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Profile of students' mathematics anxiety

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Abstract. Mathematics anxiety has gained massive attention from researchers and mathematics teachers. It happens among students and even becomes a determinant of their view towards mathematics in the future. This study purposes to observe the profile of students' mathematics anxiety in one of public junior high school in Sleman, Yogyakarta, Indonesia. The type of this research is descriptive quantitative research. This study engaged a purposive sampling technique, and the instrument used is a sheet of mathematics anxiety questionnaire with Likert scale. The analysis conducted is descriptive. The result of the analysis indicates that students' mathematics anxiety profile tends to belong in the medium category. Based on the results of research and discussion, it can be concluded that the students' mathematics anxiety in one of public junior high school in Sleman needs to be well-managed.

1. Introduction

Anxiety is an important and common thing for everyone. No exception, it can occur to elementary until college students. Anxiety experienced by each person is a normal situation and it does not become a serious problem when the feeling is not excessive. When the feeling is excessive, it turns to an anxiety disorder. Anxiety is a reaction of the mind or body that occurs suddenly and has a physiological, behavioral and psychological impact that occurs simultaneously [1].

Anxiety is a complex set of multidimensional aspects in the form of cognition, affective, somatic, and behavioral reactions [2]. The dimension of cognition (disturbances of thinking/cognition) is a condition where a person feels worried about the problem and focused the attention in the heart or mind. Affective dimensions (negative emotion/affect) are feelings of anxiety experienced by someone as an emotion or mood, for example feeling tense, nervous, and restless. Somatic dimensions (bodily/somatic) are symptoms that are shown physically, such as a heartbeat and sweaty hands in responding to the body when facing a threat. Behavioral reactions (behavioral reaction) see the anxiety based on the urge to respond to the character, for example finding ways to pass threats. Generally, it shows characteristics of a person nonverbally. This study observes the anxiety in three dimensions, namely cognition, affective and somatic dimensions.

In the current era of globalization and modernization, the role of education is a necessity to improve the quality of human resources [3]. In the education world, especially mathematics education, almost every student experienced math-related anxiety. This anxiety occurs due to several things, such as teachers, learning processes and math tests. Math anxiety is a feeling of tension, fear, or concern that



disrupts its math performance [4]. Math anxiety is a tense and anxious feeling that interferes with manipulating numbers and solving math problems in various situations of daily life and academic situations (Richardson and Suinn in [5]). "Math anxiety (MA) is a negative emotional response to the current or prospective situation involving mathematics" [6]. Therefore, math anxiety is discomfort and disruption feeling experienced by individuals or students while facing math problems.

Students who have high anxiety feel that they are less capable and cannot learn mathematics, and it may affect how they do the math test. Most studies have investigated math anxiety at various levels, ranging from elementary schools, secondary schools, and university levels. In general, a high level of math anxiety is related to lower math performance. There was correlations between the levels of mathematics anxiety and students' achievement [7]. Although math anxiety may not be the only variable related to math performance, it can be a possible factor [8]. Some effects of math anxiety that might occur are a decreasing in confidence in mathematics, uninterested in mathematics, even avoiding mathematics. These certainly become the basis of that students' math anxiety needs to be concerned with learning.

At 2012, the study of 433 secondary school children in the UK found that they have experience with math anxiety, and it was a concern in the mathematics class, especially because there was evidence that math anxiety developed during the elementary school years. They suggest that long-term research is needed to investigate the development of math anxiety and its effects on math performance [7]. Meanwhile, the mathematics anxiety of students at every level of education has varying levels. The purpose of this study is to observe the profile of students' mathematics anxiety in one of public junior high school in Sleman.

2. Method

The type of this research is descriptive quantitative. The research was conducted on August 2018 at one of public junior high school in Sleman in the first semester of the academic year 2018/2019. This study engaged a purposive sampling technique. The population used in this study are all students in one of public junior high school in Sleman. This study sample comprised 95 students. The instrument used is a sheet of mathematics anxiety questionnaire with Likert scale. The analysis of the pilot study showed that the instrument has reliability Cronbach's alpha = 0.869 and it is considered to be acceptable. The analysis conducted is descriptive statistics. Therefore, we could see the level of students' mathematics anxiety at one of public junior high school in Sleman.

3. Result and discussion

3.1. Analysis of student's mathematics anxiety in classical

Analysis of student's mathematics anxiety in the classical profile of this to see how the students' mathematics anxiety for both classes analyzed. Students' math anxiety levels are divided into 3 categories, namely high, medium, and low. The recapitulation of the data presented in table 1 below.

Table 1. Description of students' level of math anxiety.

Level of math anxiety	The number of students	Percentage
High	8	8,4 %
Medium	46	48,4 %
Low	41	43,2 %

Based on table 1, it can be seen that the average student's mathematics anxiety is at a medium level. The average score per item is between 1.85-2.61. All Standard Deviations (SD) are below 1.00 (0.42-0.74), which indicates that the large distribution of item scores is less than the average value so that it can be said that the data is less varied.

Mathematics is taught to students to understand the various numerical data presented to them. They are expected enable to do the calculations from simple to complex which encountered in daily life. But,

the common belief that most students feel is that mathematics is a difficult subject to learn [7]. Basically, students who have good skills in math, still have an anxious feeling as emotions or atmosphere, for example feeling tense, nervous, and anxious about things related to mathematics. The results showed a relatively high in the number of students' math anxiety cases which reached 48,4% of students in the medium level, 8,4% of students in the high level, and 43,2% in the low level. The data becomes the preliminary assessment in improving the quality of mathematics learning in junior high school, and some aspects related to mathematics.

Anxiety is a fear that has been proven a long time to trigger junior high school students experiencing math anxiety. Math anxiety becomes a concern in the mathematics class. especially because of evidence that math anxiety develops during the elementary school period [7]. Other researchers also show that the mathematics anxiety of secondary school students in Selangor, Malaysia is at a medium level [9]. Although students are not in a situation to face a national exam, their teacher always gives several tests in every month. This finding also supports the previous research, which found that students experience anxiety when they know that a test or task will come [10]. The test is an inevitable uncertainty and it causes students to feel worried. In fact, assessment is an important thing to identify the success of educational [11]

3.2. Analysis of student's mathematics anxiety in each dimension

This study classifies anxiety that is viewed based on 3 dimensions, namely the dimensions of cognition, affective and somatic.

Table 2. Description of students' level of math anxiety in each dimension.

Dimension	Average score	Category
Cognition	13,8	Medium
Affect	18,8	Medium
Somatic	17,7	Medium

Based on table 2, from each dimension, it can be seen that students' anxiety level is at a medium level. The highest average score is in the affective dimension and the lowest average in the dimension of cognition. Hereby is presented the table of students' anxiety levels from each dimension.

3.2.1. Cognition

In this dimension, there are 4 indicators with 6 statement items. This anxiety comes from someone's thought or opinion about things that have not happened.

Table 3. Description of students' level of math anxiety in the dimension of cognition.

Level of math anxiety	The number of students	Average score	Percentage
High	10	17,9	11 %
Medium	37	14,76	39 %
Low	48	12,17	50 %

Based on table 3, it can be seen that the frequency of students' math anxiety levels is mostly at low levels, followed by medium, and high in the dimensions of cognition. It showed that most students feel not worried about their problems. But, there were ten students still feel worried about their problems and focusing attention within the heart or mind.

3.2.2. Affect

In this dimension, there are 4 indicators with 8 statement items. This dimension is related to the feeling of anxiety that a person experiences with something that is happening or has occurred in the form of emotions or moods.

Table 4. Description of students' level of math anxiety on the affective dimension.

Level of math anxiety	The number of students	Average score	Percentage
High	11	24,18	12 %
Medium	63	19,49	66 %
Low	22	15,81	22 %

Based on table 4, in the affective dimension, it can be seen that most students were at a medium level. There were 11 students who had high anxiety, so they feel anxious about things that related to mathematics. In this dimension, anxiety experienced by students was seen as an emotion or mood.

3.2.3. Somatic

In this dimension, there are 4 indicators with 8 statement items. This is related to the symptoms that are shown physically, such as a heartbeat and sweaty hands in response to the body when faced the threats related to mathematics.

Table 5. Description of students' level of math anxiety in the somatic dimension.

Level of math anxiety	The number of students	Average score	Percentage
High	7	15,7	7 %
Medium	39	18,9	41 %
Low	49	24,1	52 %

Based on table 5, the most frequency of students is at a low level. There were seven students who had a high level in this dimension. They feel worried and their anxiety followed by the body's response. Not everyone who feels anxious will experience physical symptoms as a result of this anxiety. The most common symptom is a heartbeat.

Based on the results of the study, there were two students (S-70 & S-73) with high levels in all of three dimensions. It indicates that the two students were really in a worry condition about the mathematics problem, felt an anxious, tense, and restless, and physically showed his body's response while facing a situation related to mathematics. However, judging from the mathematics scores of both students, they have different scores. The first student (S-70) has a mathematics score of 80, meanwhile, the second student (S-73) has a mathematics score of 71 on a scale of 100. Although both students are at a high level of math anxiety, the mathematics scores of both students are considered not low. This fact is supported by the research done by Sherman & Post. Their research showed that math anxiety is not the cause of the lower achievement in math [12].

Furthermore, there were four students (S-55, S-74, S-83, & S-84) who were at a high level of the cognitive and affective dimensions. It shows that the four students are in the condition of feeling worried about the problem with mathematics. They feel anxious, tense, and restless. However, physically it does not show the body's response that indicated anxiety. Out of four students, one student (S-55) had a math score below above 70, while the other three students were above 70. Therefore, it can be assumed that the students who had lower grades than the other students experienced math anxiety. That anxiety enables to influence their math achievement. Students with high levels of math anxiety will have negative thoughts about their abilities [13].

There is one student (S-46) who is at a high level of cognition and somatic dimensions. High anxiety can be reflected from their feelings of worry within their heart and it can be shown through his physical body responses such as palpitations and sweaty palms when they faced the situations related to mathematics. Then, there were 3 students (S-52, S-58, S-76) who were at a high level of affective and somatic dimensions. In general, it can be seen from the students' responses to statements about anxious, tense, and restless, and the body's response when dealing with math situations with agreed and strongly

agreed to answers. However, in contrast to the previous results, these three students have math scores below 70. It may occur due to the high feeling of anxiety in the three students.

Examined further, students' math achievements with their anxieties may not related to one another. When students who are very anxious (high level) in mathematics doing the bad tests and their bad performance may actually be caused by lack of competency and achievement rather than a high level of math anxiety [4]. On the other hand, the feeling of anxious in a person tends to result in ignoring academic tasks [14]. Thus, if students' math anxiety is high, but the competencies of students are good, their math achievements are considered not really bad. Some factors that cause mathematics anxiety (Trujillo & Hadfield in [5]) are a personality (psychological or emotional), environmental or social, and intellectual. Personality factor related to students' fear of their abilities. An environmental factor related to conditions when teaching and learning mathematics in the classroom. For example, conditions that were tense caused by mathematics teaching methods in the class. In addition, the factor from the family environment, especially parents of students who sometimes force their children to be smart in mathematics. The intellectual factor related to things that are cognitive. This factor related to the talent and level of intelligence of students. Intellectual factors include incompatible learning styles, student attitudes and lack of trust in mathematical abilities and uses of mathematics

Future research shall investigate what's the teaching methods used, how the methods are implemented, and what makes the methods are so enjoying as those can change students' mathematics anxiety [15]. In essence, to be able to manage student anxiety well, a thing which must be corrected as early as possible is educators or teachers aspect. In mathematics education, many researchers propose innovative ways of teaching, connecting real-life concepts and applications and motivating students to be more interested in the subject to overcome math anxiety [7]. A teacher must be prepared to face challenges and also be ready to provide assistance to students. The assistance must be timely and targeted because if not, it will make the class uncomfortable for some students. To increase students' comfort in learning mathematics, the teacher must be able to show students the beauty and the use of mathematics, so the mathematics can be learned by anyone and can also be learned with enjoying [16].

4. Conclusion

The profile of students' math anxiety is at the medium level. The highest average of three dimensions of math anxiety is affect while the lowest is cognition. Students with high levels of cognition, affective, and somatic dimensions do not always have bad math achievements. the highest average of the three dimensions of math anxiety is affect while the lowest is cognition. The results of this study can provide insight to teachers and researchers from the field of mathematics education for consideration a number of things to help students manage math anxiety. One that can be applied is the teaching method used, how the method is implemented, and what makes the method enjoy, so students can manage their mathematical anxiety. Several things that should be considered to help students manage the math anxiety are what the teaching methods used, how the methods are implemented, and what makes the methods are enjoying, so they can reduce students' math anxiety.

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