

Investigating Mathematics Anxiety of Secondary School Children: Erbil Rise Schools Case

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Abstract: Anxiety is an organism's emotional response to danger. There are many different forms of anxiety; it also has a form for the mathematics lesson. Mathematics anxiety continues to increase in students starting from primary school ages. An important reason for this is that mathematics topics are constantly getting more complex and follow a logical order. In other words, it is tough to understand the next issue without understanding the previous case. This study was conducted to determine the extent to which students suffer from math anxiety. For this purpose, a Likert scale questionnaire was applied to the students. Obtained results were evaluated with descriptive statistics. According to the results, math anxiety was detected in a significant portion of the students.

Keywords: Anxiety, Mathematics Anxiety, Success

1. Introduction

Lesson anxiety is one of the important factors affecting the success of students. It is evident that this anxiety is a very important factor in failure, especially in mathematics lessons. However, people generally perceive it as mental or cognitive insufficiency. However, eliminating stress, which is an emotional problem, will bring many different dimensions to understanding the lesson. Mathematics anxiety can be more effective than any other subject. Accepting that this is not an intelligence problem but emotional pain is an important step toward solving the problem. Eliminating anxiety in students will increase their interest and motivation in the lesson. In addition, the persistence of stress and its settlement over time complicates the problem's solution. In this case, its solution may need to be spread over time and solved in a process. In addition, there are many different reasons for math anxiety. The effect of these reasons may vary from student to student. Therefore, it is important to deal with students individually and identify the source of the problem in each student.

2. Anxiety

The fear that an organism develops against an obstacle that it cannot overcome can be defined as anxiety.

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Anxiety may differ in people according to age and gender characteristics, as well as according to the obstacle that appears. Therefore, it is pretty challenging to make a universal definition. The characteristics of anxiety, which vary according to the person and the situation, force us to define it locally (Nesse, 1999).

Anxiety, which can be defined as a feeling of fear developed by the organism against the approaching danger, emerges with some physical tension. These situations, which the organism perceives as a risk, may originate from the outside world as well as from the inner world of the person. In addition, anxiety, which is defined as an emotional state that occurs with unpleasant content, is reflected as a state of fear and alarm (Perrotta, 2019).

Anxiety, which is a complex emotion in general, reveals itself as uncertainty, apprehension, fear, and alarm. The organism feels helpless against the obstacle or danger. In this case, the organism reacts emotionally and reflects it outward with some biological modifications (Horwitz & Wakefield, 2012). Anxiety is a natural human response, although its extremes have been described as a psychological disorder. Anxiety, which arises as a response to the danger the organism sees in front of it, shows that the organism is prepared for the threat. However, this concern changes according to the intensity of the danger, as well as according to the characteristic features of the organism. In this case, moderate anxiety is a tolerable response. Extreme conditions and long duration are pathological conditions (Gorman, 1996).

Extreme forms of anxiety produce several psychopathological consequences. In this case, the organism feels disproportionate fear of harm. There are some extremes that ordinary people do not think about in the face of the same danger. It is challenging for the organism to cope with this fear, which is sometimes irresistible (Perrotta, 2019). There is a fear of making mistakes and pathological perfectionism in another form. In this case, the individual, who sees that his work is not perfect by his own standards, is under the delusion that this will inevitably lead to negative and catastrophic results (Perrotta, 2019).

In another form of anxiety, the individual develops intolerance to uncertainty. In particular, it is seen that some people want to know all aspects of the events in front of them, and they feel that they should grasp the possible negativities that may arise. However, the emerging risks exceeding human knowledge and estimation trigger such anxiety (Gentes & Ruscio, 2011).

In addition, people's negative self-assessments and seeing their own capacities as insufficient increase their anxiety levels and prevent them from using their abilities as they should (Kruger & Dunning, 1999). To avoid it, students should give authentic tasks to make them interested, motivated, and engaged (Ulker & Yildiz, 2021). In another type of this anxiety, some people feel the need to control everything. However, if this is not possible, they develop anxiety (Moulding & Kyrios, 2006).

In terms of learning, anxiety has dimensions that need to be underlined. The student's concern shows features that increase his performance up to a certain level. However, after the point where anxiety reaches maximum performance, the organism's feeling of more dread causes performance loss and a decrease in success as it exceeds the tolerable limits. Even after a certain point, stress emerges that the organism cannot tolerate. The excessive anxiety that occurs, in this case, causes the organism's psychological discomfort and reduces the success considerably. The figure below shows the relationship between stress and performance.

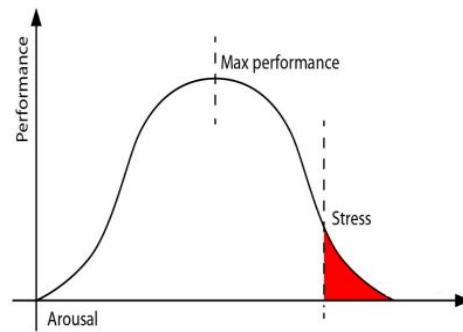


Figure 1: The relationship between anxiety and performance (Perrotta, 2019)

After the point where stress factor affects the organism adversely, the individual also develops panic, anger, and violence (Perrotta, 2019).

3. Mathematics Anxiety

The fear that a student develops that they will not be able to understand math topics is called math anxiety. In some cases, even if they know the subjects of mathematics, the fear and anxiety of not understanding the mathematical problems that they will encounter arise (Ashcraft & Moore, 2009). This fear often arises when academic performance is inadequate. In other words, math anxiety occurs in people who are not able to do math correctly. Significantly, the low performance of the students who have good performance in other courses and the fact that they do not understand the subject properly are factors that trigger math anxiety (Maloney et al., 2014). In addition, individuals with math anxiety have very low self-confidence and take little or no pleasure in mathematics. That's why they avoid professions that are related to mathematics (Hembree, 1990).

Some studies have shown that math anxiety occurs more in girls than boys. In addition, this anxiety can start from the 1st and 2nd grades of primary school. It continues to increase afterward (Maloney et al., 2014). Another remarkable situation about mathematics anxiety is that students who are not successful in mathematics are generally thought to have this anxiety. However, students who achieve sure success in mathematics also have some concerns, and it negatively affects the students' mathematics performance (Park et al., 2014).

Mathematics anxiety is one of the most important reasons for failure in mathematics. Many students carry this concern after the 4th grade of primary school. However, at this point, it becomes clear that loss in mathematics should be sought in the emotional characteristics of the person rather than the intelligence characteristics. Emotion, belief, and attitudes, which are the essential elements of a person's affective side, emerge as very important factors in the development of anxiety. These emotional elements also trigger math anxiety in many students. In this case, math anxiety is accompanied by fear, panic, and embarrassment. When all these emotional states come together, math anxiety arises. This shows that failure in mathematics should be sought in emotional characteristics rather than intelligence characteristics (Ashcraft & Moore, 2009).

It is undeniable that mathematics has some aspects that require high cognitive performance due to its nature. We can state that these abstract aspects contain some elements that explain the failure in mathematics. However, the conceptual aspects of mathematics have created some cultural prejudices, and it has been observed that the majority of people develop negative feelings towards mathematics together with the subconscious they receive from their culture. In fact, this negative cultural environment affects people starting from childhood and continues to increase at later ages. It can be asserted that this cultural background feeds the mathematics anxiety seriously (Dowker et al., 2016).

The accumulation of academic literature on mathematics anxiety takes us to a different point. At this point, while it is an important discussion topic to what extent mathematics anxiety causes difficulties in understanding mathematics, another dimension of the issue is how much mathematics causes these worries since mathematics is actually a complex subject. In other words, it is an important debate whether math anxiety causes failure in mathematics or the difficulty of mathematics causes anxiety (Dowker et al., 2016).

The anxiety that the students show towards the lessons is not limited to mathematics. In fact, students develop anxiety towards others, too. But math anxiety is so dominant above all others that it almost puts the others in the background. Therefore, the emerging literature has generally been shaped around mathematics anxiety (Punaro & Reeve, 2012). The figure below clarifies the process of mathematics anxiety (Mitchell, 1987).

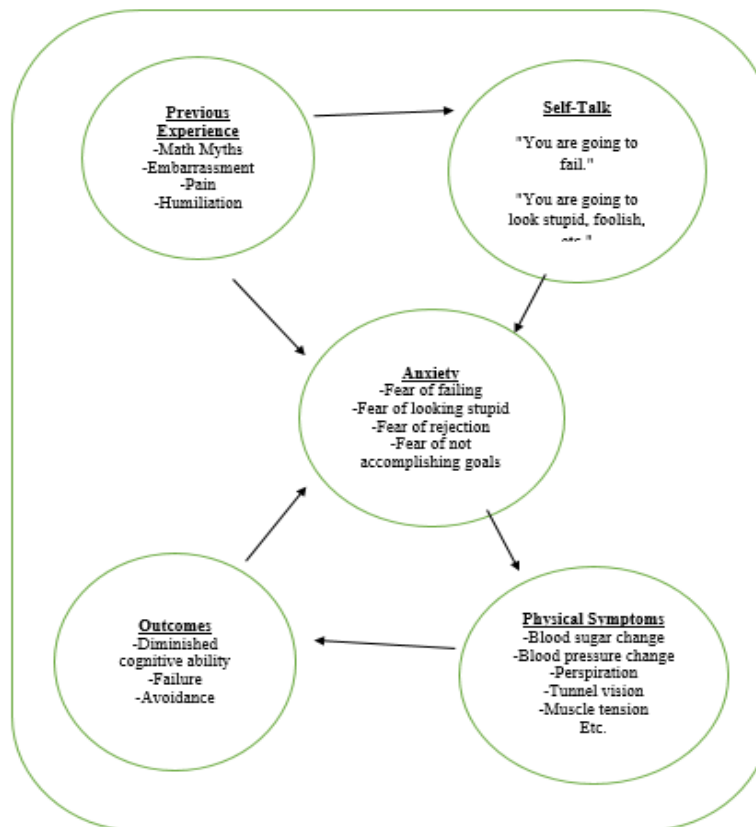


Figure 2: Math anxiety process

4. Factors Giving Rise to Mathematics Anxiety

Mathematics anxiety is a situation that arises under the influence of very complex factors. Each of these factors can affect students at different rates, and only some of them may also be effective. These factors cover a broad spectrum starting from the person himself to his family, teacher, school, and even the society in which he lives.

4.1 Individual Factors

Even personal factors alone are quite a large volume. At the beginning of these unique factors are the genetic characteristics of the student. There are similar situations in previous generations of people who are often unsuccessful in math and are highly anxious about it (Wang et al., 2014). Some studies have shown that gender factor plays a role as well in math anxiety (Spelke, 2005). In particular, studies have reflected that girls are more concerned about mathematics than boys (Devine et al., 2012). Some studies have also stated that the gender factor emerges at later ages and is not seen in primary school children (Dowker et al., 2012). In addition, it has been observed that people who are exposed to some gender stereotypes experience this anxiety more. In addition, some female teachers have expressed this concern to children because they are very worried (Beilock et al., 2010).

The age factor also has essential effects on math anxiety. Generally, children of primary school age do not have much math anxiety. However, it was observed that anxiety increases in direct proportion to age as the age progresses (Mata et al., 2012). Such a result may be due to the fact that mathematics was given in the form of simple four operations in primary school ages, but that it included much more abstract elements in the following years.

Students' family structure and socio-cultural background also play a role in math anxiety. The encouragement and support of the family is an important factor in overcoming this problem. Likewise, it has been noted that families with better social and economic status are generally more successful in life, as well as relatively more successful in mathematics (Adeyemi, 2015). In addition, the individual abilities of the student play an important role. Although some students show significant success in all other subjects, they cannot show the same success in mathematics. In addition to all these, people's need to learn mathematics and the fact that they face it as a need is a factor that increases their anxiety about mathematics (li et al., 2021).

A person's attitude towards mathematics and anxiety about mathematics are two different things. Attitude shows the student's interest in the lesson. However, there can sometimes be a direct relationship between attitude and anxiety because anxiety can arise in people who need to learn mathematics. It is difficult to express that people who have a negligent attitude towards mathematics will have any concerns (Adams & Holcomb, 1986).

4.2 Culture

The negative attitude towards mathematics in some cultures develops so much that it plays an important role in younger generations' negative attitudes and concerns. In some cultures, the importance given to mathematics is transferred to younger generations in the same way, and it is seen that students in these

cultures experience less anxiety. Celik and Yunus (2019) note that the cultures of society and the language they use are two important things that constitute them and do not separate from each other. Meanwhile, concerns about mathematics are taken to different dimensions at this point. Although math anxiety is less in children who grow up in societies with high mathematics achievement, another dimension of this anxiety emerges (Serin, 2020). Career and success are measured by mathematics. In these societies, children are worried about increasing their mathematics achievement. In countries with high mathematics achievement, such as Korea and Japan, students' mathematics anxiety is relatively quite high even though they are successful. On the other hand, although mathematics achievement is high in Western European countries, anxiety remains at low levels (Dowker et al., 2016).

4.3 School

Students are satisfied when a university of their choice meets or exceeds their expectations (Khan & Yildiz, 2020). School environment and mathematics achievement at school affect students' success as well as their anxiety levels. Generally, students in schools with higher mathematics achievement tend to be more successful, and there is less anxiety about mathematics. In addition, the educational technologies used by the school have a significant impact on learning. Worry often arises where there is no learning (Thomson et al., 2003).

4.4 Teacher

One of the most important reasons why students worry about mathematics is the teacher. It has been determined that if the methods and techniques used by the teacher are correct and suitable for the student's learning, self-confidence develops in the students. Otherwise, anxiety occurs. The teacher's attitude towards both the lesson and the students has the potential to determine the students' attitudes in this regard, as well as their perspectives towards mathematics. While the teacher's attempts to increase the student's interest in mathematics are an important factor, negative attitudes are another important factor in the students' anxiety. In addition, the experience of the teacher and, accordingly, the excellent teaching of the lesson is a very important factor in the development of students' attitudes and concerns (Jackson & Leffingwell, 1999). As a result, teachers' implementing extracurricular activities in warm-ups or after the lesson is paramount to fade the students' anxiety away (Tosun & Yildiz, 2015).

5. Methodology

5.1 Research Model

This study was organized with a Likert scale questionnaire for students to reveal their math anxiety. In the questionnaire we applied, first of all, their fears against mathematics were investigated, and questions were asked about it. In the second part, the students' opinions about the issues that may be the causes of this anxiety were investigated.

5.2 Sampling

In this study, Rise International School students belonging to Stirling schools in Erbil city of Iraqi Kurdistan region were used. These students are 7th and 8th-grade students, and there are 20 of them in

total who answered the questionnaire. The 7th grade, in which mathematics started to get complicated and started to include abstract concepts, was specially chosen. The fact that students' math subjects have gone beyond the four operations and are now in a position to challenge students is an important reason for choosing these classes.

5.3 Data collection

The 11-question questionnaire, which we prepared in accordance with the Likert scale, was prepared in Google Form and conveyed to the school administration. The school administration shared the link we sent with the students, and the students filled out this questionnaire.

6. Findings

In the questionnaire we created, students' concerns about mathematics were investigated. In order to reveal this, besides the questions about the nature of mathematics, the students' personal concerns were investigated. In addition, it has been tried to reveal how much the effect of the multiplication table, which may cause math anxiety in students, can be.

First of all, the students were asked a question about what kind of image emerges in their minds about mathematics. Students who are concerned about mathematics often refer to mathematics as a complex and incomprehensible subject. To see what reflections this had on the students, we asked the students the next question.

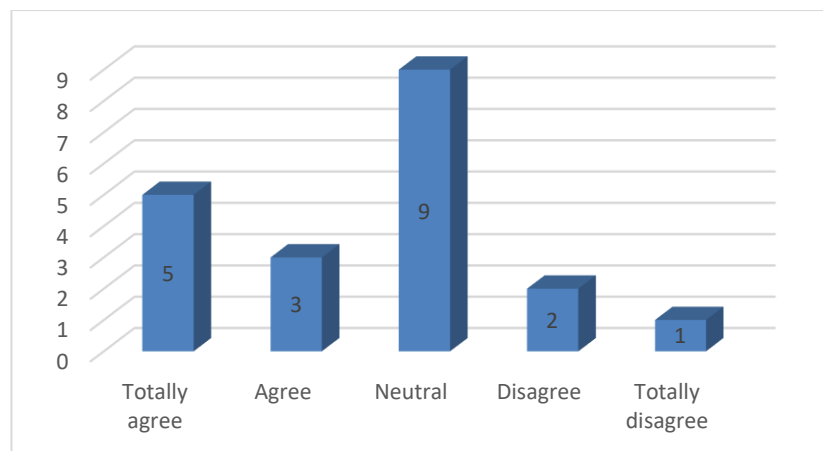


Figure 3: When I think of mathematics, complex and incomprehensible things come to my mind

8 students (%40) out of 20 agree that mathematics is something complex and incomprehensible, and it is relatively high for an ordinary sample. Moreover, 9 of them (%45) are neutral, and they are in two minds about it. They did not make up their mind precisely about it. It seems a majority of the students have some negative opinions about mathematics.

We see that the perception that mathematics has complex and incomprehensible aspects is effectively entrenched in students. While the previous question was about the nature of mathematics, the next question

examined the emotional approaches of the students towards it. In this context, whether they were worried when asked a math question was discussed.

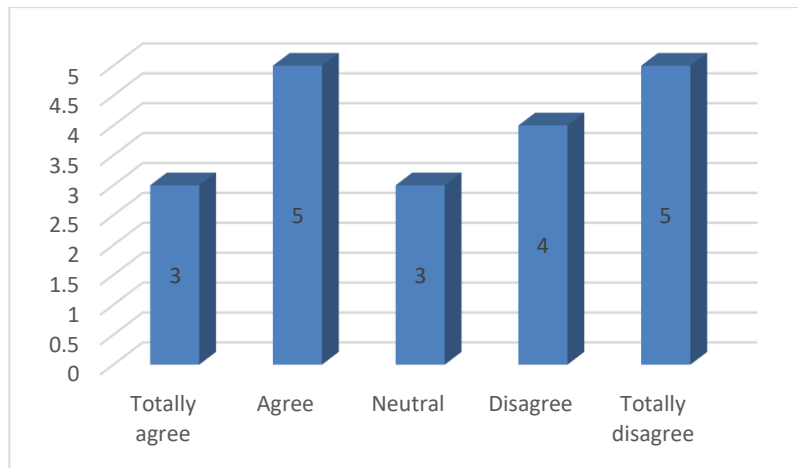


Figure 4: I am worried that I will always be asked questions in math classes

When we look at the response we received, 8 students (40%) expressed their concerns. However, 9 students (45%) stated that they did not experience such anxiety. As it is understood from these statistics, although the majority of the students have some stereotypes about mathematics, some of them stated that they are not worried. Although these students accept the difficulty in mathematics, they do not feel any emotional avoidance in themselves.

The fear of mathematics can sometimes reach uncontrollable levels, and this can turn into a phobia. In this case, the prejudices they have developed against mathematics can be an important obstacle to achieving success. We asked the following question to determine how far these concerns have gone.

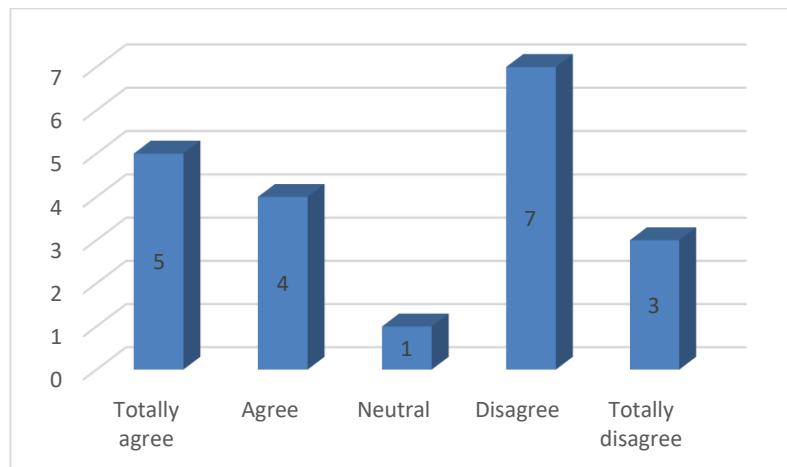


Figure 5: I fear nothing as much as I am afraid of math exams

9 of the students (45%) stated that they were afraid of nothing else as much as they feared mathematics and implied that their fear of mathematics had turned into a phobia. On the other hand, 10 students (50%) stated that they did not experience such fear. The striking point is that only one student remained neutral on this subject. As can be understood from here, the students clearly defined their ideas about the fear of mathematics.

One of the moments when the anxiety and fears about mathematics are felt the most is when they have to attend the lesson. Because in this case, a real stimulus emerges that will remind them of their fear of mathematics. We asked students if they were afraid when they entered their math classes to determine this.

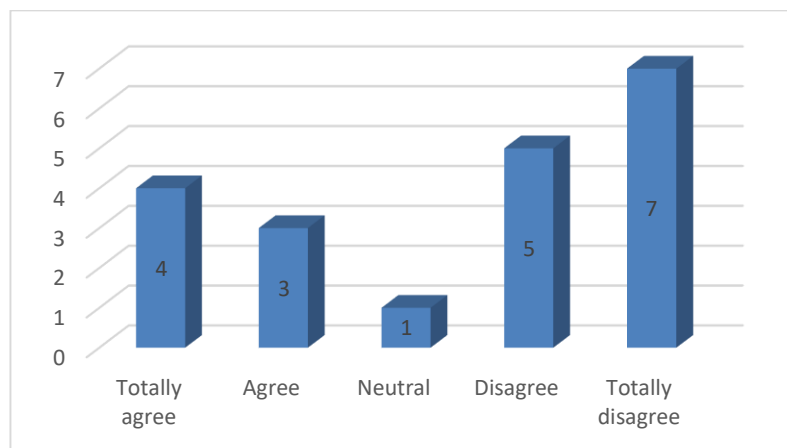


Figure 6: I get scared when I go to math class

Consistent with the previous questions, 7 students (35%) stated that they experienced fear when they entered mathematics classes. While 12 students (60%) stated that they did not experience such fear, only one student remained neutral on this issue. We can draw from this conclusion that the students exhibited an evident attitude about their emotional approach. In other words, while there are no clear answers where ideas are asked, it is seen that students are very clear when emotional methods are requested, and they differ sharply on such issues.

So far, how much children are worried about mathematics and the ratio of those who are concerned to the total number is shown. As seen above, some students do not have much concern about mathematics. However, the issue of how much they like mathematics is discussed in the next question. We asked the following question because it turned out to be an important topic how much students without fear of mathematics love mathematics.

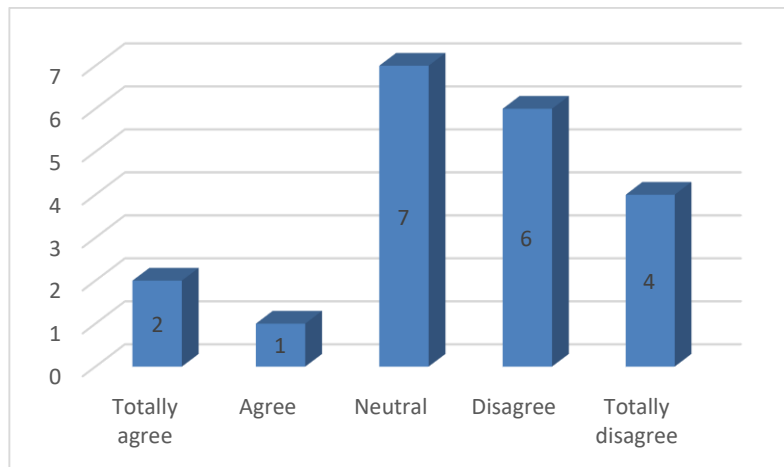


Figure 7: For me; math is a lot of fun

Only 3 of the students (15%) stated that mathematics is entertainment for them. Generally, 60% of the students indicated that they were not afraid of mathematics. However, the number of those who love mathematics is deficient among them. Therefore, even those who do not have a fear of mathematics do not see mathematics as a fun lesson. Moreover, a significant part of them (7 students) remained neutral about it. They cannot clearly express their emotional affinity to mathematics.

One of the most significant fears of those who have mathematics fears to ask questions in class. They are aware that the question they ask, especially when they do not understand the subject, can become a problem. In this case, they fear being humiliated by their friends. Because of these fears, students avoid asking questions in class. We asked the following question to determine how valid this was with the students we surveyed.

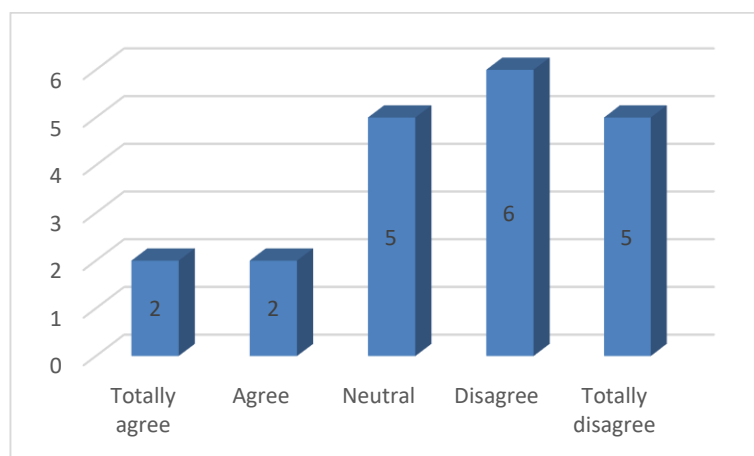


Figure 8: I'm afraid to ask questions in math class

We have determined above that 40% of students generally have math anxiety. We see that 4 of these students have concerns about asking questions. The number of children who expressed their mathematics

anxiety was 8. When we calculate that 4 of them are afraid to ask questions, we see that half of these students are scared to ask questions.

Sometimes, not knowing the rudimentary elements of that course can be found as a reason at the root of the problems. In order to determine this situation, it was investigated in the next question whether the multiplication table, which is one of the fundamental subjects of mathematics, was known by the students.

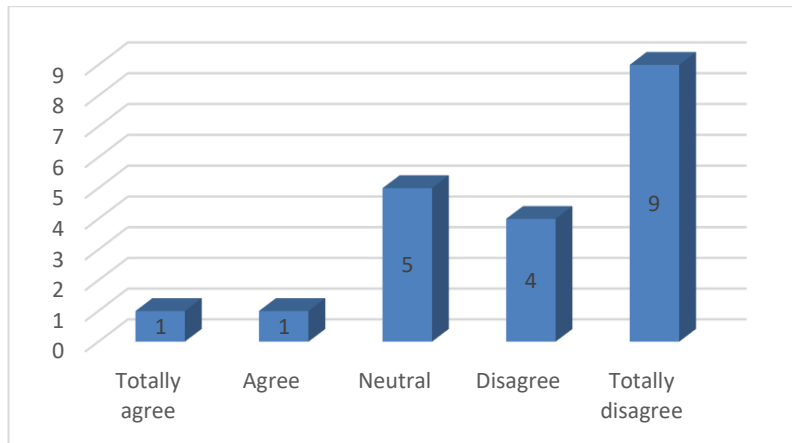


Figure 9: I have problems with the multiplication table

When we look at the answers we received from the students; we see that only 2 students have problems in this regard. Others have not shown such a problem. Therefore, it is seen that not knowing the multiplication table does not pose a problem. The two students might be severe cases because they have been supposed to know it up to this class.

One of the most common complaints about mathematics by students is that the subjects are more complex in each next issue. Mathematics anxiety tends to increase daily in students who constantly have to deal with more complex topics. We asked the following question to see how valid this finding was for the students we surveyed.

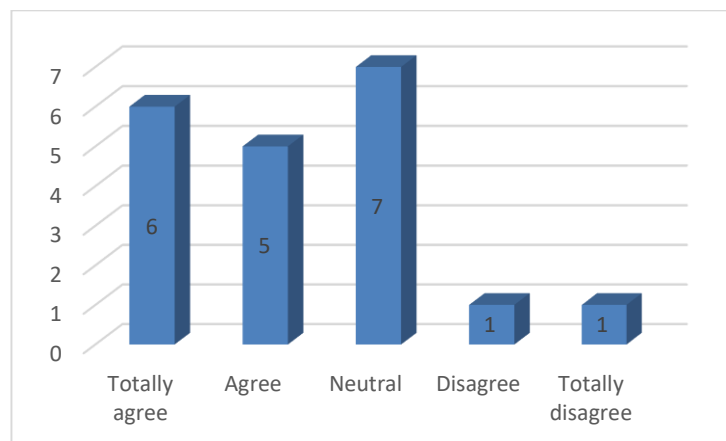


Figure 10: Mathematics topics are getting more complex every day

It is seen that 11 students (55%) expressed a positive opinion on this subject. On the other hand, 7 students (35%) remained neutral. The positive views of the majority of the students on this issue show that it is a serious problem for them as well. The fact that the topics become more difficult with each passing day makes it difficult for students to understand and causes them to become tenser over time. Even reaching some extreme points causes anxiety. One of the most important aspects of mathematics that distinguishes it from all other courses is that its subjects follow a logical order. In fact, sometimes, not understanding an issue may cause no future subject to be understood. Students' missing a class makes it difficult to understand other lessons. In fact, the continuation of this situation in every coming topic may cause a gradual increase in mathematics anxiety. We asked the next question to determine how effective this was on students.

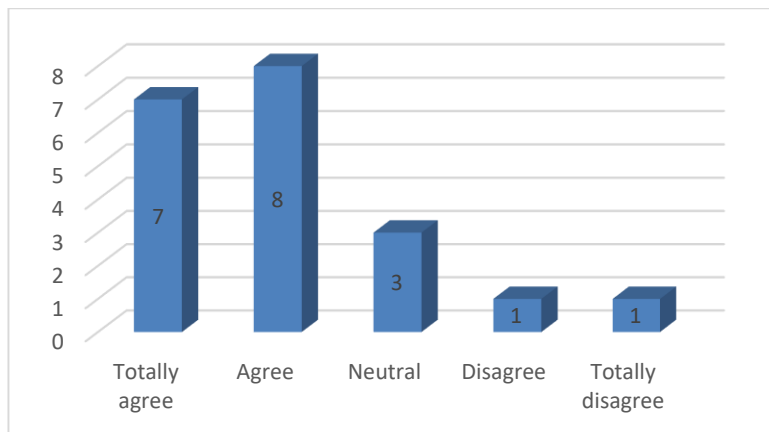


Figure 11: It is impossible to understand a topic if you do not understand the previous topic

As can be seen, 15 students (75%) expressed a positive opinion on this issue. 3 students (15%) remained neutral. The fact that the majority of the students expressed a positive opinion on this issue shows how serious the issue is for the students. Only 2 students shared a negative opinion on this subject. To strengthen the previous answer, we asked the next one to the students. We wanted to detect if they really think that every next topic is becoming harder for them.

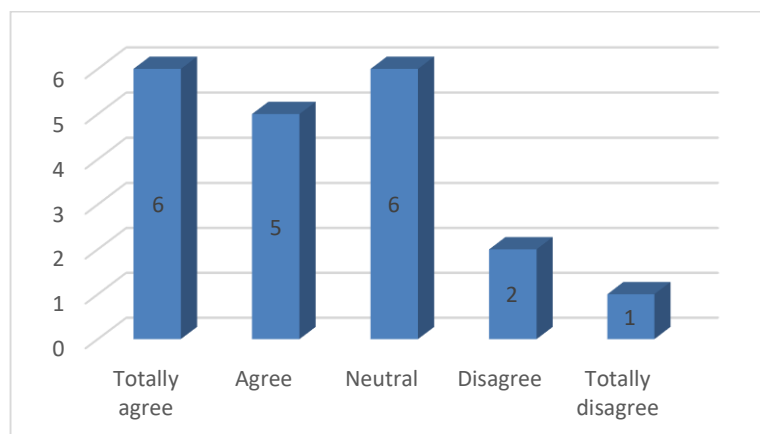


Figure 12: Every topic is more complex than the previous topic

As can be seen, 11 students (55%) think that every topic is becoming harder than the previous one. 6 students (30%) remained neutral, and 3 of them (15%) disagreed.

7. Discussion

It is true that if learners can manage their own learning, they will be better prepared and will learn with ease (Yildiz & Yucedal, 2020; Mart, 2021). Moreover, mathematics is inherently a difficult subject. First of all, making operations on abstract concepts and dealing with numbers all the time has negative effects on students' psychology. On top of that, one of the most important factors that make mathematics difficult for students is that the subjects are constantly getting harder. Therefore, negative thoughts and feelings towards mathematics can constantly develop in the minds of students. Mathematics portrays complex and incomprehensible images for many students, as it emerged in our survey. First of all, these prejudices against mathematics are factors that make it difficult from the very beginning.

Therefore, when students are asked a math question, they feel very anxious and fear that they will not be able to solve the question. This has some different implications. Especially the fear of being humiliated in front of their friends is holding back students from taking bold steps. In fact, for some students, the fear of mathematics has reached such a point that they can forget all their other worries. A significant portion of the students stated that they were afraid of going to the math class. Although this number is below the class average, it is quite a lot for a class.

Similarly, where it was determined how much fun the students took from mathematics as a lesson, very few students stated that mathematics was fun. However, as revealed in other questions, the number of students who are not afraid of the mathematics lesson is not proportional to the number of students enjoying it. More than half of the students said that they were not scared of taking a math class and that they could do it when asked a question. However, students who say they enjoy the mathematics lesson are only 15% of the course.

In addition, it was observed that some of the students in the class hesitated even to ask questions. An important reason for this is the fear of not understanding the lesson, as well as the fear of being humiliated by his friends. One of the reasons behind students' failures in mathematics lessons may be that they do not know some basic mathematics subjects. So, where we asked students if they knew the multiplication table, we found that very few people did. Therefore, this subject is either very little or not included in the underlying causes of math anxiety.

One of the difficult aspects of the mathematics course is that the subjects become more difficult with each passing day. When we ask how valid this is, it is seen that the majority of the students agree on this issue. Therefore, there is an important reason behind the math anxiety that the subjects are getting more difficult with each passing day. In parallel with this, we asked the students to what extent they can understand the next topic when they do not understand a subject. Likewise, the majority of the students stated that it is not possible to understand the other topics without understanding previous ones. This is one of the most important reasons for math anxiety. Another reason for concern is that students express that each passing case is more difficult than the previous one.

The fact that mathematics is complex by nature is one of the essential factors that feed students' anxiety. Not understanding the subjects over time and not being able to cope with new topics day by day causes the pressure to increase constantly and reduces the student's success in the course.

8. Conclusion

There is a lot for teachers to do for a complex subject such as mathematics. First, teaching the mathematics course in order to catch up with the curriculum is one of the issues that cause the problem. Students need a lot of psychological support from their teachers. Understanding mathematics includes emotional and affective elements rather than cognitive elements. Minimizing students' math anxiety and providing them with a more comfortable environment will carry mathematics teaching to a different dimension. By nature, people have a lot of prejudices against mathematics. Elimination of these prejudices should be one of the important tasks of the mathematics teacher. In order to eliminate mathematics anxiety, some roles should be undertaken by policy makers as well as the role of the teacher. Mathematics anxiety is not only related to the aspects of the course itself but also cultural forms feed negative perceptions. In order to overcome these difficulties, other actors other than the teachers should also come up with new ideas.

This study focused on the dimension of mathematics anxiety related to the lesson itself. In addition, these anxieties may originate from the teacher as well as from the textbook. Sometimes it can even be caused by classmates. The focus of this study only on the course is one of the limited aspects of the study.

References

- Adams, N. A., & Holcomb, W. R. (1986). Analysis of the relationship between anxiety about mathematics and performance. *Psychological Reports, 59*(2), 943-948.
- Adeyemi, A. (2015). Investigating and overcoming mathematics anxiety in in-service elementary school teachers. *Electronic Theses and Dissertations, 5463*. <https://scholar.uwindsor.ca/etd/5463>
- Ashcraft, M. H., & Moore, A. M. (2009). Mathematics anxiety and the affective drop in performance. *Journal of Psychoeducational Assessment, 27*(3), 197-205.
- Beilock, S. L., Rydell, R. J., & McConnell, A. R. (2007). Stereotype threat and working memory: mechanisms, alleviation, and spillover. *Journal of Experimental Psychology: General, 136*(2), 256.
- Celik, B., & Yildiz, Y. (2019). The role of foreign language culture in teaching the language and learner motivation. *International Journal of Social Sciences & Educational Studies, 5*(4), 150-161.
- Devine, A., Fawcett, K., Szűcs, D., & Dowker, A. (2012). Gender differences in mathematics anxiety and the relation to mathematics performance while controlling for test anxiety. *Behavioral and brain functions, 8*(1), 1-9.
- Dowker, A., Bennett, K., & Smith, L. (2012). Attitudes to mathematics in primary school children. *Child Development Research, 2012*.
- Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? *Frontiers in Psychology, 7*, 508.
- Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to symptoms of generalized anxiety disorder, major depressive disorder, and obsessive-compulsive disorder. *Clinical Psychology Review, 31*(6), 923-933.

- Gorman, J. M. (1996). Comorbid depression and anxiety spectrum disorders. *Depression and Anxiety*, 4(4), 160-168.
- Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education*, 21(1), 33-46.
- Horwitz, A. V., & Wakefield, J. C. (2012). *All we have to fear: Psychiatry's transformation of natural anxieties into mental disorders*. Oxford University Press.
- Jackson, C. D., & Leffingwell, R. J. (1999). The role of instructors in creating math anxiety in students from kindergarten through college. *The Mathematics Teacher*, 92(7), 583-586.
- Khan, N. U. S., & Yildiz, Y. (2020). Impact of intangible characteristics of universities on student satisfaction. *Amazonia Investiga*, 9(26), 105-116.
- Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology*, 77(6), 1121.
- Li, Q., Cho, H., Cosso, J., & Maeda, Y. (2021). Relations between students' mathematics anxiety and motivation to learn mathematics: a meta-analysis. *Educational Psychology Review*, 33(3), 1017-1049.
- Maloney, E. A., Sattizahn, J. R., & Beilock, S. L. (2014). Anxiety and cognition. *Wiley Interdisciplinary Reviews: Cognitive Science*, 5(4), 403-411.
- Mata, M. D. L., Monteiro, V., & Peixoto, F. (2012). Attitudes towards mathematics: Effects of individual, motivational, and social support factors. *Child Development Research*, 2012.
- Mart, C.T. (2021). Literature-Based instruction: A worthwhile approach for the mastery of a second language. *The Southeast Asian Journal of English Language Studies*, 27(2), 49-61.
<http://doi.org/10.17576/3L-2021-2702-04>
- Mitchell, C. (1987). *Math anxiety: what it is and what to do about it*. Action Press (AZ).
- Moulding, R., & Kyrios, M. (2006). Anxiety disorders and control-related beliefs: The exemplar of obsessive-compulsive disorder (OCD). *Clinical Psychology Review*, 26(5), 573-583.
- Nesse, R. (1999). Proximate and evolutionary studies of anxiety, stress, and depression: synergy at the interface. *Neuroscience & Biobehavioral Reviews*, 23(7), 895-903.
- Park, D., Ramirez, G., & Beilock, S. L. (2014). The role of expressive writing in math anxiety. *Journal of Experimental Psychology: Applied*, 20(2), 103.
- Perrotta, G. (2019). Panic disorder: definitions, contexts, neural correlates, and clinical strategies. *Current Trends in Clinical & Medical Sciences*, 1.
- Punaro, L., & Reeve, R. (2012). Relationships between 9-year-olds' math and literacy worries and academic abilities. *Child Development Research*, 2012.
- Serin, H. (2020). The impact of technology-aided instruction on the motivation of geometry learners. *International Journal of Social Sciences & Educational Studies*, 7(3), 63-72.
- Spelke, E. S. (2005). Sex differences in intrinsic aptitude for mathematics and science? a critical review. *American Psychologist*, 60(9), 950.
- Thomson, S., Lokan, J., Lamb, S. ve Ainley, J. (2003). *Lessons from the third international mathematics and science study*. TIMSS Australia Monograph Series Australian Council for Educational Research.

- Tosun, M., & Yildiz, Y. (2015). Extracurricular Activities as Warm-Ups in Language Teaching. *International Journal of Social Sciences & Educational Studies*, 2(1), 62-64.
- Ulker, V., & Yildiz, Y. (2021). The implementation of the authentic assessment in EFL classes in Erbil. *International Journal of Social Sciences & Educational Studies*, 8(2), 206-221.
- Wang, Z., Hart, S. A., Kovas, Y., Lukowski, S., Soden, B., Thompson, L. A., ... & Petrill, S. A. (2014). Who is afraid of math? Two sources of genetic variance for mathematical anxiety. *Journal of Child Psychology and Psychiatry*, 55(9), 1056-1064.
- Yildiz, Y., & Mustafa Yucedal, H. (2020). Learner autonomy: A central theme in language learning. *International Journal of Social Sciences & Educational Studies*, 7(3), 208-212.