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# FACTORS CAUSING AVERSION TO MATHEMATICS AMONG GRADE 12 STUDENTS IN PRIVATE SCHOOL IN THE MUNICIPALITY OF TAMPARAN PROVINCE OF LANAO DEL SUR, PHILIPPINES

**Hassan S. Gandamra**
*College of Education, Mindanao State University-Iligan Institute of Technology, Iligan City, Philippines,*
*hassangandamra0@gmail.com*

**Bartolome L. Cagas**
*Institute of Science Education, Mindanao State University, Marawi City, Philippines,*
*bcagas2000@yahoo.com*

## Abstract

*This study investigated the factors causing aversion to mathematics among grade 12 students of a private school in the municipality of Tamparan, Lanao del Sur, Philippines, enrolled in the school year 2023-2024. One hundred fifty (n=150) grade 12 students were surveyed using the Causes of Students' Aversion in Mathematics Questionnaire (CSAMQ) developed by the authors. The following two questions guide the investigation: 1) what are the causes of students' aversion to mathematics? 2) What are the students' levels of aversion to mathematics? Students' aversion to*

*learning mathematics was hypothesized as caused by the nature of mathematics, the teacher, and student factors. On the causes of aversion, students declared that of mathematics factors (40.65%) and the teacher factors (56.3%) do not cause aversion, while the student factors (39.26%) cause aversion among them. On the level of aversion, students have a low level of aversion in mathematics due to the nature of mathematics factors (40.65 %) and teacher factors (56.3%), while having a high level due to student factors (39.26%). The results underscore the need to reduce the causes of aversion among students due to teachers' teaching practices and students' learning attitude, study practices, and personality characteristics of both teachers and students.*

**Keywords:**
Aversion, Aversion Level, Mathematics, Nature of Mathematics, Students' Aversion

## 1. Introduction

Mathematics is one of the important subjects in the school curriculum and is very useful in daily life and in studying other subjects. However, the majority of students across the world dislike mathematics (Gafoor & Kurukkan, 2015). Mathematics aversion is the condition characterized by a person's dislike of all things mathematical in nature, regardless of the context or level of mathematical difficulty (Ahdoot, 2022). According to Gokkusagi (2006), many students develop negative attitudes toward mathematics throughout their academic careers and genuinely dislike the subject. For most students, the subject is a source of frustration, discouragement, and anxiety, and they regard mathematics as difficult.

Eighty-eight percent (88%) of the students said that they disliked mathematics, while only 6% liked it (Gafoor & Kurukkan, 2015). The major causes of students' dislike of mathematics include subject matter, learning environment, cognitive, emotional, and psychomotor characteristics of the learners, and teacher instruction. If this problem will not be addressed properly, mathematics will remain an unattractive subject to students.

Several studies on mathematics aversion have shown that the nature of mathematics (e.g., Garcia & Martinez, 2021; Smith & Johnson, 2017; Larkin & Jorgensen, 2016; Hilton & Pedersen, 1980; ~~and~~ Allain, 2010), teacher factors (e.g., Seka, 2010; Eleweke, 2007; Chronaki & Kollosche, 2019), student factors (e.g., Johnson, 2016, Jones & Brown, 2019; Schunk & Ertmer, 2000; Pintrich, 2003; Devlin, 1998), and mathematics anxiety (e.g., Scarpello, 2007; Geist, 2008; Beilock, 2008; Boaler, 2000; ~~and~~ Ganley & McGraw, 2016) are some of the reasons why students dislike mathematics. According to Scarpello (2007), mathematics anxiety is one of the primary causes why 75% of Americans give up on mathematics education and stay away from several math-related careers. Other factors causing mathematics aversion among students are failure in the past; low status given to mathematics by parents; lack of confidence; relationship with current or previous mathematics teacher; and physical problems, such as dyslexia, that is, impaired ability to understand written language (Fraser & Honeyford, 2000). Tobias (1979, ~~as~~ cited in Hilton & Pedersen, 1980) discussed that students faced difficulties in the mastery of mathematical notions, understanding word problems, and how mathematics relates to the real world. Sometimes symbols and formulas make mathematics questions more complicated and complex, so the students cannot understand the pivot point of the question. Further, Tobias explained these points by considering

fractions, calculus, negative numbers, and word problems. In some other cases, the teacher's assumption of students' knowledge is another drawback (Seka, 2010). Many teachers act as if computational procedures and processes are simple and self-explanatory; and sometimes teachers have little sympathy for students who do not understand concepts. In such situations, a student who is lost (lacks understanding) is not going to have love for the subject. In this context, students' subject matter mastery becomes a problem, and therefore end up hating the subject.

Studies reported investigating the causes of students' aversion to mathematics were focused on students, teachers, and the nature of the subject. However, few studies of this nature were reported. Of all the studies reported, student-related causes identified are anxiety, failure in the past, low status given to mathematics by parents, lack of confidence, learning environment, difficulty in understanding the subject matter, and physical problems. No studies have pointed to students' interest and behavior. On the teacher-related causes, teaching style and relationship with the current or previous mathematics teacher were identified. Teachers' teaching behavior and teachers' content knowledge have not yet been identified. On the nature of mathematics-related causes, subject content was identified, but not specifically on mathematics principles and mathematics topics as boring to learn. Most studies reported were done in foreign countries such as Brazil, Tanzania, South Africa, Norway, India, Netherlands, Kenya, and Texas using graduate students, college, junior high school, and elementary students. Few studies of the same nature have been conducted and reported in the Philippines using senior high school students.

Knowing all of the causes of students' aversion to mathematics allows us to better understand the problem. As a result, teachers, curriculum designers, policymakers, and future researchers are encouraged to design programs that will help students develop a positive attitude toward learning mathematics. Teachers should create and implement a mathematics-friendly learning approach that will lessen students' dislike of mathematics. Furthermore, they should motivate the students well to actively participate in every mathematics learning activity.

## Research Questions

Generally, the purpose of the study is to investigate the causes of students' aversion to mathematics. Specifically, it sought to answer the following questions:

1. What are the major causes of students' aversion to mathematics?
2. What are the levels of students' aversion to mathematics?

## Theoretical Framework

A dictionary definition of hate cited by Neufeldt & Guralnik (1997) is "strong dislike or "to dislike or wish to avoid". Swan (2004) explained that hatred could come from living objects like humans or inanimate objects like mathematics. Students may hate mathematics because of their teachers (living things) and the subject of mathematics (inanimate objects) itself.

This study is anchored on the Duplex Theory of Hate by Sternberg (2003). It deals with both the structure of hate and the interaction of feelings and actions, and applies to both individuals and groups of hate. It covers two parts, which are the triangular theory of hate and the story-based theory of hate. Within the duplex theory of hate, the triangular theory of hate was proposed to structure and characterize its aspects. Hate is not a single emotion; it has different types with different patterns of feelings and actions.

Figure 1 shows the three components of the triangular theory of hate. The first component is the "negation of intimacy". Feelings of closeness, warmth, communication, support, and respect are related to intimacy. Negation of intimacy is characterized by repulsion and disgust. An individual seeks psychological and physical distance from the things he hates. These feelings develop gradually and are slow to dissipate. The second component is "passion," which is characterized by anger and fear. The individual feels fear when he gets angry, whether one can control his feelings, behavior, or avoid the situation. Feelings of longing, desire, and need are related to passion. These feelings develop rapidly and decline quickly. The third component of hate is "commitment/decision," which is characterized by cognitions of devaluation and diminution through contempt for the targeted group. Being cognitive, it can be learned from social interaction. The hater is likely to feel contempt towards the target individual or group, viewing the target as barely human or even as subhuman. It develops slowly and dissipates slowly.

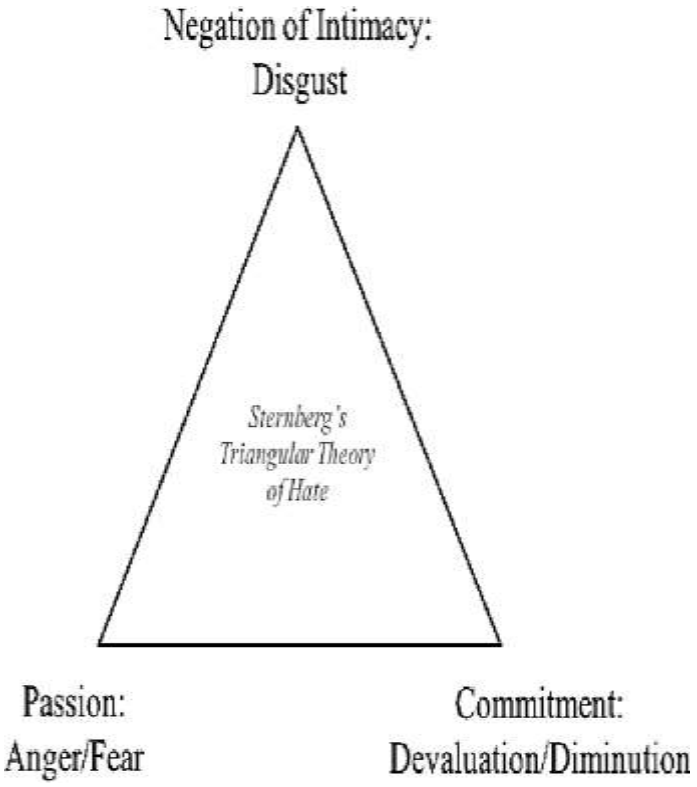


**Figure 1:** *The triangle of hate (Source: https://doi.org/10.1037/1089-2680.7.3.299 )*

**Research Locale and Respondents**

The study was conducted in the town of Tamparan province of Lanao del Sur during the second week of May 2024. The respondents involved one hundred fifty (n=150) grade 12 students of one private school, the As-Salihein Integrated School Foundation. Purposive sampling was used due to accessibility because the first author was formerly a mathematics teacher of the said school. Forty percent (40%) of the respondents are male and 60% are female. Majority of the students (76%) are between 17 and 18 years old, with the remaining students aged 19 years old and above. In terms of preferred courses, they are going to enroll in college, 27% want to pursue medical courses, 19% are social work, 15% are considering criminology courses, 12% are engineering courses, 10% are still undecided, and the remaining 17% had diverse preferences such as accountancy, education, customs broker, forestry, agriculture, information technology, and Islamic missionary.

Regarding the educational attainment of their parents, approximately 51% of the fathers and 49% of the mothers are college graduates. In terms of their fathers' occupations, 37% are

government employees, 36% are businessmen, around 19% are farmers, and 8% are self-employed. On the other hand, the majority of the mothers are housewives (40%), 30% are government employees, 25% are involved in business, and 5% are self-employed.

### Research Instrument

A survey questionnaire developed by the authors, called the Causes of Students' Aversion in Mathematics Questionnaire (CSAMQ) was used. The CSAMQ was made of two parts. Part I asks information on the respondents' profiles, such as age, gender, preferred course to enroll in college, parents' highest educational attainment, and parents' present occupations. Part II of the 15-item statement indicators in a 5-point Likert-type with option responses of Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (U) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. The content of the 15-item statement indicators constitutes factors and was grouped into three with five (5) items per group. The first five items were grouped as mathematics-related factors, the next five items were grouped as teacher-related factors, and the last five items were grouped as student-related factors.

The questionnaire underwent exploratory factor analysis (EFA). Statements 1 to 15 have factor loadings ranging from 0.220 to 0.641, with goodness-of-fit indexes (Chi-square) ranging from 0.830 to 0.931. It has a reliability index of 0.875 (Cronbach's alpha).

### Data Gathering Procedure

In the collection of data, To collect the necessary data, the author's first obtained permission and approval from the school head of As-Salihein Integrated School. Invitations were sent to the respondents, requesting their voluntary participation in the study. Respondents were asked to complete an Informed Consent Form. After they filled up the consent form indicating to participate and submitted, the first author gave the questionnaires to the mathematics teachers of the said school. The mathematics teachers administered the questionnaires, and the first author personally retrieved them.

## Result and Discussions

### Causes of Students' Aversion in Mathematics

The causes of students' aversion to mathematics were assessed using the hypothesized three major factors nature of mathematics, the teacher, and student-related factors. Table 1 presents the percentage (%) of respondents responding to each of the five option responses of the questionnaire, the mode, and the rank of each factor item statement indicator. In determining the mode and rank, the SD and D were collapsed as (SD+D) as well as the A and SA as (A+SA).

**Table 1:** *Percentage (%) Distribution of Respondents to the Five Option Responses, Mode and Rank of Each Factor Item Statement Indicator*

| Causes of Aversion | Percentage (%) of Respondents Responding in Each of the Five Option Responses (n=150) | | | | | | | Mode | Rank |
|---|---|---|---|---|---|---|---|---|---|
| | SD (1) | D (2) | SD+ D | N (3) | A (4) | SA (5) | A+SA | | |
| **A. Nature of Mathematics Factors** | | | | | | | | | |
| 1. Mathematics involves the proving of mathematical ideas. | 16.66 | 33.3 | 49.96 | 32.7 | 10.67 | 6.67 | 17.34 | 49.96* | 2 |
| 2. Mathematics involves problem-solving. | 6.7 | 28.7 | 35.4 | 26.6 | 32.7 | 5.3 | 38.0 | 38.0*** | 4.5 |
| 3. Mathematical concepts and principles are hard to familiarize and memorize. | 2.7 | 28.0 | 30.7 | 31.3 | 31.3 | 6.7 | 38.0 | 38.0*** | 4.5 |
| 4. Mathematics requires deeper thinking and analysis. | 17.3 | 37.3 | 54.6 | 19.4 | 19.3 | 6.7 | 26.0 | 54.6* | 1 |
| 5. Mathematics involves many manipulations of mathematical expressions and equations. | 7.3 | 25.3 | 32.6 | 20.7 | 38.0 | 8.7 | 46.7 | 46.7*** | 3 |
| **B. Teacher-Related Factors** | | | | | | | | | |
| 1. Do not teach well the subject matter. | 16.7 | 40.7 | 57.4 | 29.3 | 6.0 | 7.3 | 13.3 | 57.4* | 3 |
| 2. Gave problem-solving seat works and assignments. | 3.3 | 26.7 | 30.0 | 28.7 | 33.3 | 8.0 | 41.3 | 41.3*** | 5 |
| 3. No sense of humor in his/her teaching. | 20.7 | 50.7 | 71.4 | 18.0 | 10.6 | 0.0 | 10.6 | 71.4* | 1 |
| 4. Do not entertain questions. | 20.7 | 50.0 | 70.7 | 17.3 | 8.7 | 3.3 | 12.0 | 70.7* | 2 |
| 5. Do not relate math concepts and principles to real-life situations. | 16.0 | 36.0 | 52.0 | 26.0 | 19.3 | 2.7 | 22.0 | 52.0* | 4 |
| **C. Student-Related Factors** | | | | | | | | | |
| 1. Don't have any interest in it. | 8.0 | 41.3 | 49.3 | 30.7 | 19.3 | 0.7 | 20.0 | 49.3* | 2 |
| 2. Cannot endure a long time of studying and practicing solving mathematics problems. | 5.3 | 19.3 | 24.6 | 32.7 | 38.0 | 4.7 | 42.7 | 42.7*** | 3 |
| 3. Bored of studying it. | 6.4 | 16.4 | 22.8 | 22.2 | 45.7 | 9.3 | 55.0 | 55.0*** | 1 |
| 4. Find no uses in the real life of the works I am pursuing. | 6.0 | 28.7 | 34.7 | 28.7 | 29.3 | 7.3 | 36.6 | 36.6*** | 5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5. Difficulty in understanding its concepts and principles. | 7.3 | 27.3 | 34.6 | 23.4 | 31.3 | 10.7 | 42.0 | 42.0*** | 4 |

*Source: Authors' made illustration*

*Note.* * means SD+D percentage value; ** means N(neutral) percentage value; *** means A+SA percentage value
SD = Strongly Agree; D= Disagree; N=Neutral ; A = Agree ; SA=Strongly Agree

**Nature of Mathematics Factors**

Looking item 1 to item 5 on the nature of mathematics aspect factor, less than half of the respondents considered "mathematics involves proving of mathematical ideas (item 1), mathematics involves problem-solving (item 2), mathematical concepts and principles are hard to familiarize and memorize (3), mathematics requires deeper thinking and analysis (4), and mathematics involves many manipulations of mathematical expressions and equations (item 5)" as causes of their aversion in mathematics. In contrast, only item 4 posted a higher percentage of more than half (54.6%) of respondents while the rest of items (4) ranged from 30.7% to 49.96% which less than half did not consider it as causes of their aversion. Comparing the five (5) items in terms of the percentage of respondents expressing neutrality is also less than half ranging from 19.4% to 32.7%. The said five (5) specific hypothesized factors have different impacts on the respondents as far as causes of aversion in mathematics are concerned. This implies that the respondents have different weaknesses, difficulties, and preferences for studying mathematics. Furthermore, they exhibit different cognitive avoidance and preferences.

However, the results revealed three striking phenomena. First, a higher percentage of respondents (54.6%) declared that "mathematics requires deeper thinking and analysis" (item 4) did not cause them averted in mathematics than those who declared averted them (26.0%). This suggests that more students believe that math problems can be solved through memorization of formulas and procedures, which doesn't always require deep analysis. In many cases, math involves applying standard methods to solve problems, which can feel repetitive and less about deep thinking.

The second striking result revealed in the data (Table 1) is that a higher percentage of respondents (49.96%) affirmed that "mathematics involves proving of mathematical ideas" did not cause them averted in mathematics than those who declared averted them (17.34%). This suggests that more students focus more on applying formulas and algorithms rather than proving mathematical concepts and ideas.

The third striking result is that a higher percentage of respondents (46.7%) declared that "mathematics involves many manipulations of mathematical expressions and equations" causes them averted in mathematics than those who are not averted (32.6%). This suggests that the respondents were threatened and felt burdened by the manipulations of mathematical concepts involved in mathematics learning. A new generation of students doesn't like subjects that involve too much manipulation such as mathematics and physics. They were very uncomfortable and the worst don't like cognitive-demanding learning activities as problem-solving. It cannot be denied that topics in mathematics such as polynomial equations and functions, limits and derivatives, and geometry are formula and problem-solving-oriented topics. They serve as integrative aspects of learning the concepts and principles.

Apparently, students struggle in learning mathematics primarily due to its highly logical and analytical nature, complex computational processes, and the abstract language involving numbers, letters, and symbols used to define and express concepts. These inherent aspects of mathematics pose challenges for students in grasping and applying mathematical ideas effectively.

The findings are supported by Allain (2010), the reason why mathematics subject is difficult to learn is that the concepts in mathematics are abstract and difficult to familiarize and memorize. Without its algebraic symbols, large parts of mathematics simply would not exist. Indeed, the issue is a deep one, having to do with human cognitive abilities (Devlin, 1998). The recognition of abstract concepts and the development of an appropriate language to represent them are really two sides of the same coin. Sadly, the level of abstraction in mathematics, and the consequent need for notation that can cope with that abstraction, means that many, perhaps most, parts of mathematics will remain forever hidden from the nonmathematician; and even the more accessible parts may be at best dimly perceived, with much of their inner beauty locked away from view.

The findings can also be attributed to several factors such as the steps that are needed, the process of deriving the equation, and the unfamiliar wordings of the problems. According to Larkin & Jorgensen (2016), students identified themselves as non-mathematical due to the challenging nature of this subject, in particular because they could not understand its concepts. Students' over-reliance on copying work down from the board and excess use of worksheets made the nature of mathematic complicated. A grade 6 student said that "It sucks. And it sucks because it's hard and you have to do it every single day. Most people just have to do math all the time, and

I don't like doing math all the time" (p. 940). Sometimes the perception of hating mathematics is not hated. It is reported that some students have mixed feelings; that is, they like some elements of the subject but have anger towards some specific content of mathematics. One student said that mathematics is mostly easy, but it is hard to do my times tables. So, they may relate the negative feelings to their "content-specific difficulty with mathematics." Students became frustrated due to its challenging nature, trickiness, specific steps, and mathematical rules, leading to annoyance and confusion. Sometimes, they felt annoyed and frustrated when they were teased by their fellows who were good at mathematics.

**Teacher-Related Factors**

Looking on item 1 to item 5 on the teachers' aspect factor, more than half of the respondents do not consider "do not teach well the subject matter (item 1), no sense of humor in his/her teaching (item 3), do not entertain questions (item 4), and do not relate math concepts and principles to real-life situations (item 5)" as causes of their aversion in mathematics. In contrast, also less than half considered it as causes of their aversion. While more respondents (but less than half) considered "teachers gave problem-solving seat works and assignments", as a cause of their aversion in mathematics. In contrast, also, less than half considered it did not cause them averted. Less than half expressed neutrality/undecided. Comparing the five (5) items in terms of the percentage of respondents expressing neutrality, the 5 items posted lower percentage ranges from 17.3% to 29.3%. Apparently, the said five (5) specific hypothesized factors have different impacts on the respondents as far as causes of aversion in mathematics are concerned. This suggests that the respondents face a variety of challenges that cause their aversion, and obstacles when learning mathematics.

However, the results revealed three striking phenomena. First, a higher percentage of respondents (71.4%) declared that "no sense of humor in his/her teaching" (item 3) does not cause aversion in their learning in mathematics than those who affirmed that they have greater aversion (12.0%). This suggests that the teacher's humor fosters a positive classroom environment, encouraging collaboration and communication among the students. Therefore, students may then listen attentively to teachers' discussions and may reduce anxiety in math, making it feel more approachable and less intimidating.

The second striking result revealed in the data (Table 1) is that a higher percentage of respondents (70.7%) declared that "does not entertain questions" causes them lesser aversion to mathematics than those who have greater aversion (12.0%). This suggests that the respondents learn easily the mathematics concepts because most of the time, their questions and clarifications are entertained clearly and thus students can easily cope during discussions. Furthermore, this results in students 'increasing their motivation to learn mathematics and developing positive attitudes towards it.

The third striking result is that a higher percentage of respondents (57.4%) declared that "do not teach well the subject matter" causes them lesser aversion to mathematics than those who declared greater aversion (13.3%). This suggests that good teaching equips students with the tools and strategies needed to tackle various math problems and a knowledgeable teacher can present the subject in an engaging way, making lessons interesting and relevant. Hence, when students understand the material, they build confidence in their math abilities, leading to better performance. The data implied that pedagogy was evident in teachers. However, teachers' teaching behavior such as multitasking demands, a shortage of compelling real-life examples for math concepts, and a scarcity of illustrative examples as significant causes contributing to their aversion.

The findings are supported by Boaler (2000) posted that the teacher treating his students as students or as a person can affect learning. It is also excruciating that teachers rarely encouraged mathematical discussion, and the teacher did not allow them to talk within a class. Such an anti-social environment in which students cannot work together or even ask for help shows a weak relationship between a teacher and students and makes mathematics boring and unpleasant.

Furthermore, teachers have a large impact on students' stance toward mathematics. Teachers need to model a positive mathematics attitude promoting a positive disposition by communicating a love for mathematics, promoting student confidence, perseverance, and curiosity. Additionally, they should encourage independence and logical thinking, and they should focus on why algorithms work, instead of on memorization. Contrary to the named criteria, the issue of the quality of mathematics teachers is a dilemma. Kitta (2004) says that the quality of most mathematics teachers is poor, as they are both deficient in terms of subject matter knowledge and teaching skills.

In some other cases, the teacher's assumption of students' knowledge is another drawback (Seka, 2010). Many teachers act as if computational procedures and processes are simple

and self-explanatory; and sometimes teachers have little sympathy for students who do not understand concepts, in such situations, a student who is lost (lacks understanding) is not going to have love for the subject. In this context, students‟ subject matter mastery becomes a problem and therefore ending up hating the subject.

**Student-Related Factors**

Looking item 1 to item 5 on the student aspect factor, more than half of the respondents considered "bored of studying it (item 3), while less than half of the respondents considered "cannot endure a long time of studying and practicing solving mathematics problems (item 2), find it no uses in real life of works I am pursuing (item 4), and difficulty in understanding its concepts and principles (item 5)" as causes of their aversion in mathematics. In contrast, less than half do not considered "don't have interest on it (item 3)" as causes of their aversion. Less than half expressed neutrality/undecided. Comparing the five (5) items in terms of the percentage of respondents expressing neutrality, the 5 items posted lower percentage ranges from 22.2% to 32.7%. Apparently, the said five (5) specific hypothesized factors have different impacts on the respondents as far as causes of aversion in mathematics are concerned. This suggests that the said respondents have different aspects of aversion, challenges, and hindrances in learning mathematics.

However, the results revealed three striking phenomena. First, a higher percentage of respondents (55.0%) declared that "bored of studying it" (item 3) causes aversion in them as far as mathematics learning is concerned than those who affirmed that they have lesser aversion (22.8%). This suggests that most students feel bored in studying mathematics because they believe that this is not needed in their desired future work.

The second striking result revealed in the data (Table 1) is that a higher percentage of respondents (49.3%) declared that they "do not have interest in it" (item 1) did not cause them aversion to mathematics than those who declared greater aversion (20.0%). This suggests that students have an interest in learning mathematics.

The third striking result is that a higher percentage of respondents (42.7%) declared that "cannot endure the long-time of studying and practicing solving mathematics problems" causes them aversion to mathematics than those who have lesser aversion (24.6%). This suggests that the

respondents were struggling during class discussions because they could not endure long-time studying and practicing mathematics problems. Thus, as a result, students have a hard time internalizing and understanding conceptually.

Apparently, it appears that because math topics are abstract, students find it difficult to understand them when they are written in combinations of letters, numbers, signs, and symbols. This may therefore be the cause of students' boredom and lack of interest in mathematics. Precise interpretation and manipulation of mathematical expressions and equations are necessary, and this can make it difficult for students to visualize or apply to real-world situations. Students are not able to study and practice solving mathematical problems for extended periods of time. Students may find it challenging to understand the underlying ideas and their real-world applications due to the complexity of integrating various symbols and procedures, which might overload their cognitive load. There are a number of reasons for this problem, including the student's trouble visualizing mathematical concepts and principles. It can also be attributed to the weak foundation in mathematics of the students.

According to Alego (1988), by the time students begin their secondary school education their attitude to mathematics is not positive. In primary school, it seems pupils start standard one with the usual openness to learn the subject. By the time they reach standard six or seven, their attitudes towards mathematics tend to be negative. Arguing on a similar case, Amato A. (2004) says that some primary school teachers demonstrate negative attitudes towards mathematics. Amato points out that, such teachers have been found to allocate more instruction time to subject-matter areas that they enjoy, and less to areas that they dislike. In this regard, we find students in secondary schools already not motivated and interested in learning mathematics, hating the subject is therefore because of the poor basics.

The findings in this study ~~also~~ corroborate that Jones and Smith (2019) that students often struggle with integrating alphanumeric and symbolic representations in mathematics, which hinders their problem-solving abilities.

Furthermore, the finding is also supported by Sichizya (2010), mathematics self-concept refers to a person's image with respect to how he or she is perceived and valued in a mathematics learning context. It is a fact that, despite its utility and importance, mathematics is perceived by most students as difficult, boring, not very practical, and abstract and its learning as requiring a "special ability" that is not always within everyone's reach.

### Levels of Students' Aversion in Mathematics

To determine the level of aversion in mathematics among the respondents, strongly agree (SA) and agree (A) responses are categorized as high aversion, and disagree (D) and strongly disagree (SD) are categorized as low aversion. Neutral (N) responses were not categorized. To determine the percentage of students falling in high aversion level, the number of students responding SA and A are combined. Similarly, the number of students responding D and SD are combined for low aversion levels.

**Table 2 :** *Percentage (%) Distribution of Students in Each Level of Aversion*

| Causes of Aversion | Percentage (%) of Students (n=150) | | |
|---|---|---|---|
| | Level of Aversion | | |
| | Low (SD+D) | Neutral | High (SA+A) |
| **A. Nature of Mathematics Factors** | | | |
| 1. Mathematics involves the proving of mathematical ideas. | 49.96 | 32.7 | 17.34 |
| 2. Mathematics involves problem solving. | 35.4 | 26.6 | 38.0 |
| 3. Mathematical concepts and principles are hard to familiarize and memorize. | 30.7 | 31.3 | 38.0 |
| 4. Mathematics requires deeper thinking and analysis. | 54.6 | 19.4 | 26.0 |
| 5. Mathematics involves many manipulations of mathematical expressions and equations. | 32.6 | 20.7 | 46.7 |
| **B. Teacher-Related Factors** | | | |
| 1. Do not teach well the subject matter. | 57.4 | 29.3 | 13.3 |
| 2. Gave problem solving seat works and assignments. | 30.0 | 28.7 | 41.3 |
| 3. No sense of humor in his/her teaching. | 71.4 | 18.0 | 10.6 |
| 4. Do not entertain questions. | 70.7 | 17.3 | 12.0 |
| 5. Do not relate math concepts and principles to real-life situations. | 52.0 | 26.0 | 22.0 |
| **C. Student-Related Factors** | | | |
| 1. Don't have any interest in it. | 49.3 | 30.7 | 20.0 |
| 2. Cannot endure a long time of studying and practicing solving mathematics problems. | 24.6 | 32.7 | 42.7 |
| 3. I'm bored of studying it. | 22.8 | 22.2 | 55.0 |
| 4. Find no uses in the real life of the works I am pursuing. | 34.7 | 28.7 | 36.6 |
| 5. Difficulty in understanding its concepts and principles. | 34.6 | 23.4 | 42.0 |

**Source:** *Authors' made illustration*

### Nature of Mathematics Factors

On the overall ~~results~~, the respondents demonstrated a high level of aversion to mathematics involving proving mathematical ideas, mathematics involves problem-solving, mathematical concepts, and principles are hard to familiarize and memorize, mathematics requires deeper thinking and analysis, and mathematics involves much manipulation of mathematical expressions and equations ranges from 17.34% to 46.7% while those demonstrated low level ranges from 30.7% to 54.6%. This indicates that respondents were almost equally divided in terms of difficulties, avoidance, and preferences in learning mathematics.

The results presented in this study corroborate Smith and Johnson's (2017 that students frequently had trouble understanding abstract mathematical ideas and logic. In a comparable manner, Brown et al. (2018 found that students may face serious difficulties when it comes to language use in mathematics. Additionally, Garcia and Martinez (2020) noticed that manipulating mathematical symbols and carrying out difficult mathematical operations are common challenges for students. All of these studies demonstrate the challenges it is for students to acquire mathematics because of the nature of the subject, which is defined by its abstract ideas, logical procedures, linguistic requirements, and computational nature.

On the other hand, students are more likely to be interested in learning and using mathematical concepts when they are offered tangible applications and real-world significance. This emphasizes how important it is to contextualize mathematics instruction to improve student understanding and participation.

**Teacher-Related Factors**

On the overall, the respondents demonstrated a high level of aversion to not teaching the subject matter well, gave problem-solving seat works and assignments, had no sense of humor in his/her teaching, did not entertain questions, and did not relate math concepts and principles to real-life situations ranges from 12.0% to 41.3% while those demonstrated low-level ranges from 30.0% to 71.4%. This indicates that respondents were almost equally divided in terms of aversion, difficulties, hate, and preferences in learning mathematics.

The results presented in this study corroborate many supporting studies that clarified these problems. Johnson (2018) and Brown et al. (2020) found that students' understanding of math concepts decreases when teachers do not provide enough examples or encourage students to ask

questions. These findings are consistent with the findings from students in the study who expressed aversion in these areas. On the other hand, a study by Garcia and Martinez (2021) showed that students are more likely to feel confident in their abilities and run into fewer difficulties taking mathematical topics when teachers exhibit an established understanding of the subject. This is in line with the findings of the students, who felt less aversion when their lecturers demonstrated in-depth subject expertise. The aforementioned studies highlight the significance of teacher practices in either enhancing or preventing students' mathematical learning experiences. They also highlight the importance of interactive teaching strategies, clear explanations, and a wealth of illustrative examples to promote student understanding and participation.

**Student-Related Factors**

On the overall, the respondents demonstrated a high level of aversion don't have any interest in it, cannot endure a long time of studying and practicing solving mathematics problems, are bored of studying it, find it no use in real life works I am pursuing, and difficulty in understanding its concepts and principles ranges from 20.0% to 55.0% while those demonstrated low level ranges from 22.8% to 49.3%. This implies that the students face challenges in a number of areas related to their mathematical education. These results point to certain areas in which students struggle with mathematics, suggesting possible areas for focused intervention and support to help them comprehend and perform better in the subject.

The findings support those of Smith et al. (2018), who found that high school students frequently have trouble integrating symbols and numbers in algebraic equations. These findings are consistent with the challenges related to the combination of letters, numbers, signs, and symbols that were discussed in the study. Similarly, Johnson (2016) revealed that students struggle to apply prior knowledge to solve mathematical problems, which is related to their inability to make the connections between prior knowledge and the questions posed in the study's reported issues. Additionally, research by Jones and Brown (2019) suggests that many students have trouble understanding abstract mathematical concepts, which supports the study's claim that kids have trouble understanding and retaining math concepts. In combination, these studies highlight the typical difficulties that students face when learning mathematics, especially when it comes to integrating knowledge, using it effectively, and comprehending difficult concepts in mathematics.

## Conclusion

### Causes of students' aversion to mathematics

In terms of ~~the n~~ature of mathematics-related factors, the students have a much greater aversion to the following: 1) Manipulations of mathematical expressions and equations because they were threatened and felt burdened by the manipulations of mathematical concepts involved in mathematics learning, 2) Problem-solving because of the required steps and methods in solving mathematics problems, and 3) Difficulty in familiarizing and memorizing ~~its~~ concepts and principles. The students, have lesser aversion due to involvement of deeper thinking and analysis to mathematical concepts because many math problems can be solved through memorization of formulas and procedures, which doesn't always require deep analysis.

In terms of teacher-related factors, the students have a much greater aversion due to the giving of more problem-solving seat works and assignments by teachers because excessive seat works and assignments made them burnout, reducing motivation and interest in the subject. Teachers showed humor and entertained questions, made them less averted.

In terms of student-related factors, the students have much greater aversion due to the following: 1) Studying the lessons during ~~t~~eachers' discussions because they feel bored, 2) Spending a long in studying and practicing solving mathematics problems, and 3) understanding difficult mathematical concepts and principles. Some students have a lesser aversion ~~in mathematics~~ because they still have an interest in learning mathematics.

### Level of students' aversion to mathematics

In terms of the nature of mathematics-related factors, the respondents demonstrated a high level of aversion to proving mathematical ideas, problem-solving, difficulty in familiarizing and memorizing mathematical concepts and principles, requires deeper thinking and analysis, and many manipulations of mathematical expressions and equations. In terms of teachers-related

factors, the students demonstrated a high level of aversion due to the following: teachers do not teach well the subject matter, give more problem-solving seat works and assignments, have no sense of humor in his/her teaching, do not entertain questions, and do not relate math concepts and principles to real-life situations.

In terms of student-related factors, the students demonstrated high level of aversion due to the following: lack of interest in mathematics, cannot endure a long time of studying and practicing solving mathematics problems, bored of studying, find it no uses in real life of works they are pursuing, and difficulty in understanding mathematics concepts and principles. Students' interest in mathematics, learning attitude, and character made them dislike mathematics.

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