

Analysis of Mathematics Anxiety Experienced by Students of Vocational School in Padang City and The Factors That Affect Them

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Abstract

Mathematics is a subject that many students fear. This fear has a negative impact, one of which is math anxiety. This study aims to describe the level of math anxiety of SMKN students in Padang and the factors that influence it. This research is a descriptive study with a total sample of 72 students at one of the State Vocational Schools in Padang City. Sampling used a purposive sampling technique, which is based on the results of recommendations, observations, and interviews from counseling teachers and Mathematics teachers at SMKN Padang. This study measures math anxiety which includes math test anxiety, numerical anxiety, and abstraction anxiety. The data collection tool used in this study was a questionnaire with a Likert scale model totaling 38 statement items with 5 alternative answers. Overall, Students' math anxiety is in the high category of 45.83%, which means that many students experience math anxiety, the average student anxiety towards mathematics is the high category which is influenced by personality, environmental and intellectual factors.

Keywords: anxiety, math anxiety, vocational school students in the city of padang

Abstrak

Matematika adalah mata pelajaran yang ditakuti banyak siswa. Ketakutan ini memiliki dampak negatif, salah satunya adalah kecemasan pada matematika. Penelitian ini bertujuan untuk mendeskripsikan tingkat kecemasan matematika siswa SMKN di Padang dan faktor-faktor yang mempengaruhinya. Penelitian ini merupakan penelitian deskriptif dengan jumlah sampel sebanyak 72 siswa pada salah satu SMK Negeri di Kota Padang. Pengambilan sampel menggunakan teknik purposive sampling, yaitu berdasarkan hasil rekomendasi, observasi, dan wawancara dari guru BK dan guru Matematika SMKN Padang. Penelitian ini mengukur kecemasan matematika yang meliputi kecemasan tes matematika, kecemasan numerik, dan kecemasan abstraksi. Alat pengumpulan data yang digunakan dalam penelitian ini adalah angket dengan model skala likert berjumlah 38 item pernyataan dengan 5 alternatif jawaban. Secara keseluruhan kecemasan matematika siswa berada pada kategori tinggi sebesar 45,83% yang berarti banyak siswa yang mengalami kecemasan matematika, rata-rata kecemasan siswa terhadap matematika termasuk kategori tinggi yang dipengaruhi oleh faktor kepribadian, lingkungan dan intelektual.

Kata Kunci : kecemasan, kecemasan matematika, siswa smk kota padang

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INTRODUCTION

Mathematics is one of the most important sciences in every activity of life or solving everyday problems. In the 2013 Revised Edition of the Curriculum, each student is expected to be able to learn optimally (Hendri, Daharnis, & Nurfarhanah 2014) , while teachers are expected to become facilitators for each learning process (Syupriyanti, Firman, & Neviyarni 2019) in an effort to direct students to be able to carry out competency development mathematics is like life skills, especially in building creativity, critical thinking skills, collaborating or working together, and communication skills (Afriansyah, Puspitasari, Luritawaty, Mardiani & Sundayana, 2019) . Not all students are able to learn mathematics, and it even becomes a new problem, namely math anxiety (Dewi & Pujiastuti, 2020 ; Saputra, 2014) based on the assessment of the Program for International Student Assessment (PISA) that (Luttenberger, Wimmer, & Paechter, 2018) . Mathematics anxiety is defined as “feelings of tension and anxiety”, feelings of worry that interfere with solving Mathematical problems in ordinary life and academic situations (Dowker, Sarkar, & Looi, 2016) , such as manipulating numbers, solving math problems, or when they are faced with evaluative situations connected with Mathematics (Luttenberger, Wimmer, & Paechter, 2018) . It can be concluded that Mathematics anxiety involves feeling tense and anxious or disturbing when attending Mathematics lessons.

More broadly, Mathematics anxiety is a form of learning stress in Mathematics class or in situations that require Mathematics or avoiding scary Mathematics situations Lai et,al (2015) which is influenced by negative or embarrassing experiences of students which result in learning disabilities. But it interferes with an individual's ability to learn Mathematics and hinders students' ability to understand and participate in Mathematics (Passolunghi, Caviola, Agostini, Perin & Mammarella, 2016) .

So Mathematics anxiety experienced by students is generally caused by painful experiences experienced by students for years which are formed as a result of personality and intellect. The inability of students to understand Mathematics makes students intimidated every time they take Mathematics lessons. Anxiety is described by Fitriana Neviyarni, Netrawati & Karneli (2020) as a subjective feeling of mental tension which is disturbing as a general reaction to the inability to deal with a problem or a lack of feeling of security .

As for other things, namely the negative experience of learning Mathematics, such as the impatient Mathematics teacher explaining Mathematics lessons to students. The anxiety that students feel at school is generally felt when studying mathematics, even many students do not understand how to avoid math anxiety which can cause students to always be anxious both in lessons and even in environmental conditions. This includes students also experiencing social anxiety both with friends and with teachers or with their lessons, students who experience social anxiety also experience obstacles in social interaction, so as an alleviation effort, group counseling aims to increase the quantity of individual progress in good social interaction, towards achieving optimal development is achieved (Fitriana, Puspita, Neviyarni, Netrawati, & Karneli, 2021).

The results of research conducted by Kusmaryono & Ulia (2020) revealed that 76% of students thought that Mathematics material was getting more difficult every year, and 43% of students felt dizzy when facing difficult Mathematics material. Thus causing excessive math anxiety to students. This is influenced by (1) low ability to think critically, (2) low cognitive aspects and attitudes (attitude) towards Mathematics, (3) low



motivation in studying Mathematics, and (4) Mathematics is considered an unattractive and unpleasant subject (Pratiwi, 2021).

Furthermore, the results of researcher Pratiwi (2021) reveal that Mathematics is a difficult subject because they have to memorize a lot of formulas and a lot of material that they have to understand, and in the end it is easier for students to lose concentration and get nervous when studying Mathematics. Research by Pratiwi, Syahrman, & Sinthia (2019) revealed that students who find it difficult to learn mathematics find it increasingly difficult when the teacher puts pressure on them. Based on the explanations and some research results, it is clear that many students experience anxiety in mathematics lessons. These conditions include feelings of fear, discomfort, tension, the like when studying mathematics, doing mathematics, solving problems and solving mathematical problems. This condition is also experienced by students in secondary schools, one of which is vocational high schools (Fitriah et al. 2021; Sari, 2021). Furthermore, the results of other studies revealed that the mathematic problem-solving abilities of Vocational High School students were still relatively low, namely around 73% of Vocational High School students were relatively lacking in mathematical solving abilities (Sumartini, 2016).

The results of initial observations were found in one of the students at SMKN Padang, namely students of SMKN 3 Padang, several students of SMKN 3 Padang who experienced problems with Mathematics. Especially in one of the majors at SMKN 3 Padang, namely the Department of Computer and Network Engineering (TKJ) which is one of the objects of this research. This is reinforced by the learning outcomes and absences given by Mathematics teachers to BK teachers. The results of observations and interviews with 10 students from October 6 2021- November 6 2021, obtained data that some students were anxious before learning Mathematics was carried out. Students who experience Mathematics anxiety tend to avoid learning Mathematics, have a negative attitude towards Mathematics, and have low self-confidence in doing Mathematics (Finlayson, 2014). The types of math anxiety can be divided into three separate areas: math test anxiety, numerical anxiety, and abstraction anxiety (Nolting, 2012). Students with Mathematics anxiety have at least three irrational thoughts namely (1) they cannot succeed on their own, (2) think that avoiding exams can help them cope with their anxiety better, and (3) it is a "disaster" for them when they cannot appear as expected by the teacher in solving math problems (Asanjarani & Zarebahramabadi, 2021).

Phenomenon in the field that students who experience anxiety often feel depressed, lazy, lethargic, unenthusiastic and panic when they get a math assignment. They even feel afraid or worried when asked to do math assignments in front of the class. In addition, students find it difficult to concentrate so they appear emotional. such as irritability, erratic anxiety and negative thinking that Mathematics is a difficult subject to understand. Based on the preliminary study, another condition was found, namely students found it difficult to understand formulas and remember the mathematical formulas that had been explained by the teacher. In addition, many of these students experience confusion, even their heart beats fast when studying Mathematics. Furthermore, students also revealed that because they were not able to learn Mathematics, students often trembled, were stressed, often urinated even though they did not consume much water before the Math lesson started. In fact, some students said they avoided taking math lessons and hoped that mathematics would be eliminated. Also, some students often pray that mathematics learning ends quickly and pray that the math teacher will have other activities that result in having to take a day off without assignments. There are some students who also admit that mathematics is a monster lesson because there are many formulas that must be



memorized and remembered which makes students anxious when they are going to take part in mathematics learning, then there are sudden quizzes that are often given by the teacher and new material that is difficult for students to remember. This makes students feel that mathematics always makes them anxious.

METHOD

This research is a quantitative type descriptive research. This research was conducted on 72 students of SMK Negeri 3 Padang who were in class X majoring in Network and Computer Engineering (TKJ). Sampling used a *purposive sampling technique*, namely based on what research to aim for related to math anxiety in students, the samples taken were also based on the recommendations of Mathematics subject teachers at school, observations, and interviews with counseling teachers and students who often attend counseling rooms to discuss remedial exam results at SMK N 3 Padang. This study measures math anxiety including (a) math test anxiety, (b) numerical anxiety, and (c) abstraction anxiety developed by (Nolting, 2012). The data collection tool used in this study was in the form of a questionnaire with a *Likert scale model* which totaled 38 statement items with 5 alternative answers with the highest score 5 and the lowest 1. Data analysis in this study uses descriptive analysis with a percentage formula.

RESULT AND DISCUSSION

Based on the results of data processing, the results of this study can be described as follows:

Table 1.

Level of Mathematics Anxiety of Students of SMK N 3 Padang City (n = 72)

Category	intervals	f	%
Very high	157-173	3	4.17
Tall	140-156	33	45.83
Currently	123-139	29	40.28
Low	106-122	5	6.94
Very low	92-105	2	2.78
Amount		72	100

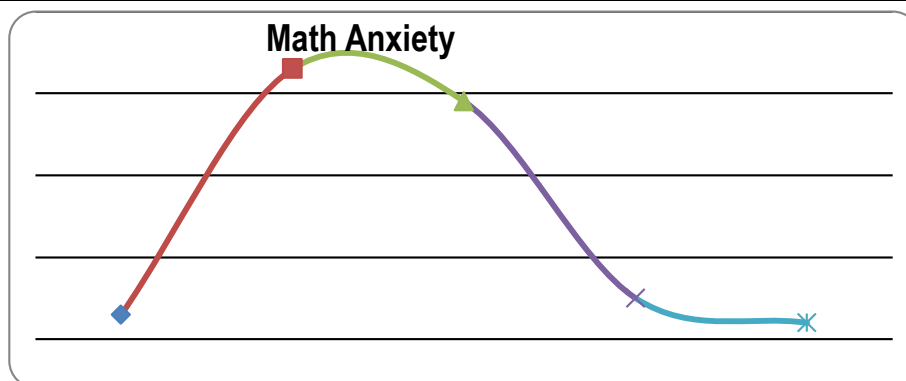


Figure 1. Graph of Mathematics Anxiety Level of Students of SMK N 3 Kota Padang (n = 72)



Based on table 1 it is known that there are 3 students whose level of math anxiety is in the very high category with a percentage of 2.08%, then 33 students are in the high category with a percentage of 45.83%, then 29 students are in the medium category with a percentage of 40.28 %, and 5 students in the low category with a percentage of 6.94%, then 2 students in the very low category with a percentage score of 2.78%. So it can be concluded that the average student anxiety about mathematics as a whole is in the high category. It can also be seen from the graph of math anxiety for students, the explanation is that students experience math anxiety of various kinds, according to the instruments that have been given to students at SMKN 3 Padang get the conclusion that the average student experiences problems with math anxiety on several items such as students experiencing problems with the numeric such as the difficulty of memorizing algebraic formulas and algorithms explained by the teacher during the learning process so that students feel anxious when asked about new material by the teacher, when doing assignments and Daily tests also make students anxious, other concerns such as students always having negative perceptions about mathematics which makes when there is a quiz or the presence of a teacher who will teach in class makes students anxious so that this causes anxiety in students. The average math anxiety experienced by students is in the high category, we can see this in table 1 and figure 1 below on.

Anxiety is one of the psychological problems that people are prone to experience (Nurmina et al., 2020). Anxiety is fear, tension or a feeling of anxiety that comes from something that is pressing (Fitria et al., 2020) or unhealthy negative emotions (Fauziah et al., 2020). This anxiety is often felt by some students at school when attending math lessons. Mathematics anxiety is a form of one's feelings in the form of feelings of fear, discomfort, tension, panic, helplessness, fear, pressure, embarrassment, and inability or anxiety to participate in learning Mathematics. Anxiety can also result in a negative emotional state in solving math problems. Math anxiety is a student 's negative thoughts about mathematics.

Math anxiety is a feeling of fear experienced by students related to subjects that contain mathematical calculations, both in situations at school and in everyday life (Paechter, Macher, Maertskvishvili, Wimmer & Papousek, 2017). Mathematics anxiety is also defined as a feeling of worry and increased physiological reactivity when individuals are related to mathematics, or when they are faced with evaluative situations related to mathematics (Lutzenberger, Wimmer, & Paechter, 2018) . Math anxiety is referred to as a condition in which students respond to a math task with feelings of tension or fear (Jolejole-Caube, Dumlao, & Abocejo, 2019). Even math anxiety is considered a complex psychological phenomenon and involves many factors in the form of tension and fear of mathematics (Ardi, Rangka, Ifdil, Suranta, Azhar, Daharnis, Afdal & Alizamar, 2019). Maths anxiety usually stems from negative experiences in dealing with teachers, tutors, classmates, parents or siblings. Symptoms of people experiencing Maths anxiety include experiencing delays in completing Maths assignments, avoiding class frequently, and saying negative things about Maths. Feelings and thoughts about math anxiety include tension, panic, helplessness, fear, depression, embarrassment, and an inability to cope (Girginer, 2015) . From the definition above, it can be said that Mathematics anxiety is a form of one's feelings in the form of feelings of fear, discomfort, tension, panic, helplessness, fear, pressure, embarrassment, and inability or anxiety to participate in learning mathematics. Anxiety can also result in a negative emotional state in learning Mathematics. People who have math anxiety tend to avoid everything related to math.



People who have math anxiety tend to avoid everything related to mathematics, especially in individuals who have anxiety in the form of math test anxiety, numerical anxiety, and abstraction anxiety (Nolting, 2012). Math test anxiety, namely anxiety that arises before experiencing, during and after math tasks, such as involving anticipation, completion, and feedback in Mathematics tests, Numerical anxiety, namely feelings of tension, fear of interfering with solving Mathematics, refers to everyday situations that requires people to work with numbers and do Mathematical calculations, such as the anxiety that arises when thinking about Mathematics, do Math homework, or listen to or watch Math instruction. While abstraction anxiety is anxiety that arises when it involves work with variables and Mathematical concepts used for solve equations, such as anxiety when students are following Mathematics lessons. Mathematical anxiety experienced by students can cause disruption of students' cognitive abilities in mathematics, especially in solving mathematical problems because students will feel burdened when they get Mathematics assignments (Namkung, Peng, & Lin, 2019). Shishigu (2018) revealed that Mathematics anxiety is defined as a negative emotion that interferes with the process of solving Mathematical problems. So that students who do not like Mathematics avoid everything related to Mathematics. This means that students' anxiety about Mathematics is not only in the learning process, but has a negative attitude and view of Mathematics which causes students to experience fear before Mathematics learning takes place.

Based on the results of the research conducted, the form of students' anxiety about mathematics is that students look irritable when friends ask about math tests, are easily surprised when taking daily math tests, feel dizzy when working on math problems, and find it difficult to concentrate on doing math tests and doing math homework. This happens because the students' memory is weak when doing math homework which ends up feeling anxious the day before taking the math test. The results of other data analysis found that students' fingers trembled when completing their own math assignments, cold sweats when they saw friends solving math problems, and felt muscle tension after hearing other students explain mathematics. This reaction is related to an unstable emotional state and is usually characterized by anxiety, tension, anxiety, and fear when faced with unexpected activities when learning mathematics (Wahyudy et al., 2019). Furthermore, based on the process of carrying out mathematics learning activities it was revealed that students were not interested in listening to conversations about the mathematics teacher's explanation even for a long time, felt anxious when they heard other students explain mathematics, and found it difficult to learn new mathematics material due to the difficulty in focusing on listening to topics concerning mathematics lessons. . Anxiety reactions arise because students do not know the right strategy in learning material in learning mathematics so that feelings of pressure and fear arise about mathematics lessons (Pratiwi, Syahrman, & Sinthia (2019). Negative thoughts that arise cause students to feel disturbed so that the emergence of worries that arise often accompanies panic and anxiety disorders when participating in mathematics learning.

Factors causing Mathematics anxiety can be classified into three categories: (1) environmental factors, such as negative experiences in class, parental pressure, insensitive teachers, mathematics content, conventional Mathematics education delivered with strict rules; (2) mental factors, such as teaching methods that are not suitable for learning styles, lack of student determination, lack of confidence in Mathematics, skills and lack of belief in the usefulness of Mathematics; and (3) personal factors, such as reluctance to ask questions due to embarrassment, fear and low self-esteem (O'Leary, Krystle, Cheryll, Fitzpatrick, & Darcy, 2017). The personal factors that influence



Mathematics anxiety are cognitive processes and motivation (Jameson, 2014) . As for the personal factors that influence students' perceived math anxiety, they are influenced by cognitive factors and motivation (Jameson, 2014) . Another factor is past negative experiences with mathematics including students' hostility towards mathematics teachers caused by negative feedback when students experience repeated failures to solve math problems (Harari, Rose, Vukovic, & Bailey, 2013) . Anxiety and attitudes to mathematics can occur in students influenced by the pressure of mathematics assignments and previous learning experiences (Gautreau, Michelle, & Lunceford 2016) . In other words , math anxiety is influenced by cognitive, affective, and psychomotor aspects of students in the process of learning Mathematics (Mulyana, Senajaya, & Ismunandar, 2021).

Peker (2009) classifies math anxiety factors into three categories, namely personality factors, environmental factors and intellectual factors. Personality factors arise from within students, such as feeling embarrassed when asked questions, having low self-confidence so that it affects students' low expectations. Environmental factors are factors that come from the student's environment, such as an unpleasant learning experience in class, demands from parents who want their children to be good at Mathematics, teachers use models and methods that are less interactive so that students feel that Mathematics only memorizes formulas, performs complex calculations. long and unpleasant. Meanwhile, intellectual factors are factors that come from the students' cognitive abilities, such as students who feel a learning style that does not suit them, students' lack of persistence in mathematics, lack of confidence in students' abilities, and lack of benefits from mathematics.

Puteh & Khalin (2016) revealed that there are factors that cause Mathematics anxiety, namely: there are curriculum weaknesses, there are negative experiences of students in learning Mathematics, there are pressures from the family environment, teacher personality and teacher teaching style, there is influence on peers, and there is students' past experiences. Apart from that, other factors that also affect Mathematics anxiety are the factor of anxiety about learning Mathematics (anxiety about the learning process) and the factor of anxiety about evaluating Mathematics or those related to test situations. Anxiety about learning Mathematics (anxiety about the learning process) is when completing assignments alone, watching the teacher work on math problems on the blackboard, listening to the Mathematics teacher talk for a long time, listening to other students explaining Mathematics, and starting new topics in Mathematics. The anxiety factor for evaluating Mathematics or related to the test situation is thinking about the Mathematics test the day before it is carried out, when taking Mathematics tests, difficult Mathematics homework, having quizzes before starting Mathematics lessons (Carey, Hill, Devine, & Scuz, 2017) .

CONCLUSION

The conclusion of this study was to obtain research results on the analysis of math anxiety for students of SMK N 3 Padang City in the high category, where they get angry easily when friends ask about math tests, are easily surprised when taking daily math tests, feel dizzy when doing math problems, and it is difficult to concentrating on doing math tests and doing math homework. Mathematics anxiety is a form of one's feelings in the form of feelings of fear, discomfort, tension, panic, helplessness, fear, pressure, embarrassment, and inability or anxiety to participate in Mathematics learning. Anxiety can also result in a negative emotional condition in solving Mathematics problems. who have math anxiety tend to avoid everything related to mathematics, especially in



individuals who have anxiety in the form of math test anxiety, numerical anxiety, and abstraction anxiety. Mathematics anxiety experienced by students can cause disruption of students' cognitive abilities in mathematics, especially in solving mathematical problems because students will feel burdened when getting a Mathematics assignment as negative emotions that interfere with the process of solving Mathematical problems. So that students who do not like Mathematics avoid everything related to Mathematics. This means that students' anxiety about Mathematics is not only in the learning process, but has a negative attitude and view of Mathematics which causes students to experience fear before Mathematics learning takes place.

Recommendations and suggestions for this research are the need for good collaboration between subject teachers and guidance counselors at school, in order to help students overcome the problems they are facing, especially on high math anxiety among students at SMKN 3 Padang. There needs to be encouragement to help students so that the math anxiety experienced by students can be alleviated properly. Then, with the facilities provided by the school, they begin to be able to use and take advantage of existing facilities, one of which is the counseling room and guidance counselor which is a place for students to express what they feel, starting to feel anxious about lessons which can cause excessive anxiety and cause unfavorable effect on the final grade later. So students are recommended to ask a lot of questions and express their feelings to anyone at school, including the counseling teacher at school so that what students are feeling can be overcome and assisted by the counseling teacher at the school.

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