INCIDENCE OF MATHEMATICS ANXIETY AMONG JUNIOR HIGH STUDENTS' LEARNING OF MATHEMATICS IN GHANA

Mary Obeng
Department of Basic Education, University of Education, Winneba

Clement Ayarebilla Ali
Department of Basic Education, University of Education, Winneba
ayarebilla@yahoo.com

Jones Apawu
Department of Mathematics Education, University of Education, Winneba

Paul Kobina Effrim
Department of Educational Foundations, University of Education, Winneba

Abstract

There is no gainsaying that mathematics anxiety continues to scare during classroom instruction. However, its real incidences as freely expressed by learners remain unexploited. This study therefore explored the incidences of mathematics anxiety among public junior high school learners in Effutu Municipality of Ghana. In achieving this purpose, the researchers employed a qualitative descriptive phenomenological design in which purposive sampling procedure was used to select seven students from a population of junior high school two learners. The instrument used for data collection was interview guide. The learners were guided to freely express their opinions to reduce response redundancy. These responses from the participants were further trimmed into well-defined themes for analysis. The results of the responses showed high incidences of mathematics anxiety among the learners. The findings showed that the commonest incidences were forgetfulness, fear, inappropriate methods, inadequate practice and examinations phobia. In order to minimize these incidences, it was recommended among others that teachers should use teaching and learning aids peculiar to learners' environment and provide a variety of instruments to provoke varied learning styles.

Keywords*:* Incidence of mathematics anxiety; junior high school students; learning of mathematics; social cognitive theory

Introduction

Anxiety is generally defined as stress, tension and strain brought into one's body and mind. This is viewed as two perspectives (Bruce, 2016). One perspective is physical, where the learner loses control of the body, suddenly gets sweaty palms without any physical activity, feels pain in the neck even when in an upright posture or develops stomach ache. The second perspective is psychological, where the learner has feelings of doubts or uncertainty or mind wanders from one negative thought to the other. In both cases, the learner is engulfed by feelings of apprehension, uneasiness and helplessness in which no immediate solution is tenable (Sule, 2017).

Mathematics anxiety therefore is a situation where the leaner feels tension, apprehension and fear of all situations involving mathematics and its applications (Yang, 2014). This creates discrepancy between the proficiency and competency in mathematics achievement (Siebers, 2015). This is normally due to the painful years of negative mathematics experiences and generally by created by mathematics teachers (Yang, 2014), and manifested through the feelings of discomfort and nuisance when learners encounter problems in mathematics learning (Guita, & Tan, 2018). In other forms of mathematics anxiety, learners' hearts beat fast, feelings of false beliefs in solving mathematical problems and even total avoidance of mathematics scenarios (Guita, & Tan, 2018). The net effect is that learners develop negative attitudes toward mathematics, lack motivation to engage in mathematics problems and totally disregard functional mathematics to everyday life (Adeyemi, 2015). Even studies of Furner and Duffy (2002), and Abotowuro (2015) agree that mathematics anxiety affect female students more than male students.

This study was guided by Social Cognitive Theory, developed by Albert Bandura (AlSayyari, 2016; Bandura, 1989). This theory in short says that human beings have feelings, can think, and can learn from their environment (Nabavi, 2012)). This explains why individuals develop and interact with others in their environment (Dimopoulou, 2016). Cardinal in this theory is triadic Or Internal Principle of Social Cognitive Theory (see Figure 1).

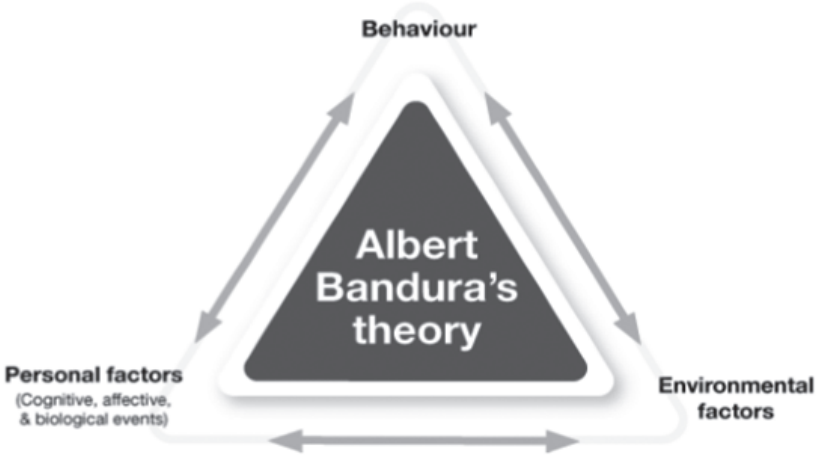

Figure.1: Internal Principle of Social Cognitive Theory

Source: Nabavi (2012)

On Figure 1, the triadic comprises a reciprocal interaction of personal factors, behaviour, and the environment. The environment and personal factors, including beliefs, thought patterns, and emotional reactions determine a person's behaviours. In turn, the behaviours would form the

person's future beliefs (Brennan, 2017). Several studies suggest that mathematics anxiety arise out of behaviour, personal and environment. Therefore, in connecting mathematics anxiety to Bandura Social Cognitive Theory, one can conclude that the personal factors are the self-efficacy, race and gender. The environment includes the beliefs about mathematics learners and teachers, and the behaviour takes care of the learners' avoidance of mathematics scenarios and their applications to everyday life.

Adeyemi (2015) also found out that learners' mathematics anxiety was attributed to teachers' instructional strategies and teachers' lack of understanding of mathematics concepts. Sarfo and Adusei (2016) found out that learners have high mathematics anxiety in core mathematics as compared to elective mathematics. Even that, there were noticeable significant positive differences between genders. Again, findings of Bruce (2016) equally revealed that 95% of learners experience mathematics anxiety or fell in the anxiety range of 75%-95%. In fact, out of 200 participants of Bruce study, 47.5% had severe anxiety for mathematics.

Again, Oyenetan, Olalekan, Sulaimon and Aikabeli (2018) observed that most learners experience mathematics anxiety even before reaching junior high school level. Thus, learners' fear of not being able to do the mathematics or too hard or failure in the early stages of schooling create deficits in their confidence levels even before they reach junior high school. This early fear or lack of confidence lead to mathematics phobia, and sometimes causes massive school dropout (Mutodi, & Ngirande, 2014).

There is no gainsaying that mathematics anxiety continues to cause havoc, scare, low performance and abysmal achievements in mathematics during classroom instruction and external examinations (Sarfo, & Adusei, 2016). However, its real incidences as freely expressed by learners remain unexploited. The decline in performance in mathematics by public junior high school learners in Effutu Municipality is a case to buttress this point. It is uncommon to see many learners dodge mathematics classes. Some come to school late to avoid the mathematics lessons that mostly start in the early morning. And yet others do not participate in mathematics lessons either by not asking and questions or by writing and submitting mathematics tasks on time. In all these scenarios, one can easily observe feelings of stress and tension anytime mathematics teachers demand for the right things to be done.

In suggesting remedies to the canker, Siebers (2015) opines that confidence, self-motivation and teacher reinforcements are paramount. Mathematics educators, educators and educational psychologists should be knowledgeable (Ayadi, 2015), and explore varied ways of stemming the tide. And to achieve this laudable goal, this study sought to explore the incidence of mathematics anxiety among public junior high school learners in Effutu Municipality of Ghana. It is hoped that the measures suggested will not only reduce the incidences of mathematics anxiety in the Effutu Municipality but in Ghana in general.

Purpose of the Study

This study is aimed at exploring key incidences of mathematics anxiety among junior high school students and how it affects gender of the students.

Research Questions

The following research questions guided the study.

1. What are the main incidences of mathematics anxiety among pupils in junior high schools?
2. What are the causes of incidence of mathematics anxiety among pupils in junior high schools?
3. What are the effects of mathematics anxiety on students' learning of school mathematics in junior high schools?

4. How can the effects of mathematics anxiety in junior high schools be ameliorated?

Methodology

The study employed phenomenological design to solve the research problem. In achieving this purpose, the researchers utilized the purposive sampling procedure to select seven junior high school two learners from each of the selected seven junior high schools in the Effutu Municipality in the Central Region of Ghana. The selection of the seven learners was purely based on the researchers' choices of proximity and willingness to participate in the project (Creswell, 2012). This is because the whole qualitative methods involved collecting and analyzing non-numerical data to understand the learners' conceptions, opinions and experiences about mathematics anxiety. This method made the processes more flexible and well-focused on retaining rich knowledge on the incidences of mathematics anxiety and suggesting laudable and cogent measures to reduce the canker in the research setting. The choice of phenomenological design was to help adequately explore the phenomenon by describing and interpreting lived experiences of participants in mathematics anxiety (Bhandari, 2020). Seven pupils were selected for this study. The instrument of data collection was the semi-structured interview guide. This instrument was used to assess opinions, attitudes, or behaviours in personality traits or perceptions. In the data analysis, the researchers employed the interview transcripts from students' phenomenological experiences by recordings responses, transcribing the transcripts, finding patterns, coding the responses and identifying recurring themes from the seven participants. With the aid of thematic analysis, the responses were trimmed down to three themes for easy analysis. This gave meaningful insights, generation, descriptions and interpretations of the data gathered (Bhandari, 2020). All ethical issues were given the needed attention. They include informed consent, confidentiality, privacy and anonymity, voluntary participation and withdrawal at any point in time (Saunder et al., 2016).

Results and Discussion

Research Question One: What are the main incidences of mathematics anxiety and how are these incidences caused in junior high schools?

The first research question sought find out the main incidence of mathematics anxiety among junior high school pupils. Themes found within the data regarding incidences of anxiety include: feelings of uneasiness and confusion, nervousness, tension, sickness, worry and discomfort.

The pupils selected for the study recounted their experiences on uneasy and confused during mathematics lessons. One of the pupils said:

> *''... anytime they asked us to get ready for mathematics lessons, I start feeling uneasy and eventually become confused as to what do. At times, I will be considering running away from the class. Most of the time I am nervous. I always wished there was no mathematics lessons so that i would not go through all these''* . [Pupil 1].

Another pupil gave the following comment,

> *'' ... I become extremely confused because someone had earlier told me that mathematics is difficult and so it makes me confused. I usually become very tense and before I could say anything, I am already sick. Even class exercises in mathematics make my situation worse''.* [Pupil, 5].

Two other pupils also commented on the questions posed to them:

> *'' ... I am always worried because someone told me that mathematics is difficult and this has been hunting me for some years. I become uncomfortable whenever our mathematics teacher comes to start the lesson. I sometimes go blank when we are about doing test or examination''.* [Pupils 7]

> *'' ... I become confused, tensed, nervous and sick when I see mathematics problems written on the chalkboard for us to either solve or contribute to solution to the problem. I always prayed that the lesson had not happened. My situation becomes worse when we are told to get ready for tests or examinations''.* [Pupil 6]

It is evident that most of the participants felt uneasy and confused during mathematics lessons, nervous when doing mathematics problems and got tensed up when they prepare for mathematics test. The pupils also got nervous when they have to use mathematics outside of the school and worried that they would not be able to learn/perform well in mathematics assignment/tests/examinations. Further, mathematics lessons made most of the pupils feel uncomfortable and raised their level of heart beat. These observations suggest that the incidences of mathematics anxiety among the students were quite high and predominant.

Research Question Two: What are the causes of incidence of mathematics anxiety among pupils in junior high schools?

The second research question sought find out the causes of incidence of mathematics anxiety among junior high school pupils. Themes found within the data regarding causes of incidences of mathematics anxiety include: stress, forgetfulness, fear or panic, difficulty in understanding, reluctance and stigmatization.

In trying to find out from the pupils selected for the study what might been the cause of the incidence of mathematics anxiety, some of the participants gave the following responses. One pupil gave the comment as:

> *'' ... I usually forget most of the topics or concepts that the teacher had taught us. When it happens that way, I become nervous, confused and end up panicking. This make me afraid of the subject and the teacher''. [Pupil 5].*

Another pupil also said:

> *'' ... I find it difficult to understand what the mathematics teacher will be teaching because the teacher will talk with a cane in his hand and that put fears in me. I also fear that my friends will know that I don't understand what the teacher teaches in mathematics''. [Pupil 3].*

One of the participants also gave the comment as:

> *'' ... I do not have other elder siblings to help me solve mathematics problems so I most of the time feel reluctant to do any given homework. Also, when the teacher comes, he will not help us to correct our mistakes but start caning us. This makes it difficult for me to understand the topics taught''. [Pupil 7]*

One other pupil also said:

> *'' ... As for me, because I don't understand what my mathematics teacher teaches, I become afraid easily and panic any time he is around. I also forget easily whatever I am taught''. [Pupil 6].*

Analysis of the responses so far indicate that most of the participants felt stressed up when attending a mathematics class, easily forgot mathematics concepts as if they never attended the class, afraid of answering questions in mathematics class even when they knew these answers due lack of confidence, the way their teacher taught during mathematics lessons made it difficult for them to understand the lessons, panic when answering mathematics questions in class and were afraid to give incorrect answer during mathematics instruction. There is no doubt that many of these issues have the tendency to deter students from learning mathematics and can subsequently affect their mathematics achievement.

Research Question Three: What are the effects of mathematics anxiety on students' learning of school mathematics in junior high schools?

The third research question sought find out the effects of incidence of mathematics anxiety on students learning of mathematics. Themes found within the data regarding the effects include: blank speech, blank thoughts, lack of confidence, sleeplessness, general frustration and lack of future career.

> *'' .. I am unable to think mathematically, I lack confidence and have sleeplessness. I am most of the time frustrated and do not know what my future career will be''. [Pupil 3]*

> *'' ... The utterances made by my mathematics teacher make me unease and totally blank and totally confused as I am unable to think mathematics nor contribute during mathematics class. I become disappointed because I would not know what to say to get praises from him''. [Pupil 4]*

> *'' I become a worried person because I do not know enough mathematics and I might not perform well in future mathematics-related careers. This makes me have trouble sleeping in the nights before a mathematics class or test''. [Pupil 7]*

> *'' ... My worries are beyond comprehension. I feel frustrated when working out mathematics problems because I don't understand the concepts. I do not know whether I will be able to use mathematics in MY future career''. [Pupil 5]*

In summary, it is evident that most of the participants alluded that bad utterances made by their mathematics teachers impacted negatively to their learning in a mathematics class. This in turn affected their ability to think clearly when solving mathematics problems, and this gave them worries they did not know enough mathematics to enable them pursue mathematics careers in future. The net effect is that they hardly sleep at nights whenever they were going to write mathematics classes or tests and became frustrated when working out mathematics problems. These issues may impede their ability to use mathematics in everyday life.

Research Question Four: How can the effects of mathematics anxiety in junior high schools be ameliorated?

The fourth research question sought find out how to ameliorate the effects of mathematics anxiety among junior high school pupils. Themes found within the data regarding the effects include: use of realia or manipulatives, active involvement and participation, appropriate mathematics language, real life and functional mathematics, encouragement and motivation, revision and relevant previous knowledge (RPK), attention to detailed, and assistance and clarity of tasks.

Each of the participants suggested some of the ways by which their mathematics anxiety will be reduced to enhance learning of the subject. Their comments are as follows:

> *'' ... If we are taught by our mathematics teachers using the real objects or materials we will see everything very clear. There will not be any confusion. We shall understand what we are taught very well''. [Pupil 2]*
>
> *'' ... The teacher always talk without involving us but if we are actively involved and made to participate in the lessons, we will not fear but love mathematics''. [Pupil 7]*
>
> *'' ... I do not understand the terms the teacher uses. If the teacher will use appropriate mathematics language at our level, I will try my best to understand. Sometimes, it is very difficult to understand a term he mentions''. [Pupil 4]*
>
> *'' ... I find mathematics difficult because I try to ask where I can use it. The teacher should help us to use mathematics in our real life situation so that we can understand the functions mathematics play in our experiences''. [Pupil 3]*
>
> *'' The teacher always put fear in us and his utterances put us away from the subject. But, if he should encourage and motivate us, we will be developing interest in the subject''. [Pupil 5]*
>
> *'' The teacher should revise with us what he had already taught us so that if we have forgotten, we can remember them. There is always new thing being added and that makes learning mathematics very difficulty''. [Pupil 3]*
>
> *'' Some of the mathematics questions the teacher gives out are very difficult to understand. But the teacher will simplify or clarify the problem and exercises to do, we shall not be afraid of mathematics at all''. [Pupil 6]*

In summary, it can be inferred that most of the participants were of the view that realia or manipulatives, active involvement and participation, appropriate mathematics language, real life and functional mathematics, encouragement and motivation, revision and RPK, attention to detailed, and assistance and clarity of tasks are the main solutions to help minimize the incidences of mathematics anxiety in junior high schools in Ghana.

Discussion of Findings

The research question one was on incidences of mathematics anxiety and the findings show that the major incidences of mathematics anxiety are feelings of uneasiness and confusion, nervousness, tension, sick, worry and discomfort. It is clear the incidences of mathematics anxiety were quite high. These normally occur during negative mathematics experiences, created by mathematics teachers (Yang, 2014), and manifested through the feelings of discomfort and nuisance in mathematics learning (Guita, & Tan, 2018). Even though the other forms of mathematics anxiety such as heart

beat, false beliefs and total avoidance (Guita, & Tan, 2018) did not feature prominently, the net effect of these incidences are linked to negative attitudes toward mathematics, lack of motivation to engage in mathematics problems and total disregard in functional mathematics (Adeyemi, 2015). However, it is worthy of note that students get confused when they know that a mathematics test or task is coming (Smith, 2004), and become nervous, tense, worried and uncomfortable when solving mathematics problems (Mutodi, & Ngirande, 2014). Incidences of mathematics anxiety are also experienced from teachers who have hostile behaviours, inadequacy of the instruction skills, and peer pressures (Bekdemir, 2010).

It is also important of note that these incidences increase as the students progress in their academic ladder (Birgin, Baloğlu, Çatlıoğlu, & Gürbüz, 2010). We therefore expect these students to encounter many more incidences of mathematics anxiety as they progress on their next higher levels. But the biggest worry is the gender of consideration. Abotowuro (2015) opines that female students will encounter the incidences, to a large extent, than males. With three female students in this study, it was noticeable that all their responses tilted towards higher incidences. In all cases, no females 'disagreed' or 'undecided' on any of the issues. Because the male participants were more than the female participants, 'Agree' was prominently higher than 50% and as high as 90% if more male students equally agreed with the female students (Zhang, Zhao, & Kong, 2019).

Findings for the second research question two revealed that the causes of incidences of mathematics anxiety were identified as stress, forgetfulness, fear or panic, difficulty in understanding, reluctance and stigmatization (Sarfo, & Adusei, 2016). This was supported by Mutodi and Ngirande (2014) findings that teachers' inability to fine-tune different learning styles for students is a major cause of mathematics anxiety. The attitudes of some teachers live much to be desired. Even though the causes cannot be blamed solely on teachers, it is imperative that teachers use methods that will rather catalyze students understanding and not allow students to learn and forget so soon. This not notwithstanding, students equally contribute significantly to the incidences of mathematics anxiety. Oyenetan, Olalekan, Sulaimon and Aikabeli (2018) support that the causes of mathematics anxiety are fear, lack of confidence and mathematics phobia. That is, even before learners in the lowest levels of education such as kindergarten and lower primary begin to experience mathematics in the formal setting, they already concur that mathematics is difficult and too hard to learn. This behaviour breeds fear or panic, stress, reluctance and stigmatization in the latter years as in the junior high school. And fear causes low self-esteem, disappointment and academic failure (Gresham, 2004; Akin & Kurbanoglu, 2011).

Again, Taylor (2017) opines that when learners have strong, positive motives to achieve mathematics goals, situations will be approached with a better attitude and by more creative means. However, when they carry negative feelings into the mathematics classroom, situations will be approached with thoughts of failure or humiliation. It is therefore worthy of note that the high incidences of mathematics anxiety were negatively caused by students' poor reasoning and emotional regulation. High incidences of mathematics anxiety caused by stress, panic and stigmatization mostly drive students engaged in negative thinking about their self-ability.

Findings on the effects of mathematics anxiety on students' learning of school mathematics showed that the effects blank speech, blank thoughts, lack of confidence, sleeplessness, general frustration and lack of future career. Oyenekan, Olalekan, Sulaimon, and Aikabeli (2018) found that many learners are not able to perform well in Mathematics when they experience anxieties. Khatoon and Mahmood (2010) support that learners often feel worried, tired and afraid or downgrade mathematics as not

important. In particular, the effects are most observable in mathematics concepts such as borrowing, carrying, and long division. When performing tasks on these concepts, mathematics anxiety disrupts students' working memory and slows down performance.

In adducing strategies to ameliorate the situation as demanded by research question four, , the participants suggested use of realia or manipulatives, active involvement and participation, appropriate mathematics language, real life and functional mathematics, encouragement and motivation, revision and relevant previous knowledge (RPK), attention to detailed, and assistance and clarity of tasks. Thompson, Wylie and Hanna (2016) identify three major types of interventions namely, curricular, instructional, and non-instructional. Curricular interventions involve offering mathematics classes and remediation, instructional interventions are teacher-made feedbacks and non-instructional interventions directly target specific behavioural and cognitive facets of learners. Furner (2017) suggests learners' learning modalities, use a range of assessment procedures, enjoyment in learning mathematics, competition and games, minimal stress, show uses of mathematics, employ cooperative and collaborative approaches, imbibe creative and critical thinking, and demonstrate mathematics as undertaking of man.

Similarly, Vakili and Pourrazavy (2017) recommend short and diverse assessments, gradually increase in difficulty levels of mathematics tests and exercises integrate optimism in the mathematics lessons, and promote and maintain a friendly mathematics milieu. For this reason, Opoku (2013) believes that learners can develop a more positive attitude towards their mathematics classes, if teachers provide a high level of support and offer students the opportunity to play a significant role in the teaching and learning process. Russell (2019) opines understanding of mathematics concepts to overcome the whole notion of mathematics anxiety. Therefore, teachers, parents, society and educational psychologists have major roles to play to ensure that learners understand the mathematics being taught and learned to in order to nip incidences of mathematics anxiety in the bud.

Conclusion

It could therefore be concluded that the incidences of mathematics anxiety were found to be feelings of uneasiness and confusion, nervousness, tension, sick, worry and discomfort. These were based on the fact that mathematics lessons made them feel uncomfortable and thereby raising heart beats. This led to nervousness making them unable to learn well due to tension, resulting in sickness and discomfort.

The incidence of mathematics anxiety among junior high school pupils were cause by stress, forgetfulness, fear or panic, difficulty in understanding, reluctance and stigmatization. This incidence of mathematics anxiety resulted in the students exhibiting blankness in speech and thoughts, lack of confidence, sleeplessness, general frustration and lack of future career because they felt they will not be able to apply mathematics in their future careers. The use of realia or manipulatives, active involvement and participation may reduce the incidence of mathematics anxiety in junior high pupils. Further, the use of appropriate mathematics language, tailoring the tasks to real life situations and making mathematics functional coupled with encouragement and motivation among others will tend to ameliorate the incidence of mathematics anxiety among junior high school pupils

Recommendations

It is recommended among others based on the findings and conclusions drawn that:

One, with reference to the main incidences of mathematics anxiety, we observed that much of the anxiety happens in the classroom due to the lack of diversity in learning styles of learners.

Therefore, teachers must re-examine traditional teaching methods which often do not match learners' learning styles and skills needed in a technologically advanced society. Also, teachers should present mathematics lessons in a variety of ways to accommodates learners' different learning styles. Again, learners' anxiety levels in mathematics need to be closely monitored by teachers and parents so that it does not interfere with their ability to do well in class.

Two, in line with the causes of the incidences of mathematics anxiety, we recommend that teachers, parents and general society should work together to assure that every learner learns mathematics relevant to everyday life. This would motivate learners to learn the mathematics skills that they need to succeed in real life. Furthermore, teachers should encourage group studies in class to provide instrumental aid, by helping them keep track of assignments, create mathematics journals and portfolios. These supports would make their efforts more effective, in terms of both learning and graded performances on homework, projects, and tests.

Three, based on the effects of the incidences of mathematics anxiety, we recommend that teachers demystify the teaching and learning of Mathematics. Only qualified (trained to teach the subject, tested, and experienced mathematicians) should be allowed to teach Mathematics at all levels of education. Furthermore, every public school should organize seminars and workshops for all junior high school learners periodically to relieve stress, fear and boredom. Similarly, there should be periodic mathematics competitions and games among various junior high schools learners at all levels to demystify mathematics and reduce negative perception.

Four, based on the solutions or strategies, educational authorities together with teachers, parents and educational psychologists should institute measures to discourage negative influence such as teasing of peers, wrong notation or misconception that mathematics is difficult for average learners, and perception that mathematics is a male-dominated subject. In addition, there should be enhancement and upgrading of Mathematics teachers via seminars, workshops and any other reasonable means, in all ramifications (pedagogical practices, train the trainers, salary and emolument incentives, and promotion).

REFERENCES

- Abotowuro, S., (2015). *Factors Influencing the Perceived Difficulties of Senior High School Students in Elective Mathematics*. Published Master's Thesis. Kwame Nkrumah University of Science and Technology.
- Adeyemi, A. (2015*). Investigating and Overcoming Mathematics Anxiety in In-service Elementary School Teachers*. Electronic Theses and Dissertations. https://scholar.uwindsor.ca/etd/5463
- Akin, A., & Kurbanoglu, (2011). The relationship between mathematics anxiety, mathematics attitudes, and self-efficacy: *A structural equation model.* Studia Psychologica, 53, 263-273.
- AlSayyari, M., (2016). *A Social Cognitive Investigation of People with Physical Disabilities in Saudi Arabia, Doctor of Philosophy thesis, School of Education,* University of Wollongong. https://ro.uow.edu.au/theses/4870.
- Ayadi, F. (2015). *The Effect of Anxiety on Performance of Students in Mathematics*. Munich: GRIN Verlag, https://www.grin.com/document/448181.
- Bandura, A. (1989). Human Agency in Social Cognitive Theory. *American Psychologist*, 44, 1175-1184.
- Bekdemir, M. (2010). The Pre Service Teachers' Mathematics Anxiety Related to Depth of Negative Experiences in Mathematics Classroom while they were Students. *Educational Study Mathematics.* 75:311-328.

- Bhandari, P. (2020). An introduction to qualitative research. Retrieved from https://www.scribbr.com/methodology/qualitative-research/.
- Birgin, O., Baloğlu, M., Çatlıoğlu, H., & Gürbüz, R. (2010). An Investigation of Mathematics Anxiety among Sixth through Eighth Grade Students in Turkey. *Learning & Individual Differences.* 20(6), 654-658.
- Brennan, M.K. (2017). Innovations in Assessing Practice Skills: Using Social Cognitive Theory, Technology, and Self-Reflection. PhD Dissertation, St. Catherine University. Retrieved from St. Catherine University.
- Bruce, D., (2016). Mathematics Anxiety among Ghanaian Students: *A Case Study of Students of Kinbu Senior High / Technical School, Accra and Hermann-Gmeiner SOS Junior High School, Tema. Journal of Education and Practice.* Vol.7, No.15.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th Ed.).* Boston, MA: Pearson Education.
- Dimopoulou, E., (2016). *Self-Efficacy and Collective Efficacy Beliefs of Teachers of Pupils with Autism in the UK.* Published PhD Thesis. Department of Education, Brunel University.
- Furner, J. M. & Duffy, M. L. (2002) *Equity for All Students in the New Millennium, Intervention in School & Clinic,* Vol. 38, Issue 2.
- Gresham, G. (2004). *Mathematics anxiety in elementary students.* CMC ComMuniCator, 29(2), 28-29.
- Guita, G.B., & Tan, D. A, (2018). Mathematics Anxiety and Students' Academic Achievement in a Reciprocal Learning Environment. *International Journal of English and Education,* Volume: 7, Issue: 3,
- Khatoon, T., & Mahmood, S. (2010). Mathematics Anxiety among Secondary School Students in India and its Relationship to achievement in Mathematics. *European Journal of Social Sciences, 16(1), 75-83.*
- Mutodi, P. & Ngirande, H. (2014). Exploring Mathematics Anxiety: Mathematics Students' Experiences, *Mediterranean Journal of Social Sciences MCSER Publishing,* Rome-Italy 5(1).
- Nabavi, R.T. (2012). Bandura's Social Learning Theory and Cognitive Learning Theory: *Theories of Developmental Psychology. University of Science and Culture.* Retrieved from https://www.researchgate.net/pudlication/267750204.
- Opoku, D.A. (2013). Analysis of JHS Students' Attitudes toward Mathematics and its Effect on the Academic Achievement: The Case of Asunafo South District. Mphil Thesis, College of Education, University of Ghana.
- Oyenekan D. F., Olalekan, F., Sulaimon, M.O., Aikabeli, L., (2018). The Effects of Mathematics Anxiety on Academic Performance of Moshood Abiola Polytechnic Students. *World Wide Journal of Multidisciplinary Research and Development,* 4(11): 28-38.
- Russell, D. (2019). *How to Overcome Math Anxiety.* Retrieve from https://www.researchgate...
- Sarfo, J.O., & Adusei, H., (2016). Math Anxiety and Achievement among Male Senior High Students in the Eastern Region of Ghana. Africa: *History and Culture, Vol. (2), Issue. 2.*
- Saunder, M. et al. (2016). *Research Methods for Business Students,* 5th Ed, Pearson: New Delhi.
- Siebers, W.M., (2015). *The Relationship between Math Anxiety and Student Achievement of Middle School Students.* Published PhD Thesis. Colorado State University.
- Smith, M. R. (2004). *Math Anxiety Causes, Effects, and Preventive Measures.* State College, Olympia, WA. Retrieved from http://digitalcommons.liberty.edu/honors/255/
- Sule, S.S. (2017). Examination Of Causes And Effects Of Anxiety On Secondary School Students' Poor Academic Performance In Mathematics, *International Journal Of Academic Research In Education, 3(1), 01-06.*

- Taylor, S.R., (2017). *Successful Teacher Practices for Reducing Mathematics Anxiety in Secondary Students.* Published PhD Thesis. Carson-Newman University.
- Thompson, R., Wylie, J., & Hanna, D. (2016). Maths anxiety in psychology undergraduates: a mixed-methods approach to formulating and implementing interventions. Psychology Teaching Review, 22(1), 58-68. Available at: https://pure.qub.ac.uk/ws/files/72593507/maths.pdf.
- Vakili, K., & Pourrazavy, Z. (2017). Comparing the math anxiety of secondary school female students in groups (science and mathematical physics) public schools. International Journal of Environmental & Science Education, 12(4), 755-761. Available from https://files.eric.ed.gov/fulltext/EJ1144820.pdf.
- Yang, J. (2014). Math Anxiety: Can teachers help students reduce it? American educator, 28-43.
- Retrieved from https://hpl.uchicago.edu/sites/hpl.uchicago.edu/files/uploads/American%20Educator,%20 2014.pdf
- Zhang, J., Zhao, N., & Kong, Q.P, (2019). The Relationship between Math Anxiety and Math Performance: *A Meta-Analytic Investigation. Frontiers in Psychology, Vol. 10, pp.2-5*