INVESTIGATION INTO STUDENTS PERCEPTION ON TEACHING METHODOLOGY OF MATHEMATICS TEACHERS IN SECONDARY SCHOOLS IN MINNA, NIGER STATE

BY

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ABSTRACT

This study was carried out to investigate student perception on teaching methodologies of Mathematics teachers in Bosso Local Government Minna, Niger State. Two research questions were formulated and tested to guide the study. The survey research design type was adopted and the targeted population of one hundred and twenty (120) students was selected using simple random sampling technique across the four (4) selected secondary schools in Bossso Local Government Minna, Niger State. Twenty four (20) item-questionnaires were used as instrument for data collection and were validated by expert from Science Education Department and Mathematics Department which was analyzed according to the research questions. The data collected from the respondents was analyzed using mean, standard deviation. The results lend credibility to the suggestion that students have positive perception on Mathematics teachers using demonstration method of teaching than lecture method.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Mathematics is perceived by society as the foundation for scientific and technological knowledge that is cherished by societies nationwide. It is an instrument for socio-economic, scientific, political and technological developments (Githua and Mwangi, 2003). The relevance of mathematics in all realms of life and the recent debate on the falling standards of students' achievement in mathematics has triggered the growing attention for researchers, parents and education authorities in their quest for the way forward over the last two decades (Blum 2002). According to Jegede (2002), Mathematics is paramount for people living in the 21st Century, for the successful growth of a country's economy and for them to be successful. To this regard, Nigeria places so much emphasis on academic excellence, especially in Mathematics and Science because they are most important subject that could help the Nation to meet her objectives for science and technological advancement. Benefits have been identified in terms of student engagement learning mathematics (Lam, et al., 2009), as well as increased Opportunities to develop students' abilities to think creatively and innovatively (Lee & Breitenberg, 2010) and to work independently (Doppelt, 2009).

Mathematics is a compulsory subject offered in Nigeria secondary schools and is taught daily in all the schools or at least four times in a week.

Odilli (2006) sees mathematics as a subject that helps students to form the habit of clarity, brevity, accuracy, precision and certainty in expression and this will go a long way in giving us the much needed unity in this country. Oxford Advanced Learners Dictionary (2001) defines

mathematics as the science of size and numbers (which arithmetic, algebra, trigonometry and geometry are branches). New Encyclopedia Britannica defines it as the science of structure, order and relation that has evolved from elementary practices of counting, measuring and describing the shapes of objects.

Perception (from the Latin word, percipio) is the organization, identification, and interpretation sensory. The way in which something is regarded, understand, or interpret. Perception can also be defined as the way you think about or understand something or someone. The ability to understand or notice something easily.

Students' attitude towards mathematics seems to be shaped by how students define mathematics, and what they consider the role of mathematics to be in their life. Low self-esteem and phobia in mathematics learning seem to result in confused thinking, disorganization, avoidance behavior and passivity. For instance, a student considering mathematics as bunch of symbols and procedures tends to treat his/her mathematics concepts as a set of memorization facts. The students will put little or no effort to understand reasons behind the symbols and procedures. If a student does not think mathematics is important then the student will not again consider his/her mathematics course worthy enough to spend time on. Motivation of these students would be very low, and then it will be difficult for such students to learn mathematics meaningfully and have understanding of mathematics concepts. This means one needs to address students' attitudes and behaviors before introducing mathematical concepts and expecting meaningful learning in his class. A multiple of causes for the student's low achievement in mathematics has been attributed to: difficulty in understanding the specialized mathematical language, ineffectiveness, teacher-centered teaching methods and learners' negative attitudes towards the subject. Learners lack of motivation to learn the subject and lack of mathematics syllabus coverage (Shikuku, 2009).

In any teaching context teachers of mathematics need not only to understand the relevant mathematical content but also know how to maneuver himself with the methodologies of teaching mathematics for students to develop understanding of specific mathematical content and how that content can be represented and made accessible for students (Ball, Thames, & Phelps, 2008; Chick, 2007).

Following Beswick, Callingham and Watson (2011), in the construct of teacher methodologies we also include teachers' relevant beliefs, for example, about their role as teacher, the nature of mathematics, and how mathematics is best taught and learned. Confidence, in both the everyday uses of mathematics and to teach various aspects of the curriculum, is also considered part of teacher methodology.

In the current era of high stakes testing, however, teachers teaching mathematics often ―teaches to test and spend little time helping the student learn some mathematics concepts. In order to improve the academic performance of all students learning mathematics, teachers need to help students develop effective learning strategies. As research suggests, effective use of learning strategies can greatly improve student achievement (Protheroe & Clarke, 2008). Students may choose inappropriate learning strategies or may approach learning with few strategies and use only these ineffective strategies while tackling a task, even when their methods repeatedly lead to failures. For this reason, Pressley & Harris (2006) suggested that educators can implement ―strategies instruction, a useful approach to teaching mathematics.

Teachers vary in how they manage their classes, how they interact with their students learning mathematics, and how they view their roles as educators. When teachers teaching mathematics show learners how to select and use appropriate strategies, they display their own preferred

teaching methods. Thus, teaching methodology affect not only instructional strategies adopted by teachers but also students' learning abilities. Instead of relying on their preferred teaching methods, teachers should understand that one methodology of teaching may not meet the needs of all students. Students differ in the way they approach the learning process and deal with various learning activities (Callahan, Clark, & Kellough, 2002). One good way to have teachers consider individual learning differences and recognize the need to modify their own teaching methods is to have them learn from the student's perspective. Much research has been devoted to teaching styles and learning strategies in higher education. There is little research; however, concerning students' perceptions of their teacher's teaching methodologies which aid their own learning process. The government and other stakeholders in the education sector have introduced a number of initiatives to promote effective teaching and learning of mathematics with the aim of making the subject more enjoyable (Anku 2008).

Student perception is an important source of information for education research. But perception can also be a flawed source of information. Students are often perceive on topics, such as Teacher methodologies of teaching in the classroom of their schools, and this type of student perception are increasingly being used to shape policy and personnel decisions. For example, student perception of teachers methodologies of teaching are being included as part of new teacher evaluation systems in Nigeria. Students are also often perceived about their own behaviors. Student's perception is the basis for the measurement of character traits and non-cognitive skills. Unfortunately, most education research ignores an important problem of such student's perception called reference group bias – a problem that limits the usefulness of perception in making valid comparisons across students from different backgrounds, classroom settings, cultures or countries. Reference group bias occurs when individuals have different

frames of reference (i.e. Implicit standards), they use to answer the question they are being asked. For example, when students are asked to rate the competencies of their teachers' method of teaching mathematics, the individual standard for teacher methods impact the rating that the student assigns the teacher. For instance, the notion of what it means for a teacher to keep his/her class in order is most probably affected by cultural and classroom context and so, two students who face the same performance from their teachers may rate their teachers' teaching mathematics in the classroom differently.

Teachers are the single most important resource to a students learning" (The White House, 2010). Research on teacher's methodologies over the past few years has provided data That suggest schools have an impact on student learning, but more importantly, that the largest influence on student learning can be traced to teachers (Darling-Hammond, 2000). Results of these studies have provided documentation that supports the value of teacher content knowledge of the topic they are to teach, most especially, mathematics; content-specific pedagogy, and professional learning tied to the content taught by teachers (Allen, 2003; Darling-Hammond, 2000).

The teaching and learning of mathematics has therefore been an issue of considerable concern f or some time now and the Mathematics curriculum in Nigeria has been under intense scrutiny coupled with a number of restructuring and the introduction of new syllabus and teaching methods. In response to this demand, researchers, educators and other stakeholders in the education sector have advanced educational arguments supporting the need for scientific evidence into the issue and the way forward In Nigeria ministry of education (M.O.E) 2003. In addition to this, assessing teachers teaching methodologies using students' ratings and feedback has proved to be reliable, variable and as one of the best methods of measuring teachers'

teaching methodology by a number of studies according to Arthur *et. al.* 2003. He also argued that the current system of assessing teachers by examining their own perceptions of their teaching methodology is neither reliable nor valid, since it most often considers students' views as unimportant although students are directly affected by the teacher's actions and inactions. For example, a number of studies have found some inconsistencies between teachers' perceived and actual teaching practices. Li and Yu (2010), conducted a research on the relationship between a secondary school teacher's perception about mathematics and his/her teaching methodology, divulged some inconsistencies between the teacher's perception and his teaching methodology. They blamed these inconsistencies to a lack of pedagogical content knowledge about mathematics teaching.

In Nigeria, students' ratings of teachers' methodology are widely used in secondary schools and universities. However, there are limited studies which have investigated teachers teaching methodology by examining students' perceptions of their teacher's teaching methods at secondary education level. The assessment method used in evaluating teachers' teaching methods and effectiveness of their teaching where students' views have been ignored has not provided reliable and valid information.

. Mathematical perceptions considered for this study include individual constructs that are generated by individual experiences (student characteristics), home and societal context of the student and those emanating from classroom experiences (Hannula, 2007). Studies generally have found boys to hold a more positive attitude towards mathematics (e.g. Kaasila, Hannula, Laine & Pehkonen, 2006).

In this study, the term 'perceptions of mathematics' is conceptualized as a mental representation or view of mathematics, apparently constructed as a result of social experiences, mediated through interactions at school, or the influence of parents, teachers, peers or mass media. It also refers to some kind of mental representation of something, originated from past experience as well as associated beliefs, attitudes and conceptions. There are several studies that focus on investigating on students perceptions of their mathematics teacher teaching methodology (Picker & Berry, 2000; Rensaa 2006; Aguilar, 2012; Moreau, Mendick & Epstein, 2010). Despite this large body of research, there is a lack of research on views and beliefs held by Minna Niger state secondary school students to determine whether those perceptions has any relationship with students' motivation to learn mathematics. Student's perceptions of their mathematics teacher teaching methodology were also studied because it could be an indicator of the students' differences in performance in mathematics achievement that exists among secondary school students in Minna, Niger state

1.2 Statement of the Problem

Researchers have studied the ways in which both teachers and learners perceive teachers methods of teaching and how these perceptions impact learning.

The problem of this study emanated as a result of the inconsistency of the result of findings in these research. The students' perception is regarded as unimportant although they are directly affected by the teacher's actions and inactions. However, in other to know how efficient and reliable the mathematics teacher teaching methodology is, student's perception is an important source of information which can be used for educational research.

Consequently, the purposes of this study were to investigate students' perceptions on teaching methodology of mathematics teacher of senior Secondary school in Bosso Local Government Area, Minna. To determine if there is a difference between gender perception of their mathematics teacher, and to see if there is a relationship between students' perceptions of teaching methodologies.

1.3 Aims and Objectives of the Study

The main aim of the research is to study the perception of students on their teacher's methodologies of teaching and learning mathematics in Bosso local government area of Niger state. Specifically, the objectives of this are to

1. Investigate on student's perception of the methodologies of their mathematics teachers.
2. To examine whether there is any difference between male and female students' perception on their teachers teaching methodology.

1.4 Significance of the Study

1. The significance of this study will help the teacher to know what the students perceived about their teaching methodologies.

2. The result of this investigation will help the teacher to improve in the area where the students are not satisfied with his/her teaching and learning methodologies.

1.5 Research Questions

This study investigates three questions related to the teaching methodologies of mathematics teachers and the learning strategies of secondary school students:

1. What teaching methodology do secondary school students preferred most to solve their mathematics problems?

2. Is there a difference between male and female students perception in their preferred methods of teaching mathematics?

3. What are the main teaching methodologies of secondary school teachers, as perceived by mathematics students?

1.6 Scope/Delimitation of the Study

This study centers on the investigation into students' perception on teaching methodologies of Mathematics teachers in Minna metropolis, Niger State. The North Central Zone of Nigeria. The state is bordered by the North with Zamfara State, by the East with Kaduna State, by the South with the Federal Capital Territory (FCT) Abuja and by the West with Kwara State. Minna metropolis has a total number of 45 Senior Secondary Schools (both public and private)

Four (4) schools among these senior secondary schools were selected for the study and the SSII students were found suitable for the study, as they offer science subjects and Mathematics is not an exception in the subject they offer. These four (4) schools are Bosso Secondary School, Fema School, Hasha international School Bosso, and Challenge international school Bosso are all situated in Minna Niger State.

1.7 Definition of Terms

1. **Investigation:** This is the ability to observe or study by close examination and systematic enquiry.

2. **Perception:** This ability to see, ear, or become aware of something through the senses.

3. **Methodologies:** This is a set or system of methods, principles, rules for regulating a given discipline, as in the arts of sciences.

4**. Mathematics:** The abstract science of number, quality and space, either as abstract concept (pure mathematics), or has applied to other disciplines such as physics and engineering (applied mathematics).

5. **Teacher:** A teacher is a person who helps others to acquire knowledge, competence or values. Informally the role of a teacher may be taken by someone.

6. **Student:** A student is a learner or someone who attends an educational institution

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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Given the nature of high-stakes accountability in Nigeria, school districts and state boards of education are focused on the practices that directly influence student learning. Methods of teaching mathematics are changing from the historical practice of administrative of teacher tasks, knowledge, and ability to teacher practices that produce observable and measureable student academic achievement. A historical review of literature provides a multitude of data that supports a common belief: teacher effectiveness is the greatest determinant of student achievement (Darling-Hammond, 2000; Gold Haber & Brewer, 2001). Boyd, Lankford, Loeb, Rockoff and Wyckoff (2007) discovered a narrowing of the achievement gap in New York City schools when policy makers placed teachers with greater credentials into high-poverty schools. The gaps between student groups is supported by the findings in the work of Darling-Hammond (2000), and Gold Haber (2001), as well as in the more recent research on effective teaching.

The study reviewed related literatures on students' perception of mathematics teacher teaching methodology. The development of students' positive perception towards methodology is a key intended outcome of mathematics curriculum at each grade level in most countries

This literature review will be divided into three parts which are:

2.1 Conceptual Framework

2.2 Theoretical Framework

2.3 Empirical Studies

2.4 Summary of Literature Review

2.1 Conceptual Framework

2.1.1 Teaching Methodology

Various researchers have stressed different aspects of methods in teaching. Teaching methodologies refers to educators' behaviors as they teach in the classroom (Genc & Ogan-Bekiroglu, 2004). Educators' personal qualities are considered persistent (Shieh, 2005). According to Conti, ―the overall traits and qualities that a teacher displays in the classroom and that are consistent for various situations can be described as teaching methods (p. 3). They stated that the teaching techniques and methodologies. How teachers teach is related to how they learn. ―Research supports the concept that most teachers teach the way they learn‖ (Stitt-Goheds, 2001, p. 137). Based on their personal learning experiences, teachers tend to teach students how they themselves learn the best and introduce learning strategies that have benefited their own learning. The same learning strategies, however, may not work well for all of their students. Therefore, Dunn and Dunn indicated that teachers should adjust their preferred way of teaching to reach each student. In a survey on effective teaching (Babbage, 2002), effective teachers were identified as those who knew how to challenge and encourage their students, and demonstrate enthusiasm for the content. The teachers were willing to try new teaching methods and make connections between the content and the lives of their students.

Gloria Ladson-Billings, in an online interview with Au (2005), stated the following "Part of being highly qualified as a teacher is that you actually understand student's, you understand community, you understand context — so that you go into a setting and you're able to understand

enough about the setting, enough about yourself, to be able to be effective... If the students aren't really learning anything, how can you be highly qualified?

That has got to be an ultimate goal of the enterprise — that students come out able to solve problems, able to make decisions, able to critically analyze their environments. Highly qualified teaching is intimately tied to results, but I'm not talking about results as standardized tests Despite the importance of these different but interrelated factors, the core of the interplay between the learner and what is learned is accredited to the teacher who is recognized and accepted by the society to pass on the society's accumulated norms, values, knowledge and skills to the present and future generation. It is upon this that impact of teacher related factors on students learning of mathematics and student's performance in mathematics has been receiving a considerable attention for some time now. In examining the impact of teacher related factors on students learning and their performance, a number of studies (Mew born 2001) have investigated into the impact of teachers' subject content knowledge on their teaching and established those teachers' subject content knowledge impacts on their teaching. Mew born (2001) established that although mathematics teachers' subject content knowledge plays a vital role in their teaching, "merely knowing more mathematics does not ensure that one can teach it in a way that promote students conceptual understanding" (p. 28).

That is, teachers' perception of their teaching and how they teach is of great importance in measuring the effectiveness of mathematics teaching and learning and it also reinforces teacher's decision making (Ahmed and Aziz 2009). Ernest (1989) explained that, teaching reforms cannot take place unless teachers' deeply hold good beliefs about mathematics teaching and learning changes?" (p.249). Handal and Herrington (2003) also argued that "successful curriculum change is most likely to occur when the curriculum reform goals relating to teachers' practice

takes into account of the teacher's belief" (p.65). In all the above studies, the main methods used in examining teachers perceptions of their teaching mathematics in general was through the collection of both quantitative data (through questionnaire) and qualitative data (through interviews) from teachers about how they perceived their own teaching.

Researching into teacher's beliefs and perceptions of their teaching has therefore been receiving considerable attention for some time now and this is broadly documented in the literature. However, Ahmed and Aziz (2009) argued that collecting data from students regarding their teachers' teaching provides meaningful data of what their teacher does. Ahmed and Aziz further argued that collecting data from students about their teachers' teaching is a valuable as their perceptions are "coloured by challenging and interesting experiences that allow them to observe learning and teaching behaviors more intimately than their teachers" (p.19). That is, students perception of their teacher's teaching contribute very much in improving the teaching and learning of the subject as it provides valuable suggestions and directions for the teacher's future improvement (Ahmed and Aziz 2009). Ahmed and Aziz (ibid) also found out that when students develop conceptual understanding of the concept presented when they perceive their teachers' classroom environment as cooperative rather than competitive. In describing students perception regarding their mathematics teachers' teaching, Rawnsley (2007) established that students develop a more positive attitude toward their mathematics lessons where the teacher is considered to be highly supportive and gives the students the chance to play an integral role in the teaching-learning process.

In addition to this, assessing mathematics teachers teaching practices using students' perception has proved to be reliable, variable and as one of the best methods of measuring mathematics teachers' instructional practices by a number of studies (Arthur et. al. 2003). Arthur et. al. (2003)

argued that the current system of assessing teachers by examining their own perceptions of their teaching is neither reliable nor valid, since it most often considers students' views as unimportant although students are directly affected by the teacher's actions and inactions. For example, a number of studies have found some inconsistencies between teachers' perceived and actual teaching practices. Stigler and Hiebert (2009) disclose that most teachers, among teachers who normally express non-traditional beliefs, display inconsistent practices and, although all the teachers in their study reported that they hold non-traditional beliefs, their actual teaching practices were inconsistent with these beliefs.

Perkkila (2003) also found that teachers' beliefs about mathematics were primarily non-traditional, but their instructional practices still focused on textbooks, rules and procedures in solving problems. Li and Yu (2010), who studied the relationship between a pre-service teacher's beliefs about mathematics and his/her teaching practices, divulged some inconsistencies between the teacher's beliefs and his teaching practices. They attribute these inconsistencies to a lack of pedagogical content knowledge about mathematics teaching.

Questions regarding the value-added connection between teaching and learning have been at the forefront of studies as boards of education attempt to find the magic combination of quality teaching practices and teacher content knowledge. "Value-added" is defined as how much value has been added to student learning (Carter, 2008). As student learning progresses from level to level, student scores from previous achievement tests are compared with later scores to measure growth rather than evaluation of one score at a particular point in time.

2.1.2 Characteristic of Effective Teachers

The bedrock of educational system lies on a core of devoted, knowledgeable, competent and well-trained teachers. Groton (2008) rightly pointed out that if a person is to be successful in his chosen career, that individual also needs a set of ethical beliefs or standards for guidance or direction in the appropriate use of competences. A competent mathematics teacher seeks to know his learners' behavior in which he teaches, and must perceive the individual learner as a whole since he has affective, cognitive and psychomotor talents. Also, students' participation in the instructional process is critical and their perception presents methodological challenges. The knowledge of the way the students think and perceive can aid the teacher to reflect upon and adjust his teaching strategies to enhance students' understanding and achievement. Allport (2008) described perception as the way people judge others with who they are in contact. A persons' attitude to an idea or object determines what the person thinks, feels and how the person would like to behave towards that idea or objects. Schunk (2009) defined attitude as internal beliefs that influence personal actions which is learned through one's experience. This has to do with a disposition to act or react in a particular way as the individual responds to a situation (Amoo & Rahman, 2004). Thus, the students' perception of the teachers' characteristics could influence their attitude toward mathematics or any other school subject. Students more often than not judge their teacher since such areas as the teachers' knowledge of the subject matter, communication ability, the choice of appropriate teaching method and the general classroom management skills. A teacher who is rated high on these indices the perception of the students is likely to enjoy the confidence, respect and admiration of his students.

In a recent study by Stronge, Ward, Tucker, and Hindman (2008), the researchers studied the instructional behaviors and practices of teachers and sought to determine the best practices that would foster increases in student learning.

The overall benefit of the Stronge et al (2008). Study was the recognition of the instructional characteristics and behaviors of teachers that correlated with increased gains in student learning. Three succinct themes came from the results of the analyses: effective teachers understand that a one size fits all approach does not promote student learning; effective teachers ask more higher-level questions than ineffective teachers; and in the effective teacher's classroom, disruptive behaviors occur on an average of one per every 2 hours when compared with one every 12 minutes in an ineffective teacher's classroom. The researchers believe that "effective" teachers, when considering student achievement, possess a set of attributes that produces positive teacher-student relationships and student encouragement (p. 208). The findings from Stronge et al. (2008), Wright et al. M, Nye et al. (2004), and Darling-Hammond (2000) reinforce the importance of teacher methodology and effectiveness as the common denominator in student learning.

Eggen and Kauchak in Adediwura and Tayo (2007) sub-divided teachers' knowledge of subject matter into: knowledge of content, pedagogical content knowledge and general pedagogical knowledge.

Ball and Bass (2000) had earlier explained that knowledge of mathematics itself (knowledge of subject matter) should go further than the specific content of the discipline to the knowledge of how to teach, present mathematical concepts and that of selection and use of instructional media

and resources. Muijs and Reynolds (2002) posited that teaching effectiveness of the teacher is hampered if he/she is not versed in the contents to be taught.

A teacher who has a deep understanding of the concept to be taught is more likely to use unambiguous language; his/her presentation is likely to be more coherent and he/she would offer clearer explanation than those with a weaker background, (Uya, 2011). Huckstep, Rowland, and Thwaites (2003) in their finding on importance of mathematics teachers' knowledge of subject contents, affirm that effective teaching that can lead to better achievement by the students and provide a positive attitude depends on teachers' confidence and in-depth knowledge of the subject matter.

2.1.3 The Brief History of Mathematics

The history of the ancient mathematical world begins with Pythagoras in Egypt and Mesopotamia. The history goes on with Plato, and Aristotle in Greece. During his travels to Egypt and Mesopotamia, Pythagoras established religious brotherhoods devoted to religious visions and the pursuit of knowledge. It was from these religious brotherhoods that he established that many were able to investigate the workings of mathematics. The religious brotherhoods were active for over twenty years and were disbanded due to riots shortly after Pythagoras death. Before his death, Pythagoras was able to discover harmonic notes in relation to mathematics.

In addition, he was able to expand mathematical knowledge in relation to geometry. "From the evidence of geometrical figures, and the ratios found in number sequences, Pythagoras was led to the generalization that the entire universe is governed by Plato believed that learning occurred in a sequence of appetite and spirit and that educational training should follow that order.

Furthermore, he believed that the youth should exhibit considerable effort to enhance their knowledge. “Arithmetic, geometry and other studies leading to dialectic should be introduced in childhood” (Bowen, 1972, p. 106). Leaning happened when the person was open to new possibilities and not experiencing any duress. During this time, after a child had finished their two-year military training, they were enrolled in the academy to learn the five Pythagorean sciences: arithmetic’s, plane geometry, solid geometry, astrology, and harmonics. From this additional training a few were selected to continue training with five year instruction in the art of dialectic. By the age of thirty-five a person completed their training and was believed to have finally achieved enough knowledge to begin to know the truth (Bowen 1972). “Reason does not appear until the dawn of maturity, so that introduction to rational studies should begin only then” (Bowen, p. 107). Plato believed in developing the philosophers that were able to develop abstract thinking. This indicated the first movement towards constructivist teaching of philosophical teachers that were able to extract abstract ideals and relate them back to real world experiences.

While Plato believed in abstract mathematical thinking, Aristotle was the opposite. Aristotle believed that the mind was a logical structure that conveyed learning through the senses. Aristotle believed in the areas of facts and what is real and can be touched with your hands. “Behind all movement must rest a mover which is the cause itself, that is, beyond which no previous cause exists (Bowen, p. 121). Pythagoras and Plato were two main influences in constructivist teaching and learning, the next section probes the influences during the 18th and 19th century.

His principal of harmony (Bowen, 1972,), He believed that man had an inner harmony that revolved around his personal psyche. Through the contributions that Pythagoras made to the mathematical world, Plato expanded on what had already been obtained by Pythagoras.

The basis for constructivist teaching started in the 18th century by an Italian philosopher named Giambattista Vico who defined knowledge as a cognitive structure of a person so to know something is to know how to create. In 1781 another philosopher named Immanuel Kant adapted Vico's philosophical views into a book titled the critic of pure reason. He believes that the mind is actively involved in all areas of our lives (Bowen, 1972).

2.1.4 New Mathematics Education.

During the 1950's an important event occurred that began to change the educational system and teaching styles. In October 1957, Russia launched Sputnik, the first satellite. One event had the power to change the educational system forever. Because the Russian's beat the United State and were the first ones to reach outer space the United States began to panic. They were afraid that they were not preparing today's students in the mathematical and science skills that they need. This was the start of what was to later be called the space race, the need to beat the Russians. Where previously there has been no money to put into education, suddenly there were funds available to aid in reforming the mathematics and science systems (Spring, 2007). During this time the public was recognizing a need for greater mathematical and science skill for technology to make sure that the U.S. was still the world leader.

The change in the mathematical world shifted from a traditional and route memorization to a constructivist approach. The new math movement focused on strengthening students' mathematical skills to enable them to expand their knowledge into the sciences. The goal of the new math movement was to allow students to develop their cognitive thinking abilities and to be able to relate mathematics.

The mathematics reform movement of the 1970's and 1980's focused on returning mathematics education back to more traditional and rote memorization. It was believed that students needed to follow the strict rules and complete practice drills to be able to gain knowledge in mathematics, "it isn't that American kids can't calculate…it's that they have trouble figuring out what calculations to use if they are not told" (Roitman, 1999, p. 127). Many believed that using hand-on materials and other elements to relate their experiences to real life would inhibit the students learning. Students would not be able to relate the interactive mathematics to computational math (Askey 1999).

2.1.5 The Rationales for Studying Mathematics.

The following are few reasons why student should study Mathematics though most people claimed that they will never use the idea in real life and that it is pointless, but in fact, the same Mathematics that they claim to be ridiculous and dumb issued in everyone's daily life;

- The principle of Mathematics can be satisfying for everyone, every person should develop problem-solving skills, and Mathematics is required for everyday life. Students in high school and college are forced to take mathematics regardless of what they wish. They are not allowed to completely skip it just because they despise the subject, as I am not allowed to completely skip over English classes, which I feel I despise equally as much due to the fact that Mathis important for an individual's mental activity. It challenges those who excel in the arts to use the other part of their brain and stimulates thoughts that they may not have had otherwise. It is not calculus that is required to challenge someone or improve him, but even the basics, which may be difficult for some, can help students to achieve a personal satisfaction in accomplishing something they are not necessarily good at.

- It is a necessary part of educational process to make the individual well-rounded in all aspects including science, humanities, writing classes, language, and the other basic fields of study. While this assumptions true, this is not the main reason why mathematics should be a required part of a school's curriculum. First of all, simply removing the requirement for math classes would lower the standards for everyone either educating or being educated. Simply giving up on a generation of kids who are not good at math is definitely not the right way to go. If anything, people should be pushed harder in mathematics to do the best as possible even if that means "failing." Hopefully failure would lead persistence to succeed and motivation to do better. In secondary school, math should be required for at least three years. This is because during the secondary school years, a student rarely knows what future profession he or she may have. Entering secondary school, one may have dreaded mathematics in previous years, but upon being exposed to higher levels of math, the person might gain curiosity or even enjoyment for mathematics. Dropping the requirement may steer students away from something that they may develop to be very good at or have future profession in.

- One of the reasons why mathematics should be required course is the fact that it helps to develop the problem solving process. Although one may not directly use mathematics in their everyday lives, math plays an indirect role in how they make many day to day decisions such as finances or time management. The ability to solve problem is not something that can be directly taught, but is rather a discrete skill learned over many years through trial and error, past experiences, and exercises that might help to develop such a skill. Mathematics is certainly one of these exercises. Math is one of the few fields of study where many facts are not necessarily memorized. Such field where this is necessary is history. In math, one only has to know the basic operations, and symbolisms. With this limited knowledge; one can solve an infinite number of

problems. Theorems may require a certain amount of memorizing, but even these can be derived from previously gained knowledge. In other words, gaining math skills does not just mean that one knows how to do math, but rather opens up the brain to all kinds skills and development .

- The physical world is governed by a tremendous amount of mathematical relations. Quantities are conserved, rates of change vary, and effects are accumulated over time. Subatomic particles, chemical compounds, toilets, trebuchets, water balloons, car crashes, bird flight, populations, nuclear reactions, planetary orbits, and solar radiation all behave according to some mathematical model. Even the simple act of pushing or pulling a cart can be mathematically scrutinized. Math is the best way to describe the physical world since it can concisely portray a generalrelation and how it varies.Anybody with any stake in the physical world, namely everybody, should have at least a minimal understanding of physics. Any understanding of physics requires an understanding of math. Both the philosophy and history major conceded that math up to and including Geometry, Algebra II, and Trigonometry is necessary for even those in non-mathematical fields. The other engineering major were undecided between Trig and Calculus I.

- Mathematics have developed so far through history that it is now possible for someone with limited knowledge of arithmetical concepts to perform all needed calculations using simple technology, and for this reason the majority of the population will never put into practice any further mathematics learned. The focus of education has not always been on practical application, however; classical education, which was in some ways the ideal, served to better the mind regardless of applicability or usefulness. An educational theory that emphasized the permanent intellectual benefits of sophisticated thought, and connected the various subjects with their collective need for logic and analysis would both require and justify the teaching of

mathematics to everyone.

2.1.6 The Concept of Perception

Perception is the process by which an individual interprets and organize sensation to produce a meaningful experience of the world (Lindsay & Norman, 1977). In other words, a person is confronted with a situation or stimuli. The person interprets the stimuli into something meaningful to him or she based on prior experiences. However, what an individual interprets or perceives may be substantially different from reality. Perceptual experiences provide an essential source of information about the world. It is clear that having the capacity of undergoing such experiences yields an evolutionary advantage. Information generated from perceptual experiences can be, and often is, revised: perception is, of course, a fallible sense modality. And its fallibility emerges, in part and in certain contexts, from a conceptual component. If while strolling on the beach I mistake a rock for a crab, it is my interpretation of the sensory information I received in other words, my conception that was ultimately responsible for the mistake. That I received some sensory information through my eyes is undeniable. In that case, the problem was the way I conceptualized the relevant information. Our mind is shaped, in part, by the visual experiences we have, these experiences provide visual information about the environment, and data that can be structured to form conceptions. This is not a naïve form of empiricism that insists that all the content of the mind has to be perceptually based. Some contents obviously are; but not all of them have to be certain mathematical concepts clearly far outstrip anything that can be perceptually obtained. Consider, for instance, the higher reaches of set theory included in the iterative conception of set (Forster2008). On this conception, sets are generated in stages according to a prescribed procedure. These sets cannot be simply obtained

perceptually the huge cardinality and the abstract nature of the sets involved prevents anyone from experiencing them perceptually.

This is a construction guided and structured by suitable mathematical principles, which are formulated as principles of set theory. Thus, the construction is implemented and achieved conceptually. It may be argued that it is possible to perceive some sets. Perhaps, the argument goes, we can perceive singleton sets (such as, the set {a} whose only member is a) as long as (i) these sets are impure (that is, they ultimately contain non-sets as members), and (ii) the members of these sets can be perceived (they are the kind of objects that, under suitable conditions, someone can have a perceptual experience of them). These singleton sets would be located anywhere their members are located, and if these members can be perceived, so can the corresponding sets. This argument, however, is problematic.

Even if the singleton sets could be perceptually experienced, it does not follow that all sets are so experienced. Pure sets (that is, sets which ultimately contain only sets as members) cannot be perceived in this way. Since neither these sets nor their members have spatiotemporal location (since pure sets have no such locations), it is not possible to perceive them. To perceive an object it is required that the object be located in space-time, so that the relevant information can be transmitted from the object to our perceptual apparatus. Since pure sets do not satisfy this condition, they cannot be perceived. This dramatically restricts the range of sets that could be formed if we were to restrict sets to just impure sets. Perception is, in many ways, very restricted in what it can do. It provides content to the mind only of what is actual. The necessary (to the extent that there is something in that category) and the merely possible are not perceptually given. In order to perceive an object, say a dragonfly that objects needs to be present. Otherwise, one would not perceive the dragonfly, but only think that the dragonfly was perceived, or

perhaps imagine the dragonfly. This is because perception is active: (i) if I perceive that is P, then 'P' is true. (ii) If I perceive o, then o is present. In other words, the facility of perception encompasses both perception of facts (e.g. perceiving that a dragonfly is resting on a leaf; see (i) or perception of objects (e.g. perceiving a dragonfly; see (ii)). And it is precisely because perception is active and restricted to the actual that it is a significant source of structural information for the mind. In turn, perception shapes the mind by specifying the contents of what the mind apprehends, and also the mode of presentation of these contents, which are visually For a discussion of this view, see Maddy (1990). Critical reactions to it can be found in Maddy (1997) and Balaguer (1998). Of course, everything that is actual is also possible. In this sense, some possibilities are given in perception.

2.1.7 Students Attitude towards Mathematics Teachers with Respect to Perception

The conceptions, attitudes, and expectations of students regarding Mathematics and Mathematics teaching has been considered to be very significant factors underlying their school experience and achievement (Borasi, 1990; Shoenfeld, 1985). Most student attitude towards sometimes is as a result of their perception of the subject and vice versa in general, the concepts students hold about Mathematics determine how they approach the subject. In many cases, students have been found to approach Mathematics as procedural and rule oriented. This prevents them from experiencing the richness of Mathematics and the many approaches that could be used to develop competence in the subject. Attitude can also be gender related. There are many who hold the view that boys do better in Mathematics than girls. This belief tends to affect the attitude of girls towards Mathematics. Farooq and Shah (2008) in a study of secondary school students in Pakistan found that there was no significant difference in confidence of male and female students towards Mathematics at secondary school level. They rather found that students' success in

Mathematics depended on attitude towards the subject. Nonetheless, some studies have found gender difference in students' confidence in Mathematics. Compared to boys, girls lacked confidence, had debilitating causal attribution patterns, perceived Mathematics as a male domain and were anxious about Mathematics (Casey, Nuttal&Pezaris, 2001). In the study, girls were found to have lower self-confidence in Mathematics than boys.

Instructively, research on the relationship between student attitude and performance has also been inconclusive. Researches that have been conducted to determine the relationship between students' attitude towards Mathematics and achievement in Mathematics have yielded contradictory results. The findings have thus lacked consistency on the subject. Some studies have demonstrated a strong and significant relationship between Mathematics attitude and Mathematics achievement (Minato &Yanase, 1984, Randhawa& Beamer, 1992, Schenkel, 2009). In the Schenkel's (2009) study of elementary school pupils, positive correlation between student attitude and student performance was found. Student beliefs and attitudes were found to have the potential to either facilitate or inhibit learning. In a comparative study of factors influencing Mathematics achievement, Burstein (1992) found that there is a direct link between students' attitudes towards Mathematics and student outcomes. Cheung (1998), in his study of 11-13 year olds, also discovered positive correlation between attitude and Mathematics achievement. The correlation showed that the more positive the attitude, the higher the level of achievement in the student. Some researchers have, however, demonstrated that the correlation between attitude towards Mathematics and achievement in Mathematics was rather weak and could not be considered to be of practical significance (Vachon, 1984; Wolf &Blixt, 1981). In a meta-analysis of 113 primary studies involving elementary and secondary school children, Ma and Kishor (1997) found that attitude towards Mathematics and achievement in Mathematics was

positively and reliably correlated but not strong. The correlation was not statistically significant. Flowing from the preceding findings, studies in different cultural settings are eminent to realize the influence of student attitude towards Mathematics on student learning outcomes in the subject.

2.2 Theoretical Framework.

The conceptions, attitudes, and expectations of the students regarding mathematics and mathematics teaching have been considered to be very significant factor underlying their school experience and achievement (Schoenfeld, 2008). These conceptions determine the way students approach Mathematics tasks or student perception towards Mathematics, in many cases leading them into non-productive paths. Students have been found to hold a strong procedural and rule-oriented view of mathematics and to perceive that mathematical questions should be quickly solvable in just a few steps, the goal just being to get "right answers". For them, the role of the student is to receive mathematical knowledge and to be able to demonstrate so; the role of the teacher is to transmit this knowledge and to ascertain that students acquired it (Borasi, 1990). Such conceptions may prevent the students from understanding that there are alternative strategies and approaches to many mathematical problems, different ways of defining concepts, and even different constructions due to different starting points. They may approach the tasks in the mathematical class with a very narrow frame of mind that keeps them from developing personal methods and build confidence in dealing with mathematical ideas.

Looking at the area of student perception on mathematics and learning theories, two general kinds of theories are found. There are those which focus particularly on mathematics learning and there are general learning theories which can be applied to the learning of mathematics. It is

assumed that general theories of learning have much to offer to the processes of teaching and learning mathematics (Orton, 2004). Orton imagines if it is possible to enhance learning mathematics through optimum sequencing, or is it a question of waiting until students are ready. He also asks whether students discover mathematics and if they can construct mathematical knowledge for themselves. It appears there are a variety of different learning theories and it is difficult to know which the appropriate one is.

This part of this chapter will look at theories that supporting the process of learning Mathematics to build positive perception of Mathematics on student but, here, four of the general views about other learning theories that link to learning mathematics are presented as follows:

• Piaget and cognitive developmental psychology

• Behaviorist Approach

• Theories of learning mathematics

• Constructivism theories

2.2.1 Piaget and Cognitive Developmental Psychology

Jean Piaget (1896-1980) is considered to be the most influential developmental psychologist in the twentieth century (see Flavell, 1996). After finishing his doctorate degree in biology, he devoted his life to study psychology, searching the mechanism of biological adaptation and analyzing logical thought. His approach was based on an evolutionary epistemology. Piaget realized that any decent learning theory involves epistemological considerations and he called his own research programmed ‘Genetic Epistemology’ (Piaget, 1972). Adaptation is the term that

describes an individual's changes in response to the environment. Adaptation plays an essential role in Piaget's theory.

Glasersfeld (1989) noticed that the most basic of all Piaget's ideas is that knowledge does not attempt to produce a copy of reality but, instead, assists purposes adaptation .Piaget explored two questions: How do children manage to adapt to their environment?;and, How can we classify and order child development over time? Piaget's method in his experiments depends on asking children for their ideas about natural events and recording their answers with great attention. He believed that the highest form of human adaptation is Cognition. He used features of biological adaptation and created his own distinctive terminology as explained below, in order to explain children's adaptation to the environment.

Schemas; according to Piaget, are the basic ways of arranging patterns or steps of thought or action that we construct to make sense of our interactions with the environment. Schemas can be described as files in which we store information, so each schema treats all objects and events in the same way. Piaget believed that thinking is an internalized activity. Individuals interact with and make sense of the environment around them, and it is this physical interaction that becomes internalized to create thinking.

Assimilation and Accommodation: according to Piaget, the term adaptation is used to describe the process of adjusting schemas in response to the environment by means assimilation and accommodation. Assimilation is the process of taking in new information and trying to fit this information into existing schemas, or responding to the environment in terms of previously learned patterns of schemas. Accommodation is the ability to fit the new information, or

responding to the environment in a new manner, if previously learned patterns of behavior or schemas are not sufficient.

Equilibrium is when the individual's perception of the world fits into existing schemas. It is a state of continual activity in which an individual compensates for disturbances to the system. Dis-equilibrium is when existing schemas cannot deal with new experience. In order to answer the question of how to classify and order child development, Piaget postulated four stages for cognitive development through which individuals' progress between birth and young adulthood, these stages being qualitatively different from each other. He claimed that children pass through a series of stages of thinking in this order and that no child can jump a stage, although some children would advance earlier or later to the next stage. Slavin (2006) listed these cognitive stages

Piaget's Stages of Cognitive Development

People progress through four stages of cognitive development between birth and adulthood, according to Jean Piaget. Each stage is marked by the emergence of new intellectual abilities that allow people to understand the world in increasingly complex ways.

Table 1.0; stages of cognitive development (Slavin, 2006

STAGE	APPROXIMATION AGES	MAJOR ACCOMPLISHMENT
Sensor-motor	Birth to 2 years	Formation of concept of "object performance" and gradual progression from reflexive behavior to goal directed behavior.
Preoperational	2 to 7 years	Development of the ability to use symbols to

		represent object in the world. Thinking remains egocentric and self-centered.
Concrete operational	7 to 11 years	Improvement in ability to think logically. New abilities include the use of operations that are reversible. Thinking is decentered, and problem solving is less restricted by egocentrism. Abstract thinking is not possible.
Formal operational	11 years to adulthood	Abstract and purely symbolic thinking possible. Problems can be solved through the use of symbolic experimentation.

2.2.2 Implication of Piaget's Theories to Building Students' Perception in Learning Mathematics

According to Piaget's theory, interaction pattern has a facilitative effect on students' academic achievement. The classroom is a small society where the teacher/student, student/student, teacher, student and instructional materials interactions occurs and the setting within which instruction and learning take place.

Piaget's theory implies that the child could be motivated and challenged to learn through interaction Ruther, (2006) added that when a child learns through a positive interaction process, it facilitate retention and positive transfer of learning. Also according to the theory, the benefits of enhancing the way people learn are limitless learning through interactions may fuel continual improvement. Okeke, (2000) added that the more you interact the better you are able to arrive at

your own solution. He concluded that the more knowledge you gain through interaction, the better equipped you are to sort through the information overload of today's academic achievement world.

Behaviorist Approach

A behaviorism concentrates on behavior observation and the behaviorists' belief that learning takes place through stimuli (events in the environment) and gradual responses made by an individual. Human learning was first seen as response acquisition (Smith et.al, 1998). Early behaviorist psychologists, Watson, Pavlov and Skinner, started to study the human learning process based on the training of animals to associate a stimulus and a response. Then animals exhibit required patterns of behavior to prove that conditioning worked (Atkinson et.al, 1993).

The Russian physiologist, Ivan Pavlov (1849-1936) in his salivation responses study in dogs, observed that dogs salivate not only when food is presented but also when food is about to be presented. He realized and explained what is currently known as classical conditioning theory. He rang a bell as he fed some dogs several meals. Each time the dogs heard the bell they knew that a meal was coming, and they would begin to salivate. Pavlov then rang the bell without bringing food, but the dogs still salivated. They had been 'conditioned' to salivate at the sound of a bell. The principles outlined by Pavlov can be applied to learned emotional reactions, which are central to the educational process because an individual (perception) motivation to learn and their belief in their ability to learn will affect how they learn. As an example of learned emotional reactions, Bentham (2002) described to a very bright student 'Connie' who achieved ten grades for her GCSEs. Connie had developed a learned emotional reaction to mathematics (she becomes negative towards mathematics) because her mathematics teacher punished her for

her failure to answer the question ‘what was five times five’, and this could be explained in terms of classical conditioning theory.

Pavlov’s study inspired psychologists in the United States such as E.L Thorndike (Hilgard& Bower, 1966). In his early work, Thorndike linked behaviour to physical reflexes and he went beyond Pavlov by showing that stimuli that occurred after behaviour had an influence on future behaviors. Thorndike (1922) proposed a number of laws, which have contributed to discussion. The law of exercise: The response to a situation becomes associated with that situation, and the more it is used in a given situation the more strongly it becomes associated with it. On the other hand, disuse of the response weakens the association. There is no assertion that practice guarantees mastery, but the majority still believes that practice is the best way to master knowledge (Orton, 2004). Mathematicians are still seeking to establish a strong bond between the stimulus (the question-type) and the response (the application of the method of solution leading to the correct answer), which seems to be direct application of the law of exercise.

The law of effect: responses that are accompanied or closely followed by satisfaction are more likely to happen again when the situation recurs, while responses accompanied or closely followed by discomfort will be less likely to recur. When student’s behavior is reinforced, the behavior is sustained, and this is an example of the law of effect.

Orton (2004) remarks that, although these laws were suggested many years ago, it is interesting to consider how acceptable they are today in the teaching of mathematics, and he wonders if we could enhance learning mathematics through optimum sequencing. Given a proper task (stimulus) from the teacher, or from a book or programmer, the correct answer (response) is obtained, and then slowly but surely, learning proceeds through a sequence or chain of stimulus-

response links. Furthermore, feedback, reinforcement and reward have crucial places in the application of the theory; thus, a cycle of learning is generated. He argues that without other methods that involve repetition, learning may not retained effectively. He went on to observe that the purpose of learning multiplication tables could be considered to fit exactly through chanting, and then the student can repeat them in investigation of number patterns and relationships.

For Instant we are concerned about the student's understanding why $7 \times 9 = 63$, "we also hope that the stimulus 7×9 will produce the instant response 63".

Behavioral learning theories are useful for clarifying and explaining much of human behavior; they are even useful in changing behavior. However, it is important to recognize that behaviorism focuses almost exclusively on observable behavior. Hence, behaviorism had limits. This explains Skinner's failure to provide any explanation of less visible learning processes, such as concept formation, learning from text, problem solving impossible to see what happens inside, and he preferred to keep explanatory concepts to a minimum and simply report data; relationships were unnecessary and unscientific (Asher,2003). Later, a new era began with cognitive psychologists who attempt to look inside the human mind 'the black box'.

2.2.3 Theories of Learning Mathematics

The nature of mathematics as an objective, logical and abstract subject has consolidated resistance to educational shifts similar to the other subjects. Mathematics education researchers have sought to introduce psychosocial theories, to describe the process of learning in mathematics. Two theories of learning mathematics will be presented; one is the Dienes theory of learning mathematics (Dienes, 1960), and the other one is the van Hiele theory of learning geometry (from Orton, 2004 and Fuys et.al, 1988).

Dienes Theory of Learning Mathematics

Dienes started from the position that mathematics could not be learned in a stimulus response manner since it did not address the problem that mathematics-learning was so dependent on understanding the structure (Orton, 2004) . He derived his original inspiration from Piaget, Bruner (1966) and Bartlett (1958), but his theory was also found by research of his own. Dienes theory presents an early-learning environment intended to improve the construction of an understanding of place value, and it gives us a wealth of teaching ideas. Dienes's perspective of learning mathematics comprised the following four principles (Dienes, 1960):

The constructive principle: Dienes claimed that teacher must construct mathematical ideas. He considered the structure of a given mathematical idea cannot be abstracted from concrete objects, but alternatively must be abstracted from relational/ operational/organizational systems that humans require on sets of objects. For instance, when Dienes's arithmetic blocks (see Figure 2-1) are used to teach the "regrouping structure" of our base-ten numeration system, children must first organize the blocks using an appropriate system of relations and operations. Only after these organizational systems have been constructed, can children use the materials as a model that embodies the underlying structure.

2.2.5 Constructivism Theories

Constructivism is one of the most important ideas in current educational psychology, and it draws heavily on Piaget's and Vygotsky's work (Slavin, 2006). It had considerable influence in science education research through the 1980s and 1990s. For example, instruction in mathematics (National Council of Teachers of Mathematics, 1989), and science (American Association for the advancement of Science, 1993) are increasingly grounded in constructivist

theories of learning. The important of constructivist theories of learning (Slavin, 2006) is the idea that learners must personally discover and transform complex information if they are to make it their own, and the learners are seen as constantly checking new information against old rules and then revising rules when they no longer work. It is a view of learning and development that emphasizes the active role of the learner in building understanding and making sense of the world (Eggen&Kauchak, 2007).

"Constructivists believe in making that knowledge results from individual constructions of reality. From their perspective, learning takes place through the continual creation of rules and hypotheses to explain what is being observed. The need to create new rules and formulate new hypotheses occurs when students' present conceptions and new observations" (Brooks, 1990).

According to constructivism, knowledge cannot be transmitted and teachers cannot simply give students knowledge. Instead, students' knowledge must be constructed in their own minds. The role of teachers is facilitating the learning process by teaching in ways that make information meaningful and relevant to students, by providing ways for students to discover or apply ideas themselves (Slavin, 2006). The works of Piaget and Vygotsky emphasized that cognitive change takes place only when already exist conceptions go through a process of disequilibration in light of new information, and emphasized the social nature of learning (Slavin, 2006). There are different views of constructivism each with different implications for educational practice (Biggs, 1996). Constructivists disagree on the nature of knowledge and the importance of social interaction. These two varieties of constructivism will be discussed. The first, originating largely in the work of Piaget, is called the theory of personal constructivism, which focuses on individual, internal constructions of knowledge (Greeno et.al, 1996). This view of construction emphasizes learning activities that are learner centered and discovery oriented. Children's

everyday knowledge of natural phenomena is viewed as a coherent framework of ideas based on a common-sense interpretation of their experience knowledge of living in the world. For example, it is arguable that learning mathematics facts through discovery learning based on what the children already know is more effective than having them presented by a teacher (Pressley et.al, 1992). The second view, strongly inspired by Vygotsky's theories, is called the social construction of knowledge, which proposes that knowledge exists in a social context and is initially shared with others instead of being represented solely in the mind of an individual (Bruning et.al, 1999). Vygotsky developed a fully cultural psychology stressing on the primary role of communication and social life in meaning formation and cognition, and four key principles of his ideas have played an important role. First is his stress on the social nature of learning, where learning is viewed as more a cognitive structure used to interpret nature rather than physical events and phenomena themselves. In this approach the social context in which learning takes places is crucial. Social interaction plays a fundamental role of social construction in the development of cognition. Vygotsky (1978) states: "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inter psychological) and then inside the child (intra psychological). He asserted the significance of dialogue as a tool through which individuals collectively, or individually, could negotiate conceptual change (Boudourides, 1998).

The second key concept is the idea that the potential for cognitive development relies on the "zone of proximal development" (ZPD): a level of development attained when children engage in social behaviour. Vygotsky believed that there exists a difference between what learners could achieve by themselves and what they could do with assistance from a more skilled individual. He developed a concept of a learning environment consisting not only of children and learning

material and processes, but children, learning material and interactive communication. Overall, constructivism does not provide us with a learning theory and does not prescribe to us what our teaching approach should be, and it has only a marginal impact on the theory and practice of scientific education. Undeniably, constructivism has given a challenge to consider on a relativist approach to the teaching and learning processes. Some of these considerations were rather critical against it (Suchting, 1992; Matthews, 1993; Phillips, 1995; Osborne, 1996) and some have urged caution in its adoption (Millar, 1989; Solomon, 1994). While many would disagree with the constructivist approach, few would silence the psychological influence on education brought about by the constructivist view of learning. In fact it is as "a psychological theory about how beliefs are developed" (Matthews, 1998), where the original core of constructivism might be found. Kirschner et.al (2006) have brought together many modern approaches to teaching and learning and demonstrated that any model which does not take into account the limiting capacity of working memory does not lead to better ways of learning. They include constructivism in this describing as an excellent description of learning which, nonetheless, is of very poor predictive value.

2.3 Empirical Studies.

2.3 Teaching Methodology and Students' Learning

Little or no people can deny that every student learns and responds to information differently. To better serve a student's learning needs, researchers have discussed the role of teaching methods in student learning. Many of those researchers support the view that matching teaching methodologies and learning strategies improves student achievement (e.g., Stitt-Gohdes, 2001; Henson, 2004; Hou, 2007).

Zeeb's (2004) research indicated that aligning learning strategies of students with teaching methodologies of instructors could lead to an improvement in academic performance. He examined how junior high students learned and how their teachers taught and found that there was a disconnect between students' learning strategies and their teachers' teaching methodologies. Zeeb used the information obtained from assessing learning and teaching methodologies to help teachers modify their teaching methods to accommodate varying learning preferences, which resulted in improving students' test scores. According to Farkas (2003) he investigated the effect of teaching methodologies on two groups of seventh-grade students. Students in the experimental group preferred similar learning method and were taught according to their preferences, while the other which is the control group was taught with a conventional teaching method. In this study, the students in the experimental group, who received a teaching method that matched their preferred learning strategies, outperformed the control group academically. The experimental group also showed more positive attitudes toward learning, more understanding of people's feelings, and an increased ability to transfer what they had learned from one area to another.

Researchers have classified teaching methodologies in many ways and have considered certain teaching methods more effective in improving student learning. Curtin (2005) studied a group of students and their teachers and categorized teaching methods as didactic and interactive. Didactic teachers make most of the decisions in the classroom, emphasize teaching the content, and put students in a passive role. On the other hand, interactive teachers allow for the diverse learning strategies of their students, place much emphasis on the teaching and learning process, and expect students to be active learners. The findings of Curtin's study suggest that teachers who adopt an interactive teaching method can better meet the specific needs of their students. The

interactive instructors utilized more cooperative learning strategies alongside with numerous activities that worked best with students.

Research conducted by Chang (2002) indicated that a constructivist teaching strategies affects students' perceptions towards teaching and learning of mathematics. Chang explored views of students who were instructed with a constructivist approach and a traditional approach.

Students placed more value on having the opportunity to actively participate in group discussions and to examine concepts they learned when they were taught through the constructivist approach rather than the traditional approach. The study suggested that the constructivist teaching method fosters greater flexibility in teaching, and brings about students' use of deep learning strategies (thinking and discussing) and knowledge construction. In contrast to Chang's study, Kim's (2005) research in Korea indicated that even though students who received a constructivist teaching method for nine weeks had greater use of learning strategies than those who received traditional teaching methodologies, there was no significant difference between learning strategies used by these two groups. More experience with the new teaching method would help determine the effect of those new teaching strategies. In looking at the aforementioned examination of teaching methodologies, one can see that several studies have shown that students have greater learning gains when their teacher takes account of the learners' needs to experience meaningful learning, encourages active engagement, empowers students to direct their own learning, and demonstrates flexibility in his or her teaching methodologies.

Students' Perceptions of their Mathematics Teaching Methodology

Since student achievement is influenced by factors other than the teacher's actions, it is also influence to understand students' perceptions of teaching strategies, as these relate to their own

learning. Accordingly, research studies have been conducted to examine students' perceptions of their mathematics teaching methodologies. The studies enable educators to be aware of students' perspectives and to recognize the need to make adjustments in teaching mathematics in class. In a study conducted by Norzila, Fauziah, and Parilah (2007), 175 college students took a questionnaire to see if there were differences between students' perceptions and preferences of their mathematics teachers teaching methodologies. The researchers found that there were no gender differences in students' preferred and perceived teaching methods. However, students preferred learner centered teaching methods, whereas the most frequently used teaching method of teachers were teacher-centered in nature.

Hughes (2009) researched the relationships between teaching methodologies perceived by students learning mathematics and teaching methods adopted by their teachers. A total of 117 students participated in the study and were put into either a control group or an experimental group. The instructor taught control-group students pre-calculus with a conventional lecture-based approach. On the other hand, two instructors in the experimental group adopted teaching methods that increased student involvement; they also provided real-life examples and sufficient time for students to learn a concept by asking questions. The results showed a significant difference in students' perceptions of teaching methodologies between the control group and experimental group. The results also revealed that students felt they learned better when instructors employed teaching methods that was more interactive than when instructors adopted a conventional lecture method.

Chen (2008) developed an instrument for investigating junior high school students' perceptions of their teachers' teaching methodologies as part of his thesis project.

Based on Sun's (2007) teachers' discipline methods inventory. In his research of 1,587 students, Chen found that the most prevalent teaching methods perceived by students learning mathematics were the indifferent teaching methods. The findings of the study showed that there were significant differences between students' perceived teaching methods and their academic achievement. Students who perceived that their teachers employed an authoritarian or a democratic teaching method scored higher on tests than students who perceived laissez-faire or an indifferent teaching method. Chen concluded that students performed better academically if they felt that their teacher established rules to manage their learning, but at the same time listened to students' opinions toward learning and gave them feedback. Several research studies have been conducted to determine if there are differences between teachers' and students' perceptions of teaching methodology. McCollin (2000) used the Principles of Adult Learning Scale (PALS) to investigate teachers' teaching methods. The PALS was also adapted to measure teaching methods as perceived by students. The sample consisted of 84 faculty members and 585 college students. The data analysis, utilizing an independent t-test, indicated a significant difference between instructors' self-perceived teaching methods and students' perceptions of teaching methods. In another study, Kulinna, Cothran, and Zhu (2000) also examined teachers' perceived teaching methodologies. The researchers compared the results of their study with those of Cothran, Kulinna, and Ward (2000), since the latter investigated college students' views of teaching methodologies. The study revealed, again, that teachers' and students' perceptions of teaching methodologies differed significantly. Teachers used some methods slightly more than students observed. The study also showed that teachers and students valued different teaching methodologies; however, the two groups had different opinions about which teaching methodologies of mathematics which enhanced motivation and learning. Gifford (1992) also

studied how teachers and students viewed teaching methods. Her research participants were 34 instructors and 519 adult students. Gifford discovered that there was a disparity between faculty's and students' perceptions of teaching methodologies.

2.5 Summary of Literature Review

Methodologies used in Teaching mathematics has been extensively studied, which has increased the understanding of the relationships among how teachers teaches, how students learn mathematics and the types of teaching methodologies better suited to promote learning in classrooms. Researchers have examined students' perceptions of their teachers' teaching methodologies and suggested that these perspectives are influential in learning.

Teacher teaching mathematics must be diverse in is methods of teaching so as to help his students' to be stimulated by what his teaching as well aids the process of learning of his students.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

The study adopted the cross-sectional research design where questionnaires were used to gather valuable data for the research work. In this study, questionnaire were given as hand guide to the generating data for this study Therefore, the survey design was considered suitable since the study tend to seek information from a sample that was drawn from a population using questionnaire

3.2 Population of the Study

The population in this study was secondary school seniors attending public and private schools in Bosso Local Government area, Minna, Niger. The targeted population of this study was SS2. Seniors were selected in order to allow the students to consider their high school experiences over the years of life in secondary school with the maturity of a student on the verge of graduation. There are sixty-two (62) senior secondary schools in Bosso, where (19) are owned by government and forty-three (43) were owned by private personnel, with the total population of five thousand six hundred and twenty-eight (5628). However, only four schools in Minna metropolis were used for the purpose of this work.

3.2 Sample and Sample Techniques

Four (4) secondary schools were randomly selected out of the total population of SSII students' which are one thousand three hundred and forty-four (1344) of secondary schools in Bosso Local Government, Minna. The only targeted population is the SS2 students which the researcher randomly selected one hundred and twenty (120) and questionnaire were served to the concern

students and their responses were collected. The total sample was one hundred and twenty (120) from the total population of students in SS2.

S/N	NAMES OF SCHOOLS	NUMBER OF MALES	NUMBER OF FEMALES	TOTAL
1	BOSSO SEC. SCHOOL.	20	10	30
2	FEMA SCHOOL	15	15	30
3	HASHA INTL. SCHOOL	21	9	30
4	CHALLENGE INTL. SCHOOL	20	10	30

Selections of the students were done using Simple Random sampling technique (SRS). The sample of the study was made up of 30 students from each secondary school selected, summing up to 120 students.

Selection of students was done by balloting where a pick of "YES" or ''NO'' method was adopted in order to get those to represent that particular class. This method was adopted to give every student in the population equal chance of being selected into the sample

3.4 Research Instrumentation

A structured questionnaire developed by the researcher was used as the research instrument for data collection. The questionnaire which consisted of two sections (A, and B), Section A deals with the aspect of personal data consisting of background information.

Likert scale option was adopted in section B of the questionnaire which was responded to by indicating the appropriate respondents' best attitude using the four point Likert's scales as Strongly Agree (SA), Agree (A), Disagree (D), or Strongly Disagree (SD), Undecided (U)

3.5 Validity of the Instrument

The instrument developed by the researcher was validated by three (3) lecturers. One (1) lecturer from Science Education Department, one (1) lecturer from department of Mathematics and the project supervisor each from Federal University of Technology Minna. To ascertain the appropriateness of questionnaire items before administering it to respondents, their comments were used to readjust the questionnaire.

3.6 Reliability of the Instrument

To determine the reliability of the questionnaire, one-shot pilot-test was carried out among 10 students outside the sampled population of the study. The researcher visited the school and administered the questionnaires to the students which were randomly selected with the permission of the principal. The questionnaires were thereby collected by the researcher after being appropriately responded to. A Cronbach Alha reliability coefficient of 0.89 was obtained for the student's questionnaire.

The researcher visited the selected schools to carry out the study. The questionnaires were thereafter administered by the researcher to ninety (120) students in the three (4) secondary schools used for the study. These were later collected after being appropriately responded to by the students.

3.7 Method of Data Collection

The researcher visited the selected schools to carry out the study. The questionnaires were thereafter administered by the researcher to ninety (120) students in the three (4) secondary

schools used for the study. These were later collected after being appropriately responded to by the students.

3.8 Method of Data Analysis

The researcher visited the selected schools to carry out the study. The questionnaires were thereafter administered by the researcher to ninety (120) students in the three (4) secondary schools used for the study. These were later collected after being appropriately responded to by the students.

Data collected for the purpose of analyzing the research questions was analyzed using Statistical Package for Social Sciences (SPSS).

CHAPTER FOUR

4.0 DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter shows the presentation of the analysis of the data collected from students that offer Mathematics in the randomly selected secondary schools in Bosso Local Government, this data collected is based on the students' perceptions on teaching methodology of secondary school mathematics teacher in Bosso Local Government which was analyzed through descriptive statistics that involves frequency counts, mean and standard deviation used to answer the research questions. The tool used for the analysis of data is Statistical Package for Social Sciences (SPSS) version 22. This chapter presents the analysis of data under the following sub-headings:

- The Distribution of the Sample
- Analysis of students responses based on the Research Questions
- Discussion of Results

4.2 The Distribution of the Sample

The research instrument was distributed to 120 students that offer mathematics from four (4) randomly selected schools in Bosso Local Government, which consists of 76 male students and 44 female students. The distribution of the sample is illustrated on the table below:

Table 4.1 Number of respondents from each school visited.

S/N	Schools	Male	Female	Total
1.	Bosso Secondary School Minna	20	10	30
2.	FEMA School	15	15	30
3.	HASHA Intl. School	21	9	30
4.	Challenge intl. school	20	10	30
	Total	76	44	120

4.3 Analysis of Students responses based on the Research Questions

4.2.1 Research Question 1

What teaching methodology do secondary school mathematics students preferred?

In order to answer this research question the following items were used to collect data from 120 students from randomly selected schools, which were analyzed using mean and standard deviation to determine what teaching methodology do secondary school mathematics students preferred. The result is presented in Table 4.2.1 which indicates individual responses to the items:

Table 4.2.1 Analysis of teaching methodology preferred by secondary school mathematics students

S/n	ITEMS	**SA**	**A**	**U**	**D**	**SD**	$\bar{X}$	***SD***	**Remark**
1.	I understand mathematics the more when my teacher dominate through the lesson	0	4	4	48	64	1.70	0.69	REJECT
2.	. I don't have to stress myself when my mathematics teacher dominate	0	4	4	38	74	1.78	0.66	REJECT
3.	When mathematics teacher dominate throughout. it tends to challenge me to study hard	0	33	3	37	47	2.27	1.17	REJECT
4.	When my mathematics Teacher dominate we don't spend longer hour in class	36	68	0	4	12	3.55	1.10	ACCEPT
5.	When my mathematics teacher dominate I understand very fast to grasp whatever he's saying	0	3	0	45	72	1.68	0.61	REJECT
6.	Demonstration	36	68	0	4	12	4.00	1.00	ACCEPT

	stimulate my skills to study mathematics								
7.	I understand when my mathematics teacher uses demonstration for his lesson	23	77	2	5	13	3.83	0.91	ACCEPT
8.	I participate in class when my mathematics teacher demonstrate	14	74	3	7	22	3.55	1.10	ACCEPT
9.	I can depend on my mathematics skills after my mathematics teacher demonstrate a concept to us	74	14	2	7	22	3.55	1.10	ACCEPT
10.	With my mathematics teacher demonstration I can teach others after the class	14	74	2	22	7	3.55	1.09	ACCEPT

Table 4.2.1 shows the analysis of teaching methodology preferred by secondary school mathematics students it was observed that the respondents was in agreement with the demonstration method in mathematics lessons. Most of the students' responses are on demonstration method. Items 6 with the mean 4.00, item 7 with the mean 3.83, item 8 with the mean 3.55, item 9 with the mean 3.55 and item 10 with the 3.55 were all greater than the criterion mean 3.00 and they were all accepted. This implies that students prefer teacher using demonstration in mathematics lesson.

4.2.2 Research Question 2

What is the main teaching methodologies secondary school mathematics teacher use as perceived by students?

Table 4.2.2 Analysis of Students perception of teaching methodology secondary school mathematics teacher used

S/n	ITEMS	SA	A	U	D	SD	$\bar{X}$	*SD*	Remark
11.	My mathematics teacher doesn't give room for questioning and answering	0	2	0	47	71	1.64	0.58	REJECT
12.	My mathematics teacher teaches and doesn't expect our contribution	0	2	1	47	70	1.80	1.86	REJECT
13.	My mathematics teacher doesn't mind if we understands the lesson or not	0	0	2	51	67	1.60	0.58	REJECT
14.	My mathematics teacher can cover topics with speed when he dominate the class	14	71	6	7	22	3.53	1.10	ACCEPT
15.	My mathematic teacher is the type that dominate throughout the lesson	0	2	0	43	75	1.68	0.58	REJECT
16.	My mathematics teacher demonstrate the lesson throughout	27	66	1	6	20	3.73	1.14	ACCEPT
17.	My mathematics teacher teaches with stipulated examples to demonstrate	18	71	2	7	22	3.59	1.13	ACCEPT
18.	My mathematics teacher take time to demonstrate a concept for us	20	69	2	7	22	3.61	1.14	ACCEPT
19.	My mathematics teacher uses life experience to	16	70	1	13	20	3.47	1.23	ACCEPT

	demonstrate theorems and principles during his class								
20.	My mathematics teacher can use anything to demonstrate his lesson	17	82	0	7	14	3.73	1.03	ACCEPT

Table 4.2.2 shows the perception of students on the teaching methodology secondary school mathematics teacher use, it was observed that students were in agreement with high perception that mathematics teacher used demonstration method often in the class, this is because the mean of items 16, item 17, item 18, item 19 and item 20 were greater than the criterion mean 3.0.

4.4 Discussion of Results

Research question one revealed that most students prefer secondary school mathematics teacher using demonstration method in mathematics class. Which implies that when mathematics teacher uses demonstration for his lesson it stimulate the skills of the students to study mathematics and make them understand very fast to grasp whatever the teacher is saying.

Research question two revealed that students were in agreement with high perception that mathematics teacher used demonstration method often in the class which enable the students to have better understanding of the concept of mathematics.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is concerned with the presentation of the summary of the results, the conclusion reached on and the recommendations made on the researcher's findings.

5.1 SUMMARY OF THE STUDY

The aim of this study was purposed at investigating into student's perception on teaching methodologies of Mathematics teachers in secondary schools in Bosso Local Government, Minna, Niger State. This was to identify whether students perception towards Mathematics teachers teaching methodologies is positive or negative. Two research questions were raised in the study and were formulated and tested in an attempt to find answers to the research questions. The study was limited to four (4) secondary schools in Bosso Local Government Minna, Niger state.

Questionnaire of twenty (20) items was administered to one hundred and twenty (120) students to find out their perception of their Mathematics teachers teaching methodologies. Responses from the respondents were analyzed using mean and standard deviation (SD).

The literature of this study was reviewed under the following sub-topics; teaching methodologies, characteristics of effective teachers, the brief history of mathematics, new mathematics method, the rational for studying mathematics, the concept of perception, students' attitude towards mathematics teacher with respect to perception, piaget and cognitive developmental psychology, piaget stages of cognitive development, implication of piaget's theories to building students' perceptions in learning mathematics, theories of learning

mathematics, constructivism theories, teaching methodologies and students learning, students' perception of their mathematics teaching methodology and summary of the literature review.

5.2 LIMITATION OF THE STUDY

The following limitations were however encountered in this study;

i. This study was limited to four (4) secondary schools in Bosso due to time and financial constraints.

ii. This study was also limited to all SSII students that offer Mathematics across the four (4) secondary schools in Bosso Local Government, Minna due to the nature of the subject used as case study.

5.3 CONCLUSION

In regard on the findings of this study presented in the proceeding chapter, it is possible to safely conclude that the students have positive perception on demonstration method of teaching Mathematics in Bosso secondary schools Minna. This study has also found out that most mathematics teachers preferred using lecture method of teaching mathematics rather than using demonstration method because is faster and efficient to them.

Lack of appropriate teaching methodology of some mathematics teacher had led many students' to have phobia for studying mathematics. Since significance numbers of student agree to the fact that their Mathematics teachers'' uses lecture method and this can make the lesson not to be understood by the students'.

The findings also show that a significant numbers of students agree to the fact that demonstration method of teaching mathematics aids and help them to understand the concept of the lesson more better

Research question one revealed that most students prefer secondary school mathematics teacher using demonstration method in mathematics class. Which implies that when mathematics teacher uses demonstration for his lesson it stimulate the skills of the students to study mathematics and make them understand very fast to grasp whatever the teacher is saying.

Research question two revealed that students were in agreement with high perception that mathematics teacher used demonstration method often in the class which enable the students to have better understanding of the concept of mathematics.

5.4 RECOMMENDATIONS

In view of the foregoing findings, the researcher proposes the following recommendations aimed at addressing and mitigating the identified challenges and weaknesses in the perception of students on their mathematics teacher teaching methodology

1. The ministry of education should seriously and consistently employ more trained and competent Mathematics teachers.

2. Head of department with the assistance of the school authority should endeavor to organize seminar for the teachers on how to use different methodology in teaching Mathematics to suit their students'

3. Mathematics teacher should be diverse in their use of methodology which can as well help their student in their own area of learning mathematics.

5.5 SUGGESTIONS FOR FURTHER RESEARCH.

Interested researchers may wish to explore some of the following issues which this study merely scratched on the surface base on the findings of this study;

1. What teaching methodology does the students' preferred most in learning mathematics?

2. Investigation into difference between Mathematics teacher's perception of student, teaching methodology and the performance of student on Mathematics.

3. What other teaching methodology can best suit the students' learning mathematics in the class room?

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