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STATE HIGH SCHOOL STUDENTS IN TASIKMALAYA CITY ARE ASSESSED BASED ON THEIR INTEREST CLASS (NATURAL SCIENCES/SOCIAL SCIENCES)

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ABSTRACT

This study aims to determine the profile of students' mathematics anxiety based on the chosen elective class. The method used in this study is a survey method with data collection techniques involving observation (interviews or questionnaires). Participants were grade XI students of Public Senior High Schools in Tasikmalaya City in the 2023/2024 academic year, totaling 10 schools. The sample consisted of two classes from each school, consisting of one class specializing in science and one class specializing in social studies, selected using a purposive sampling technique. The instrument used was a mathematics anxiety questionnaire. Data processing techniques involved descriptive statistical analysis using Ms. Excel & Nvivo version 14. The results of the study showed that there were differences in anxiety between students in science and social studies elective classes. The impression from these findings is the need for special interventions in the mathematics learning process in social studies classes to reduce mathematics anxiety.

Penelitian ini bertujuan untuk mengetahui profil kecemasan matematika siswa berdasarkan kelas spesialisasi yang mereka pilih. Metode yang digunakan dalam penelitian ini adalah metode survei dengan teknik pengumpulan data yang melibatkan observasi (wawancara atau kuesioner). Partisipan adalah siswa kelas 11 dari SMA negeri di kota Tasikmalaya untuk tahun ajaran 2023/2024, berjumlah 10 sekolah. Sampel terdiri dari dua kelas dari setiap sekolah, terdiri dari satu kelas spesialisasi sains (IPA) dan satu kelas spesialisasi ilmu sosial (IPS), yang dipilih menggunakan teknik purposive sampling. Instrumen yang digunakan adalah kuesioner kecemasan matematika. Teknik pengolahan data melibatkan analisis statistik deskriptif menggunakan Ms. Excel & Nvivo versi 14. Hasil penelitian menunjukkan bahwa terdapat perbedaan kecemasan antara siswa di kelas spesialisasi sains (IPA) dan siswa di kelas spesialisasi ilmu sosial (IPS). Kesan dari temuan ini adalah perlunya intervensi khusus dalam proses pembelajaran matematika di kelas ilmu sosial untuk mengurangi kecemasan matematika.

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1. INTRODUCTION

Mathematics is the most fundamental science among other sciences, meaning that mathematics is independent of other fields of study. In the world of education, mathematics is a compulsory subject as stipulated in Law No. 20 of 2003 concerning the National Education System, Article 37 of which states that mathematics is a compulsory subject for students at the elementary and secondary levels (Kurniawan, 2021). Based on a mathematical anxiety survey conducted by Harahap (2021) on students' mathematics learning, the results obtained were 30% of students stated that mathematics is an easy and fun subject to learn, 50% stated that mathematics is a fairly difficult and frightening subject to learn, and 20% of students said that mathematics is a very difficult and frightening subject to learn (Harahap & Siregar, 2021). The view of mathematics as a difficult subject has become the mainstream perception in the eyes of students (Putri, 2022; Maulana, 2023; Rahman, 2024). This shows that quite a few students experience problems in the mathematics learning process. Many students also give up before the mathematics lesson begins, resulting in many students feeling anxious and stressed while learning (Suryani, 2023).

According to Widiastuti and Kartika (2020), mathematical anxiety negatively impacts students' mathematical knowledge and abilities. High levels of mathematical anxiety can increase feelings of tension and panic when faced with mathematics, which can lead to decreased concentration and a loss of motivation to learn (Handayani, 2023). This is reinforced by Anwar (2021), who stated that there is a negative relationship between mathematical anxiety and students' mathematical abilities. This means that students who experience high levels of mathematical anxiety tend to have weak mathematical abilities. Student anxiety has a significant impact on learning. According to Susilowati (2022), there are two factors that cause mathematical anxiety: external factors and internal factors. External factors include feelings of tension, helplessness, and fear. Feelings of tension can arise when someone feels pressured to achieve good results or finds learning mathematics difficult. Furthermore, mathematical anxiety can also be influenced by students' negative perceptions of mathematics. According to Beilock and Maloney (2021), Winarso and Haqq (2023), and Zientek et al. (2023), negative assessments or negative perceptions of mathematics among students accompanied by difficulties in learning can lead to mathematical anxiety.

Mathematical anxiety is an interesting topic for research. According to Nurmala (2022), based on research data, mathematical anxiety has become a focus of attention both internationally and nationally. Internationally, data from Web of Science shows that 450 papers have been published on mathematical anxiety between 2020 and 2024. This demonstrates the high level of interest and attention in this topic among researchers. At the national level, research on mathematical anxiety and negative perceptions of mathematics is also quite widespread, particularly in the context of the mathematics learning process.

Various previous studies, both at the elementary and secondary levels, consistently show that mathematical anxiety has a significant relationship with students' mathematics abilities and learning outcomes. Anita (2014) found that mathematical anxiety negatively affects junior high school students' mathematical connection skills, indicating that the higher the level of anxiety, the lower the students' ability to connect mathematical concepts. This finding is in line with research by Ikhsan (2019) which states that mathematical anxiety has a significant influence on mathematics learning outcomes, so that students with high levels of anxiety tend to achieve lower learning outcomes.

Besides impacting cognitive aspects, mathematical anxiety is also closely related to the learning experience and learning approach applied in the classroom. Dinihari (2016) stated that the implementation of a cooperative learning model can help reduce students' mathematical anxiety because it provides space for social interaction, peer support, and a more comfortable learning atmosphere. This is reinforced by Nurul Auliya (2013) who showed that the cooperative

learning model of the Course, Review, Hurray (CRH) type not only improves mathematical understanding but is also able to significantly reduce students' mathematical anxiety.

Efforts to create enjoyable learning are also seen as an important strategy in reducing mathematical anxiety. Mailani (2015) emphasized that enjoyable learning can increase students' motivation and enjoyment of learning, thereby reducing the emotional stress that often arises in mathematics learning. A similar approach is also seen in context- and culture-based learning, as proposed by Ulya and Rahayu (2017) and Mustika (2022), who stated that ethnomathematics learning can help students feel closer to mathematics and reduce anxiety through contexts familiar to everyday life.

Psychologically, math anxiety is also related to students' perceptions and attitudes toward mathematics. Siregar and Restati (2017) in their preliminary study showed that negative perceptions of mathematics lessons can be a major trigger for anxiety, especially in students who have had unpleasant learning experiences. Susilowati (2018) also found a negative relationship between math anxiety and elementary school students' math achievement, indicating that math anxiety can form early and persist into higher education.

Furthermore, Nurmala (2022) emphasized that mathematical anxiety does not exist in isolation but is influenced by other psychological factors such as self-efficacy and learning independence. Students with low self-efficacy tend to have higher levels of mathematical anxiety because they feel unable to cope with the demands of learning mathematics. This condition is further exacerbated when students are in an unsupportive learning environment or use a learning approach that emphasizes the end result without considering the learning process.

Considering these findings, it can be concluded that mathematical anxiety is a complex phenomenon influenced by cognitive, affective, pedagogical, and psychological factors. Previous research has largely focused on the relationship between mathematical anxiety and learning abilities or outcomes, as well as efforts to reduce it through specific learning models. However, studies that specifically capture the profile of students' mathematical anxiety based on their interest at the high school level, particularly in the local context, are still relatively limited. Therefore, this research is important to provide a more specific empirical picture of high school students' mathematical anxiety and serve as a basis for formulating more adaptive mathematics learning strategies that are oriented towards student needs.

2. METHOD

The research method used in this study is a survey method. The aspect examined in this study is the influence of mathematical perception on mathematical anxiety reviewed based on the interest class of students in public high schools in Tasikmalaya City. This study aims to obtain information regarding the influence of mathematical perception on mathematical anxiety reviewed based on interest class. Specifically, the research instrument serves to measure the value of the variables studied. The research instrument used in this study is a mathematical anxiety instrument in the form of a questionnaire aimed at determining mathematical anxiety, high school students towards mathematics. The research design uses an ex post facto design. Methodologically, ex post facto research is an experimental study that tests hypotheses but does not provide certain treatments (Widarto 2013).

2.1. Research Subjects

This study was conducted among high school students in Tasikmalaya City, involving tenth and eleventh grade students taking mathematics. Subjects were selected using a purposive sampling technique to ensure that the students involved had varying levels of mathematical anxiety. Specifically, the subjects of this study involved 100 tenth grade students and 100 eleventh grade students from several different high schools in Tasikmalaya City. The tenth grade students were selected because they had just started their senior high school education and had

initial experience with mathematics at this level. The eleventh grade students were chosen to provide a more in-depth perspective on changes or developments in their mathematical anxiety levels after one year of study. Subject selection also took into account variations in gender, socioeconomic background, and previous academic achievement to obtain a comprehensive picture of mathematical anxiety among high school students. Demographic data from the subjects were recorded and analyzed to understand factors that might influence their mathematical anxiety. By involving various subjects from various backgrounds, this study is expected to provide a deep and comprehensive understanding of mathematical anxiety and the factors that contribute to it among high school students in Tasikmalaya City.

2.2. Data collection

This study used several methods and instruments to collect relevant data related to mathematics anxiety among high school students in Tasikmalaya City. First, a mathematics anxiety questionnaire was used to measure students' anxiety levels. This questionnaire consists of a series of questions arranged on a Likert scale with five response options, ranging from "strongly disagree" to "strongly agree." The questions covered aspects such as feelings of tension during mathematics lessons, concerns about their ability to complete mathematics assignments, and general perceptions of mathematics. This questionnaire was adapted from an instrument that had been validated in previous studies to ensure its reliability and validity.

In addition to the questionnaire, in-depth interviews were also conducted with a randomly selected number of students from each participating class. These interviews aimed to gain a deeper understanding of students' experiences and feelings about mathematics. Interview questions covered topics such as factors contributing to anxiety, strategies students use to cope with anxiety, and the impact of anxiety on their academic performance. Interviews were conducted face-to-face and recorded with students' consent for further analysis.

Classroom observations were conducted during the mathematics learning process to directly observe classroom dynamics and interactions between teachers and students. Researchers observed students' behavior, facial expressions, and responses to the material being taught. These observations were conducted using a pre-developed observation guide, which included indicators of anxiety such as restlessness, tension, and inability to concentrate.

In addition, academic documentation such as math test scores, progress reports, and attendance records were also collected to analyze the relationship between math anxiety and student academic achievement. This data was taken from school archives with permission from the school and the students concerned. By using a combination of questionnaires, in-depth interviews, classroom observations, and academic documentation, this study is expected to provide a comprehensive picture of math anxiety among high school students in Tasikmalaya City. This triangulation approach also allows for cross-validation of the data obtained, thereby increasing the accuracy and reliability of the research findings.

2.3. Data analysis

This study employed different data analysis techniques for quantitative and qualitative data to gain a comprehensive understanding of mathematical anxiety among high school students in Tasikmalaya City. For quantitative data obtained from the mathematical anxiety questionnaire, analysis was conducted using descriptive and inferential statistics. Descriptive statistics were used to describe the distribution of students' mathematical anxiety levels, including the mean, median, and standard deviation. Inferential analyses, such as t-tests and ANOVA, were used to test hypotheses about differences in mathematical anxiety levels based

on demographic variables such as gender, grade, and socioeconomic background. Furthermore, regression analysis was used to examine the relationship between mathematical anxiety and students' academic achievement.

For qualitative data obtained from in-depth interviews and classroom observations, analysis was conducted using thematic analysis techniques. Interview and observation data were transcribed and read thoroughly to identify key themes that emerged related to math anxiety. These themes were then categorized and analyzed to understand the factors causing anxiety, students' coping strategies, and the impact of anxiety on learning and academic achievement. This qualitative data was also analyzed using qualitative analysis software such as NVivo to facilitate data organization and coding.

Triangulation techniques were used to validate the findings by comparing quantitative and qualitative data. The results of the questionnaire analysis were compared with findings from interviews and observations to ensure consistency and identify relevant patterns. With this approach, the research is expected to provide a more complete and accurate picture of math anxiety among high school students and provide a strong basis for policy recommendations and more effective educational interventions.

3. RESULTS AND DISCUSSION

3.1. Results

The mathematical anxiety profile of senior high school students in Tasikmalaya City based on their interest types was obtained from the accumulated scores of students according to the mathematical anxiety indicators. The indicators used to determine students' mathematical anxiety in this study consisted of four indicators as developed by Cooke (2022)namely, Somatic, Attitude, Cognitive, and Knowledge. The results of the average score calculation for each indicator of mathematical perception are attached in the following table:

Table 1. Mathematical Anxiety Profile of Senior High School Students in Tasikmalaya City Based on Interest Type

Student Profile Based on Interest Class		Science			Social Studies		
		Average	Percentage	Average Total	Average	Percentage	Average Total
Mathematics Anxiety Variable	Indicator (1): Somatic	2,8	60%	55.83%	2,1	36.66%	33.33%
	Indicator (2): Attitude	2,8	60%		1,8	26.66%	
	Indicator (3): Cognitive	2,6	53.33%		2,1	36.66%	
	Indicator (4): Knowledge	2,5	50%		2	33.33%	

Based on the calculation results, it was obtained that the percentage level of the somatic indicator of the science interest class was 60%, the percentage level of the attitude indicator was 60%, the percentage level of the cognitive indicator was 53.33% and the percentage level of the knowledge indicator was 50%. So based on the total average for the mathematics perception indicator of the science interest class was 55.83%. Based on the predetermined range because 55.83% is in the interval, it can be concluded that the average student in the science interest class tends not to feel anxious about mathematics. $2{,}5 < x \leq 4$.

For the social studies elective class, based on the calculation results, it was obtained that the percentage level on the somatic indicator was 36.66%, the percentage level on the attitude indicator was 26.66%, the percentage level on the cognitive indicator was 36.66%, and the percentage level on the knowledge indicator was 33.33%. So, based on the total average for the mathematics perception indicator for the social studies elective class, it was 33.33%. Based on the predetermined range, because 33.33% is in the interval, it can be concluded that the social studies elective class tends to still feel anxious about mathematics. Thus, the category of mathematical anxiety of students in the science elective class is no longer anxious, and in the social studies elective class, they still feel anxious about mathematics $1 \leq x \leq 2{,}5$.

Based on the results of research that has been carried out in the field, it is stated that students in the science interest class do not feel anxious about mathematics lessons, with details of the percentage of each indicator, namely the somatic indicator of the science interest class is 60%, the percentage level of the attitude indicator is 60%, the percentage level of the cognitive indicator is 53.33% and the percentage level of the knowledge indicator is 50%. Presented in the following diagram:

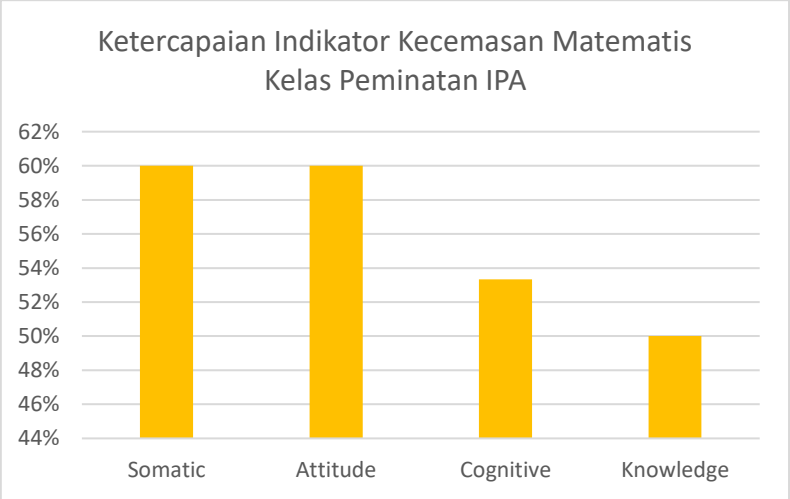

Figure 1. Achievement Diagram of Mathematical Anxiety Indicators in Science Interest Classes

The highest achievement indicators in mathematical anxiety in science interest classes are Somatic and Attitude indicators, where in the Somatic indicator students are asked to assess the physical reactions that arise while or after taking mathematics lessons, while in the Attitude indicator students are asked to assess their self-confidence and feelings that arise before, during, and after taking mathematics lessons. So it can be concluded that the mathematical anxiety of science interest class students tends to feel less anxious in taking part in mathematics learning activities.

The Somatic and Attitude indicators are the most highly evaluated indicators of math anxiety in science classes because they provide a comprehensive picture of students' experiences and perceptions of mathematics. First, the Somatic indicator, which refers to physical reactions that occur during or after a math lesson, may be high because mathematics is often perceived as a challenging subject that requires deep thought. The tension or anxiety that arises when facing material perceived as difficult or complex can trigger physical reactions such as heart palpitations, cold sweats, or other physical sensations. Second, the Attitude indicator, which

encompasses students' self-confidence and feelings before, during, and after a math lesson, may also be high because this subject is often considered a benchmark for intellectual ability. Students may feel pressure to perform well in math, especially in science classes where there are typically high expectations for academic achievement. Uncertainty about their abilities in this subject or concerns about assessment by teachers or classmates can increase anxiety and undermine self-confidence. These two indicators are interrelated and influence each other. Physical reactions that arise due to anxiety can affect students' mental attitudes towards mathematics, while negative mental attitudes can also worsen the physical reactions felt.

For the social studies class, based on the results of research that has been carried out in the field, it is stated that students in the social studies interest class still feel anxious in facing mathematics lessons, which will be explained based on the percentage details of each indicator, namely the somatic indicator of 36.66%, the attitude indicator of 26.66%, the percentage level of the cognitive indicator of 36.66% and the percentage level of the knowledge indicator of 33.33%. Presented in the following diagram:

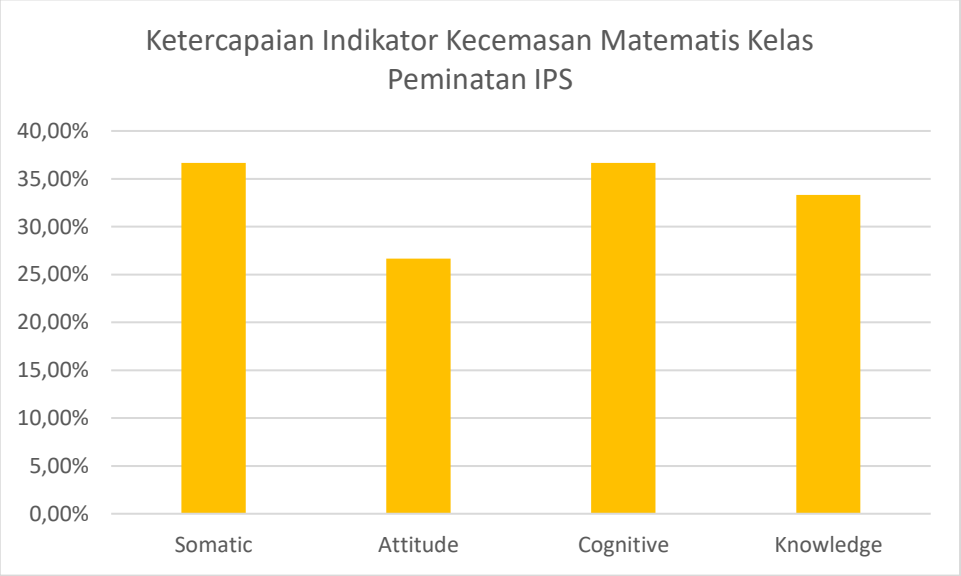

Figure 2. Achievement Diagram of Mathematical Anxiety Indicators in Social Studies Interest Class

The indicators with the highest achievement in mathematical anxiety in the social studies elective class are somatic and cognitive indicators where in the Somatic indicator students are asked to assess the physical reactions that arise while or after taking mathematics lessons, while in the cognitive indicator students are asked to assess the condition and readiness in taking mathematics lessons. So it can be concluded that the mathematical anxiety of students in the social studies elective class tends to feel anxious in taking part in mathematics learning activities.

Somatic and Cognitive indicators are the most highly achieved indicators of mathematical anxiety in social studies classes because they provide important insights into students' experiences and thought processes related to mathematics. First, the Somatic indicator, which refers to physical reactions that occur during or after a mathematics lesson, may be high because mathematics is often considered a challenging subject for some students. The discomfort or stress that arises when facing difficult material can trigger physical reactions such as heart palpitations, stomach bloating, or even headaches. This may indicate that students are experiencing physical tension related to mathematical anxiety. Second, the Cognitive indicator,

which refers to students' state and readiness in participating in mathematics lessons, may be high because students feel less confident or unprepared for mathematics lessons. Uncertainty about their ability to understand the material or complete mathematical tasks can lead to greater anxiety and interfere with the learning process. These two indicators are interrelated and can influence each other. Physical reactions that arise due to mathematical anxiety can affect students' cognitive readiness in facing mathematics learning, while lack of self-confidence or cognitive unpreparedness can also worsen the physical reactions felt.

3.2. Discussion

The results of the study showed that students in science classes tended not to experience mathematical anxiety. This was reflected in the high percentages of somatic and attitude indicators, each reaching 60%, followed by cognitive indicators at 53.33% and knowledge indicators at 50%. These findings indicate that, in general, students in science classes were able to manage their physical reactions, attitudes, cognitive readiness, and understanding of mathematics learning well.

Somatic and attitude indicators were the indicators with the highest achievement in science classes. Somatic indicators describe the physical reactions that occur when students participate in mathematics learning, while attitude indicators relate to students' self-confidence and feelings before, during, and after learning takes place. The high achievement in these two indicators indicates that although mathematics is a subject that demands high-level thinking skills, students in science classes are relatively able to control their physical reactions and maintain a positive attitude towards mathematics learning. This may be influenced by the stronger academic demands and high achievement expectations in science classes, so that students are accustomed to facing mathematical challenges more adaptively.

In contrast to science classes, the study results showed that students in social studies classes still experienced mathematical anxiety. The indicators with the highest achievement in social studies classes were somatic and cognitive, each at 36.66%. This finding suggests that mathematical anxiety in social studies classes is more characterized by physical reactions and suboptimal cognitive readiness for mathematics learning.

The relatively high somatic indicators in social studies classes indicate physical tension experienced by students when facing mathematics learning, such as discomfort or stress. Meanwhile, the cognitive indicators reflect students' readiness and mental state in understanding mathematics material. High levels of anxiety in the cognitive indicators indicate that social studies students tend to feel unprepared or lack confidence in facing the demands of mathematics learning, which can ultimately hinder the learning process.

Overall, the differences in mathematical anxiety profiles between science and social studies classes indicate that the type of interest plays a role in shaping students' emotional experiences with mathematics. Science students tend to have more positive attitudes and readiness, while social studies students still require learning support that can reduce mathematical anxiety, both physically and cognitively.

4. CONCLUSION

Based on the research results, data processing and analysis, and hypothesis testing, several suggestions can be made for further research and educational practice. First, mathematics teachers in social studies classes need to develop teaching strategies that can reduce math anxiety, such as more interactive and collaborative learning approaches and providing more intensive emotional support. Furthermore, additional guidance programs and the use of learning aids can help improve the self-confidence and cognitive abilities of social studies students. Second, further research is recommended to involve more schools, including private schools, to

obtain a more comprehensive picture of the profile of math anxiety in various educational contexts.

This way, the interventions developed can be more effective and targeted. Finally, it is important for future researchers to explore other factors that may influence math anxiety, such as family environment and social support, to deepen understanding.

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