Influence of Mathematics Anxiety on the Learning Engagement of Grade 3 Pupils

Alma R. De Guzman
alma.deguzman011@deped.gov.ph
Saint Anthony College of Technology

Nairo S. Olalia, EdD
nairo.olalia@deped.gov.ph
Saint Anthony College of Technology

Abstract — The primary goal of this study was to examine the influence of mathematics anxiety on the mathematics learning engagement of the Grade 3 pupils during the School Year 2024-2025 in the South District of the Division of Angeles City. The conduct of this study used mixed method more particularly the sequential explanatory mixed method. There were 103 pupils who were requested as respondents of the study. They were randomly selected to lessen bias. In addition, 10 pupils were invited as participants for qualitative part. Questionnaire and documentary semi-structured interview were used to gather data. Weighted mean, multiple regression and thematic analysis were applied for interpretation. Results tell that learners feel quite a bit anxiety on learning mathematics anxiety (M=4.19) and perception of difficulty and motivation (M= 4.24). Also, respondents agree (M=4.12) that they have high learning engagement in Mathematics. Furthermore, the Multiple R = 0.2215 indicates a weak positive correlation between Mathematics Anxiety and the learning engagement. The ANOVA table shows an F-value of 5.1616 with a significance level (p = 0.0252), which is less than 0.05. In addition, the desired support of learners to address their anxiety include Making Learning Enjoyable and Strengthening Enrichment Activities. Lastly, an anxiety management plan is proposed based on the findings of the study.

Keywords: mathematics anxiety, learning engagement, enrichment, mixed method

I. THE PROBLEM AND ITS BACKGROUND

Introduction

Mathematics is one of the learning areas that is always being offered despite the changes in the curriculum. This means that it is one of the most important and most needed subjects that the learners need to know as they go on their learning journey. However, this subject is said to be one of the most feared.

Learning has never been easy. It requires time and effort on the part of the teachers and the learners for them to be able to realize the objectives of a given lesson plan. Unfortunately, there are times that the learning fails due to various reasons on the part of the teachers, administrators, parents and even the learners.

It is rooted on the difficulty of understanding the lessons or the concepts of being presented. When everything becomes a challenge, it leads to anxiety. As known, Mathematics is a subject that involves mathematical computation and problem solving. This may be taxing on the part of the students, which may lead to anxiety. The subject itself becomes a cause of anxiety to the pupils. Mathematics anxiety may happen to any kind of students regardless of their cognitive ability.

From the idea of Merrit (2011), math anxiety is a general and universal concern for all learners in the whole world. Teachers are the ones who are mostly trying to address the existence of the problem because if their students are experiencing anxiety on their subject, teachers will also suffer because it will be hard for them to convince their students to participate actively in the activities. The anxiety in Mathematics hinders the teachers from accomplishing their target objectives in their lesson.

Mathematics anxiety can be rooted back in the year 1950. Ashcraft (2012) underscored that it is the feeling of uneasiness, tensed or being scared of doing the activities or any learning task related to Mathematics. This implies that the learning is having the feeling of being unease in participating to activities that will lead to the acquisition of knowledge regarding the subject.

Another thing to consider is the point of view of Cates and Rhymer (2013), there are really pressure and tension in learning. Pupils failed to appreciate the pressure and consider it as burden in their learning journey. Mathematics anxiety disrupts the motivation of the pupils to learn.

Math anxiety is an emotional reaction that drains a person. The fear of the subject is being recognized both in education in the field of psychology. Crowder (2011) coined it as having the feeling of being tensed or anxious whenever there are manipulation of numbers or math topics being involved either in ordinary life or in classroom setting. It ranges from having a feeling of slight tension to a strong fear of the subject. However, it is not confined within the classroom situations. Anxiety also has its negative effect outside the classroom to the point that there is sever avoidance on any situation that involves mathematics. When math anxiety becomes serious, it is not only confined with getting a test on the subject but it also includes even the learning experiences.

In the elementary school setting, pupils who are experiencing math anxiety is a serious problem that the education sector is trying to address. Students' experiences in math differ from each other but others feel being stiff when they are having an examination in the subject. Others do not want to do anything that are related with numbers. The symptoms for math anxiety may be in form of psychological or physical. In terms of psychological, there are times that learners are experiencing temporary memory loss, inability to think, low self-confidence, self-pity, self-talk, the feeling of being isolated and thinking that the student is the only one who cannot understand the topics of the subject. For the physical symptoms, students experience nausea, sweating, shortness-of-breath, increased blood pressure and heart palpitations. Preis and Biggs (2011) coined that these symptoms and other experiences on the subject may lead to a cycle that will invoke fear to the students and will hinder them from learning the subject with ease. When one experiences anxiety in a particular subject, it makes the learners suffer because the fun of having the journey to learn new competencies or to appreciate the subject is being set aside. The fear conquers everything or even the student himself, which makes him not to appreciate the beauty and importance of learning the subject.

Being bad at math is not the only definition of math anxiety.It implies that the child is having hard time to progress with mathematics and have a feeling that he is being left behind by

the class. When a student experience math anxiety, his working memory is being robbed by the fear he feels. Working memory can be thought of as a kind of mental scratch pad. It makes keeping several things in mind simultaneously possible. When students have math anxiety, they are forced to do two things at the same time: deal with their worries if what they are doing is right or can they finish it before the time given to them and solve the problems given to them in the lessons. As a result, students experience less working memory that they use in solving the problems, and their math performance suffers (Beilock & Willingham, 2014). This means that mathematics anxiety is not good for students because it affects their performance in class negatively. It is even more alarming especially for those who are considered as the slow learners or those who are having challenges already. Teachers and school heads need to find ways on how they can be of great help to their learners.

Ballado (2014) also noted a significant negative relationship between anxiety and academic achievement. This means that when there is high mathematics anxiety, there is a low mathematics achievement. Considering the situation, it is very crucial for the teachers to determine the causes of the anxiety in mathematics of the students for them to be able to provide the most appropriate remedy or intervention. When students are left behind, it may add to the emotional damage that they are already experiencing.

In addition, people who have high level of fear when it comes to mathematics are at high risk of avoiding math classes as well as math-related activities (Ruffins, 2017). When the anxiety is not manageable anymore, students find way to temporarily escape from it and one of their ways is to escape from their classes. Unfortunately, skipping classes or sessions is not the solutions to anxiety. It will only make the students feel more anxiety because he will be left behind with the topics that are being discussed in the class. When the assessment is given, those who escaped from their classes may find it hard to answer the given questions and may result to increase level of anxiety towards Mathematics. Those who have anxiety must be monitored by the teachers well.

Unconsciously, society facilitates the development of math anxiety as it is considered a cultural norm. Each culture has a different source for math anxiety as a nation but two distinct cultures would be the Western countries and the Asian perspective. Western perspective was explained by Buckley (2011) who stated that the beliefs of the community also affect the learning

of the students. When the community has a negative belief on the subject, it is being absorbed by the learners. The society accepted that mathematics anxiety is a normal phenomenon that every learner will experience that is why students already have this precognition that they will have hard time to learn the subject. Those who are doing good in Math in a society are being labelled as intelligent. Those who show low level of mathematics anxiety are being labeled as nerd because it is different from the expectations of the society that the subject is difficult to master.

For the Asian perspective, Shields (2016), a student from the University of Hong Kong, conducted a study on 91 college students to gather their personal insights on math anxiety, and to determine how and when math anxiety surfaced throughout their school lives. Results showed that 61% of respondents related their math anxiety to teachers. 19% being the largest percentage, started to experience math anxiety in the ninth grade, followed by 15% in the seventh grade, 12% in fourth grade, and 11% by the eighth or eleventh grade. Joining grades seven, eight, and nine, which are the years that students are introduced to Algebra, 45% of respondents first felt math anxiety during then. Likewise, 51% expressed their beginning of math anxiety during Algebra class. What is most interesting though is that greater than 60% of the respondents stated that society made them believe that math would be vital to their future; however, those interviewed were not aware of how important math was to their future careers. These realizations about the importance of math may have added to their level of math anxiety, seeing that they felt that they could not do what society (may include parents and/or significant others) expected of them.

Mathematics anxiety has been a subject of research across levels. Elementary students, adolescents and even students in tertiary level have been used as subjects for study focusing on this phenomenon (Vitasari, Wahab, Othman, & Awang 2010). Mathematics anxiety is becoming more prevailing reason why students are not able to participate effectively in their mathematics class. When students feel that what they know is not enough to catch up with their classmates, they have the feeling of being isolated because there is an invisible barrier between them and their classmates or their teacher. With this in mind, teachers must be keen observer for them to be able to determine who among their students are already experiencing anxiety in their subject.

Math anxiety refers to the emotional reaction of the student towards the subject that adversely affect his performance in math. Hembree (2011) cited that it is very important to make

every learner overcome their fear of the subject because it will be beneficial for them in their middle school and high school years. Records reveal that students in higher grade level are the ones who are prone to experience mathematics anxiety because the lessons in these grade levels are more complex compared with those who are in the lower grade level. The difficulty of the competencies or lessons being presented to the class is one main reason for the anxiety of the students.

On the other hand, recent studies have shown that math anxiety can begin as early as elementary school and can reach its peak during middle school and high school (Scarpello, 2017). The first instance of math anxiety amongst elementary students are most likely caused by cognitive predispositions and social influences. In cognitive predispositions, a child will have negative views towards math in the future as they progress in formal schooling if they are lacking in their skills. This implies that even at the young their young age, students already experience anxiety and teachers and parents may see it as ordinary challenge. If it is not given the right attention, it may affect the progress of the students.

Children who are cognitively predisposed are more prone to negative social influence. Teachers are the ones who likely to influence the elementary pupils because they are their main source of information. Studies do imply that teachers may have passed down to their students the negative attitude towards math unintentionally (Maloney & Beilock, 2015). It is on the hand of the teachers on how they can make their students love the subject. The teachers are the ones who facilitate classroom instruction that is why they have a huge role to perform to ensure that their classroom interactions are enjoyable.

The reasons for math anxiety can be classified by three main factors: environmental, having negative experiences in math subjects or with bad teachers; personal, the lack of confidence, low self-esteem, and the influence of previous negative experiences with mathematics or; cognitive, the innate qualities such as failure to naturally be adept at math, which fuels a sense of inadequacy (Adelson, 2014). Knowing the reasons for the anxiety of the learners will be of great help both for the teachers and the students because they can work together on this for the benefit of the learners.

Since math demands correct answers, Young, Wu and Menon (2012) positioned that it may bring about more anxiety over committing mistakes or giving the wrong answers compared to reading and understanding. Mathematics often requires a definite answer especially when the questions are objective type. It asks the students to do computations which may be time consuming and causes pressure on the part of the learners. In addition, when students are given situations or word problem, they also need to apply reading skills for them to be able to extract the main information that they need to answer the problem presented to them.

In the case of other students, factors such as the fear of not finishing a test on a given time, being placed in mathematics courses that requires high level of competence or the feeling of being unable to control life situation may become causes of one's math anxiety (Diaz, 2016). Since the level of the students vary, there are students who can finish a test or activity in a shorter period of time and there are students who need more time. Due to time pressure, students experience tension and uneasiness in taking the test, which leads to anxiety.

Bradley (2010) cited that people with math anxiety experience panic, passive behavior, paranoia and lack of confidence. These are the most common symptoms of math anxiety. The student believes that his classmates are not experiencing the same symptoms. Because of this, it will be hard for the student to work on his own because the panic, passive behavior and fear consume the person and just let everything passes by because of the belief that the problem will not be solved no matter what. When students fail to overcome their math anxiety, it will give them hard time in their career choices and opportunities because there are professions that require math lessons or topics. Learners and teachers need to work together to find ways on how they can overcome the math anxiety for them to be able to accomplish the tasks given to them in every lesson or topic.

According to Newman (2015), the math processing center of the brain shuts down when it experiences overwhelming math activities and tasks. Inability to encode, decode, process memory and retrieve mathematical facts are also considered as symptoms of having math anxiety. Researchers conducted a study on what occurs inside a person's brain when they performed math. Through MRI scans, it was evident that when a person worries because of the upcoming math events, it triggered a response that is as similar to the response when a person feels pain. A person's

anxiety about math will activate their posterior insula, a piece of tissue deep in the brain located above the ear, and is connected to acknowledging threats to a person's body such as physical pain.

The teacher must also allow his students to make up their own inquiries for them to be able to apply critical thinking. It is more important to let the students think critically on their own to arrive on the correct answer rather than just telling them the right answer. He stresses that students need to embrace that mathematics is not just about computations or calculations, it requires creative thinking. Mollah (2017) supports this by explaining that flexibility in math helps facilitate cooperation, reduce stress and anxiety, and create positive attitudes. As mathematics anxiety continues to recognize in different field of research across nations, its effect to various variables are also observing and examining in the vicinity of numerous disciplines.

Effects of different social figures in the level of mathematics anxiety are also investigated in numerous ways. Performing mathematics with the presence of teachers and classmates was also known to be the subject of the research (Newstead, 2018). Students also feel pressure especially in front of the class or the teacher. The fear of committing a mistake in answering the questions or performing an activity consumes the confidence of a child, which may develop into anxiety. The pressure that the classmates give to the students is also one thing that should not be neglected. With this, it is needed for a teacher to help the students to develop their confidence in facing their classmates.

Results in a study showed that teachers seemed to be the most influential figure on student's mathematics anxiety (Usop, Sabri, Sam & Wah, 2012). Teachers are the ones who control the entire experiences of the students in their class. When teachers provide these students a happy and conducive learning environment, it helps in reducing the pressure and tension in learning the subject.

Perles (2012) cited that one good way to overcome math anxiety is to change the attitude towards the subject. This means that students should not look at mathematics as a subject that will give them trials or burden but as a subject that is challenging and necessary. Teachers will play a huge role to make this happen by giving these students activities like games to make them feel that it is enjoyable. However, it is not that easy to convince the students to just accept that mathematics

is not a subject that should be feared of. The experiences of the students on the subject is what make them afraid of the subject. This also means that to change the perspectives of the students about the subject, teachers must be able to provide happy and enjoyable experiences.

Furthermore, students are also prone to getting tired. Blazer (2011) highlighted the value of giving the students the time to relax such as deep breathing in class or just a couple of seconds to have a break. When the pressure is too much on the part of the students, they may not be able to always give their best and short rest is necessary.

A more practical solution that is most commonly suggested and supported for reducing math anxiety is exposure to mathematics. It is recommended for students to challenge themselves and practice math on a day-to-day basis. It was emphasized by the researchers that practice and repetition of lessons is very important in math because it will help the students build their confidence to solve mathematical problems and improve their mathematical competence (Freedman, 2010). Giving these learners the opportunities to practice what they have learned will help them improve their mastery of the topics and will build their confidence. From this point, it is very salient that these learners must have good study habits for them to practice their learned competencies even at home.

Studies have shown that disorganization is linked to stress, and can amplify the symptoms of anxiety (Sherman, 2015). By learning to organize their notes, schedules, school things and study habits, students will have a better chance of not being affected by the anxiety that comes with math. It is part of having a good study habit. Planning and organizing the staff to be used for lessons will make the students feel that what they need are already available for them to overcome the challenges of learning Mathematics.

Another recommended strategy is for students to adopt a new style or modify their current style of studying. Students should play to their strengths and find a good studying technique (Rispoli, 2011), and should use these studying techniques to better understand the processes in the lesson. Students should ask questions about concepts that they do not understand or want to clarify (Viray, 2016).

The review of related literature and studies magnified that mathematics anxiety is a topic that is rich in terms of findings. In addition, it was also revealed that the learning engagement of pupils is low in Mathematics. However, the presentation also reveals that there is no study conducted yet regarding mathematics anxiety and its influence in the learning engagement of pupils. This helped the researcher to conceive a study that centered on examining the influence of mathematics anxiety on the mathematics learning engagement of the Grade 3 pupils during the School Year 2024-2025 in the South District of the Division of Angeles City.

Conceptual Framework

The study was based on the Control-Value Theory of Achievement Emotions (Buckley, 2011) to help explain math anxiety among Grade 3 pupils. The theory is centered in the trigger of achievement emotions, which includes activity-related emotions such as enjoyment, and anxiety. There are two components in his theory: (1) how much as student values what they are doing. and (2) how much control the student believes that he or she has over a task. When a learner highly values what they are doing and has a high level of control over the task, he would find enjoyment. On the other hand, when a student highly values a task but has no control, anxiety is experienced.

The aforementioned theory served as the basis to craft the graphical presentation of the study IV-DV model.

The independent variable were the pupils' math anxiety, while the dependent variable was the level of engagement. The one directional arrow indicates the hypothesized influence of math anxiety on pupils' level of engagement.

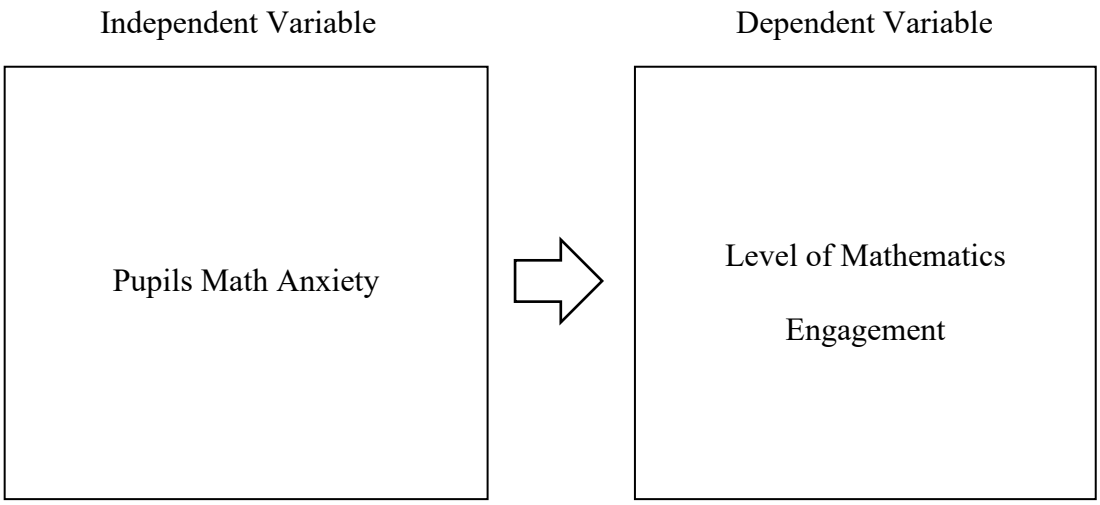

FIGURE 1
PARADIGM OF THE STUDY

Statement of the Problem

The primary goal of this study was to examine the influence of mathematics anxiety on the mathematics learning engagement of the Grade 3 pupils during the School Year 2024-2025 in the South District of the Division of Angeles City.

Specifically, the study sought to answer to the following questions:

1.How may the level of mathematics anxiety of the Grade 3 pupils be described?

2. How may the level of pupils' engagement in Mathematics be described?

3. Does mathematics anxiety of the Grade 3 pupils significantly influence their level of engagement in Mathematics.

4. How may the learners want to be supported to address their anxiety in Mathematics?

5. Based on the findings of the study, what anxiety management plan may be proposed?

Hypothesis

Mathematics anxiety of the Grade 3 pupils does not significantly influence their level of engagement in Mathematics.

Significance of the Study

It is expected that the following will benefit from the study:

School Heads. The improvement in the learning engagement and lessening the math anxiety of the students may benefit the school heads in the assessment of child friendly school. When these learners feel that the schools is taking care of them well even in the difficult subject, they may give higher rating on child friendly school which is a reflection of the management and leadership skills of the school heads.

Teachers. This research would allow educators to know and gain awareness about the levels of anxiety experiencing by their students most especially on math subjects. This could lead to the creation of more effective teaching styles which will aid the problem on math anxiety.

Pupils. This study can also help the pupil's identify whether they have a high or low level of math anxiety, such that awareness on the matter will be beneficial, most particularly to those students with high level of math anxiety to help them improve on the matter.

Future Researchers. This study will encourage them to do research that is aligned with the current study following the recommended additional demographic profile and other variables. Apart from that, they could also use the theories, data and results gathered by researchers to support their studies.

Scope and Delimitation

The locale of the study was in South District in the Division of Angeles City. From the local, Grade 3 pupils were requested to be the respondents of the study since they are the center of the investigation.

The main objective was to examine the influence of mathematics anxiety of the Grade 3 pupils on their learning engagement.

To materialize it, the researcher gathered data on the level of mathematics anxiety of the pupils and the level of pupils' engagement in Mathematics. Using these two pieces of information, the influence was established.

Furthermore, the researcher also collected responses on how the Grade 3 pupils want to be assisted to address their anxiety in Mathematics.

Based on the findings of the study, an anxiety management plan was proposed.

Definition of Terms

These terms are defined conceptually to help the readers fully understand this study.

Engagement. It refers to the actual involvement of the pupils in the activities or lesson presented to the school relevant to Mathematics. Ashwin and Mcvitty (2015) noted that engagement is not limited with classroom discussion but also with other activities that are happening in the school.

Math Anxiety. The term is defined as the existence of a syndrome that leads to having emotion pressure or stress on the part of student in learning numbers and figures and any lesson related to Mathematics (Cates & Rhymer, 2013). In this study, it refers to the anxiety that pupils experience during mathematics teaching and/or mathematics instruction.

II. METHODOLOGY

This chapter discusses research design, respondents and sampling technique, instrumentation, data collection and statistical treatment.

Research Design

The conduct of this study used mixed method more particularly the sequential explanatory mixed method. This research, as it endeavors to surface and converge both quantitative data and qualitative information, necessitates the use of the mentioned mixed method design.

In the view of Creswell (2013), a mixed method approach is a combination of both the quantitative and qualitative research and data in one research study. The use of the two methods in a single research is not only confined with combining the beauty of the two but by the purpose of strengthening the weakness of the other. Even Almaki (2016) noted the same concept that mixed method is a powerful design that involves collecting, analyzing, and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon.

Specifically, sequential explanatory design was applied. According to Creswell (2013) is a kind of mixed methods design which makes the researcher gather quantitative and qualitative data to come up with a substantial presentation of findings and results of the research problem. In this method, the researcher typically collects the two forms of data sequentially. It begins with quantitative part and the results of the quantitative will be the basis of qualitative data gathering.

Since the study aimed to collect both quantitative and qualitative data to answer the main goal, it was indeed necessary to apply the sequential explanatory design.

Respondents/Participants

The main locale of the study was the South District where the researcher is currently located and assigned as public school teacher.

There were two sets of sources of information in this study.

For the quantitative part, the Grade 3 pupils were requested as the respondents of the study. They came from the public elementary schools of the South District during the School Year 2024-2025.

The selection of the respondents was facilitated using the G-power test. This software is designed to ensure the accuracy in determining the sample size. Based on the computation, a total of 103 Grade 3f pupils were involved as respondents in the study and were selected through random sampling. The salient of point of applying stratified random sampling is that it ensures that all of the schools are represented in the study since the selection is based on stratum. Furthermore, it underscores the value of using randomization in the selection to lessen the bias.

Table 1 highlighted the distribution of respondents in each public elementary school of South District.

TABLE 1
RESPONDENTS OF THE STUDY

Schools	Frequency	Percentage
Public Elementary School A	29	28.16
Public Elementary School B	23	22.33
Public Elementary School C	19	18.45
Public Elementary School D	21	20.39
Public Elementary School E	11	10.68
Total	**103**	**100.00**

Table 1 shows that the distribution of the respondents came from five public elementary schools. The same illustration underscores that 28.16% of the pupils were from Public elementary school A, while 10.68% of the pupils were from Public elementary school E.

Another consideration is the qualitative part. In this study, the researcher had 10 pupils to be the participants in the study. They were given questions that centered on collecting answers on

their desired support to address their anxiety. These 10 participants were selected purposively. The researcher considered the 10 pupils with highest level of anxiety on the quantitative part.

Research Instruments

To examine their anxiety, the Mathematics Anxiety Scale was the main instrument of the study (Zakariya, 2018). This questionnaire contained the profile sheet and the 20 item 5-point Likert scale that was developed to measure the levels of mathematics anxiety pupil's "usually" experience under two categories: Learning Mathematics Anxiety and Perception of difficulty and motivation. It was self-administering test that did not require time limit. The questionnaire served as the basis for the assessment of their math anxiety. The respondents were asked to rate themselves according to the given statement.

On the other hand, for the level of engagement, Hart, Stewart and Jimerson (2011) Student Engagement in Schools Questionnaire was adapted. Still, Content validity of the instrument was checked by the panel of experts including (1) education program supervisor in charge of Mathematics, (2) education program specialist in charge of research, and (3) master teacher or district coordinator in Mathematics.

The qualitative part of the study resorted to semi-structured interview. This meant that the researcher needs to prepare a set of questions before the actual interview. The questions were only prepared once the result of the quantitative part were already complete. This served as the basis for the construction of the questions. In semi-structured interview, the prepared questions may increase or decrease. Everything was dependent on how the participants answered each question. The questions to be asked are open-ended so teachers may always have the liberty to fully express themselves. These questions were the expanded version of a research question in the previous chapter.

The prepared questions were presented to panel of experts for validation.

Data Collection

Prior to the actual conduct of the study, all the necessary permits and approval from the higher authorities were secured including the graduate school and office of the Schools Division Superintendent. This was done by the researcher by personally crafting a letter of request duly noted by the research adviser before it was sent to the offices. Once the approvals are secured, data collection began by sending a copy of the approval to the target respondents.

The researcher asked permission personally from the respective advisers of the selected Grade 3 pupils to administer the survey questionnaires. In addition, their assistance was also requested for the interview.

Due to the current situation, the use of online platform for data gathering was prioritized.

Ethical Considerations

Since the considered subject of this study are minors and belongs to vulnerable groups, a letter of permission from the District Supervisor, Principal and respective parents of selected Grade 3 pupils were secured in order to avoid ethical research violation. An informed consent forms were sought from respective parents on this regard. The names of the selected Grade 3 pupils were kept in confidential manner in order to hide their identity and to observe anonymity of the subjects.

Statistical Treatment/Data Analysis

The quantitative data to be collected were treated using the following statistical tool:

1. Mean, to examine the math anxiety and level of engagement of pupils.

Scale		Descriptive Equivalent	Numerical Rating
5	-	High Anxiety	4.50-5.00
4	-	Quite a Bit Anxiety	3.50-4.49
3	-	Moderate Anxiety	2.50-3.49
2	-	Some Anxiety	1.50-2.49
1	-	Low Anxiety	below-1.49

Scale		Descriptive Equivalent	Numerical Rating
5	-	I completely agree	4.50-5.00
4	-	I agree	3.50-4.49
3	-	I cannot decide	2.50-3.49
2	-	I disagree	1.50-2.49
1	-	I completely disagree	below-1.49

2. Multiple regression, to examine the influence mathematics anxiety on pupils' engagement.

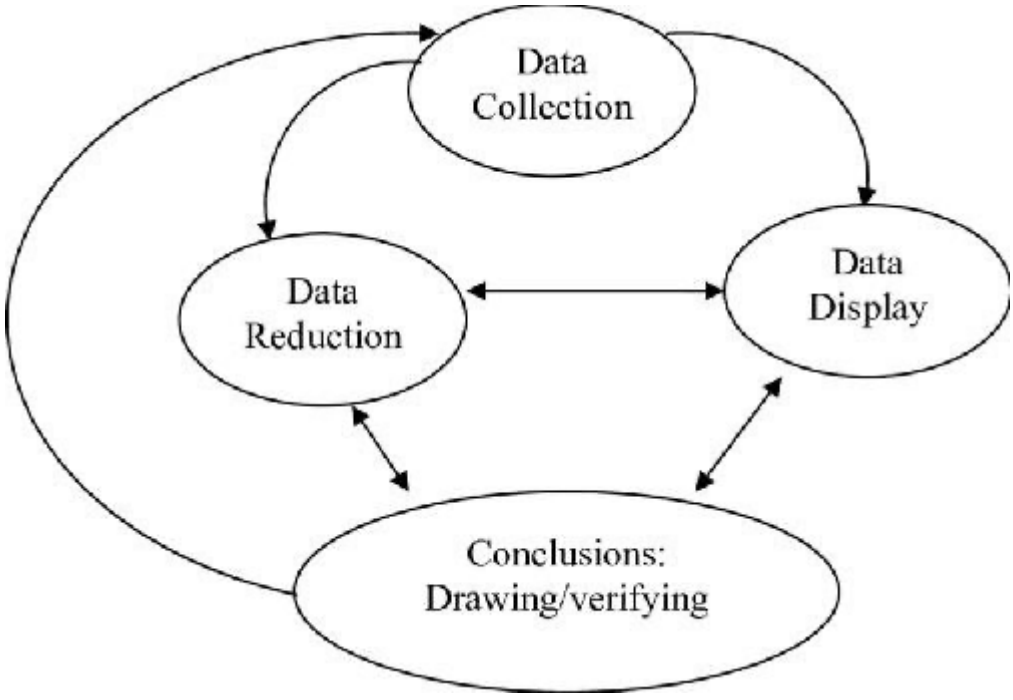

FIGURE 2
DIAGRAM OF QUALITATIVE DATA ANALYSIS

The heart of data analysis in this part is on thematic analysis of the data.

It consists of three four stages or 'streams' including data collection, data reduction, data display and data conclusion-drawing/verifying.

Data collection is the first part of this model. The researcher needs to gather first the data to be interpreted from the target source.

Data reduction is the second stage in data analysis according the Miles & Huberman (1994) model. It includes the process of selecting, simplifying and transforming the data.

The third main step of the Miles & Huberman Model (1994) is data display. This step involves retrieving data using data display. It cannot be separated from data reduction because it complements the former. Data display is "the organized, compressed assembly of information" (Ibid p.11). It aims to make sense of the data that is collected. Data display organizes data, helps to arrange concepts and the thoughts (Miles & Huberman 1994).

The last step of the Miles & Huberman Model comprises data drawing and conclusions (1994). These workers have suggested the use of some points to assist researchers to draw conclusions having displayed data in a variety of ways. Some of their ideas to generate meaning from the data were adopted by this research.

These included: 1- The notation of any patterns or themes and the relevance of any statement especially if similar or contrasting

2- Grouping or establishing categories of 'information that can go together

3- Identifying interrelations among factors and variables

4- Building conceptual coherence and consistency, which at the end it should use to explore the validity of the findings so that they fit the theoretical framework of the study.

III. RESULTS AND DISCUSSION

This part of paper presents the analysis of data both in quantitative part and qualitative part. Presentation is based on the research questions posted in the previous chapter.

1. Level of Mathematics Anxiety of the Respondents

Using the adopted instrument, the researcher gathered data about the level of mathematics anxiety which is presented in Table 2.

It can be seen from the illustration that the learning mathematics anxiety accumulated a grand mean of 4.19 (SD=0.72). The highest mean of 4.31 (SD=0.75) is found on “I am always under a terrible strain in a math class”, while the lowest mean of 4.13 (SD=0.71) is listed on “Math confuses me”. The high standard deviation on the responses tells that the answer of the pupils are diverse.

The findings indicate that the pupils who participated in the survey are experiencing anxiety when it comes to learning mathematics. There are times when kids are having difficulty with the activities and lessons that they are taking in mathematics. According to Svecova (2024), it is reasonable to anticipate that students at lower grade levels may have anxiety over mathematics, particularly in situations when these students are unable to acquire the fundamentals of mathematics. Because mathematics becomes more difficult to understand as students progress through the grades, it is imperative that teachers ensure they are able to teach the fundamental skills. There is also a correlation between the reactions of students who state that mathematics is challenging and the way in which other students see the subject.

TABLE 2
ASSESSMENT OF LEARNING MATHEMATICS ANXIETY

Learning Mathematics Anxiety	Weighted Mean	SD	Description
1 I can become a good student of mathematics	4.24	0.72	Quite a Bit Anxiety
2 Math confuses me	4.13	0.71	Quite a Bit Anxiety
3 I have always had trouble with math	4.14	0.72	Quite a Bit Anxiety
4 No matter what I do, I always get low grades in math	4.14	0.68	Quite a Bit Anxiety
5 Usually I have difficulty with mathematics	4.17	0.71	Quite a Bit Anxiety
6 Math is one of the most boring subjects	4.19	0.73	Quite a Bit Anxiety
7 I will always have difficulty on learning math	4.21	0.72	Quite a Bit Anxiety
8 I know I can do well in math.	4.28	0.71	Quite a Bit Anxiety
9 I hate studying maths, even the easiest parts	4.27	0.74	Quite a Bit Anxiety
10 I am always under a terrible strain in a math class	4. 31	0.75	Quite a Bit Anxiety
Grand Mean	**4.19**	**0.72**	**Quite a Bit Anxiety**

Table shows that perception of difficulty and motivation was given a rating of quite a bit anxiety based on its grand mean of 4.24 (SD=0.73). Another information presented is that "Usually I feel unable to solve mathematical problems" is given the highest mean of 4.29 (SD=0.74) and a verbal rating of quite a bit anxiety. On the contrary, the lowest mean of 4.21 (SD=0.73) is given to "Math is hard for me" with rating of quite a bit anxiety.

According to the findings, the pupils who participated in the survey consider mathematics to be a challenging or challenging topic, which acts as a barrier to their motivation. According to Auguis et al. (2024), the experiences and perceptions of the students in mathematics are the source of the anxiety that they face when it comes to mathematics. As a result of the challenging times that they have encountered in the past, there have been instances in which they have already formed the preconceived notion that the activities are challenging. This is because of the preconception

that they have in their minds. In point of fact, it is of the utmost significance that educators provide their students with activities that they find inherently entertaining.

TABLE 3
ASSESSMENT OF PERCEPTION OF DIFFICULTY AND MOTIVATION

Perception of difficulty and motivation	Weighted Mean	SD	Description
1 Math is hard for me	4.21	0.73	Quite a Bit Anxiety
2 In math, it's hard for me to decide what I have to do	4.22	0.76	Quite a Bit Anxiety
3 Usually I feel unable to solve mathematical problems	4.29	0.74	Quite a Bit Anxiety
4 I'm not the type to do well in math.	4.22	0.74	Quite a Bit Anxiety
5 I do not know how to study math	4.28	0.73	Quite a Bit Anxiety
6 I don't think I could handle more difficult math.	4.24	0.74	Quite a Bit Anxiety
7 I'm one of those people who were not born to learn math	4.26	0.75	Quite a Bit Anxiety
8 I don't feel comfortable studying math like I feel with other subjects	4.23	0.73	Quite a Bit Anxiety
9 Except for a few cases, no matter how much effort I put out, I cannot understand math	4.22	0.72	Quite a Bit Anxiety
10 I am afraid to ask questions in math class	4.26	0.74	Quite a Bit Anxiety
Grand Mean	**4.24**	**0.73**	**Quite a Bit Anxiety**

2. Learning Engagement in Mathematics

The study also dwelt on collecting the learning engagement in Mathematics of the respondents which is found in Table 4.

Table 4 accumulated a grand mean of 4.12 (SD=0.28) indicating that pupil respondents agree that they have high learning engagement in Mathematics. It is also noticeable that the highest mean of 4.32 (SD=0.32) is found on "I have become more willing to consider different points of

view". A closer look on the table will show that all of the indicators were given rating of Agree but the lowest mean of 3.72 (SD=0.26) is given to "I am able to bring information and different ideas to solve problems". The results magnified that the learners agree that they do active engagement in learning mathematics.

Adeleye et al. (2024), the level of involvement that students have in a subject is mostly determined by the types of lessons and activities that teachers provide for their students. When teachers provide learning activities that are within the level of the students and can address the anxiety and worries in learning, there is a larger possibility that these learners would participate more.

TABLE 4
ASSESSMENT OF LEARNING ENGAGEMENT

Indicators	Weighted Mean	SD	Description
1 I have developed my ability to make judgements about alternative perspectives	3.81	0.31	Agree
2 I have become more willing to consider different points of view	4.32	0.32	Agree
3 I have been encouraged to use my own initiative	4.12	0.28	Agree
4 I have been challenged to come up with new ideas	3.91	0.24	Agree
5 I feel I can take the responsibility of my own learning	4.04	0.24	Agree
6 I have become more confident of my ability to pursue further learning	3.85	0.30	Agree
7 I have learned how to be to be more adaptable	4.12	0.25	Agree
8 I have become more willing to change my views and accept new ideas	4.13	0.23	Agree
9 I have improved my ability to use knowledge to solve problems	3.90	0.27	Agree
10 I am able to bring information and different ideas to solve problems	3.72	0.26	Agree
11 I have developed the ability to efficiently communicate with others	4.10	0.30	Agree
12 I have improved my ability to convey ideas	4.12	0.34	Agree
13 I have learned to be an effective team or group member	4.27	0.28	Agree
14 I feel confident about the way I deal with a wide range of people	4.21	0.32	Agree
15 I frequently work together with other in my classes	4.17	0.31	Agree
Grand Mean	**4.12**	**0.28**	**Agree**

3. Influence of Mathematics Anxiety Level of Engagement in Mathematics

The data on mathematics anxiety and learning engagement were subjected to another statistical treatment to measure the possible influence of one variable to the other.

TABLE 5
REGRESSION OF LEARNING MATHEMATICS ANXIETY AND LEVEL OF ENGAGEMENT

Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	T	Sig.
Mathematics Anxiety	0.233374	0.102721	0.23	2.271907	0.025234
		Regression Statistics			
	Multiple R			0.221545	
	R Square			0.049082	
	Adjusted R Square			0.039573	
	Standard Error			1.013222	
	Observations			102	
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.298954	5.298954	5.161562	0.025234
Residual	100	102.6618	1.026618		
Total	101	107.9608			

Table 5 shows that the regression analysis examined the effect of Mathematics Anxiety on the mathematics engagement. The Multiple R = 0.2215 indicates a weak positive correlation between Mathematics Anxiety and the dependent variable. The ANOVA table shows an F-value of 5.1616 with a significance level (p = 0.0252), which is less than 0.05. This confirms that the regression model is statistically significant—Mathematics Anxiety has a meaningful, though limited, influence on the Mathematics Engagement. This means that for every one-unit increase in Mathematics Anxiety, the dependent variable increases by approximately 0.23 units.

Becker and Ringleb (2025) underscored that a little anxiety and challenge may have positive effect to learners. When they know that they have something to do or to finish that is difficult, they may allot more time to prepare or do it because of what they feel.

4. Desired Support of the Learners to Address Anxiety

Following the collection and analysis of quantitative data, the researcher also gathered qualitative data pertaining to the learners' desired support in addressing their anxiety. A semi-structured interview was used for this. Open-ended questions concerning their desired data were posed to these learners. Following tabulation and analysis of the gathered data, the following themes emerged.

Theme 1: Making Learning Enjoyable

The lessons of the current time are more difficult because there are few interactions between the teacher and the learners. Students of these days are trying to exert more effort in their studies which they also consider as an additional anxiety.

Learners see the importance of making the lessons enjoyable. They need to feel that Math is not a subject that should be feared.

This theme is formed based on the following lines:

> *Masaya sa classroom [It is happy in the classroom]* (P1)
>
> *Yung mga lessons na may games [Lessons that have games]* (P3)
>
> *May mga palaro habang nagkaklase [There are games while playing]* (P4)
>
> *Yung mga games ni ma'am kapag nandyan si princopal [The games of ma'am when the principal is there] (P9)*

Playing games, both digital and non-digital, is a way to learn new things and skills. Using games in school can make a big difference in how well students learn and do in school (Kula, 2021; Syafii, 2021). Game-based learning helps people learn in two steps: Games can first stimulate students to use knowledge from other subjects when making judgments. Second, students can see how the outcomes of games alter based on the choices and decisions they make. It also lets students talk to other players and talk about actions in the game. This makes coordination better, which in turn makes social skills better (Adipat et al., 2021).

Theme 2: Strengthening Enrichment Activities

When learners experience anxiety in their studies, it is suggested to give all the assistance that they need because they are already experiencing struggles in their learning journey. The challenges and anxiety of learners may be addressed by ensuring that the enrichment activities are properly conducted. The pupils need to see that it is not just about giving them papers to answer, but it is about getting the assistance that they need when activities are given.

This desired assistance of the learners is found the following key points:

> *Kapag may activity may nakaalalay sakin [When there is an activity, someone is there for me]* (P2)
>
> *Classmates ko na magaling sana tulungan ako [I hope my smart classmate will help me]* (P5)
>
> *Patulong sa kaibigan kapag may activity [Help from friend during activity]* (P6)

Enrichment activities serve as avenue for teachers and pupils to have a deeper understanding of the lesson. When pupils are having hard time on lessons, it leads to their anxiety. With this, it is very crucial that the enrichment activities are well-monitored by teachers (Homedan et al., 2021).

5. Proposed Mathematics Learning Plan

The final goal of the study is to have the proposed mathematics learning plan that aims to reduce the anxiety of the students and further improve their learning engagement.

I. Rationale

Learning mathematics is facing more challenges and anxiety. Students in their respective homes are trying to learn the subject with minimal interaction with their classmates and teachers. With this, the assistance that they are getting has been lessened by the situation.

Objectives	Strategies	Person In Charge	Date	Success Indicator
1. improve teachers' capability to contextualize interactive learning materials	1. provide inset to the teachers about interactive learning materials	School heads, head teachers and master teachers	April 2022	Accomplishment report
	2. share best interactive learning materials with other teachers	School heads, recognized teachers in interactive learning materials	April to July 2022	List of best interactive learning materials Colloquium report
2. provide strategies to teachers on making follow up learning	1. get the challenges of teachers in communication and follow up	School heads, head teachers and master teachers	April 2022	List of challenges
	2. provide technical assistance to teachers on doing follow ups	Teachers, master teachers and school heads	April to July 2022	Instructional supervision report

IV. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides details about the summary of findings, conclusions and recommendations of the study.

Summary of Findings

The following summary are formed based on the discussed results:

1. Learners feel quite a bit anxiety on learning mathematics anxiety (M=4.19) and perception of difficulty and motivation (M= 4.24).

2. Respondents agree (M=4.12) that they have high learning engagement in Mathematics.

3. The Multiple R = 0.2215 indicates a weak positive correlation between Mathematics Anxiety and the learning engagement. The ANOVA table shows an F-value of 5.1616 with a significance level (p = 0.0252), which is less than 0.05.

4. The desired support of learners to address their anxiety include Making Learning Enjoyable and Strengthening Enrichment Activities.

5. An anxiety management plan is proposed based on the findings of the study.

Conclusions

The following conclusions are formed based on the findings of the study:

1. Pupil respondents are experiencing anxiety in learning mathematics and they see mathematics as a hard or difficult subject which hinders them to be motivated.

2. Learners still comply with the needed activities that they have in mathematics even though the are struggling.

3. Mathematics anxiety has positive weak influence on learning engagement. and perception of difficulty and motivation are significantly correlated with level of engagement of pupils. For every one-unit increase in Mathematics Anxiety, the learning engagement increases by approximately 0.23 units.

4. Pupils see their need for engaging activities that will make them more motivated which will be partnered by enjoyable games and learning.

5. The mathematics anxiety management plan aims to further assist the teachers on how they can provide better learning experiences to their pupils.

Recommendations

The following recommendations are derived from the conclusions:

1. Teachers may dig deeper on the sources of the mathematics anxiety of learners so they will be able to provide better learning experience that will also address the anxiety.

2. The eagerness of the learners in their studies may be maximize by giving the activities that will motivate them to continue learning mathematics. This may be done by having simple contests in some of the activities.

3. Engagement of pupils may be further improved by addressing the anxiety of learners and making them motivated in their lessons through simple reward system.

4. Teachers may prepare learning plan that will include partnering fast learner pupils with those who are struggling to ensure that enrichment activities are really done well. In addition, school heads may monitor the lesson plan submitted by teachers to ensure that game-based learning is integrated.

5. The proposed mathematics anxiety management plan may be considered by schools in thinking of topics for= the training of teachers.

6. Future researchers may have study about the sources of anxiety of the pupils in learning mathematics.

REFERENCES

[1.] Adeleye, A. et al. (2024). Learning engagement as a predictor of performance in mathematics among Nigerian senior secondary school students. *International Journal of Innovation in Science and Mathematics Education* 32(3)

[2.] Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging students in the learning process with game-based learning: The fundamental concepts. *International Journal of Technology in Education* (IJTE), 4(3), 542-552. https://doi.org/10.46328/ijte.169

[3.] Adelson, R. (2014). Nervous About Numbers. Retrieved January 13, 2016 from http://www.psychologicalscience.org/index.php/publications/observer/2014/september-14/nervous-about-numbers.html

[4.] Ashcraft, M. (2002). Math Anxiety: Personal, Educational, and Cognitive Consequences. *Journal. Department of Psychology*, Cleveland State University.

[5.] Auguis, M. et al. (2024). Student's Anxiety Level towards Mathematics: Basis for Intervention Program. *International Journal of Science and Research Archive*, 11(02), 1007–1017

[6.] Ashwin, P. and Mcvitty, D. (2015). *The Meanings of Student Engagement: Implications for Policies and Practices.* Researchgate.

[7.] Becker, S. & Ringleb, B. (2025). Stress and anxiety in schools: a multilevel analysis of individual and class-level effects of achievement and competitiveness. *Front. Educ*. 9:1519161. doi: 10.3389/feduc.2024.1519161.

[8.] Ballado, R. (2014). Mathematics Anxiety and Academic Achievement of Junior

a. Pre-service Teacher Education Students. University of Eastern Philippines, Catarman, Northern Samar, Philippines.

[9.] Baloglu, M., & Zelhart, P. (2007). Psychometric Properties of the Revised Mathematics Anxiety Rating Scale. The Psychological Record 57, 593-611.

[10.] Baraceros, E. (2016). *Practical Research 1.* Rex Publishing Company.

[11.] Beilock, S. L. & Willingham, D. T. (2014). Math Anxiety: Can Teachers Help Students Reduce It? Retrieved January 11, 2019 from

https://hpl.uchicago.edu/sites/hpl.uchicago.edu/files/uploads/American%20Educator,%202014.pdf

[12.] Blazer, C. (2011). Strategies for Reducing Math Anxiety. Retrieved August 11, 2021 from http://files.eric.ed.gov/fulltext/ED536509.pdf

[13.] Buckley, S. (2011). Deconstructing maths anxiety: Helping students develop a positive attitude towards learning maths. Retrieved January 10, 2019 from https://www.acer.edu.au/occasional-essays/deconstructing-maths-anxiety-helping-students-to-develop-a-positive-attitud

[14.] Bradley, L. M. (2010). Working With Adults With Math Phobia.

[15.] Cates. G., & Rhymer K. (2003). Examining the Relationship between Mathematics Anxiety and Mathematics Performance: An Instructional Hierarchy Perspective. Journal. Behavioral Education

[16.] Crowder, B. (2011). 8 Empowering Ways to Beat Math Anxiety. Retrieved August 10, 2021 from http://mathfour.com/math-anxiety

[17.] Diaz, N. (2009). Math Anxiety: Causes and Cures. Retrieved August 14, 2021 from http://www.thetentacle.com/ShowArticle.cfm?mydocid=3456

[18.] Freedman, E. (2010). Ten Ways to Reduce Math Anxiety. Retrieved August 12, 2021 from http://www.mathpower. com/reduce.htm.

[19.] Gall, M., Gall, J., and Borg, W. (2007), *Educational research: An introduction* (8th ed.). Boston: Pearson

[20.] Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *J. Res. Math. Educ.* 21, 33–46. doi: 10.2307/749455

[21.] Homedan, H. A. A., Baioumy, N., & Annuar, T. B. M. (2021). The Effectiveness of Enrichment Activities Program Based on Educational Techniques on the Quality of Mathematics Outcomes for Third Grade Primary Students in Jordan. *International Journal of Academic Research in Business and Social Sciences*, 11(5), 63–76.

[22.] Kula, S. S. (2021). Mind games with the views of classroom teachers. *International Journal of Research in Education and Science (IJRES),* 7(3), 747-766. https://doi.org/10.46328/ijres.1471

[23.] Maloney, E. A. & Beilock, S. L. (2015). *Math Anxiety: A Factor in Math Achievement Not to Be Ignored, 2(1), 4-12.*Retrieved January 12, 2019 from file:///C:/Users/Manaloto/Downloads/1443720506k-4-12.pdf

[24.] Merritt, W. (2011). Exploring Math Anxiety as it Relates to Math Achievement, Gender and Race. Mississippi State, Mississippi.

[25.] Mollah, K. (2017). Mathematics Anxiety among the School Students. *Pramana Research Journal*, 7(11)

[26.] Newman, R. M. (1985). Math Anxiety. Retrieved September 1, 2021 from http://www.dyscalculia.org/dyscalculia/math-anxiety

[27.] Newstead, K. (1998). Aspects of Children's Mathematics Anxiety. Educational Studies in Mathematics. 36(1)

[28.] Perin, D. (2011). Facilitating Student Learning Through Contextualization. Community
a. College Research Center.

[29.] Perles, K. (2012). Math Anxiety: 7 Simple Solutions. Retrieved August 13, 2021 from http://www.education.com/slideshow/math-anxiety-solutions/does-your-child-freeze/

[30.] Preis, C. & Biggs, B. (2001). *Can Instructors Help Learners Overcome Math Anxiety?, 28(4), 6-10.* Retrieved January 13, 2019 from http://eric.ed.gov/?id=EJ627573

[31.] Rispoli, F. (2011). Twelve Ways to Reduce Math Anxiety. Dowling College, Oakdale, NY. Retrieved July 13, 2021 from http://www.dowling.edu/faculty/Rispoli/TwelveWays.pdf.

[32.] Ruffins, P. (2007). A Real Fear. Diverse Online

[33.] Scarpello, G. (2007). Helping Students Get Past Math Anxiety. Connecting Education and Careers, 82(6), 34-35.

[34.] Sherman, A. (2015). The Link Between Depression, Anxiety, and Disorganization. Retrieved August 13, 2021 from http://psychskills.com/the-link-between-depression-anxiety-and-disorganization/

[35.] Shields, D.J. (2006). Causes of math anxiety: The student perspective. Unpublished doctoral dissertation, University of Pennsylvania, Indiana.

[36.] Svecova, V. (2024). Math Anxiety and its Relation to the Success of Mathematical Problems, *TEM Journal*, 13(1)

[37.] Syafii, M. L., Kusnawan, W., & Syukroni, A. (2020). Enhancing listening skills using games. *International Journal on Studies in Education (IJonSE),* 2(2), 78-107. https://doi.org/10.46328/ijonse.21

[38.] Usop, H. H., Sabri, N. A., Sam, H. K., & Wah, T. K. (2012). Factors causing Mathematics Anxiety among Undergraduate Students.

[39.] Viray, J. (2016). Parental Involvement as Predictor of Student Academic Performance. *Imperial Journal of Interdisciplinary Research*, 2(6)

[40.] Vitasari, P., Wahab, M., Othman A., & Awang M. (2010). A research for identifying study anxiety sources among university students. *Journal International Education Studies*.

[41.] Young, C. B., Wu, S. S., & Menon, V. (2012). *The neurodevelopmental basis of math anxiety. Psychological Science, 23(5), 492–501.* Retrieved January 10, 2019 from http://www.ncbi.nlm.nih.gov/pubmed/22434239

[42.] Zakariya, Y. (2018). Development of Mathematics Anxiety Scale: Factor Analysis as a Determinant of Subcategories. *Journal of Pedagogical Research*, 2(2), 135-144.