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PROBLEM-SOLVING ABILITY BASED ON MATH ANXIETY IN SENIOR HIGH SCHOOL STUDENTS DURING THE COMPUTER-BASED WRITTEN EXAM

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ABSTRACT

Mathematical problem-solving is a crucial competency in high school education, but students often face challenges due to psychological factors such as math anxiety. This study aimed to analyze students' mathematical problem-solving abilities based on their level of math anxiety. This research used a qualitative descriptive approach. The subjects were 32 students of class XII SMAN 17 Bandung. Three students were selected as primary subjects based on high, medium, and low levels of mathematical anxiety. Data were collected through math anxiety questionnaires, written tests (containing 2 UTBK questions from 2020 and 2024), and interviews. The findings showed that the student with low math anxiety performed well in all four problem-solving stages, while the student with moderate anxiety showed partial success, particularly struggling in the review phase. The student with high anxiety showed poor performance across all stages due to emotional barriers such as fear, nervousness, and lack of concentration. Math anxiety significantly influences students' mathematical problem-solving skills, there is a negative relationship between the level of mathematical anxiety and students' problem-solving abilities. Students with lower anxiety are better able to understand, plan, and solve problems effectively. These findings highlight the importance of addressing emotional factors in math education and suggest the need for anxiety-reducing strategies in the classroom.

Keywords : Analysis, Mathematical Problem Solving Ability, Mathematical Anxiety, UTBK questions.

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PRELIMINARY

One of the main goals of the mathematics curriculum in Indonesia, as well as in other countries, is to develop students' problem-solving skills. Problem-solving is not only the core of mathematics learning but also a relevant and applicable skill in everyday life. As stated by (Olivares et al., 2021) mathematics education is designed to develop students' competencies to face global challenges and become individuals ready to contribute to a rapidly evolving society.

Indonesia has been one of the countries participating in the PISA test since 2001. PISA is a global education assessment that measures reading, mathematics, science, and

problem-solving skills. From the beginning of its participation, Indonesia has consistently obtained less than satisfactory results. In the 2018 PISA assessment, the data showed that the average score of Indonesian students was only 379, far below the OECD average score of 487 (Nopriyanti, et al., 2024). One of the main indicators in PISA is mathematical problem-solving ability, which highlights that Indonesian students' skills in this area are still lagging behind international standards (Susanti et al., 2023). In response to this challenge, Almarashdi and Jarrah (2023) emphasize the importance of equipping students with relevant mathematical knowledge and skills so they can participate effectively in real-life situations. This reflects an urgent need to improve the quality of mathematics education in Indonesia to close the gap and prepare students to face global challenges. As part of this effort, curriculum reform has become a central focus to ensure that students' problem-solving abilities are systematically developed.

In the "Merdeka Curriculum," problem-solving skills are emphasized as part of the development of critical thinking skills needed to face 21st-century challenges (Fakhri, 2023). Mathematical problem-solving involves not only cognitive abilities but also analytical, logical, and creative skills in finding solutions to problems (Veronica, Siswono, & Wiryanto, 2022). At the senior high school (SMA) level, this ability is one of the indicators of students' readiness to face major exams, such as the Computer-Based Written Exam (UTBK), which is the entrance exam for universities in Indonesia.

Problem solving is the process of identifying, analyzing, and interpreting a problem using certain methods or techniques (Difinubun et al., 2024). There are five key competencies in mathematics learning: mathematical problem solving, mathematical communication, mathematical reasoning, mathematical connection, and mathematical representation (Minggi, Arwadi, & Bakri, 2022). In mathematics learning, problem-solving ability is essential for students to apply their knowledge and skills in new situations (Annisa et al., 2021).

However, one of the factors that can affect students' problem-solving abilities is math anxiety. Math anxiety often occurs among students during the learning process (Lailiyah et al., 2021). It can affect students across all educational levels and tends to increase over time. Math anxiety is defined as a feeling of fear, anxiety, or discomfort experienced when dealing with math-related tasks (Yurt, 2016). This condition often hinders the learning process, even for students with high cognitive ability (Vrasetya & Gunawan, 2024). The level of math anxiety varies among students, influenced by factors such as learning experiences, environment, and individual characteristics. Several experts

have categorized math anxiety into different levels for easier analysis. In this study, the researcher uses the categorization of math anxiety into three levels: high, moderate, and low, as proposed by Freedman (2006).

Math anxiety is known to have a significant impact on students' ability to complete math tasks. It negatively affects performance by reducing the effectiveness of working memory (Pelegrina et al., 2020). Working memory is a critical system in the brain that allows individuals to process, retain, and integrate information simultaneously (Sokolowski & Ansari, 2017). When students experience math anxiety, much of their working memory capacity is consumed by feelings of anxiety. As a result, the remaining capacity for processing information and solving problems becomes limited. This hinders students' ability to think effectively and solve math problems efficiently (Sokolowski & Ansari, 2017). This negative impact highlights the importance of understanding and managing math anxiety in learning. Previous studies have shown that students with high levels of math anxiety tend to struggle with understanding concepts, applying problem-solving strategies, and answering questions accurately (Guo & Liao, 2022) (Setiawan et al., 2021). Polya (1973) identified four key stages in the problem-solving process: understanding the problem, devising a plan, carrying out the plan, and looking back (Christina, & Adhirakasiwi, 2021).

UTBK, or *Ujian Tulis Berbasis Komputer*, is a computer-based university entrance test in Indonesia. It assesses students' abilities acquired during their schooling years, such as thinking, reasoning, and literacy skills. UTBK content includes: the Scholastic Potential Test (TPS) which measures cognitive abilities, literacy tests in Indonesian and English, and mathematical reasoning. The mathematics section of UTBK is designed to test higher-order thinking skills (Disnawati et al., 2022), which involve analysis, evaluation, and the creation of new solutions (Heryani, Madawistama, & Kurniawan, 2024). For students with math anxiety, the pressure to complete these tasks within a limited time can negatively impact overall academic performance (Caviola et al., 2022; Zakiatun Nisa & Harini, 2022). Therefore, it is essential to analyze how levels of math anxiety influence students' problem-solving abilities in the context of UTBK.

Previous studies on mathematical problem-solving ability show that math anxiety has a significant influence on students' performance. Barroso et al. (2021) found that the relationship between math anxiety and mathematical achievement varies based on the level of anxiety experienced by students—where higher anxiety tends to be associated with lower achievement. Meanwhile, Safitri et al. (2022) found that students' problem-solving

abilities in vector material did not meet Polya's expected problem-solving steps. Several previous studies have indeed discussed UTBK questions in relation to mathematical ability; however, their focus differs from this study. For example, research conducted by Aulia Putri & Nur Afifah, (2024) analyzed students' learning difficulties in the UTBK mathematical reasoning subtest and identified various obstacles students encountered when solving reasoning problems. That study emphasized the identification of students' conceptual and procedural difficulties without linking them to psychological factors such as math anxiety. In contrast, the present study employs adapted UTBK-type essay questions and categorizes students based on their levels of math anxiety (high, moderate, low) to then analyze their problem-solving abilities. Thus, this study offers a new contribution by integrating both cognitive aspects (problem-solving ability) and affective aspects (math anxiety), which have rarely been investigated in the context of using UTBK instruments.

Therefore, this study analyzes the relationship between math anxiety and high school students' problem-solving abilities using adapted UTBK-type essay questions. The findings are expected to show the psychological impact on math performance and serve as a basis for interventions to support students' academic success.

METHODS

The research method used in this study is a qualitative method with a descriptive research design and a phenomenological approach. This approach was chosen to explore and describe students' experiences in mathematical problem-solving related to math anxiety when working on UTBK-type questions. Data were collected through purposive sampling using triangulation techniques, including interviews, observations, and documentation, and were analyzed with phenomenological procedures such as bracketing, identifying significant statements, and clustering themes. The results of qualitative research emphasize meaning rather than generalization (Sugiono, 2019). Therefore, descriptive qualitative research aims to provide a detailed picture of a natural situation or object (Safitri et al., 2022). Through the qualitative approach, it is expected that comprehensive data can be obtained regarding students' mathematical problem-solving abilities in relation to their math anxiety when faced with UTBK-type questions.

The research subjects were 12th-grade students at SMA Negeri 17 Bandung in the 2024/2025 academic year. The selection of subjects began by choosing a specific class, then distributing the Mathematics Anxiety Questionnaire (AKM) to classify students based

on their level of math anxiety. The AKM consists of 25 statements developed by the researcher based on the Revised Mathematics Anxiety Rating Scale (RMARS) and covers three dimensions of math anxiety: cognitive, affective, and psychomotor aspects (Fatma, 2022). The validity of the questionnaire was examined through content validity involving expert judgment from two mathematics education lecturers and one senior mathematics teacher. They evaluated the relevance of items to the math anxiety construct, clarity of statements, suitability for high school students, and alignment with the RMARS framework. The expert assessments were quantified using the Aiken's V formula (Aiken, 1985), yielding coefficients ranging from 0.79 to 0.91, which indicates high content validity. In addition, the reliability test using Cronbach's Alpha produced a coefficient of $\alpha = 0.87$, exceeding the minimum threshold of 0.70, indicating strong internal consistency.

The instruments used in this study include: (1) the Math Anxiety Questionnaire; (2) a problem-solving ability test using two UTBK essay questions from 2020 and 2024; and (3) interviews. The UTBK questions were selected because they are categorized as HOTS and have undergone national validation (Disnawati et al., 2022). The interview protocol was also reviewed by experts, and its credibility was strengthened through triangulation with the questionnaire and test results. The following are the UTBK questions used:

Soal UTBK 2024 – Barisan Aritmetika

Diketahui suku ke-3 dan suku ke-5 dari suatu barisan aritmetika berturut-turut adalah −5 dan −9.

a. Analisis informasi apa yang dapat diperoleh dari soal tersebut, termasuk hubungan antar suku dalam barisan aritmetika.
b. Rancang strategi penyelesaian yang menurut Anda paling efektif untuk menentukan suku ke-10 barisan tersebut. Jelaskan alasan Anda memilih strategi tersebut.
c. Gunakan strategi yang Anda pilih untuk menghitung suku ke-10 barisan tersebut.
d. Lakukan verifikasi hasil dengan menggunakan pendekatan alternatif (misalnya rumus umum barisan aritmetika atau metode lain) dan jelaskan apakah hasilnya konsisten.

Fugure 1. UTBK Question

The math anxiety levels were used to categorize students into three groups: high, moderate, and low math anxiety. One student from each group was selected using purposive sampling, based on the Zung Self-Rating Anxiety Scale (ZSRAS) (Alfina, 2024), which consists of 25 statements scored on a scale of 25–100. The response options included: "Always (A), Often (O), Sometimes (S), and Never (N)" with a scoring range from 4 (A) to 1 (N). The questionnaire used a Likert scale to identify aspects of math anxiety in determining its level. Student anxiety scores were classified into three categories—high, moderate, and low—by processing the questionnaire results using

Microsoft Excel. Based on the calculations, out of 32 students: 3 students were classified as having high math anxiety, 13 students as having moderate math anxiety, and 16 students as having low math anxiety. These classifications were made based on the categorized levels of student anxiety as follows:

Table 1. Students' Levels of Math Anxiety

Category	Score Interval
Low	$0 < P \leq 36$
Moderate	$36 < P \leq 63$
High	$63 < P \leq 100$

Source: Adapted from Zung Self-Rating Anxiety Scale (ZSRAS) modified by Alfina (2024), adjusted using standard deviation criteria.

After identifying the three subjects, one student from each math anxiety level was selected: for the high math anxiety category, the student with the highest score was chosen; for the moderate category, the student with a score closest to the midpoint was selected; and for the low category, the student with the lowest score in the group was chosen.

The indicators used to analyze students' problem-solving abilities in this study are adapted from Polya's (1973) problem-solving stages, which are as follows:

Table 2. Description of Categories of Mathematical Problem-Solving Ability

Problem-Solving Stage	Category	Description
Understanding the Problem	High	Fully and correctly understands the problem. Able to express the known information and the question being asked from the given problem.
	Moderate	Misinterprets part of the problem or only partially understands it.
	Low	Completely misinterprets the problem or does not understand the problem as a whole.
Devising a Plan	High	Creates a correct plan that leads to the right solution.
	Moderate	Develops a solution plan that is applicable but may not yield the correct result / uses an imprecise method but arrives at the correct answer.
	Low	Does not have or create a plan that is relevant to the problem.
Carrying Out the Plan	High	Completes the entire problem and obtains the correct answer.
	Moderate	Completes part of the problem and obtains the correct answer.
	Low	Does not complete the problem or completes part/all of it but obtains the wrong result.
Looking Back	High	Reviews the process or result of problem-solving.
	Moderate	Reviews the process or result, but not accurately.
	Low	Does not review the process or result of the problem-solving.

Source:(Zulpah et al., 2024)

RESULT AND DISCUSSION

Based on the data collected through problem-solving tests and interviews with the subjects, the research findings were analyzed as follows:

1. Problem-solving ability of Subject 27 (a subject with a high level of math anxiety).

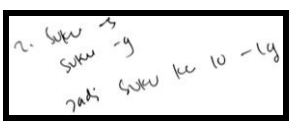

Figure 1. Response of Subject 27

a) Understanding the Problem

Based on Figure 1, Subject 27 was unable to clearly write down the given information. Subject 27 did not state what was known and what was being asked, thus was unable to connect the information provided. The following is an excerpt from the interview with Subject 27 regarding understanding the problem:

P1: "What information did you get from the question?"

S27: "There's a sequence, and then the 3rd and 5th terms."

P1: "Okay, did you experience any difficulty in understanding the question?"

S27: "Yes, Ma'am. I felt nervous while doing the question, so I rushed."

Based on the interview, Subject 27 had difficulty in understanding the problem. According to the problem-solving indicators, Subject 27 is in the *low* category for understanding the problem, because they failed to comprehend the problem fully. Additionally, the subject felt tense while working on the problem and was unable to concentrate, leading to a random answer.

b) Devising a Plan

Based on Figure 1, Subject 27 did not devise a plan. The subject did not list any steps for identifying the arithmetic sequence and did not write down any relevant formulas to solve the problem. Below is an interview excerpt:

P1: "You mentioned earlier that this is a sequence. How would you plan to solve this problem?"

S27: "I don't know, Ma'am. I forgot the method and the formula."

P1: "Are you afraid of getting the answer wrong?"

S27: "Yes, Ma'am. I feel scared, especially when doing math problems."

Based on the interview, Subject 27 could not devise a plan due to forgetfulness regarding the method and formula. According to the problem-solving indicators, the subject's planning falls under the *low* category, as they did not devise a relevant plan. Furthermore, the subject expressed fear when working on math problems, which hindered their ability to formulate a strategy.

c) Carrying Out the Plan

Based on Figure 1, Subject 27 was unable to carry out the plan. The subject did not show any working steps for solving the problem, instead directly writing the answer to the 10th term as -19, without showing any calculations. Interview excerpt:

P1: "How did you solve this problem?"

S27: "I don't know, Ma'am."

P1: "Why did you write that the 10th term is -19?"

S27: "I don't know, Ma'am. I'm sorry—I copied it from a friend."

P1: "Do you feel dizzy when working on math problems?"

S27: "Yes, Ma'am. Very dizzy."

P1: "Does this happen often?"

S27: "Yes, Ma'am. Because I don't like math."

Based on the interview, Subject 27 failed to carry out the plan properly. They did not write any solution steps and admitted to copying a friend's answer. According to the indicators, the subject's performance in this stage is in the *low* category because they did not complete the problem-solving process. Additionally, the subject experiences dizziness and dislike when dealing with math problems.

d) Looking Back (Reflecting and Reviewing)

Based on Figure 1, Subject 27 was unable to reflect and review, as nothing was written in this stage. Interview excerpt:

P1: "Why didn't you write anything in this part?"

S27: "Because I felt stuck, Ma'am. I couldn't think anymore."

P1: "Alright, what are your thoughts on solving this math problem?"

S27: "I think it's difficult because I don't know how."

P1: "What symptoms do you often experience when working on math problems?"

S27: "Fear, dizziness, wanting to finish quickly, Ma'am."

Based on the interview, Subject 27 was unable to complete the problem due to feeling mentally blocked. According to the indicators, the subject's reflection and reviewing fall into the *low* category because they did not evaluate their problem-solving process. Additionally, they found the UTBK questions difficult.

2. Problem-solving ability of Subject 2 (a subject with a moderate level of mathematical anxiety)

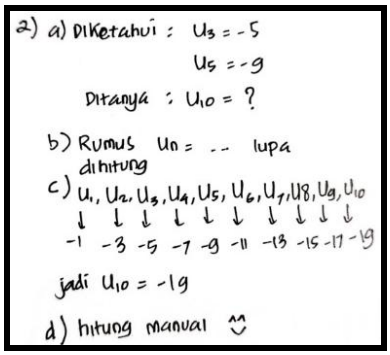

Figure 2. Response of Subject 2

a) Understanding the Problem

Based on Figure 2, Subject 2 was able to clearly write down the information. The subject correctly identified the given terms and accurately stated what was being asked, which allowed them to understand the problem well. The following is an excerpt from the interview with Subject 2 regarding understanding the problem:

P1: "What information did you get from the question?"

S2: "There's the 3rd term = -5, and the 5th term = -9. And what's being asked is the 10th term."

P1: "Alright, did you have any difficulty understanding the question?"

S2: "No, Ma'am."

Based on the interview, Subject 2 could understand the given problem by clearly writing down the known and asked components. According to the problem-solving indicators, Subject 2 falls into the *high* category for understanding the problem because they demonstrated a complete understanding and provided the correct information.

b) Devising a Plan

Based on Figure 2, Subject 2 attempted to devise a plan by writing down the steps to find the 10^{th} term of the arithmetic sequence using the formula Un. However, the subject forgot the complete formula and only noted that it needed to be calculated. The steps were not fully accurate because the complete formula was not written. Interview excerpt:

P1: "Okay, what's the next step after understanding the question? How would you solve it?"

S2: "Using the UnU_nUn formula, Ma'am, but I forgot. But I can calculate it manually, just one by one."

P1: "Do you feel afraid of making a mistake when solving this kind of problem?"

S2: "Yes, Ma'am. I'm afraid of making mistakes because sometimes I forget the formula or the method."

Based on the interview, Subject 2 was able to devise a plan, although incomplete, due to forgetting the formula and method. This aligns with (Sopiany & Rahayu, 2019), who state that errors in using formulas are part of misconceptions. According to the problem-solving indicators, Subject 2 is in the moderate category for planning because they created an applicable, though incomplete, plan. They also expressed fear of making mistakes due to forgetfulness. Even so, Subject 2 was able to continue to the next step by calculating the terms one by one.

c) Carrying Out the Plan

Based on Figure 2, Subject 2 carried out the plan by writing down the solution. They solved the problem by listing each term of the sequence one by one and arrived at the correct result. Interview excerpt:

P1: "How did you solve the problem?"

S2: "I counted them one by one, Ma'am."

P1: "Please name the terms."

S2: "$U_1 = -1$, $U_2 = -3$, $U_3 = -5$, $U_4 = -7$, $U_5 = -9$, $U_6 = -11$, $U_7 = -13$, $U_8 = -15$, $U_9 = -17$, $U_{10} = -19$."

P1: "Do you feel dizzy when solving math problems?"

S2: "Yes, Ma'am. Dizzy."

P1: "Does this happen often?"

S2: "Not often, Ma'am."

Based on the interview, Subject 2 successfully carried out the plan and correctly calculated the 10^{th} term as -19. However, it would have been better to also include the formula for the nnn-th term. According to the problem-solving indicators, Subject 2 is in the *moderate* category for carrying out the plan, because they completed part of the process and reached the correct answer. Additionally, while they did experience dizziness when solving math problems, it occurred infrequently.

d) Looking Back (Reflecting and Reviewing)

Based on Figure 2, Subject 2 was unable to reflect and review properly, as they only noted an alternative method and performed manual calculations. Interview excerpt:

P1: "What was your answer for part d?"

S2: "I think I just calculated it manually, because I guessed the answer—I don't know any other way."

P1: "Alright, what are your thoughts on solving this math problem?"

S2: "I think it's hard, Ma'am, because I don't really like math."

P1: "What symptoms do you often experience when doing math problems?"

S2: "Nervous, dizzy, and tense—just not relaxed."

Based on the interview, Subject 2 could not complete part d because they felt they had no alternative solution. According to the problem-solving indicators, Subject 2 falls into the *low* category for reviewing, as they did not recheck the process or the result. This aligns with research by Pattisina & Sopiany (2021), which stated that students often neglect the reviewing stage, and one contributing factor was Subject 2's lack of interest in learning mathematics.

3. Problem-Solving Ability of Subject 8 (Subject with Low Math Anxiety)

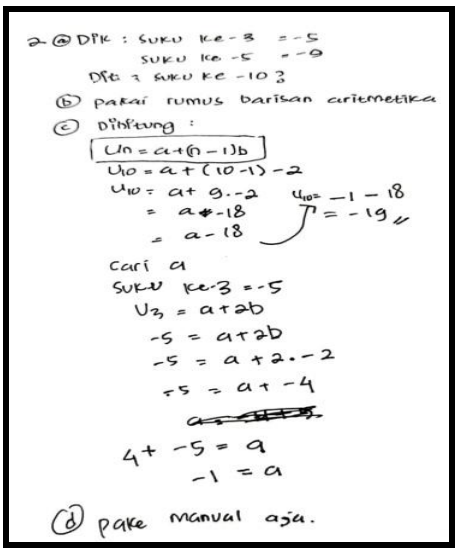

Figure 3. Answer of Subject 8

a) Understanding the Problem

Based on Figure 3, Subject 8 was able to clearly write down the information, correctly identify the known terms, and accurately determine what the question was asking. This indicates that Subject 8 was able to understand the given problem. The following is an excerpt from the interview with Subject 8 regarding understanding the problem:

P1: "What information did you get from the problem?"

S8: "It says the 3rd term = -5, the 5th term = -9. And it's asking for the 10th term."

P1: "Okay, did you have any difficulty understanding the question?"

S8: "No, Ma'am. I understand it. It's about arithmetic sequences."

Based on the interview, Subject 8 could understand the problem by correctly stating what was known and what was being asked in the question, and recognized that the problem involved an arithmetic sequence. According to problem-solving indicators, Subject 8's understanding falls into the *high* category because the problem was understood completely and accurately. This aligns with the findings of (Safitri et al., 2022), which stated that students with low anxiety are able to identify the information and the problem in a question, enabling Subject 8 to convey the information well.

b) Planning

Based on Figure 3, Subject 8 planned their solution by choosing to use the arithmetic sequence formula. Subject 8 chose the correct method for planning the solution. The following is an excerpt from the interview with Subject 8 regarding planning:

P1: "What's the next step after understanding the problem? How will you solve it?"

S8: "By using the arithmetic sequence formula, Ma'am."

P1: "Can you mention the formula?"

S8: "Yes, Ma'am. It's a + (n–1)b."

P1: "Do you feel afraid of making a mistake when solving the problem?"

S8: "Sometimes, Ma'am."

Based on the interview, Subject 8 was able to plan the solution and correctly state the formula for the nth term. According to problem-solving indicators, Subject 8's planning falls into the *moderate* category because they created a correct plan that led toward a correct solution. Therefore, Subject 8 was able to proceed to the next step by calculating the 10th term using the arithmetic sequence formula.

c) Carrying Out the Plan

Based on Figure 3, Subject 8 carried out the plan by completing the solution. Subject 8 answered the question using the arithmetic sequence formula, then determined the first term in order to calculate the 10th term. After performing the

calculations correctly, the correct result was obtained. The following is an excerpt from the interview with Subject 8 regarding carrying out the plan:

P1: "How did you solve the problem?"

S8: "I used the arithmetic sequence formula, Ma'am."

P1: "How did you find the common difference of the sequence?"

S8: "I calculated it manually, Ma'am, by listing each term one by one and trying it out until I found it."

P1: "Okay, do you feel dizzy when solving math problems?"

S8: "Yes, Ma'am. Sometimes, when the problem is really hard."

P1: "Does this happen often?"

S8: "No, Ma'am."

Based on the interview, Subject 8 was able to carry out the plan effectively and determine the 10th term correctly using the proper steps. According to problem-solving indicators, Subject 8's performance falls into the *high* category because they were able to complete the problem and arrive at the correct answer, even though they sometimes felt dizzy when facing difficult problems.

d) Reflecting and Reviewing

Based on Figure 3, Subject 8 was unable to reflect and review their work, as they only mentioned an alternative method and performed manual calculations. The following is an excerpt from the interview with Subject 8 regarding reviewing:

P1: "What's your answer for part d?"

S8: "It can be calculated manually, Ma'am."

P1: "How did you calculate it?"

S8: "By listing each term one by one: $U_1 = -1$, $U_2 = -3$, $U_3 = -5$, $U_4 = -7$, $U_5 = -9$, $U_6 = -11$, $U_7 = -13$, $U_8 = -15$, $U_9 = -17$, $U_{10} = -19$."

P1: "Why didn't you write that on the answer sheet?"

S8: "Because time ran out, Ma'am. I didn't have time to write it."

P1: "Okay, did you feel anxious?"

S8: "Yes, Ma'am. A little, because I felt rushed."

Based on the interview, Subject 8 was unable to complete part d of the problem on the answer sheet but was able to explain an alternative method during the interview. According to problem-solving indicators, Subject 8's reviewing performance falls into the *moderate* category because they reviewed the process and solution, but did not write it

down completely. Additionally, Subject 8 felt anxious and rushed while answering part d, which contributed to the incomplete response.

To make the differences in students' problem-solving performance clearer, the results for each subject are summarized in a comparison table. This table presents how students with high, moderate, and low levels of math anxiety performed at each stage of Polya's problem-solving process.

Table 3. Comparison of Problem-Solving Performance Across Anxiety Levels

Polya's Problem-Solving Stage	High Anxiety (Subject 27)	Moderate Anxiety (Subject 2)	Low Anxiety (Subject 8)
Understanding the Problem	Low — subject experienced difficulty identifying known and asked information, appeared tense, and relied on guessing.	High — subject accurately identified the known information and what was being asked in the problem.	High — subject clearly explained the problem, stated known and asked information, and demonstrated stable comprehension.
Planning the Solution	Low — subject did not formulate a plan, appeared confused, and forgot relevant formulas due to anxiety.	Moderate — subject attempted to plan but was unsure of formula completeness and expressed fear of making mistakes.	High — subject planned systematically using correct formulas and demonstrated confidence in the chosen method.
Carrying Out the Plan	Low — subject was unable to solve the problem independently and showed cognitive blockage, leading to incomplete work.	Moderate — subject carried out the plan manually and arrived at the correct answer, though the process was slow and less efficient.	High — subject executed calculations accurately and completed the problem correctly with structured steps.
Reflecting and Reviewing	Low — subject did not review or check the final answer due to mental fatigue and stress.	Low — subject did not review the result because of lack of confidence and motivation.	Moderate — subject understood the importance of checking but did not write the review step due to limited time and mild anxiety.

Based on the results presented in the table, clear differences are observed in the problem-solving abilities of students with high, moderate, and low levels of mathematical anxiety. Students with high anxiety (Subject 27) performed in the low category at all stages. Anxiety hindered their ability to understand the problem, prevented them from planning a solution, and caused cognitive blockage during problem execution, ultimately leading to the absence of reviewing behavior.

Students with moderate anxiety (Subject 2) showed stronger performance, especially in understanding the problem. However, hesitation and fear of making mistakes caused incomplete planning and partially efficient execution. Additionally, the student did not review their work, indicating that moderate anxiety still limits metacognitive awareness.

Meanwhile, students with low anxiety (Subject 8) demonstrated the strongest problem-solving performance. They understood the problem thoroughly, planned the solution correctly, and carried out the steps accurately. Although the reviewing step was

not written in detail due to time pressure, the student showed awareness of the review process, placing this stage in the moderate category.

These findings indicate that the lower the level of mathematical anxiety, the better the student's problem-solving performance. This is consistent with Foley et al. (2017), who found a negative correlation between mathematical anxiety and mathematics performance. Similarly, Susanti et al. (2023) reported that students with low mathematical anxiety tend to successfully solve problems, while students with high anxiety tend to struggle. Furthermore, the results align with Shodikin, Sumarno, and Nurkumala (2022), showing that students with stronger problem-solving abilities demonstrate more reflective metacognitive behavior, whereas students with weaker abilities demonstrate only limited metacognitive awareness.

Thus, math anxiety not only affects cognitive processing but also disrupts metacognitive regulation, reducing students' abilities to analyze, plan, and evaluate solutions. Reducing math anxiety can therefore significantly improve students' performance, especially in high-stakes contexts such as UTBK. Teachers are encouraged to integrate emotional regulation strategies and confidence-building activities into mathematics instruction, and to use diagnostic tools like math anxiety questionnaires to identify and support students who require targeted intervention.

CONCLUSION

This study explored the relationship between students' levels of mathematical anxiety and their problem-solving abilities using UTBK-type questions. The findings revealed a clear pattern: students with low levels of math anxiety demonstrated stronger performance across the four stages of problem solving based on Polya's indicators. Subject 8 (low anxiety) successfully completed 3 of 4 stages (75%), showing strong understanding, planning, and execution skills, with only slight limitation in reviewing. Subject 2 (moderate anxiety) successfully completed 2 of 4 stages (50%), demonstrating partial planning and execution ability but weaknesses in reviewing. Meanwhile, Subject 27 (high anxiety) completed 0 of 4 stages (0%), experiencing difficulty in understanding, planning, executing, and reviewing due to fear, confusion, and lack of confidence. These results quantitatively strengthen the conclusion that the higher the mathematical anxiety, the lower the problem-solving performance, supporting the negative correlation reported in prior studies. Therefore, reducing students' math anxiety through instructional strategies that integrate emotional support, confidence-building, and gradual problem-solving training is

essential. This study highlights the importance of acknowledging emotional factors in mathematics learning and encourages future research to test anxiety-reduction interventions across broader mathematical topics.

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