggests that, some teachers see the use of application-related questions in mathematics as time consuming. Consequently, they only use them when they think they have enough time. They however said that, application related tasks develop students' thinking skills. Again, teachers said they occasionally use application of knowledge tasks in order to expand students' knowledge and let students see mathematics as real. For those who use them very often, they reported that they do so in order to make mathematics meaningful to students and also to enhance transfer of learning. The overall mean score of 3.26 present a positive outlook about what teachers claim they assess.

Again, Table 6 shows that about 81% of the teachers said they often use tasks that require the use of recall tasks. Commenting on their use of tasks that requires recall some of the teachers said they use them when they are revising previous topics taught in class. They explained that recall is an important aspect in mathematics teaching and learning. Similar results were found for the use of tasks that elicit students' conceptual understanding (M= 3.54), problem solving skills (M= 3.44) and appropriate communication of mathematical solutions (M= 3.11). They seldom or occasionally use problem solving because they thought such questions are above their students and limited time. They however involve students in problem solving activities because they believed that will enable students apply their mathematical knowledge in their daily activities. In communicating mathematical solutions appropriately, some teachers said they seldom insist on the proper communication of mathematical solutions because that might scare some students away from mathematics. The respondents also commented that they insist on proper language usage in communicating mathematical solutions very often because they want to differentiate the performance of students. An overall mean score of 3.26 indicates that teachers professed positive assessment practices about what they assess.

Table 7 presents how these tasks are assessed by teachers.

Table 7: Teachers' Views on how they Assess

Question	NA(%)	SU(%)	O(%)	VO(%)	Mean	SD
How often do you use multiple assessment techniques to assess?	1(1.6)	6(9.5)	16(25.4)	40(63.5)	3.51	0.74
How often do you cater for individual differences in the classroom during assessment?	2(3.2)	3(4.8)	12(19.0)	46(73.0)	3.62	0.73
How often do you provide equal access for students in assessment?	1(1.6)		5(7.9)	57(90.5)	3.87	0.46
How often do you give adequate time for reflection during assessment?	1(1.6)	3(4.8)	12(19.0)	47(74.6)	3.67	0.65
How often do you use questions that probe students' conceptual knowledge?		3(4.8)	28(44.4)	11(17.5)	3.51	0.59
How often do you provide enough tasks for students?		5(7.9)	13(20.6)	45(71.4)	3.63	0.63
How often do you assess your students?		1(1.6)	6(9.5)	56(88.9)	3.87	0.38
How often do you use test items provided in textbooks to assess your students?	2(3.2)	13(20.6)	21(33.3)	27(42.9)	1.84	0.87
Overall					3.44	0.66

Source: Field Data, 2017

NA= Not At All; SU= Seldom Use; O= Occasionally; VO= Very Often

Results from Table 7 indicate that, 57 (90.5%) of the teachers claimed they provide equal access to all the students during assessment. All the students were given the same tasks and had equal chance of asking or answering questions in class. Another 88.9% reported that they very often assess their students whereas only 1.6% said they seldom assess their pupils. A mean score of 3.87 confirms this claim. Similar results were found for using multiple assessment techniques (M= 3.51), catering for individual differences in assessment (3.62), providing adequate time for the students (M= 3.67), and providing enough tasks for students (3.63). They however occasionally used test items that were contained in textbooks to assess their students. They very often used textbook provided items because they claimed that was the only source and they as well trust the textbooks because the textbooks were written by experts. Others also said they seldom used items from textbooks because they claimed they might contain errors.

Table 8 presents the assessment techniques employed by teachers in assessing their students learning. Teachers were asked to indicate how often they use each assessment technique in the classroom and provide possible comments regarding the decision to use each assessment technique.

Table 8: Assessment Techniques used by Teachers

Technique	NA (%)	SU (%)	O (%)	VO (%)	Mean	SD
Test	3(4.8)	10(15.9)	42(66.7)	8(12.7)	2.87	0.68
Class exercise			3(4.8)	60(95.2)	3.95	0.21
Homework	3(4.8)	10(15.9)	20(31.7)	30(47.6)	3.22	0.89
Oral questions	3(3.48)	9(14.3)	20(31.7)	31(49.2)	3.25	0.88
Group work	10(15.9)	21(33.3)	18(28.6)	14(22.2)	2.57	1.01
Portfolio	41(65.1)	7(11.1)	12(19.0)	3(4.8)	1.63	.96
Peer assessment	12(19.0)	30(47.6)	16(25.4)	5(7.9)	2.22	.85
Child self-assessment	11(17.5)	21(33.3)	19(30.2)	12(19.0)	2.51	1.0
Projects	40(63.5)	14(22.2)	8(12.7)	1(1.6)	1.52	0.78
Observation	3(4.8)	2(3.2)	12(19.0)	46(73.0)	3.60	0.77
Checklist/rating scale	46(73.0)	5(7.9)	7(11.1)	5(7.9)	1.54	0.98
Overall					2.62	0.84

Source: Field Data, 2017

NA= Not At All; SU= Seldom Use; O= Occasionally; VO= Very Often

From Table 8, 60 teachers representing 95.2% of the teachers use class exercises to assess their students. A mean score of 3.95% confirms this claim of the teachers. A significant proportion (47.6%) said they use homework very often and another 49.2% saying they use oral interview very often. Again, 73% of the teachers claim they use observation as an assessment technique in mathematics. The teachers claimed they used observation to see how students react to issues in class and to get students to concentrate on activities in class. They also reported that they used class exercise after every lesson to determine whether their students really understood their lessons.

Results from Table 8 also indicate that, 40 teachers representing 63.5% of the teachers reported that they do not use projects. Commenting on the use of projects, teachers claimed that they do not use projects because it was either difficult to use or they did not know how to use projects in mathematics. Similar results were found for the use portfolio (M = 1.63) and checklist (M = 1.54). The same comments were given for the use of portfolio and checklist in assessing the performance of students in mathematics. An overall mean score of 2.62 suggests that an average outlook as far as the use of assessment techniques is concern. In effect, though the teachers claim to be blending both the traditional and alternative approaches to assessment, they are more inclined to the traditional ones. This is similar to what they perceive about the alternative forms of assessment and their traditional forms of assessment.

Table 9 presents the feedback and feedback techniques teachers said they used during assessment. They were supposed to indicate on a four-point likert scale how often they practiced each feedback technique. Feedback techniques that involved only one technique were coded in the reverse form.

Table 9: Teachers Professed Assessment Feedback

Statement	NA(%)	SU(%)	O(%)	VO(%)	Mean	SD
How often do you give your students immediate feedback when they need direction to proceed?		1(1.6)	5(7.9)	57(90.5)	3.89	0.36
How often do you deliver high quality feedback that helps students self-correct?			10(15.9)	53(84.1)	3.84	0.37
How often does your assessment feedback encourage positive motivational beliefs and self-esteem?		1(1.6)	18(28.6)	44(69.8)	3.68	0.50
How often does your assessment feedback encourage students to compete		2(3.2)	12(19.0)	49(77.8)	3.75	0.51
How often does your assessment feedback informs you about the effectiveness of your instructional strategies			12(19.0)	51(81.0)	3.81	0.40
How often does your assessment feedback take the form of a grade/numerical score only	4(6.3)	4(6.3)	22(34.9)	33(52.4)	1.66	0.86
How often does your assessment feedback is given in written form only	11(17.5)	4(6.3)	19(30.2)	29(46.0)	1.95	1.11
How often does your assessment feedback is given in oral form only	1(1.6)	10(15.9)	20(31.7)	32(50.8)	1.68	0.80
How often does your assessment feedback is given in the form of a grade/numerical score and written.	2(3.2)	6(9.5)	22(34.9)	33(52.4)	3.37	0.79
How often does your assessment feedback is given in the form of a grade/numerical score and oral	4(6.3)	15(23.8)	19(30.2)	25(39.7)	3.03	0.95
How often does your assessment feedback is given in the form of oral and written.	17(27.0)	4(6.3)	15(23.8)	27(42.9)	2.83	1.25
Overall					3.04	0.89

Source: Field Data, 2017

NA= Not At All; SU= Seldom Use; O= Occasionally; VO= Very Often

Results from Table 9 shows that very often teachers gave immediate feedback (3.89), feedback that encouraged self-correction (3.84), feedback that engenders self-belief (3.68), encouraged competition (3.75) and feedback that informed the effectiveness of their lessons. This suggests that, the kind of feedback that teachers claimed they gave to their students is very positive. They claimed they do this to motivate students to stay on tasks and develop positive attitudes towards mathematics learning. From Table 9, most of the teachers claimed that they occasionally used one feedback technique or a combination of two feedback techniques. These were however dominated by the use of only numerical score/grade or a combination of scores and written comments. They claimed these comments and score motivated the students. Commenting on the comments that they used as part of the feedback, they claimed they attached comments such as 'very good' or 'excellent' for a good work done and back up and very poor for the weak responses.

In effect, teachers reported that they use tasks that elicit both higher order and lower order thinking skills of their students. However, majority of them seems to have faith in the items contained in textbooks. Current thinking about assessment does not encourage the use of textbook items to assess students. Again, whereas teachers claimed to be blending both traditional and alternative forms of assessment, their emphasis was on the traditional forms of assessment which included test, class exercise and homework. This supports the claim of Suurtamm, Koch and Arden (2010) who found that teachers use variety forms of assessment to improve student learning with emphasis on the use of test, homework and classroom exercise to elicit pupils understanding. Berenson and Carter (1995) however lamented that traditional assessments contribute to students' pursuits of grades rather than pursuits of learning. They suggest that broadening the system to include alternative assessments that provide an opportunity for students to make conceptual connections and reflect on understanding can refocus students towards the pursuit of learning.

The assessment technique that was commonly used by teachers in assessing students' learning was class exercise. Of particular interest is the use of projects. This is because, projects are to be included in the School Based Assessment and if teachers seldom use them, then what is the state of the SBA in our school system. Commenting on the use of project, some of the teachers said they do not know how to use projects in assessing mathematics. The seemingly lack of competencies to use the alternative forms of assessment might possibly inform their choice of the traditional forms. It also brings to question, the initial training of our teachers as well as their professional development. This gives credence to Campbell and Evans (2010) as cited in Jarrett (2016) who reported that most teachers lack the relevant experience with classroom assessment practices as they have never previously been taught or received training in the field. This lack of experience, knowledge, and skills according to Akos, Cockman and Strickland (2007), poses a problem to the education system as these teachers are not adequately prepared to meet the diverse learning needs of students in the classroom. An overall mean score of 3.04 out of four presents a positive outlook about the feedback teachers give. Their feedback were however mostly judgemental. Meanwhile, Chappuis and Stiggins (2002) lamented that judgmental feedback such as well done, good, or great work and more not only holds less for value for improvement and student learning, but it also discourages students from learning.

Research Question 3: What are the actual assessment practices of teachers in Binduri District?

This question sought to establish the actual assessment practices of teachers in the classroom. Lessons of teachers were observed and other relevant documents were observed. What teachers assessed, how they assessed and the feedback they gave to students were recorded as either 'Yes' 'No' or 'Not Observed'. Relevant comments were taken. Table 10 presents what teachers assess in the classroom.

Table 10: What Teachers Assess in the Classroom

Statement	Observation Protocol			Document analysis guide		
	Yes (%)	No (%)	Not Observed (%)	Yes (%)	No (%)	Not Observed
Task measures objectives	55(87.3		8(12.7	57(90.5		6(9.5
Task requires recall	63(100)			63(100)		
Task elicits conceptual understanding	13(20.6	50(79.4		12(19.0	51(81.0	
Task elicits students' problem solving skills	22(34.9	41(65.1		29(46.0	34(54.0	
Task probes students' reasoning	36(57.1	27(42.9				
Task requires application of knowledge	26(41.3	37(58.9		29(46.0	34(54.0	
Task enables students to communicate solutions appropriately	8(12.7)	55(87.3		50(79.4	13(20.6	

Source: Field Data, 2017

From Table 10, it can be seen from both observation protocol and the document analysis guide that most of the tasks teachers used to assess their students were in line with their instructional objectives. However, eight teachers representing 12.7% did not have lesson notes during teaching thereby making it difficult to ascertain whether their questions really measured objectives of the lesson. This means that, these teachers taught without preparation. Also, all the tasks that the teachers assigned to the students had a number of recall questions in them. This was also in the document analysis guide where about 80% of the tasks assigned to students involved recall. From Table 10, most of the lessons observed and documents observed showed that teachers seldom use tasks that require problem solving, conceptual knowledge and application. In most cases, when they employ these tasks, they are always few. Sometimes, one in every five questions or one in every three questions involved higher order thinking skills. However, it was observed that majority of the teachers probed students reasoning. Mostly, they did this by asking students to explain their answers. Table 11 presents how teachers actually assessed their students.

Table 11: How Teachers Assess Mathematics in the Classroom

Statement	Observation Protocol			Document Analysis Guide		
	Yes (%)	No (%)	Not Observed (%)	Yes (%)	No (%)	Not Observed (%)
Teacher uses multiple assessment techniques to assess	22(34.92	41(65.08				63(100)
Teachers' assessment caters for individual differences in the classroom	55(87.3	8(12.7)				63(100)
Teacher provides equal access for all students to participate	63(100)			63(100)		
Teacher provides adequate time for reflection.	41(65.08)	22(34.92				63(100)
Teacher provides enough tasks for pupils	54(85.71)	9(14.29)		52(82.54	11(17.46	
Teacher assesses students frequently in mathematics lessons.	59(93.65)	4(6.35)		57(90.48	6(9.52	
Teacher uses textbook-provided items to assess pupils.	60(95.24)	3(4.76)				63(100)

Source: Field Data, 2017

Table 11 reveals that 41 lessons observed representing 65.08% used only one assessment technique to assess the progress of their students during the lesson whiles the remaining 34.92% use more than one assessment technique in their lessons. It was observed that the most widely used assessment technique was oral interview. This item was not catered for during the document analysis. Again, majority of the teachers use textbook items to assess their students (95.24%); assesses students more frequently (93.65%); provide enough tasks for the students (85.71%); provides adequate time for reflection (65.08); provides equal access to all students (100%), and caters for individual differences in the classroom. Among the issues observed include teachers directly copying items from textbooks and pamphlets for students to solve. Most teachers provided at least three tasks for students to accomplish during the instructional process. Most of the teachers always pose their questions before calling on a student to answer. This afforded the students the opportunity to think critically before they respond. Equally, no student was exempted from a particular question. When the exercise books and other related documents of students were observed, it was found that teachers assess their students frequently (90.48%). They were assessed almost after every lesson. They were also given enough tasks to do as exercises (82.54%). On the average, five questions after every lesson were given to the students. Again, all the students answered the same questions pointing to equal access to assessment. In effect, Table 11 points to the fact teachers assessment procedure provides equal access, provides enough tasks for students to practice and caters for individual differences. This suggests that their procedure in assessment seems to promote learning. Table 12 presents the assessment techniques used by teachers in the classroom.

Table 12: Assessment Techniques used in the Classroom

Statement	Observation Protocol			Document analysis guide		
	Yes (%)	No (%)	Not Observed (%)	Yes (%)	No (%)	Not Observed (%)
Exercise			63(100)	63(100)		
Homework			63(100)	24(38.10)	39(61.90)	
Class test			63(100)	14(22.22)	49(77.78)	
Oral interview	60(95.24	3(4.76)				63(100)
Group work		63(100)			63(100)	
Peer-assessment	18(28.57	45(71.43)		10(15.87)	53(84.13)	
Self-assessment	15(23.81	48(76.19)				63(100)
Portfolio			63(100)		63(100)	
Observation	9(14.29)	54(85.71)				63(100)
Checklist/rating scale			63(100)		63(100)	
Project			63(100)		63(100)	

Source: Field Data, 2017

On the assessment techniques employed by the teachers, Table 12 shows that oral interview is the predominant assessment technique used to assess the students during the interaction process. Sixty teachers out of the 63 teachers were observed using this technique. Other assessment techniques that were employed included observation [9(14.29)] where teachers posed questions to students who were not paying attention. They also used self-assessment and peer-assessment but sparingly. When relevant documents were analysed, Table 12 shows that all the teachers use class exercise as an assessment technique. Table 12 also indicates that homework (38.10%), class test (22.22%) and peer assessment (15.87) were occasionally used to assess students. Projects, checklist, portfolio and group work are never used to assess mathematical concepts. This is not different from what teachers professed they do when it comes to the use of projects. This brings to question the status of the school based assessment which recommends the use of projects in assessing students. If teachers are really not administering projects, what do they do to get a mark for the SBA column? It further explains that, the assessment techniques of teachers are dominated by the traditional methods of assessment. Another important component of the assessment practices of the teacher is feedback. Table 13 presents the kind of feedback that teachers give to their students.

Table 13: Teachers Actual Assessment Feedback

Statement	Observation Protocol		
	Yes (%)	No (%)	Not observed
Teacher gives students immediate feedback when they need directions to proceed.	57(90.48	6(9.52)	
Teacher delivers high quality feedback information that helps learners self-correct.	29(46.03	34(53.97)	
Teacher feedback encourages positive motivational beliefs and self-esteem.	35(55.56	28(44.44)	
Teacher feedback encourages children to compete in class.	36(57.14	27(42.86)	
Teacher modifies instructional strategy based on assessment results.	16(23.4)	47(76.6)	

Source: Field Data, 2017

From Table 13, 90.48% of the teachers' gave immediate feedback whereas a marginal 9.52% did not. It was observed that the teachers do not "postpone" the questions of the students. Most of the students questions were answered in class. Again, 57.14% of the teachers gave feedback that encourages and motivates the child. Teachers were giving encouraging remarks like "that is good, try again" "yes, you can do it" and "you see that mathematics is not difficult". From Table 13, it can be seen that 76.6% of the teachers do not use their assessment feedback to modify their teaching whereas the remaining 23.6% modify their lessons as a result of the feedback that they got from their pupils. This reflects their perception about assessment as found in Table 2. Again, 53.97% of the teachers feedback information did not really help learners self-correct. From the observation notes, teachers were found either accepting answers as either completely correct or wrong. Again, from the document analysis, it was found that most of the tasks given were marked but most of them never had any evidence of correction.

Table 14: Teacher use of Feedback Technique in the Classroom

Statement	Observation Protocol			Document analysis guide		
	Yes (%)	No (%)	Not Observed (%)	Yes (%)	No (%)	Not Observed (%)
Grade/numerical score	13(20.63)	50(79.37)		48(76.12	15(23.81)	
Written		63(100)			63(100)	
Oral	49(77.78)	14(22.22)				63(100)
Grade/numerical and written	21(33.33)	42(66.67)		38(60.32	25(39.68)	
Grade/numerical and oral		63(100)				63(100)
Written and oral		63(100)				63(100)

Source: Field Data, 2017

From Table 14, whereas teachers sparingly assign numbers to pupils answers during the instructional period (79.37), they mostly assign numbers to the exercises that they gave to the pupils (76.12%). Again, teachers do use written information only as feedback to the pupils. During the instructional period, teachers mostly give oral feedback to pupils (79.37%). Teachers who prefer using multiple feedback techniques mostly combine a number and a written remark. These remarks included “excellent, keep it up”, “very good” “fail”, “back up” and “average”

Meaningful assessment involves examining the learner's entire conceptual network, not just focusing on discreet facts and principles (Heritage 2010). This calls for the use of hands-on problem solving task in the assessment of the child which calls for the use of higher order thinking skills rather than assessment tasks that require mere recall of facts. What teachers assessed mostly demanded recall of facts. There were no attempts to link one mathematical concept to another. This reduces mathematics learning to memorization of facts. It makes mathematical concepts to seem to be isolated bodies of knowledge. This confirms the findings of Hattori and Saba (2008) who undertook a comparative study on the assessment practices of Ghanaian Junior High School teachers with their Japanese counterpart based on the National Council of Teachers of Mathematics (NCTM) assessment standards and posited that Japanese lessons promoted conceptual understanding and problem solving whereas the Ghanaian lessons remained essentially traditional in approach which views the teacher as the dispenser of knowledge. Also, in the Ghanaian lessons contents were shallowly treated and obvious connections with other areas were not exploited. There were no prompts about alternative solutions neither were they elicited from or suggested by students. Ghanaian teachers mainly asked facts-eliciting questions that demanded students to make simple logical mathematical deductions from procedures and not that which challenged them to investigate. This has implications on how these pupils apply mathematics in their daily lives and by extension the development of the country.

Also, teachers generally showed positive signs in how they assessed their pupils. They however relied heavily on items that are on textbooks and pamphlets. On the assessment techniques that they used, teachers relied heavily on the traditional forms of assessment other than the alternative forms. Again, from the document analysis projects were not actually given. This confirms what they professed and what they perceived. There was also a disparity between what is expected of teachers as far as SBA is concern. Since projects were not given, the question is how these teachers get marks for the project column of the SBA forms. It even further raises questions as to how valid their assessment scores are.

Again, the feedback teachers give to students was dominated by numeral grades. To promote meaningful learning however, constructivism calls for the elimination of grades (Birenbaum in Segers et al 2003).

Research Hypothesis 1: $H_0$1: There is no significant relationship between the perception of teachers and their actual assessment practices in mathematics.

This hypothesis sought to establish and describe the nature of relationship between the perception of teachers about assessment in mathematics and their actual assessment practices. A correlation was carried out to tell the relationship between teachers' perception and their actual assessment practices in mathematics. Table 15 presents the results of the correlation.

Table 15: Correlation between Perception and Actual Assessment Practices

Correlation Co-efficient (*r*)	Sig.	No.
0.194	0.128	63

Source: Field Data, 2017

Results from Table 15 reveal that, the correlation between the perception of teachers and their assessment practices was 0.194. This suggests that, there existed a positive but weak relationship between the perception of teachers about assessment and their actual assessment practices. This means that, as perception increases their actual assessment practice also increases and the vice versa is true. This relationship is however not significant at 0.05 level of significance since sig value of 0.128 was greater than the alpha level of 0.05. This means that, there could be a change in results if the respondents are altered. Therefore, there is no enough evidence to reject the null hypothesis. This suggests that, any policy decision to improve the perception of teachers about assessment might not actually result in how they actually implement assessment in the classroom. In effect, the perception of teachers seems to be independent of their actual assessment practice. A study conducted by Chester and Quilter (1998) cited in Susuwele-Banda (2005) however suggested that teachers' perceptions of classroom assessment affected their classroom assessment practices.

Research Hypothesis 2: H_0: There is no significant relationship between the perception of teachers and their professed assessment practices in mathematics.

The study also sought to find out if there was any significant relationship between the perception of teachers about assessment and their professed assessment practices. Table 16 presents the results

Table 16: Correlation between Perception and Professed Assessment Practices

Correlation Co-efficient (*r*)	Sig.	No.
0.255	0.044	63

Source: Field Data, 2017

Results from Table 16 show a correlation coefficient of 0.255 between the perception of teachers and their professed assessment practices. This indicates a positive but weak relationship. This relationship was found to be statistically significant at 0.05 alpha level because the sig value of 0.044 was less than the significance level of 0.05. This explains that any improvement or otherwise on teachers' perception about assessment would have a direct impact on their professed assessment practices. Consequently, the null hypothesis that there is no significant relationship between the perception of teachers about assessment in mathematics and their assessment practices is rejected. This presupposes that, their perception influences what they profess. This confirms the findings of Susuwele-Banda (2005) who posited that teachers' perceptions of classroom assessment affected their classroom assessment practices. Juxtaposing this with the relationship between their perception and their actual assessment practices implies that, the perception of teachers about assessment only influences their professed assessment and not their actual assessment practices. The implication is that, teachers do not do what they claim to be doing in the classroom.

Research Hypothesis 3: H_02: There is no significant difference between the professed assessment practices of teachers and their actual assessment practices in mathematics.

The purpose of this hypothesis was to compare what teachers say they do in the classroom and their actual assessment practices as observed in the classroom. The assessment practices of the teachers in the classroom were scored and their professed assessment practices also scored. The paired sample t-test was used to compare what teachers said they do in the classroom and what they actually do in the classroom. The mean score of the professed assessment practices and actual assessment practices were scored out of four. Table 16 presents the results of the paired sample t-test carried out to establish the differences in professed assessment practices and actual assessment practices.

Table 17: Results of Paired Sample T-Test

	Mean out of four	Mean Dif	t-stat	sig.(2-tailed)	df	Number
Professed practice	3.41	1.18	15.577	0.000	62	63
Actual Practice	2.23					

Source: Field Data, 2017

From Table 13, it can be elicited that the mean score of what teachers said they do in the classroom was 3.41 whereas the mean score for their actual performance in the class is 2.23. This represents a mean gain of 1.18 in favour of the professed assessment practices of the teachers in mathematics. This means that teachers say more than what they do in the classroom. Since the sig. value of 0.000 is less than the alpha level of 0.05, then it can be concluded that the difference between the professed assessment practices of teachers and their actual assessment practices was statistically significant. The null hypothesis that there was no statistically significant difference between the professed assessment practices and their actual assessment practices was therefore rejected at 0.05 significance level.

A study conducted by Susuwele-Banda (2005) suggests that teachers' perceptions of classroom assessment affected their classroom assessment practices. In this study however, there was significant difference between what teachers' claim they do and what they actually do in the classroom. This suggests that the assessment practices as claimed by Susuwela-Banda (2005) could have been teachers professed practices and not their actual assessment practices. Since the professed assessment practice had a higher mean, the implication is that, what teachers say they do in assessment will be higher than what they actually do in the classroom even if the participants from the district are changed. This is a reminder to school management and those in supervisory roles that, they need to strengthen their supervisory responsibilities so as to ensure laudable programmes and policies like the SBA are fully implemented. In effect, any evaluation procedure or policies should consider using observation rather than relying on what teachers claim they do.

Chapter Summary

The results and discussions of the study were done in line with the research questions and hypothesis that guided the study. Most teachers have negative perceptions about what assessment is. There was a significant relationship between the perceptions of teachers about assessment and their professed assessment practices. However, there was no significant relationship between the perceptions of teachers about assessment and their actual assessment practices. The professed assessment practices were higher than their actual assessment practices.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

This chapter provides the summary of the study, the conclusions drawn from the findings of the study and recommendations made from the conclusions of the study.

Summary of the Study

The purpose of this study was to investigate the assessment practices of mathematics teachers in the classroom and how they relate to what teachers say about assessment in mathematics. Specifically, it focused on the perception of teachers about assessment in mathematics, what teachers claimed they do in assessing their students and their actual assessment practices in mathematics. It further investigated how the assessment practices of teachers relate to their perception. It also looked at the differences between the professed assessment practices of teachers and their actual assessment practices in the classroom.

The study adopted descriptive survey design. Three instruments namely questionnaire, observation protocol and document analysis guide were used to gather primary information from the respondents. The population of the study included all primary school teachers and mathematics teachers at the JHS level in the Binduri District. A sample of 63 teachers was involved in the study. They were selected through a multi-stage sampling procedure. Descriptive and inferential statistics were employed in presenting the results of the study. Descriptive statistics such as frequency counts, percentages, means and standard deviations were used to report the perceptions of teachers about assessment, the professed assessment practices of teachers and their actual assessment practices in mathematics. Correlation was carried out to determine the relationship between the assessment practices of teachers (professed and actual) and their perception about assessment in mathematics. A paired sample t-test was used to ascertain whether differences exist between the professed assessment practices of teachers and their actual assessment practices.

Key Findings

The study reveals that the perceptions of most teachers do not conform to current thinking about assessment in mathematics as most of them do see assessment as being used to inform their teaching. They however have positive perceptions about what should assessed, how to assess and the feedback that should be given to students. They favour the traditional forms of assessment to alternative ones. They also perceived that assessment tasks for students should include both higher order thinking skills and lower order thinking skills.

Teachers claimed that they employed both high order and low order thinking tasks during their assessment, assess through multiple assessment techniques, use of enough tasks and the provision of adequate time for students. It was also found that, teachers professed feedback practices centred on the use either numeral/grade only or with a combination of grade and written comments. They also favour the traditional forms of assessment than the traditional ones. Teachers also professed that they do not use project which is a component of the school based assessment in their assessment.

Most of the tasks that teachers used to assess the students involved lower order thinking skills. The most dominant assessment technique employed by teachers included exercise, oral interaction and observation. Again, project was not administered as required by the new SBA system of assessment in schools in Ghana. Teachers' feedback techniques were dominated by numerical score and written comments. Although teachers gave quick feedback to students, most of their marked exercises did not contain evidence of corrections.

There was no significant relationship between perception and actual assessment practices of teachers.

There was a statistically significant relationship between the perception of teachers about assessment and their professed assessment practices.

There was statistically significant difference between the professed assessment practices of teachers and their actual assessment practices at 0.05 significance level. The mean for the professed assessment practices of teachers was higher than their actual assessment practices.

Conclusions

Based on the findings the following conclusions are drawn;

1. Although the perception of teachers about assessment in mathematics is not generally in line with the current thinking of assessment, teachers generally had positive perceptions about what should be assessed, how it should be assessed and the feedback to give to students. This implies that teachers generally have inadequate training in assessment.

2. Teachers professed assessment practices were generally positive despite their preference for the traditional assessment practices.
3. The actual assessment practices of teachers do not conform to the current thinking of assessment. This implies that, students' performance in mathematics will be low which has implications on the development of the nation.
4. The perception of teachers influences what they professed to be doing in the classroom.
5. The perception of teachers did not really relate with what they actually do in the classroom as far as assessment is concerned. This implies that certain conditions must be right to cause perception into action.
6. Teachers do less than what they profess to do. This implies that, teachers know what they ought to do, but certain factors may be influencing their practice.

Recommendations for Policy and Practice

From the conclusions drawn from the study, the following recommendations are made for policy and practice.

1. Since the perception of teachers about assessment did not conform to the current thinking about assessment, it is recommended that the Ghana Education Service should organise In-Service Training and Education course on current trends in assessment in mathematics.
2. Since teachers professed to favour the traditional forms of assessment to the alternative, it is recommended that teachers should research on the use and relevance of the alternative forms of assessment.

3. It is also recommended that, teachers adopt better assessment practices such as using items that elicit the higher order thinking skills of students, and incorporating the alternative forms of assessment to improve the performance of the students.
4. Since the perceptions of teachers about assessment is related to their professed assessment practices rather than their actual assessment practices, it is recommended that circuit supervisors should monitor the practice of teachers regular observation of lessons and work documents.
5. It is further recommended that heads of schools should conduct regular needs assessment and provide adequate support to enable teachers practice what they professed.

Suggestions for Further Studies

This study is not exhaustive. It is recommended that this study should be replicated in other areas of the country to find out if the findings of the study persist in those areas. It is further recommended that a study should be conducted to ascertain the status of the school based assessment in our various school.

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APPENDICES

APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

DEPARTMENT OF BASIC EDUCATION

THE RELATIONSHIP BETWEEN THE PERCEPTION OF TEACHERS AND THEIR ASSESSMENT PRACTICES IN MATHEMATICS: THE CASE OF SELECTED BASIC SCHOOLS IN THE BINDURI DISTRICT

QUESTIONNAIRE FOR TEACHERS

This questionnaire is being used to gather information on how mathematics teachers perceive assessment in mathematics and how they practice it. The information is being collected as part of a Master's Thesis. It is therefore strictly for academic purposes. I will be grateful to have you take part in the study by answering the questions as honestly as possible.

Please be assured that the information you provide will be kept confidential.

Thank you.

Instruction: Tick √ the appropriate bracket [ ] representing your response to the question or statement or write your response in the blank spaces where necessary.

Section A: Background Data

1. Name of School: …………………….
2. Sex: Female [ ] Male [ ]
3. Which of the following age range has your age?

   Below 20 [ ] 20-29 [ ] 30-39 [ ] 40-49 [ ] 50-59 [ ]

   60 and above [ ]

4. What is your highest academic qualification?

   SSSCE/WASSCE [ ] Diploma [ ] 1ST Degree [ ] Masters [ ]

5. What is your professional qualification?

   Cert 'A' [ ] DBE [ ] B. Ed [ ] M. Ed./MPhil (Education) [ ]

   Any other (How many years have you been teaching?

   Less than 4 years [ ] 4-8years [ ] 9-12 years [ ] 12-16 years [ ]

   above 16 years [ ]

Section A: Teachers' Perception on What Assessment is.

6. Which one of the following statements best defines assessment as used in the classroom?

   Classroom assessment is a process of administering a test to students in order to assign grades and report to parents and officials [ ]

   Classroom assessment is a process, which helps teachers to promote students from one class to another [ ]

   Classroom assessment refers to all tests a teacher gives at the end of a topic or term [ ]

   Classroom assessment is a tool that a teacher uses to inform teaching and learning [ ]

7. Do you think assessment is useful to you? Yes [ ] No [ ]

   Explain your answer: …………………………..

8. Do you think assessment is useful to your students? Yes [ ] No [ ]

   Explain:…………………………………………………………………

Section C: What to Assess

Indicate by a tick (√) in the column the response which best describes your level of acceptance of the statements below that relates how you perceive what needs to be assessed in mathematics.

Statement	SD	D	A	SA
9. The assessment task should measure the objective(s) of the lesson.				
10. Assessment tasks in mathematics require recall of mathematical facts.				
11. Assessment tasks in mathematics involves following procedures in solving mathematical problems.				
12. Teachers' assessment tasks in mathematics involve eliciting the conceptual understanding of pupils.				
13. Teachers' assessment tasks in mathematics involve eliciting pupils' problem solving skills.				
14. Assessment in class should probe students' reasoning.				
15. What teachers assess should help pupils to apply knowledge				
16. What teachers assess should enable students to communicate their mathematical solutions appropriately				
17. Assessment tasks in mathematics should elicit higher order thinking skills of pupils.				

SD = Strongly Disagree   D=Disagree   A= Agree   SA= Strongly Agree

Section D: How to Assess

Indicate by a tick (√) in the column the response which best describes your level of acceptance of the statements below that indicate the perception of teachers on how to assess mathematical skills of students

Statement	SD	D	A	SA
18. Comprehensive assessment tasks use multiple assessment techniques to assess				
19. It is better to use traditional assessment techniques such as test to assess your students mathematical progress than alternative assessment techniques such as observation and oral interview.				
20. An effective assessment caters for individual differences in the classroom.				
21. An effective assessment provides equal access for all students diversity for students				
22. In assessing students, adequate time should be provided for reflection.				
23. Well assessed lessons involve child self-assessment				
24. Teachers questioning method should probe pupils' conceptual knowledge.				
25. An effective assessment provides enough tasks for pupils				
26. Students need to be assessed frequently in mathematics lessons.				
27. Classroom assessment test items should be textbook-provided.				
28. Assessment is effective when students are assessed in groups rather than individually				

SD = Strongly Disagree D=Disagree A= Agree SA= Strongly Agree

Section E: Feedback

Indicate by a tick (√) in the column the response which best describes your level of acceptance of the statements below that in indicate the perception of teachers, feedback to students

Statement	SD	D	A	SA
29. An effective assessment requires that teachers give students immediate feedback when they need directions to proceed.				
30. Good assessment deliver high quality feedback information that helps learners self-correct.				
31. Good assessment encourages positive motivational beliefs and self-esteem.				
32. Feedback should encourage children to compete in class.				
33. Feedback should inform the teacher about the effectiveness of his/her instructional strategies.				

SD = Strongly Disagree D=Disagree A= Agree SA= Strongly Agree

Indicate by a tick (√) in the column the response which best describes your level of acceptance of the statements below that indicate the perception of teachers on the kind of feedback that should be given to students.

Statement	SD	D	A	SA
34. Teachers' assessment feedback to students should be in the form of a grade/numerical score only.				
35. Teachers' feedback on students' work should be written only.				
36. Teachers should always give oral feedback to students' completed assessment tasks.				
37. Feedback should be in grade/numerical and written form.				
38. Feedback should be in grade/numerical and oral				
39. Feedback should be in written and oral				

PROFESSED ASSESSMENT PRACTICES OF TEACHERS

Section A: What to Assess

Indicate by a tick (√) in the column the response which best describes the frequency with what you assess the following in the classroom.

Question	NA	SU	O	VO	Comment
1. How often do your assessment tasks measure the objective(s) of your lesson?					
2. How often do your assessment tasks require recall of mathematical facts?					
3. How often do you use tasks that involve following procedures in solving mathematical problems to assess your students?					
4. How often does what you assess elicit the conceptual understanding of students?					
5. How often do you assess the problem solving skills of your students?					
6. How often do what you assess probe students' reasoning in mathematics?					
7. How often do what you assess help students to apply knowledge?					
8. How often do you assess how students communicate their mathematical solutions?					
9. How often do your assessment tasks elicit higher order thinking skills of your students?					

NA = Not At All   SU=Seldom Use   O= Occasionally   VO = Very Often

Section C: How to Assess

Indicate by a tick (√) in the column the response which best describes the frequency with how you assess the following in the classroom.

Question	NA	SU	O	VO	Comment
10. How often do you use multiple assessment techniques to assess your students?					
11. How often do you cater for individual differences in the classroom during assessment?					
12. How often do you provide equal access for all students to participate in your assessment?					
13. How often do you give adequate time to your students to reflect on the tasks?					
14. How often do you allow your students to assess themselves?					
15. How often do you use questions that probe pupils' conceptual knowledge?					
16. How often do you provide enough assessment tasks for pupils?					
17. How frequent do you assess your pupils?					
18. How often do you use test items provided in textbooks to assess your students?					
19. How often do you assess students in groups?					

NA = Not At All SU=Seldom Use O= Occasionally VO = Very Often

Indicate how often you use the following assessment techniques in assessing pupils in mathematics in a term. Indicate by a tick (√) in the column the response which best describes the frequency with which you use each assessment technique in the classroom.

Technique	NA	SU	O	VO	Comments
20. Test					
21. Class exercises					
22. Homework					
23. Oral interview					
24. Group work					
25. Portfolio					
26. Peer assessment					
27. Child self-assessment					
28. Projects					
29. Observation					
30. Checklist/rating scale					

Section D: Feedback

Indicate by a tick (√) in the column the response which best describes your level of acceptance of the statements below that in indicate the how feedback to students

Question	NA	SU	O	VO	Comment
31. How often do you give your students immediate feedback when they need directions to proceed?					
32. How often do you deliver quality feedback information that helps my students to self-correct?					
33. How often do your feedback encourages positive motivational beliefs and self-esteem in your students?					
34. How often do your feedback encourages your students to compete in class?					
35. How often do you use the assessment results to improve upon your instruction?					

NA = Not At All SU=Seldom Use O= Occasionally VO = Very Often

Indicate how often you use the following feedback techniques in assessing your students in mathematics. Indicate by a tick (√) in the column the response which best describes the frequency with which you use each feedback technique in the classroom.

Technique	NA	SU	O	VO	Comments
36. Grade/numerical score					
37. Written					
38. Oral					
39. Grade/numerical and written					
40. Grade/numerical and oral					
41. Written and oral					

APPENDIX B

OBSERVATION PROTOCOL ON TEACHERS ASSESSMENT PRACTICES

Date………………………   Name of the school………………………

Time of observation…………………… Start …………… End ……

Class………………Teachers’ gender………………………………

Number of students …………………… Lesson Topic: …………………………

Section A: What the teacher Assesses

Statement	Yes	No	Not observed	Comment
1. Assessment task(s) measure(s) the objective(s) of the lesson.				
2. Assessment task(s) require(s) recall of mathematical facts.				
3. Assessment task(s) involve(s) following procedures in solving mathematical problems.				
4. Assessment tasks involve eliciting the conceptual understanding of students.				
5. Assessment tasks involve eliciting pupils’ problem solving skills.				
6. Assessment tasks probe students’ reasoning.				
7. What teacher assesses help pupils to apply knowledge				
8. What teacher assesses enable students to communicate their mathematical solutions appropriately				
9. Assessment tasks elicit higher order thinking skills of pupils.				

Section B: How the teacher Assesses

Statement	Yes	No	Not observed	comments
10. Teacher uses multiple assessment techniques to assess				
11. Teachers' assessment caters for individual differences in the classroom.				
12. Teacher provides equal access for all students to participate				
13. Teacher provides adequate time for reflection.				
14. Teacher uses child self-assessment				
15. Teachers probes pupils' conceptual knowledge.				
16. Teacher provides enough tasks for pupils				
17. Teacher assesses students frequently in mathematics lessons.				
18. Teacher uses textbook-provided items to assess pupils.				
19. Teacher assesses pupils in groups.				

Teacher use of assessment techniques

Statement	Yes	No	Not observed	Comments
20. Oral interview				
21. Group work				
22. Peer assessment				
23. Child self-assessment				
24. Observation				

Section C: Teacher use of Feedback

Statement	Yes	No	Not observed	Comments
25. Teacher gives students immediate feedback when they need directions to proceed.				
26. Teacher delivers high quality feedback information that helps learners self-correct.				
27. Teacher feedback encourages positive motivational beliefs and self-esteem.				
28. Teacher feedback encourages children to compete in class.				
29. Teacher modifies instructional strategy based on assessment results.				

Teacher use of Feedback Techniques in class

Statement	Yes	No	Not observed	Comments
30. Grade/numerical score				
31. Written				
32. Oral				
33. Grade/numerical and written				
34. Grade/numerical and oral				
35. Written and oral				

APPENDIX C

DOCUMENT ANALYSIS GUIDE

Date………..   Name of the school…………………………………...……

class: ………..

Section A: What the teacher Assesses

Statement	Yes	No	Not observed	Comments
1. Assessment task(s) measure(s) the objective(s) of the lesson.				
2. Assessment task(s) require(s) recall of mathematical facts.				
3. Assessment task(s) involve(s) following procedures in solving mathematical problems.				
4. Assessment tasks involve eliciting the conceptual understanding of students.				
5. Assessment tasks involve eliciting pupils' problem solving skills.				
6. What teacher assesses help pupils to apply knowledge				
7. What teacher assesses enable students to communicate their mathematical solutions appropriately				
8. Assessment tasks elicit higher order thinking skills of pupils.				

Section B: How the teacher Assesses

Statement	Yes	No	Not observed	comments
9. Teacher uses multiple assessment techniques to assess				
10. Teacher provides equal access for all students to participate				
11. Teacher provides enough tasks for pupils				
12. Teacher assesses students frequently in mathematics lessons.				
13. Teacher uses textbook-provided items to assess pupils.				

Does the teacher use the following assessment techniques?

Technique	Yes	No	Not Observed	Comments
14. Test				
15. Class exercises				
16. Homework				
17. Group work				
18. Portfolio				
19. Peer assessment				
20. Child self-assessment				
21. Projects				
22. Checklist/rating scale				

Section C: Feedback

Does the teacher use the following feedback techniques in class?

Statement	Yes	No	Not observed	Comments
23. Grade/numerical score				
24. Written				
25. Grade/numerical and written				

26. Does the teacher give immediate feedback to students?

Yes [ ] No [ ] Not Observed [ ]