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Profile of Mathematical Problem-Solving Ability in Students with Attention Deficit Hyperactivity Disorder (ADHD) Based on Their Emotional Intelligence

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ABSTRACT

Mathematical problem-solving is a critical skill, particularly for students with Attention Deficit Hyperactivity Disorder (ADHD), whose abilities in this area are influenced by emotional intelligence. This study aims to analyze the mathematical problem-solving skills of ADHD students with their emotional intelligence levels. A qualitative case study approach was applied, involving three ADHD students with varying levels of emotional intelligence—high, moderate, and low. The results revealed that students with high and moderate emotional intelligence could meet all key indicators of mathematical problem-solving, including understanding the problem, planning solutions, implementing strategies, and evaluating results. However, students with moderate emotional intelligence exhibited less structured strategies and checking procedures. In contrast, ADHD students with low emotional intelligence struggled at all stages, particularly in understanding the problem and planning solutions, and were unable to perform double-checking. These findings highlight the significant role of emotional intelligence in enhancing mathematical problem-solving abilities in ADHD students. The higher the emotional intelligence, the better the students can solve mathematical problems. These results emphasize the need for tailored educational strategies integrating emotional intelligence development to support ADHD students' academic success.

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1. INTRODUCTION

Mathematics is one of the fundamental sciences that plays a crucial role in developing knowledge and technology [1]. According to Fajriyah, mathematics education is one of the essential areas of focus in education. Mathematics learning aims to teach calculation techniques and develop students' critical and creative thinking skills [2]. Thus,

mathematics is not solely concerned with numerical calculations and formulas; it also functions to shape logical, systematic, and analytical thinking patterns, which are highly necessary for solving various problems encountered in daily life.

Mathematical problem-solving ability is one of the most fundamental and essential skills in education, as it is required not only for solving exam questions but also for addressing real-life challenges, which often demand effective and efficient problem-solving [3], [4]. Marzuqi et al. state that higher-order thinking skills are essential for students to learn effectively, particularly in developing mathematical problem-solving abilities [5]. Effective mathematical problem-solving involves several systematically executed stages. Polya proposed that the process of solving mathematical problems consists of four main stages: (1) understanding the problem, (2) planning a solution, (3) implementing the planned solution, and (4) evaluating the obtained results [6]. These four stages are crucial and require strong cognitive skills and the ability to manage emotions and maintain concentration effectively. This ability is necessary not only for regular students but also for students with special needs, such as those with Attention Deficit Hyperactivity Disorder (ADHD).

ADHD is a neurodevelopmental disorder characterized by difficulties in maintaining attention, hyperactivity, and impulsivity that are not appropriate for an individual's developmental age [7]. According to Sulemba et al., ADHD is a behavioral and neurocognitive disorder marked by an inappropriate level of hyperactivity, inattention, and impulsivity for a child's developmental age [8]. These characteristics often hinder students from engaging in learning activities that require prolonged focus, such as mathematics, which generally demands precision and high concentration. Previous studies, such as the one conducted by Re et al., revealed that students with ADHD often struggle to organize the necessary information for solving mathematical problems, particularly when such information needs to be updated or recalled [9]. These difficulties arise because they are easily distracted by various external stimuli and struggle to maintain their attention for extended periods.

Birda et al. also found that ADHD students face difficulty focusing and organizing problem-solving steps, making it challenging to solve mathematical problems requiring systematic problem-solving procedures [10]. This issue is highly relevant to the challenges ADHD students encounter in solving complex mathematical problems that require multiple solution steps. Therefore, a more specific approach is needed in teaching mathematics to ADHD students, one that does not solely rely on cognitive aspects but also considers their emotional and attentional characteristics.

Apart from ADHD, internal factors can also influence students' mathematical problem-solving abilities, such as psychological factors, including emotional intelligence [11]. Khoirunisa also states that factors influencing mathematical problem-solving ability include creativity and emotional intelligence [12]. Emotional intelligence is a set of non-cognitive skills that enable individuals to recognize and manage themselves and those of others, control emotions to achieve goals and cope with environmental demands and pressures [13]. Emotional intelligence refers to an individual's ability to recognize and manage their emotions, understand others' feelings, and build positive social relationships

[14]. A lack of consideration regarding the internal factors influencing problem-solving abilities and students' unfamiliarity with following the correct problem-solving steps further impacts their learning outcomes [15].

Previous studies have demonstrated a significant relationship between emotional intelligence and mathematical problem-solving abilities. For instance, Maftukhah and Hikmah et al. found that students with high emotional intelligence have better mathematical problem-solving skills than those with low emotional intelligence [16], [17]. This finding suggests that students with high emotional intelligence can manage stress, stay focused on assigned tasks, and maintain motivation despite difficulties solving mathematical problems.

Conversely, students with low emotional intelligence tend to struggle with maintaining focus and often fail to regulate their emotions when facing challenges. The study by Oeleu et al. also confirmed that strong emotional intelligence can help students overcome academic challenges, including mathematical problem-solving, as students with high emotional intelligence find it easier to manage stress and anxiety that often arise during the problem-solving process [18]. As a result, ADHD students with low emotional intelligence frequently experience more significant difficulties in following the problem-solving stages, especially in understanding the problem and planning a solution.

Although many studies have examined the mathematical difficulties faced by ADHD students, very few have investigated how emotional intelligence can help moderate these difficulties. Most previous research has primarily focused on the mathematical challenges experienced by ADHD students without considering the role of emotional intelligence in supporting the problem-solving process. Ramadina and Marlina state that mathematical problem-solving ability and emotional intelligence contribute significantly to the learning process [19]. For example, Daiana et al. demonstrated that students with high emotional intelligence could complete all stages of Polya's problem-solving model more effectively. In contrast, students with low emotional intelligence struggled at several stages [20].

This study aims to fill this gap by analyzing the influence of emotional intelligence on the mathematical problem-solving abilities of ADHD students, particularly in understanding the problem, planning a solution, implementing the plan, and evaluating the results. This research is expected to significantly contribute to the field of education, particularly in designing more effective learning approaches for ADHD students. By understanding the relationship between emotional intelligence and mathematical problem-solving abilities, the findings of this study are expected to serve as a reference for educators in developing more inclusive teaching strategies that cater to the emotional and cognitive needs of ADHD students. Furthermore, this research will enrich the literature on the role of emotional intelligence in supporting the academic success of students with neurodevelopmental disorders such as ADHD and contribute to developing a more inclusive curriculum for students with special needs.

2. METHOD

This research was conducted at the State Extraordinary School (SLBN) by Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H., Jambi City, during the odd 2024/2025 school year semester. The research employs a qualitative approach using a descriptive method to explore and understand the mathematical problem-solving abilities of students with ADHD and their emotional intelligence.

The data in this study is qualitatively collected through problem-solving tests, emotional intelligence questionnaires, and interviews with students. The primary data sources are three ADHD students, selected based on the Indonesian ADHD Rating Scale (IARS) and Abbreviated Conner's Teacher Rating Scale (ACTRS), which their homeroom teachers completed. The criteria for participant selection included: (1) students formally diagnosed with ADHD, (2) students enrolled in SLBN Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H., (3) students from different educational levels (middle school and high school) to represent a range of mathematical abilities, and (4) students with the ability to communicate verbally to ensure effective participation in interviews.

Data Collection Techniques

This study employs several data collection techniques, including observation, questionnaires, problem-solving tests, and interviews, to obtain in-depth information on the mathematical problem-solving abilities of ADHD students.

1. Observation was conducted to identify research subjects using IARS and ACTRS. Additionally, observation was used to understand the students' conditions and characteristics within the school environment.
2. Questionnaires were used to assess students' emotional intelligence, referring to five key aspects: self-awareness, emotion management, self-motivation, recognizing others' emotions, and relationship-building. The data was analyzed using a Likert scale to categorize students' emotional intelligence levels.
3. Problem-solving tests were administered to evaluate students' mathematical problem-solving abilities, designed according to their grade levels and curricular content. The test framework included indicators such as problem comprehension, solution planning, execution of the plan, and result verification.
4. Semi-structured interviews were conducted in two phases: initial interviews with teachers to gather insights on ADHD students and post-test interviews with students to explore their problem-solving approaches based on predefined indicators. The interview data was analyzed qualitatively to understand students' cognitive patterns in mathematical problem-solving.

Instrument Validity Testing

In this study, the validity of the instruments was tested using expert validation, aimed at ensuring that the instruments used measure aspects relevant to the research objectives. This expert validation involved specialists in mathematics education and emotional intelligence to assess the instruments' completeness, relevance, and clarity.

The expert validation process began with selecting experts who had competence in the related fields, such as psychology for the emotional intelligence questionnaire and mathematics education for the problem-solving tests. The instruments that had been developed were then provided to the experts for evaluation, with the expectation of receiving feedback on the completeness, clarity, and relevance of the indicators used. Based on the feedback received, the researcher refined the instruments by adding or modifying indicators deemed unclear or irrelevant so that the resulting instruments would be more valid and accurate in measuring the intended aspects.

The success of the expert validation was measured by the extent of changes made to the instruments based on the experts' suggestions. This process ensures that the instruments used can produce accurate and relevant data.

Data Validity Testing

The validity of the data in this study was tested using triangulation. Triangulation in qualitative research is used to ensure the validity of the data obtained, making it more credible and reliable. In this study, the type of triangulation used is technique triangulation. Technique Triangulation involves using different data collection techniques to verify the credibility of the same data. The study obtained data through mathematical problem-solving test items, which were further examined through in-depth interviews. If discrepancies were found between the results from different techniques, the researcher further discussed the data sources to determine which results were more valid. Technique triangulation aims to deepen the researcher's understanding of the data by checking the consistency and alignment of the data obtained through different techniques.

Data Analysis Techniques

The qualitative data analysis in this study was conducted using an inductive approach, focusing on the organization and in-depth understanding of the data. The analysis followed the steps Miles and Huberman outlined, consisting of three main stages [21]:

1. Data condensation

In this stage, the researcher selects and simplifies the data collected from various instruments (tests and interviews) to identify information relevant to the research objectives. Irrelevant or less critical data is discarded, while data closely related to the research topic is grouped and coded to facilitate further analysis. For example, interview transcripts are organized into themes representing common patterns in students' problem-solving abilities and emotional intelligence.

2. Data display

After data condensation, the next step is to organize the information into narratives, tables, or charts. The purpose of data display is to simplify understanding and interpretation. In this stage, the researcher presents thematic analysis or categorization based on predetermined indicators, such as problem comprehension, solution planning, and reflection on problem-solving outcomes. By organizing the data in a more structured

format, the researcher can identify the relationships between various factors that influence the problem-solving process of ADHD students.

3. Conclusion Drawing/verification

The final stage involves drawing conclusions based on the condensed and displayed data. The researcher interprets the meaning of the categorized data to understand better the phenomenon being studied, in this case, the relationship between emotional intelligence and mathematical problem-solving abilities in ADHD students. The verification process ensures consistency between different data sources (tests and interviews) through triangulation. The researcher also revisits findings that are unclear or need further clarification, either by confirming with the respondents or referring to relevant literature.

Research Procedure

This study was conducted in three phases:

1. Preparation Phase
   a. Determining the research location at SLBN Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H., Jambi City.
   b. Obtaining research permits and conducting preliminary observations to identify research subjects.
   c. Preparing research instruments, including emotional intelligence questionnaires and mathematical problem-solving tests.
2. Data Collection Phase
   a. Conducting observations, distributing questionnaires, administering tests, and interviewing ADHD students.
   b. Preliminary data analysis based on the collected information will be performed.
   c. Validating data using source and methodological triangulation to ensure credibility.
3. Data Analysis Phase
   a. Condensing data by selecting and simplifying relevant information.
   b. Displaying data in narrative and tabular forms for more straightforward interpretation.
   c. Drawing conclusions based on findings that have undergone validity testing.

3. RESULTS

3.1 Research findings of ADHD 1 students

This study was conducted on a Student with ADHD 1, an eighth-grade student at SLBN Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H. The student has been diagnosed with ADHD and participated in this research to evaluate their mathematical problem-solving ability. Based on the emotional intelligence questionnaire, the student scored 108, which falls into the high emotional intelligence category. With high emotional intelligence, the student was expected to understand the problem, plan solutions better, and complete the given task more efficiently than those with lower emotional intelligence.

For this research, the student was given a geometry-related problem, precisely to determine the perimeter of a triangle based on the provided diagram. This test assessed the

student's ability to understand basic geometry concepts and apply problem-solving strategies. The analysis was conducted based on four key indicators of mathematical problem-solving ability:

1. Understanding the Problem

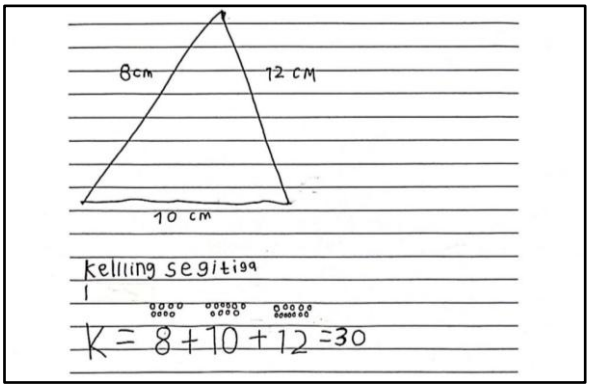

Figure 1. Results of ADHD Students' Answers 1

Based on Figure 1. above, students with ADHD 1 clearly understood the problem and correctly identified the information. In their answer sheet, the students redrew the triangle and labeled each side with its respective length as provided in the problem. Additionally, the student understood the question's objective, which was to find the perimeter of the triangle.

Interview excerpts to evaluate problem comprehension:

R : "What do you understand from this problem?"
SADHD 1 : "Red pencil, yellow, green..." (pointing to the image provided).
R : "What information is given in the problem?"
SADHD 1 : "Triangle, red pencil 8 cm, yellow pencil 10 cm, green pencil 12 cm."
R : "What are we looking for in this problem?"
SADHD 1 : "Perimeter of the triangle."

From this interview, it is evident that the student comprehended the problem well, was able to restate the given data accurately, and understood what was required to be solved.

2. Planning a Solution

In the planning stage, the student understood that the perimeter of a triangle is obtained by adding up the lengths of all three sides. However, in the answer sheet, the student did not explicitly write down the steps or strategy used. Instead, they proceeded directly to the calculation.

Interview excerpts to evaluate solution planning:

R : "How do you find the perimeter of this triangle?"
SADHD 1 : "8, 10, 12."
R : "What do you do after knowing these side lengths?"
SADHD 1 : "Perimeter of the triangle, I calculate it."

Although the students demonstrated an understanding that perimeter is found by summing the three sides, they struggled to verbalize the step-by-step strategy used to solve the problem. This suggests that while the student grasped the concept, they had difficulty articulating their thought process systematically.

3. Implementing the Plan

In this phase, the student successfully performed the necessary calculations. The student obtained the final answer of 30 cm, the correct sum of the three side lengths.

Interview excerpts to evaluate solution implementation:

R : "What is your final answer?"
SADHD 1 : "8 plus 10 plus 12, thirty."
R : "Did you find it difficult to do the calculation?"
SADHD 1 : "No."

Based on these responses, the student could execute the solution correctly without difficulty performing the calculations.

4. Reviewing the Answer

On the answer sheet, the student did not explicitly show any steps for rechecking their work. However, during the interview, they expressed confidence in their answer and were able to restate their calculations.

Interview excerpts to evaluate answer verification:

R : "Are you sure about your answer?"
SADHD 1 : "Yes."
R : "How do you know this answer is correct?"
SADHD 1 : "I counted it. It is a triangle."

Although the students did not formally verify their work on paper, their confidence and ability to repeat the calculations indicate that they mentally checked their answers. This suggests that while the students focused on obtaining the correct result, they did not engage in a structured process of reviewing their work.

3.2 Research findings of ADHD 2 students

A student with ADHD 2 is an eleventh-grade student at SLBN Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H., who participated in this study to assess their mathematical problem-solving ability. Based on the emotional intelligence questionnaire, the student scored 56, which falls into the low emotional intelligence category.

For this study, the student was given a problem related to mixed operations of addition and subtraction with whole numbers. The analysis was conducted based on four key indicators of mathematical problem-solving ability:

1. Understanding the Problem

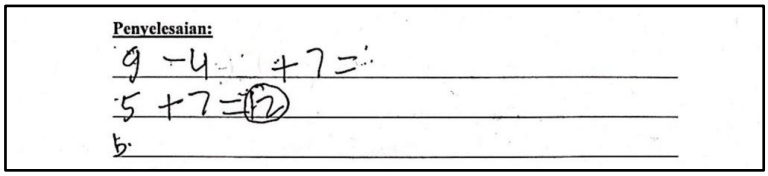

Figure 2. Results of ADHD Students' Answers 2

Based on Figure 2. above, the student struggled to understand the given problem and could not independently identify the information provided. The student did not restate the known data on the answer sheet, requiring multiple prompts during the interview to extract relevant details.

Interview excerpts to evaluate problem comprehension:

R : "What information is given in the problem?"
SADHD 2 : "... (silent)."
R : "Can you read the problem aloud again?"
SADHD 2 : "Niko has nine apples, gives 4 to Amel, then buys seven more."

Although the students could read the problem, they struggled to extract the key details needed to solve it. When asked about the question in the issue, the student could not articulate what needed to be solved, requiring repeated clarification from the researcher.

2. Planning a Solution

The student wrote the mathematical expression 9 - 4 + 7 on their answer sheet but did not understand the reasoning behind this operation. The student appeared to follow the pattern of numbers in the problem rather than applying a structured problem-solving strategy.

Interview excerpts to evaluate solution planning:

R : "Why did you write nine minus 4 plus 7?"
SADHD 2 : "Because I can."
R : "Can you explain why you chose these operations?"
SADHD 2 : "... (silent)."

This response shows that the student did not have a clear strategy or reasoning for choosing these operations but repeated numbers from the problem. The lack of structured reasoning suggests difficulty in planning an appropriate solution.

3. Implementing the Plan

The student performed the calculation and obtained the final answer, 12, which is mathematically correct. However, when asked to explain how they arrived at this answer, the student struggled to articulate the reasoning behind their steps.

Interview excerpts to evaluate solution implementation:

R : "How did you get the final answer of 12?"
SADHD 2 : "Because 9 - 4 + 7 equals twelve."

Although the calculation was correct, the student's inability to explain their reasoning indicates a lack of deep understanding of the mathematical operations performed. The student relied on memorization rather than conceptual comprehension.

4. Reviewing the Answer

During the interview, the student was unable to verify their answer. The student reaffirmed their answer without justifying when asked if they were confident their solution was correct.

Interview excerpts to evaluate answer verification:

R : "How do you know this answer is correct?"
SADHD 2 : "It is correct."
R : "Can you explain why?"
SADHD 2 : "... (silent)."

From this, it is evident that the student did not actively review or verify their answer, nor did they have a structured method for checking their work. The inability to explain the correctness of the answer suggests a surface-level understanding of the mathematical concepts.

3.3 Research findings of ADHD 3 students

A student with ADHD 3 is a twelfth-grade student at SLBN Prof. Dr. Sri Soedewi Masjchun Sofwan, S.H., who participated in this study to evaluate their mathematical problem-solving ability. Based on the emotional intelligence questionnaire, the student scored 77, which falls into the moderate emotional intelligence category.

For this study, the student was given a problem related to time measurement, explicitly calculating the duration of a bus trip based on the given departure and arrival times. The analysis was conducted based on four key indicators of mathematical problem-solving ability:

1. Understanding the Problem

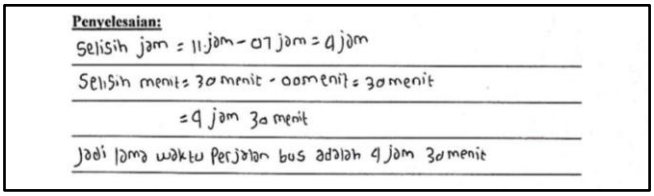

Figure 3. Results of ADHD Students' Answers 3

Based on Figure 3. above, the student understood the problem well and could restate the information correctly. However, the student did not explicitly write down the known information on the answer sheet. Nevertheless, during the interview, the student could identify key details from the problem.

Interview excerpts to evaluate problem comprehension:

R : "What do you understand from this problem?"
SADHD 3 : "Finding the time."

R : "What information is given in the problem?"
SADHD 3 : "The departure time is 7:00 AM, and the arrival time is 11:30 AM."
R : "So, what is the question asking for?"
SADHD 3 : "How long the bus trip takes."

This interview showed that the student fully understood the problem, identified the relevant information, and correctly interpreted the question.

2. Planning a Solution

The students understood they needed to calculate the difference between the departure and arrival times to determine the total travel time. However, the student did not explicitly outline their problem-solving steps on the answer sheet and went straight to the calculation.

Interview excerpts to evaluate solution planning:

R : "What steps did you take to solve this problem?"
SADHD 3 : "First, I found the difference in hours. 11 minus 7 equals 4 hours. Then, I found the difference in minutes. Thirty minutes minus 0 minutes equals 30 minutes."
R : "Why did you separate the calculation for hours and minutes?"
SADHD 3 : "To make it easier and not get confused."

Although the student did not write a detailed step-by-step plan on their answer sheet, their explanation during the interview indicated a clear and logical thought process in planning the solution.

3. Implementing the Plan

The student calculated and obtained the correct final answer in 4 hours and 30 minutes.

Interview excerpts to evaluate solution implementation:

R : "How did you solve this problem?"
SADHD 3 : "First, I calculated the hour difference. 11 minus 7 is 4 hours. Then, I calculated the minute difference. 30 minus 0 is 30 minutes. So, the total travel time is 4 hours and 30 minutes."
R : "Did you find this problem difficult?"
SADHD 3 : "No."

This response shows that the student could apply the planned solution correctly without any difficulty.

4. Reviewing the Answer

The student wrote the final answer on the answer sheet but did not explicitly indicate that they checked their work. However, during the interview, the student confidently repeated the calculation and confirmed the correctness of their answer.

Interview excerpts to evaluate answer verification:

R : "Are you sure this answer is correct?"
SADHD 3 : "Yes."

R : "How did you check if your answer was right?"
SADHD 3 : "I rechecked it. 11 minus seven is 4, and 30 minus zero is 30. So, the travel time is 4 hours and 30 minutes."

From this, it can be concluded that the student verified their answer mentally, even though it was not explicitly written in their response.

4. DISCUSSION

Mathematical problem-solving skills are essential for all students, including those with Attention Deficit Hyperactivity Disorder (ADHD). This process involves four main stages: understanding the problem, planning a solution, executing the plan, and reviewing the result [6]. However, students with ADHD often face difficulties in solving mathematical problems due to challenges in maintaining focus, regulating emotions, and formulating systematic strategies.

This study aims to analyze the relationship between emotional intelligence and mathematical problem-solving skills in students with ADHD. According to Goleman, emotional intelligence includes recognizing, understanding, and managing emotions, which is crucial in facing various situations, including solving mathematical problems [14]. The findings indicate that the level of emotional intelligence significantly influences mathematical problem-solving abilities. Students with high and moderate emotional intelligence were more capable of fulfilling all four problem-solving stages than students with low emotional intelligence. These findings align with research by Quílez-Robres et al., which states that emotional intelligence has a positive correlation with academic achievement, and by Obilor & Uchendu, which emphasizes the role of emotional intelligence in motivation and resilience in overcoming academic challenges [22], [23].

This study involved three ADHD students with varying levels of emotional intelligence:

1. ADHD Student 1 – High emotional intelligence (score: 108).
2. ADHD Student 3 – Moderate emotional intelligence (score: 77).
3. ADHD Student 2 – Low emotional intelligence (score: 56).

4.1 ADHD Student 1 with High Emotional Intelligence

ADHD Student 1 exhibited high emotional intelligence and demonstrated strong mathematical problem-solving skills. This student completed all four problem-solving stages based on test results and interviews.

1. Understanding the Problem

This student quickly identified the critical information needed to solve the problem. This ability to grasp the problem's requirements is fundamental to problem-solving [6]. The findings align with Muhtadi et al., who stated that students with high emotional intelligence tend to comprehend mathematical concepts more effectively due to their ability to regulate emotions and sustain focus [24]. Emotional intelligence is known to aid in focusing on relevant information while filtering out distractions. Farhan et al. support

this, stating that emotional intelligence enhances students' ability to comprehend tasks, especially in mathematics [25].

2. Planning a Solution

Though not explicitly written down, the students' plan was effectively executed in their minds, and the interview responses indicated a clear understanding of the concept of perimeter. The ability to create and implement an internal strategy aligns with the findings of Kintoko et al., who observed that students with high emotional intelligence perform better in tasks requiring planning and strategic thinking [26]. Amponsah et al. highlighted that emotional intelligence aids the strategic thinking and self-motivation necessary for effective planning [27]. This also aligns with Ningsih et al., who found that students with high emotional intelligence are more systematic in planning solutions due to their strong motivation to complete tasks [28].

3. Implementing the Plan

The student executed the solution efficiently. This indicates that the student could focus and complete the problem systematically. These results are supported by Njonge [29], who found that students with structured problem-solving approaches tend to achieve better academic outcomes compared to those without clear strategies. This finding is also supported by Kandioh et al., who argue that high emotional intelligence aids in effectively executing complex tasks by regulating emotions and maintaining focus during stressful tasks [30].

4. Reviewing the Answer

The student demonstrated effective self-reflection by verifying their answer. Interview responses indicated confidence in the answer and the ability to explain the solution process. The student demonstrated effective self-reflection by verifying their answer. As Zhang et al. noted, students with high emotional intelligence tend to engage in more frequent self-assessments, improving their overall problem-solving effectiveness [31]. This aligns with Quílez-Robres et al., who emphasized that self-reflection in learning is a key factor in academic success [22].

Overall, ADHD Student 1 met all indicators of mathematical problem-solving skills. High emotional intelligence helped the student maintain focus, regulate emotions, and stay motivated throughout the problem-solving process. These findings align with Aqillamaba and Puspaningtyas, who emphasized that students with high emotional intelligence tend to perform better academically, particularly in mathematics, due to their improved emotional regulation and cognitive control [32]. Thus, the strong performance of Student 1 further supports the notion that emotional intelligence is a key factor in academic success.

4.2 ADHD Student 3 with Moderate Emotional Intelligence

ADHD Student 3 demonstrated moderate emotional intelligence, resulting in slower processing during problem-solving. Although the student completed all stages, their approach was less efficient than that of Student 1.

1. Understanding the Problem

While Student 3 could identify the relevant information, they took longer to process the problem. Hidayat et al. highlight that moderate emotional intelligence may lead to slower cognitive processing, as students often struggle to regulate emotions during challenging tasks [33].

2. Planning a Solution

The student identified the steps to solve the problem, but the planning process was less systematic, and the strategy was not explicitly written on the answer sheet. This indicates that while the student understood the basic concept, there was a need to enhance structured solution development. Santos-Trigo emphasized that proper planning is crucial in achieving effective problem-solving outcomes [34]. This aligns with Masrum et al., who suggested that students with moderate emotional intelligence sometimes struggle to structure their planning effectively, often due to emotional distractions or lack of focus [35].

3. Implementing the Plan

Despite the difficulties in planning, Student 3 could execute the solution correctly, although it took more time than Student 1. These findings align with Obilor and Uchendu, who found that students with moderate emotional intelligence can still perform academically but often require more time to process information [23]. This observation supports Kintoko et al., who found that students with moderate emotional intelligence can still execute plans correctly. However, their execution is less efficient than those with higher emotional intelligence [26].

4. Reviewing the Answer

The student performed a fundamental review of their solution but did not engage deeply in self-reflection. According to Wahyuni and Mulyani, moderate emotional intelligence often results in superficial self-reflection, which may explain why Student 3 did not thoroughly review their solution [36].

ADHD Student 3 demonstrated good problem-solving skills, although the solution strategies were less systematic, and the processing was slower than that of students with higher emotional intelligence. The findings for Student 3 are consistent with the research by Kandioh et al., which found that moderate emotional intelligence leads to slower cognitive processing and less effective planning, as reflected in Student 3’s performance [30].

4.3 ADHD Student 2 with Low Emotional Intelligence

ADHD Student 2 exhibited low emotional intelligence, significantly impairing their ability to solve problems efficiently. This student struggled with attention, focus, and emotional regulation throughout all stages of the problem-solving process.

1. Understanding the Problem

At the understanding of the problem stage, the student struggled to identify relevant information. Although the students could read the question, they could not fully comprehend the task and needed repeated guidance from the researcher to clarify the problem. Hakim et al. explain that students with low emotional intelligence often struggle to concentrate and overlook important details when solving problems [37]. This aligns with Goleman, who stated that individuals with low emotional intelligence often face difficulty maintaining focus [14].

2. Planning a Solution

During the planning a solution stage, the student failed to develop an appropriate strategy and merely wrote down numbers without understanding the required operations. Sinaga et al. found that students who lack conceptual understanding struggle to create structured problem-solving strategies [38]. Dwianjani et al. also highlighted that students with low emotional intelligence struggle with logical thinking and systematic problem-solving [15]. These challenges were evident in ADHD Student 2, who could not explain the relationship between the numbers in the problem and could not organize a practical approach. Next, Wahyuni and Mulyani found that students with low emotional intelligence often lack the skills to plan effectively, resulting in disorganized and incomplete problem-solving strategies [36].

3. Implementing the Plan

While executing the planning stage, the student completed basic arithmetic operations (addition and subtraction) but did not understand the concept behind the calculations. Student 2's execution was disorganized, leading to an incomplete solution. Aqillamaba and Puspaningtyas support this observation, suggesting that students with low emotional intelligence often fail to apply strategies effectively due to poor self-regulation and focus [32].

4. Reviewing the Answer

In the reviewing the result stage, the student could not explain the solution process or draw a proper conclusion, indicating a lack of reflection and verification skills. Masrum et al. noted that students with low emotional intelligence often fail to review their work thoroughly, leading to errors being uncorrected [35].

Overall, ADHD Student 2 encountered difficulties across all problem-solving stages. Low emotional intelligence significantly affects the student's academic performance [11]. These findings align with the research of Wahyuni and Mulyani, who concluded that

students with low emotional intelligence face challenges in both focus and metacognitive awareness, leading to poorer problem-solving outcomes [36].

5. CONCLUSION

This study confirms that emotional intelligence plays a significant role in enhancing mathematical problem-solving abilities among ADHD students. ADHD Student 1, with high emotional intelligence, demonstrated strong problem-solving skills, including understanding problems, planning solutions, and executing strategies effectively. While their explanation lacked detail, the accuracy of their answers and the ability to verify their results were evident. ADHD Student 3, with moderate emotional intelligence, showed similar capabilities but struggled to document their strategies and verify answers systematically. ADHD Student 2, with low emotional intelligence, faced difficulties at every stage of the problem-solving process, often relying on memory rather than a structured approach to understanding the problems. The findings suggest that fostering emotional intelligence in ADHD students is essential for improving their academic performance, especially in subjects like mathematics. Teachers can benefit from adopting strategies emphasizing emotional regulation, such as mindfulness practices, self-reflection exercises, and collaborative problem-solving, to help ADHD students focus better and apply more structured approaches to solving academic challenges. This research contributes to the field of education by underlining the importance of emotional intelligence as a critical factor in academic success, particularly for students with ADHD. Future studies could explore how emotional intelligence impacts other aspects of educational achievement and test the effectiveness of emotion regulation interventions in supporting ADHD students' overall learning outcomes.

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