

SUCCESSFUL TEACHER PEDAGOGIC PRACTICES FOR REDUCING MATHEMATICS ANXIETY AND IMPROVE STUDENT OUTCOMES IN SECONDARY STUDENTS IN ETHIOPIA

Tsegaw, N. T.

PHD Scholar, Academic Department of the School of Social and Human Studies,
Atlantic International University, Honolulu, Hawaii

Dr. Valcin F.

Ph.D, Lecturer, Academic Department of the School of Social and Human Studies,
Atlantic International University, Honolulu, Hawaii

Dr. Lambert E. G.

Ph.D, Lecturer, Academic Department of the School of Social and Human Studies,
Atlantic International University - Honolulu, Hawaii

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ABSTRACT

The purpose of this study was to establish the successful teacher pedagogic practices for reducing mathematics anxiety and improve student outcomes in secondary students in Ethiopia. Specifically, the study sought to diagnose the type of teaching structure teachers have when teaching mathematics in Ethiopia, to examine the resources and support available for teachers in secondary schools in Ethiopia so they can overcome their math anxiety in Ethiopia, to establish the strategies and recommendations to cure the reoccurring cycle of math anxiety in Ethiopia and to find out how teachers are doing to prevent passing on their anxiety to their students in Ethiopia. This study used a descriptive cross-sectional survey since the purpose of the study was to establish the relationship between and amongst the study variables. Based on the research objectives and questions of the study, the researcher used non-probability sample technique to select respondents. A purposive sampling technique was chosen and used in the study, and it was used to

select respondents of the sample frame. The researcher used questionnaire as the research instrument. A questionnaire is a composed rundown of inquiries the responses to which are recorded by respondents. The information gathered was analyzed utilizing qualitative analysis technique. Statistical analysis and calculations were done through SPSS and MS office excel. The study concludes that mathematics in Ethiopia was still performed poorly. Teachers' methods of teaching influenced students' performance, solving problems, question and answer and research methods were found as the most appropriate methods since every individual student is involved. Provision of teaching and learning resources influenced performance in mathematics.

Key words: Teaching structure, Resources and support available for teachers, Math anxiety in Ethiopia, teacher pedagogic practices, student outcomes

INTRODUCTION

In the view of Akamolage and Olorenfemi Olabis (2011), there are many children who do not have the opportunity to attain their maximum height in the pursuit of education as a result of their poor background. Despite the fact that the subject of mathematics is considered as a prerequisite requirement in technological courses, studies show that the feelings of many in the society towards mathematics and science subjects is not a positive one (Rogers & Ford, 1997). The eventual fate of our general public will be dictated by people who can comprehend and help shape the intricate impacts of science and innovation on our reality.

The attitudes of teachers are considered to play a major role with regard to teaching and learning of the subject. When a teacher approaches it with a negative attitude, it invariably affects learners as regards their performance. If a teacher approaches the teaching of mathematics positively, there is a high probability that he or she will positively influence a good number of students in the choice of their career. Corkfort (1882) noted that there was no

area of knowledge where a teacher had more influence over attitude as well as understanding of his/her students that he/she did in mathematics. A mathematics teacher may impact for good the mentality towards science of a huge number of youngsters and conclusively influence many of them in making decisions about their careers.

Saad, Adamu and Sadiq (2014) declared that mathematics fills in as an apparatus to comprehend numerous different subjects and dialects. In a wide sense, it frames the premise of a considerable lot of technical disciplines, for example, astronomy, science, physics and engineering. Mathematics is instructed to inspire the majority which takes into consideration progression in innovation just as in science and innovation. Things running from the nuclear bomb to compact discs would not have been made to work without science and affecting such an amplifying and dynamic arrangement of rationale based information is to be done through creating and advancing positive scientific attitudes among students paying little respect to their social and cultural contrasts.

Research Problem

The objective of this study is to assess the successful teacher pedagogic practices for reducing mathematics anxiety and improve student outcomes in secondary students in Ethiopia. In other words, the goal is to respond to the following questions: What type of teaching structure do these teachers have when teaching mathematics in Ethiopia? What resources and support are available for teachers in secondary schools in Ethiopia so they can overcome their math anxiety? What are strategies and recommendations to cure the reoccurring cycle of math anxiety? What are teachers doing to prevent passing on their anxiety to their students? Boyd et al. (2014) explained that negative attitudes towards mathematics are influence a great percentage of teachers organizing to enter the education system. Even more troubling is that pre-service educators with severely high levels of math unease can potentially influence their apprehensions to their students (Chernoff & Stone, 2014; Dunkle, 2010). This study encourages teachers to eliminate the re-occurring cycle of math anxiety that is happening in our education system by considering implementation of some successful teaching practice.

According to The National Council of Teachers of Mathematics (NCTM, 2015), teaching mathematics with understanding and comprehension in a classroom setting is the correct approach to pedagogy (Lubinski & Otto, 2014). A child needs exposure to mathematical conceptions before formal schooling (Lago & DiPerna, 2015), and educators of these children require a rich background to properly explain mathematical concepts and backing proficiency growth. Additionally, Lininski and Otto (2014) established that learners need to engage in inferring, assessing and justifying and communicating their reasoning with others. This is crucial in enhancing their understanding of mathematical conceptions. Moreover, it is important for teachers to have decent comprehension and acquaintance of mathematics, and poise in one's aptitude to teach mathematics.

A study investigating the stem of math anxiety and identifying approaches used by pre-service educators to overcome math anxiety was conducted by Finlayson (2014). The study

included 70 teachers' surveys'. According to Finlayson (2014), origins of math anxiety comprise, deficiency of self-confidence, anxiety of failure, instruction practices, futile learning practices, and non-engagement of learners. In addition, Finlayson suggests generating a greater understanding of mathematical concepts and confronting math anxiety may potentially ease it. Other causes of math anxiety include, ineffective test-taking strategies, planning unsuccessful tests, psychological pressures, and the inability of educators to consider varying learning styles (Mutodi & Ngirande, 2014), previous behaviors and attitudes of teachers, past experiences of doing poorly in mathematics (Boyd et. al, 2014), and the pedagogical methods of teaching mathematics.

Uusimaki and Nason (2014) conducted a study that examined 18 third-year pre-service educators to establish the roots of math anxieties. It was found that the anxieties and adverse beliefs originate from personality, intellectual and environmental dynamics. The environmental elements found in the study include negative classroom experience, educator insensitivity, parental pressure, and the utilization of traditional methods to teach mathematics. Intellectual dynamics include the use of incompatible learning styles, self-doubt, and lack of determination, learner attitudes, lack of mathematics use and the lack of confidence in their mathematical capabilities (Uusimaki & Nason, 2014). The personality aspects include low self-esteem, shyness, and female's perception that the subject is suited for males.

Alkan (2013) states that it is imperative for effective educators to assess new teaching approaches that are capable of enhancing the learner's attitudes and their performance in mathematics leading to an improvement in their success. As a result, Alkan's (2013) study explored teaching strategies implemented by educators to minimize the rate of anxiety learner's face in mathematics. It was found that educators utilize strategies such as making math relevant, motivating learners, use of games, leveraging on parent support, and reviewing topics through examples as a means of reducing the pupil's anxiety in the subject. It is crucial for educators to maintain a positive and welcoming learning setting where the students will be able to discuss notions in math without the fear of failing.

Theoretical Framework

This research work follows Skinner's Motivational Theory of Learning and Constructivist theory. Skinner (1985) states that "students" motivation to undertake a task depends on expected reward. He further says that efficient learning will take place when there strong motivation of learner to learn by the teacher. According to him, this motivation could be as a result of either external or internal factors. And these stimuli play a vital role with regard to guiding the behavior or attitude of the learner in the attainment of the goals desired. To this end, it is necessary that students are motivated using various means that include but not limited to: advice on choosing of careers, the provision of physical facilities (laboratories) as well as encouraging them verbally. When this is done it will definitely lead to an improved performance in the subject of mathematics.

Constructivist theory that could be a school of thought regarding how it's the learners come back to understand things (epistemology) steered the study. Constructivism is an educational model unfolding the technique of knowledge construction. Information construction is a lively, instead of passive method. Constructivists are certain that data mustn't simply be placed into learners' brains; instead it ought to be made through vigorous involvement of the learners within the learning method. Constructivism emphasizes prominence of the instruction context, schoolchild previous data, and interaction amongst the learners and also content that is to be learnt. Within the constructivism viewpoint, knowledge is made by the students through their interfaces with environment. Not like a normal style of education where the educator plays a lively role within the learning/teaching atmosphere, and pupils passively accept the information, constructivists believe that training ought to target the learner (Thenjiwe et al, 2012). Many various approaches of teaching are employed by mathematics instructors round the sphere. One in all these approaches is constructivism. This approach is associate innovative instruction technique. The spirit of constructivism has captured active learning event known as 'learning through doing', knowledge acquisition thru expertise, and learning by action, pupil-centered education, peer collaboration as well as cooperative learning (Prideaux, 2007).

Constructivism evades teacher-centered instructional method. However, the teacher acts as a coach in guiding learners discover their individual knowledge. Constructivists emphasize that learners should be totally involved in instructional process rather than just receiving information. They further suggest that learning place needs to be democratic where learners give their views and they teacher simply guides the learning process. Additionally, they suggest that learning should be learner-centered and engaging whereby the educator's role is to facilitate events and in the process, learning is autonomous and learners are responsible for their own undertakings. Constructivist teaching put a lot of stress upon sensory effort, one that has been overlooked in many decades by several ancient educators. Constructivism learning has proven to be very effective for learners with special abilities. For example, autism and disorder in information processing. However, constructivism might have some limitations. It eliminates grading within the old-style manner and instead puts a lot of value on learners critical their own development, which can result to learners dwindling behind however with no formalized grading as well as evaluations, academics mightn't apprehend that the student is troubled to learn. Due to the fact that evaluation is missing, knowledge might not be creating by learners as constructivism proclaims instead just be plagiarizing what other fellow learners do. One more disadvantage is the fact that it can make learners frustrated and confused especially when they lack capability to make abstracts and relationships between the knowledge they possess already and the one they individually learn (BrightHub Education, 2019).

Teacher Pedagogic Practices for Reducing Mathematics Anxiety

Effective curriculum implementation requires active participation of both the teacher and the learners. Infusion of aspects of teaching methods like non formal learning activities and key inquiry questions are some of the most effective teaching methods that enhance students'

personalities, abilities and interest in learning especially for young learners (Waiganjo & Waiganjo, 2018). The lecture-cum-demonstration method that involves examples and experiments is very effective method of teaching (Struyven & De Meyst, 2010). It is good for teachers to use dialogue method in teaching (Maganga, 2013). This involves discussion between students and teachers about the learning environment as opposed to depositing knowledge to students who passively participate in the teaching and learning process.

Enu, Agyman and Nkum (2015) investigated on factors influencing students' mathematics performance in some selected colleges of education in Ghana. They established that students' performance is influenced by various factors which include students' personal factors. Lecture method was found to be negatively influencing performance. This led to the researchers to recommend the use of interactive method of teaching so as to enhance full participation of students. In a study conducted by Mtitu (2014) in Tanzania on implementation of learner centered teaching approaches based on competence based curriculum, results revealed that instructional practices were dominated by teachers a factor that limited students' participation (Mtitu, 2014). The study specifically researched on Geography subject but the researcher recommended same study to be carried out in future for all subjects including mathematics. Domination of teaching by teachers did not provide students with opportunity to connect their real lives in actual practices in learning environment. Mensah, Okyere and Kuranchie (2013) argue that teachers can build confidence in their students by encouraging them to believe that they can perform well in mathematics; providing them various learning styles to learn the concepts on their own pace; assisting them to value the importance of mathematics in their lives and selecting the activities carefully according to their level of understanding and their preferences.

Lectures

Most math lectures include requesting that students recollect learned steps or methods the educator has just considered, made arrangements for, and afterward worked out for the students, concerning the issue. The issue with this technique offers is starting the conversation, "For what reason does the student not get the opportunity to reason out the issue?" While students are much of the time ready to learn equations and jargon through remembrance, they are frequently incapable to sum up their insight because of being given constrained models by their instructor. For the lecture strategy to work, instructors ought to give students time and chances to reason through the math themselves while encouraging a discourse about the given material (Whitney, 1987). In this manner, Adedayo (1998) guaranteed the issue with educators reliably utilizing lecturing in mathematics class is that teachers hop into definitions, techniques, and verifications without contemplating where the student was academically or if the students comprehended what was being said.

With expanded innovation, increased gadgets and the Internet with a perpetual inventory of manipulative, worksheets, and exercises, instructors who stick to lecturing do as such for the accompanying two reasons: they were educated with this technique when they were students and they accept that this strategy is compelling since it was viable for them in their learning

(Adedayo, 1998). Numerous educators have this fixed mentality since it is the most commonplace to them; be that as it may, the lecture strategy does not consider how students of this age learn. In the event that instructors need to impact student accomplishment, they have to utilize progressively intuitive and individualized strategies as opposed to depending exclusively on the lecture strategy (Adedayo, 1998).

Interactive and Individualized Methods

As opposed to the educator being the focal point of the exercise just like the case for instructors utilizing the customary lecture style of teaching, intuitive and individualized strategies for guidance adopt a more student focused strategy to the guidance of math. In an investigation led by Newstead (1998), two kinds of numerical methodologies that instructors utilized were analyzed. At the point when educators utilized the conventional lecture approach, they started with basic paper and pencil calculation, moved to the instructor displaying issues on the board, and finished with students rehearsing without anyone else. Then again, when educators utilized an elective methodology, they began with an issue on the board or spread out in bunch settings, offered manipulatives or hands on ways to deal with taking care of the issue, requested students to discuss what procedures they would utilize and to safeguard those techniques, and summarized the exercise with students applying those systems to other real-world applications. This alternative instructional methodology used both intelligent and individualized strategies for guidance. The intelligent methodology was applied to a gathering setting while the individualized strategy was utilized with individualized students and would request that students work at their own pace, progressing as required. Students educated under the customary methodology revealed more significant levels of tension when contrasted to those taught with the alternative methodology.

In a comparative study, Clute (1984) investigated the discovery and expository techniques for teaching. Educators utilizing the discovery technique, would ask beginner level inquiries, trailed by questions that would lead students to the correct way if they somehow managed to think of wrong answers. Instructors would likewise ask that students share what they have found and work together to expand on their discovery while additionally posing inquiries to guarantee that clarifications went with their answers. Educators who used the expository technique for guidance, started with a presentation that condensed the past exercise, based on exercises recently instructed, introduced the exercise in a fundamental organization, did different guides to guarantee understanding, looked into the strategies and steps once more, rehearsed the exercise in gatherings and independently, clarified what the students would do as a task, and told them the best way to organize the problem with different techniques.

Homework

While homework may not really be viewed as an instructional technique as much as a method for content practice, homework has numerous positive and negative impacts. One such negative impact is when teachers use it as a method for busy work, taking it up, discarding it, or essentially simply stamping good and bad answers. Homework must be utilized as a

method for consistent input among students and educators. In their 2006 combination of research on the adequacy of homework and its capacity to improve scholarly accomplishment, Cooper, Robinson, and Patall characterized the beneficial outcomes of homework into four classifications: prompt accomplishment and adapting, long term scholarly, non-scholarly, and parental/family assignments. Prompt accomplishment and learning assignments have appeared to assist students with holding genuine data, for example, definitions, techniques, and fundamental aptitudes while helping the students utilize basic intuition abilities to all the more likely comprehend the work done in the class. Long term scholarly assignments improved students' sentiments about school when all is said in done, made better study habits, and helped increase scholarly aptitudes in different areas. Non-scholarly assignments gave time to better organization, a spot to be interested, and better discipline. Parental/family assignments gave numerous chances to guardians to get engaged with their kid's homework and improved parental familiarity with what was going on between the school and home. At the point when utilized effectively, Cooper and associates found that schoolwork can fill in as the lane among information and comprehension (2006).

On the other hand, Cooper, Robinson, and Patall's combination of the research featured certain negative impacts of schoolwork as adverse to an student's performance, conduct, and emotional pressure (2006). Students lost enthusiasm for their school work on the grounds that the homework was not fascinating and the time it took to finish the work made the students exhausted, both mentally and physically. The measure of homework given made students feel that they were denied time to have a great time and loosen up when at home. Pressure from parents likewise adversely affected students. Regardless of whether the guardians were mistaking the students for various instructional strategies or simply stressing the students to complete the work, students noticed these pressures as negative obstructions. At the point when students are hit with a lot of work to finish in such a short measure of time, they frequently turned to cheating.

Self-Assessment

Self-assessment makes learners responsible for their own learning by allowing them to take charge of their own learning process. It also puts them at the Centre of their own learning thereby increasing their performance. The major effect of individual assessment on learners' math attainment is a sign that learning/education is internalized well and quicker when schoolchildren fully participate in the assessment and fully become accountable for their individual learning. Scholars develop expertise to utilize standards to their individual tasks and evaluate whether these standards are met. It aids schoolchildren to interrelate well with their educator as well as the subject. It also motivates learners to mirror on their contribution and role to the development of their personal work. Schoolchild's responsibility and status change from passive student to active student and evaluator. Assessment therefore is seen not just as a penalty but then as an instrument to which achievement can be enhanced (Stiggins, 2008).

Self-assessment puts the accountability of learning squarely on shoulders of the scholars. It needs them to rely on their work and their behavior. Through self-assessment students begin to rely on however they learn and kind goals to boost their own learning. Self-assessment is very important as a result of it reminds students that they're accountable for their own learning. This stress on responsibility provides students with a way of possession. It ultimately provides them an alternative and forces them to decide on between operating through a method to achieve success and selecting to continue doing constant things that haven't worked. Self-assessment provides another manner of viewing their progress and may provide students a path to success if they believe that they'll succeed. One issue that's mutualistic with self-efficacy is self-assessment (Ramdass & Zimmerman, 2008).

Peer Assessment

Peer appraisal is the route toward gauging the quality or achievement of the consequences of a partner or companions which is followed by the plan of analysis (Van Den Berg, Admiraal and Pilot, 2016). To the companion being surveyed, the arrangement of input is helpful for permit them the occasion to improve; in any case, this isn't really the most valuable advantage of friend evaluation. The assessment cycle that an understudy must draw in with so as to give input is seemingly the main part of friend appraisal. Anderson, Howe, Soden, Halliday and Low (2016) adds that this is so on the grounds that it manages the cost of the understudy the occasion to rehearse the abilities important to assess their very own work and in this way peer assessment aim is to enhance aptitudes in self-examination (Anderson, Howe, Soden, Halliday & Low, 2016).

Learners who are told through friend evaluation strategy have been demonstrated to be cognizant of the advantages. The perspectives on grade school understudies to peer-evaluation were researched by Bryant and Carless (2019) and an exceptionally certain gathering was shown when the understudies were given the office to gain from one another while assuming liability for their own personal work came about. Bryant and Carless' examination likewise found that a few understudies were intensely mindful of the preferences that peer appraisal brought as they could distinguish mistakes in their work and along these lines dodge them in future. Peterson and Irving (2018) found that optional school understudies accepted that criticism gave through companion evaluation was persuasive and urged them to search out arrangements in improvement of their mistakes. The more extensive advantages of companion appraisal are not lost on secondary school understudies; White (2019) reports that the occasion to improve abilities which are useful for their future profession was huge inspiration. McDonald and Boud (2013) have contended that the aptitudes created through friend evaluation are critical all through all phases of schooling. These positive perspectives on peer appraisal are approved by and by: Rust et al. (2013) and O'Donovan et al. (2014) exhibited that cooperation in a companion evaluation program toward the start of a course of study brought about an upgrade in execution over those understudies who didn't take an interest.

While the upsides of friend appraisal are critical, there are various issues that must be considered in its resistance. Wen and Tsai (2016) found that college understudies' perspectives towards peer-appraisal were commonly certain; notwithstanding, there was an absence of self-assurance in their capacity to stamp their colleagues' work and, proportionally, they were uneasy about companion analysis. Karaca (2019) experienced comparable outcomes when doing an investigation into instructor student's assessments of friend evaluation. It was proposed that understudies think that it's hard to assess their friends' work viably, prompting the arrangement of harmful input. Karaca likewise found that understudies' assessments could be affected by their social associations with their companions: inviting understudies were inclined to giving excessively certain criticism; contrariwise, rivalrous understudies expanded their arrangement of negative input. Ballantyne, Hughes and Mylonas (2012) have additionally detailed that understudies can be worried about the tedious idea of friend appraisal.

Research Methodology

Research Philosophy

There are two main research philosophies, which are used in social science research, namely positivism and phenomenology. This study adopts the positivism approach, which is relevant to this type of research in order to establish the relationships between the variables and lead to hypotheses testing and generalization of the findings (Saunders, Lewis & Thornbill, 2007). This leads to a competent inquiry that results in objective testing of the theories. Research philosophy guides the way research is carried out and is based on both ontology and epistemology.

The concept of ontology refers to the nature of reality while epistemology refers to knowledge. According to Patton (1990), research philosophy has two paradigms namely, positivistic and interpretive. These paradigms illustrate the link between the ontological, epistemological and methodological assumptions. Research philosophy can be categorized into positivism, interpretivism and realism depending on the researcher's philosophical thinking (Saunders et al., 2003).

Positivism takes a quantitative approach while phenomenology is mainly qualitative (Cooper & Schindler, 2009). Positivistic approach presupposes that knowledge naturally exists and this is based on real facts, objectivity, neutrality, measurement and validity of results. Phenomenology presupposes that knowledge is based on personal experience and is subjective focusing on immediate experience, personal knowledge and individual interpretations. Positivism is a paradigm which relies on quantitative measurement of facts which are based on empirical data, objectivity, neutrality, measurement and validity of results (Saunders, et al., 2007).

This study set out to establish the successful teacher pedagogic practices for reducing mathematics anxiety and improve student outcomes in secondary students in Ethiopia. This is

supported by Furrer (2006) and Neuman (2008) who posit that what researchers observe as objectively reality can be expressed in numeric terms with explanatory and predictive power forming the foundation for positivism philosophy. This study therefore adopted the positivistic philosophy since it aimed at finding out what caused particular relationships and the effects of the relationships.

Research Design

This study used a descriptive cross-sectional survey since the purpose of the study was to establish the relationship between and amongst the study variables. The cross-sectional approach provides credence of results with conclusions on data at a given point in time. Research design is a blue-print for fulfilling the objectives and answering questions of the study (Cooper & Schindler, 2009).

Sample Size and Sampling Techniques

A sample is a sub group in a populace which can be utilized as an agent of population to determine deductions about the qualities of that populace. Based on the research objectives and questions of the study, the researcher used non-probability sample technique to select respondents. A purposive sampling technique was chosen and used in the study, and it was used to select respondents of the sample frame. Thus, it was easy and inexpensive to access and good for means of getting information from all school teachers, directors, members of PTAs, and students of council of the selected government high schools as well as the experts of Zone Education Offices of Addis Ababa city Administration.

The study targeted 50 public secondary schools in Ethiopia. The schools had a total population of 17,788. Out of this population, the teachers were 514 and the students were 17,274. As indicated in table 4.1 below, the sample size used purposive sampling methods, which is a quota sample technique. The interviewees were 25 teachers. The table below indicated that the total number of Government Secondary Schools, the total number of teachers in the schools as well as the number of respondents that selected as a sample for the study by sub city. 30% of the teachers selected by the rule of thumb from each school were set as follows.

A sample size of 384 students was drawn using Fisher et al (1991) formula as shown below:

$$n = z^2 pq/d^2$$

Where:

n - The desired sample size

z - The standard normal deviation, set at 1.96, which corresponds to 95% confidence level

p - The proportion in the target population is estimated to have a particular characteristic.

If there is no reasonable estimate, then apply 50% (this study used 0.50) $q = 1.0 - p$; d = the degree of accuracy desired, here set at 0.05 corresponds to 1.96.

$$\begin{aligned} \text{In substitution, } n &= ((1.96^2 \times 0.5 \times (1-0.5))/0.05^2) \\ &= 384 \text{ students} \end{aligned}$$

Further, purposive sampling will be used to select 25 teachers to be interviewed. The teachers selected will not be the one who will fill the questionnaires.

Table 1: Sample size

No	Sub city	*Total number of secondary schools	Name of sample secondary schools	*Number of students	Sample size of the students	*Number of teachers	Size of teachers
1	Addis ketema	3	Addis ketema	1459	32	48	14
2	Akaki	7	Bulbula	1526	34	38	11
3	Arada	6	Tikuranbessa	1804	40	65	20
4	Bole	4	Beshali	1241	28	35	11
5	Gullele	4	Medhaniale m	2565	57	104	31
6	Kirkos	4	Tebmengaya z	1820	40	44	13
7	KolfeKerani o	6	Air tina	2256	50	55	17
8	Lideta	4	Africa hibret	1134	25	34	10
9	N. Silk Lafto	6	Lafto	1443	32	38	11
10	Yeka	6	Higher 12	2026	45	53	16
	Total	50		17274	384	514	154

***Source: Addis Ababa Education Bureau, Planning Department**

Data Collection

The study collected primary data using structured and unstructured questions. Stiles and Taylor (2001) argue that both primary and secondary data complement each other. Zikmund (2003) suggests that a researcher has the liberty to select the respondents who are well versed with the area of study to ensure that the findings, which emanate from the data collected are objective and reliable. The researcher used questionnaire as the research instrument. A questionnaire is a composed rundown of inquiries the responses to which are recorded by respondents. In a questionnaire, respondents read the inquiries and translate what is expected and afterward record the appropriate responses. This questionnaire was intended to request for data that helped the researcher in responding to inquiries of the investigation. There were two questionnaires namely: the questionnaire for Mathematics teachers and questionnaire for students of mathematics. Both questionnaires were given to teachers and students respectively. To answer questions likert type items on attitude were used. Items were graded using the following key: Strong Agree (SA) was awarded 5 points. Agree (A) 4 points, Undecided (U) 3 points; Disagree (D) 2 points and Strongly Disagree (SD) 1 point. Alternative items were graded in the opposite with reversed keys: SA (1); A (2); U (3); D (4); and SD (5). Reversing the scoring of the negative items has the advantage of reflecting positiveness toward the object in question (Nyaga 1997).

Instrument Validity and Reliability

The researcher utilized content validity which alludes to how satisfactorily a test is identified with a particular field of study or substance and how sufficiently the test samples domain about which inferences are to be made. (Culled from Lecture Series on Educational Measurements and Evaluation by Matheka p.32). In identifying the teachers' methodology and effectiveness in influencing performance in mathematics, it was possible to construct an instrument that would include all possible items that measured a given concept. Expert judgment was employed in order to confirm whether the theoretic perspectives emerge as operationalized in this study. Construct validity on the other hand was ensured through the operationalization of the study variables, which reflect the theoretical assumptions that underpin the conceptual framework of this study. The study used Cronbach's alpha coefficient to compute reliability tests. Cronbach's alpha coefficient usually ranges from 0 to 1 and the higher the coefficient the more reliable the scale is. Alpha coefficient of 0.7 and above is interpreted to mean satisfactory internal consistency reliability (Cooper & Schindler, 2009). However, this study used the recommended value of 0.5 and more as the cutoff point. Pearsons, product moment correlation, F and t-tests were used to test for moderation and significance.

Data Analysis

The information gathered was analyzed utilizing qualitative analysis technique. Statistical analysis and calculations were done through SPSS and MS office excel. The next part exhibits detailed data analysis and discussion of findings. Both qualitative and quantitative data were collected. The quantitative data collected from closed questions was coded and analyzed using descriptive statistics. The qualitative data obtained from open ended questions and interview schedule was analyzed using conceptual content analysis. As cited in Wekesa (2013), Creswell (2003) states that the conceptual content analysis is a method of making elicitations through objective and systematic identification of specific characteristics of messages. Both quantitative and qualitative data was analyzed through Statistical Package for Social Sciences (SPSS) and tabulated and presented through simple frequencies, percentages, means and standard deviations. The information obtained from analysis was presented through bar charts, tables and pie charts

Results and Discussions on Teacher Pedagogic Practices for Reducing Mathematics Anxiety

Based on the reviewed literature, scholars define teaching method as a pattern of teaching modes designed to promote the achievement of a particular learning outcome. The choice of teaching method depends on the content, student's level of understanding, class demographic structure, teacher's philosophy of education, teacher's style of teaching and mission of the school. Based on the literature review, according to Salman (2012) and Ozturk and Saritas (2009) teaching methods play a significant role on students' mathematics high achievements at secondary school level. Zakaria, Chin and Daud (2010) specified that teaching should not

merely focus on dispensing rules, definitions and procedures for students to memorize, but should also actively engage students as primary participants. Nkeng and Mambeh (2008) viewed teaching methods as those techniques and strategies used by teachers in their efforts to facilitate students learning. It is an activity that translates curriculum goals and objectives into experience that students acquire during their interaction with their teacher. Hence this study sought to diagnose the type of teaching structure teachers have when teaching mathematics in Ethiopia. The study findings are as shown in subsequent subheadings.

Teaching Methods

Zakaria, Chin and Daud (2010) specified that teaching should not merely focus on dispensing rules, definitions and procedures for students to memorize, but should also actively engage students as primary participants. Nkeng and Mambeh (2008) viewed teaching methods as those techniques and strategies used by teachers in their efforts to facilitate students learning. It is an activity that translates curriculum goals and objectives into experience that students acquire during their interaction with their teacher. Teachers were asked to indicated how often they use the following methods of teaching. The findings of the study are as shown in Table 2 below.

Table 2: Teaching Methods

Question and Answer			
		Frequency	Percent
	Frequent	97	97
	Rarely	3	3
	Total	100	100
Lecture			
		Frequency	Percent
	Frequent	94	94
	Rarely	6	6
	Total	100	100
Problem Solving			
		Frequency	Percent
	Frequent	12	12
	Rarely	68	68
	Not at all	20	20
	Total	100	100
Interactive/ participative			

		Frequency	Percent
	Frequent	62	62
	Rarely	29	29
	Not at all	9	9
	Total	100	100
Laboratory and project method			
		Frequency	Percent
	Frequent	12	12
	Rarely	13	13
	Not at all	75	75
	Total	100	100
Analytical/Synthetic method			
		Frequency	Percent
	Frequent	6	6
	Rarely	5	5
	Not at all	89	89
	Total	100	100
Inductive-deductive method			
		Frequency	Percent
	Frequent	1	1
	Rarely	17	17
	Not at all	82	82
	Total	100	100
Research (discovery) Method			
		Frequency	Percent
	Frequent	20	20
	Rarely	36	36
	Not at all	44	44
	Total	100	100

Based on the study findings, with regards to Question and Answer as a teaching method, majority of the respondents (97%) indicated that they frequently use it while 3% rarely use it. 94 % of the respondents indicated that they frequently use Lecture while 6% rarely used it. With regards to problem Solving, majority of the respondents (68%) indicated that they rarely uses this method to teach mathematics, 20% do not use it at all while only 12% indicated that they frequently use it.

Majority of the respondents (62%) also indicated that they use interactive/participative mode of teaching mathematics, 29% indicated they rarely use it while only 9% who indicated that they don't use this method at all. With regards to Laboratory and project method of teaching of mathematics, majority of the respondents (75%) indicated they don't use this method at all, while only 25% indicated that they frequently and rarely use it. In addition, with regards to analytical/Synthetic method of teaching of mathematics, majority of the respondents (89%) indicated they don't use this method at all, while only 11% indicated that they frequently and rarely use. Further, with regards to inductive-deductive method of teaching of mathematics, majority of the respondents (82%) indicated they don't use this method at all, while only 18% indicated that they frequently and rarely use. Majority of the respondents (44%) also indicated they don't use Research (discovery) Method in teaching mathematics, 36% indicated that they rarely use it, while 20% indicated they frequently use it.

Students need to be involved in learning and these methods were learner centered. The methods facilitate learning by creating a conducive atmosphere as well as taking care of the individual differences. Costello (1991) considers the use of lecture method as ineffective, in that there is no active participation on the part of learners, it rather makes them passive. However, it is only useful when it comes to coverage of vast content.

Key informants indicated that teachers generally used lecturing, questions and answers, discussion and demonstration teaching methods while teaching mathematics and this shows that there was an active interaction among teachers and students while teaching mathematics. On the other hand, it also indicates that teachers did not use student centered teaching methods such as class experiments, project work and use of group technique while teaching mathematics and this hinders effectiveness of learning the subject.

The findings are aligned to those of Struyven and De Meyst (2010) and Maganga (2013) who recommended teachers to use various teaching methods in order to improve performance of mathematics among students. This should be done based on their appropriateness to students as well as in consideration with available time

Students Opinions on how teachers teach mathematics

Owo and Ikwut (2015) in their study on performance of students revealed that notion by students, parents and community at large towards mathematics as a very difficult subject is an obstacle to good performance in this subject. This led to students losing interest and concentration to study it. Similarly, teachers failed to concentrate and put maximum efforts

when solving mathematics assignments, dealing with class exercises or even setting and marking tests. This greatly led to poor performance among students. Students were asked to their opinions on how teachers teach them mathematics. Table 3 summarizes the findings of the study.

Table 3: Students Opinions on how teachers teach mathematics

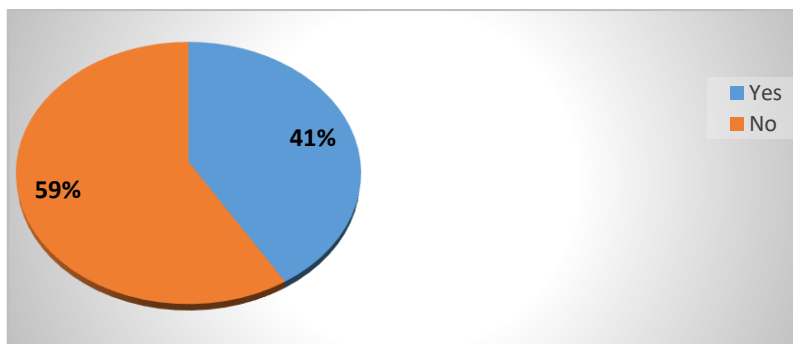
	Frequency	Percent
Using gestures	95	21.8
In groups	410	94
Technology-Multi-media	78	17.9
Lip reading	33	7.6
Direct instruction	429	98.4

According to the study findings, majority of the students (94%) indicated that their teachers teach them in groups, 21.8% indicated using gestures, 17.9% indicated using technology-multi-media. This implies that majority of the mathematics teachers in public secondary schools in Addis Ababa Ethiopia uses groups discussion as methods of teaching mathematics.

Students understanding when being taught

Students were asked to indicate whether they understand mathematics well when being taught. The study findings are as shown in Figure 1

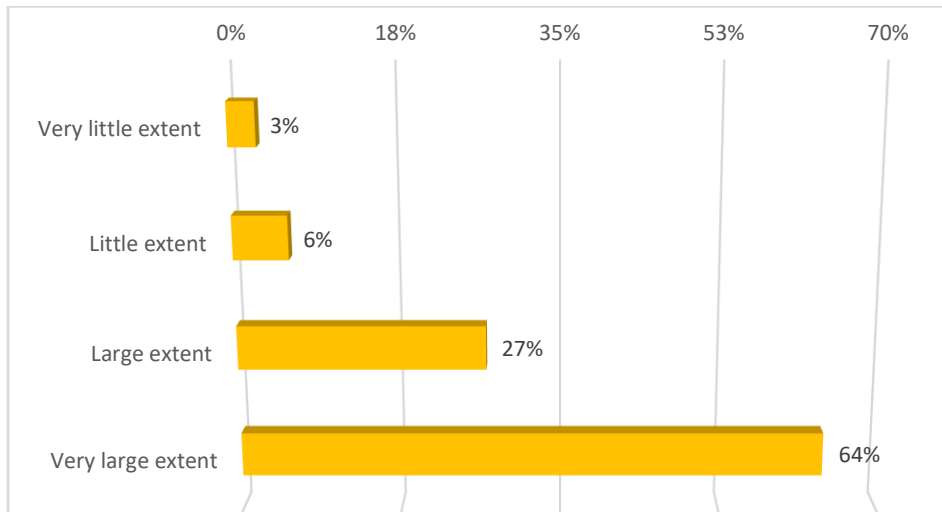
Figure 1: Students understanding when being taught



Teachers Opinion on the Extent to which type of teaching structure reduces math anxiety

Teachers were asked to indicate the extent to which the type of teaching structure reduces math anxiety in their institution.

Figure 2: Teachers Opinion on the Extent to which type of teaching structure reduces math anxiety



Based on the findings in Figure 2 majority of the respondents (64%) indicated that type of teaching structure reduces math anxiety to a very large extent, 27% indicated to a large extent, 6% indicated to a little extent while 3% indicated to a very little extent. This implies that that type of teaching structure reduces math anxiety among students in public secondary schools in Addis Ababa, Ethiopia.

Students Opinion on the Extent to which type of teaching structure reduces math anxiety

Students were asked to indicate the extent to which the type of teaching structure reduces. Table 4 presents the findings of the study.

Table 4: Students Opinion on the Extent to which type of teaching structure reduces math anxiety

	Frequency	Percent
Very large extent	239	54.8
Large extent	152	34.9
Little extent	17	3.9
Very little extent	22	5
Not at all	6	1.4
Total	436	100

Based on the findings in Table 4 majority of the students (54.8%) indicated that type of teaching structure reduces their math anxiety to a very large extent, 34.9% indicated to a large extent, 3.9% indicated to a little extent 5% indicated to a very little extent while 1.4% indicated not at all. This implies that that type of teaching structure reduces math anxiety among students in public secondary schools in Addis Ababa, Ethiopia.

CONCLUSION AND RECOMMENDATIONS

Conclusion

According to the students' responses, it was established that majority of the teachers used teacher centered teaching methods though there was an active interaction between students and teachers during mathematics lessons. According to students' responses, the study revealed that teachers generally used lecturing, questions and answers, discussion and demonstration teaching methods while teaching mathematics and this indicates that there was an active interaction among the teachers and the students. Moreover, according to teachers' responses teachers also used teacher centered teaching methods due to several reasons. They said that we tend to use teacher centered teaching methods due to lack of teaching and learning resources and lack of time to cover the syllabus as student centered teaching methods take more time to cover the syllabus. Also, the study established that teachers hardly used learner centered teaching methods such as class experiments, group technique and project works

Recommendations

Understanding of mathematics should be taught using methods that will help to get concept of logic and reasoning into the students. Classroom practice and curriculum materials should not focus only on cognitive factors but also on non-cognitive factors such as math anxiety. School counselors, teachers and parents have to help students to become conscious about mathematics and guide them in the process of meaning making. Teachers have to implement techniques that have been found to reduce the math anxiety of students. On the other hand, students have to use the findings of the study to improve understanding about their own math anxiety. They can reflect on how their own math anxiety fits in with the findings of the study and they may try to know the cause of their own math anxiety and use the strategies.

Suggestions for Further Study

This research will pave way for other scholars to carry out further studies on the factors that influence Mathematics anxiety in the whole country. This will enable educational stakeholders to find out if the factors are county specific or generalized to the whole country, enabling them to come up with more specialized solutions. It will also guide educational institutions on the measures to be adopted to ensure the trend of dismal performance in Mathematics comes to an end.

The areas the research considered for further research include:

- Contribution of other stakeholders such as Board of Management in improved performance in mathematics.
- Assessment of the implications of current policies on improved performance in mathematics.

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