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Preliminary Analysis of Students' Problem Solving Ability and Self-Efficacy in IPAS Subject at Community Learning Center (CLC) Sabah Malaysia

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Abstract: This study aims to analyze the problem solving ability and self-efficacy of students. The results of the problem solving ability research found that students who reached the KKM limit amounted to 2 people. The highest percentage of analysis of students' problem solving ability is in the indicator of understanding the problem, namely 51.7%. The lowest percentage is in the indicator of implementing the plan which is 24.6%. In addition, it was found that the level of self-efficacy of students was in the high category with three self-efficacy variables, namely the level of difficulty of the problem (level), resilience in solving problems (strenght), and breadth (generality). After the analysis, it was found that the relationship between high student self-efficacy was not directly proportional to the problem-solving ability of elementary school students at CLC Kemajuan Insan Inanam. Therefore, a comprehensive approach is needed to overcome the difference between student self-efficacy and student problem solving ability. So as to encourage the development of students' academic potential and thinking skills.

Keywords: IPAS; Problem-solving skills; Self-efficacy.

Introduction

One component of higher order thinking is the ability to solve problems. Problem solving is the highest type of learning that begins with accepting a problem and trying to solve it using the knowledge already possessed (Nissa, 2015). The purpose of problem solving ability is to create students' thinking process so that it can be applied in everyday life (Nugroho et al., 2020). Students' problem-solving skills must continue to be trained so that they can solve the various problems they face. Problem solving skills can help students make decisions that are precise, careful, systematic, and logical and consider various points of view (Rahayu et al., 2021). Contextual problems related to students' daily lives are structured to be solved well (Gunada & Roswiani, 2019). The ability in student problem solving is related to student self-efficacy. Students' confidence in their ability to complete their tasks plays an important role in improving problem solving skills.

In the process of problem solving, a very influential internal factor is students' belief in their own abilities or what is known as self-efficacy. Self-efficacy in academics is a belief based on students' ability to complete school tasks and achieve academic goals (Hidayat & Fergina, 2022). The ability to explore one's potential is the main source of self-efficacy, and allows students to gain confidence to perform tasks well (Guo et al., 2023). A good level of student self-efficacy is being able to evaluate themselves through previous failures (Sari et al., 2022). Students who have a high self-efficacy assessment will try harder to achieve better, and be more persistent in completing difficult tasks. Self-efficacy can also help students achieve goals because they have enough confidence in themselves. Self-efficacy can also help students complete tasks well and avoid various challenges in the future (Sari et al., 2024). Beliefs about

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motivation such as self-efficacy and intrinsic value, are important components in encouraging students to learn (Bai & Wang, 2023). When given a task, students who have good self-efficacy will be ready to complete it with confidence and on time (Lestari et al., 2023). In addition, encouraging growth mindset, intrinsic value, and self-efficacy can encourage students to learn on their own (Bai & Wang, 2023).

Several previous studies have shown a positive correlation between self-efficacy and students' problem solving ability. Research conducted by Ramlan et al. (2021) that there is a positive correlation between problem solving ability and student self-confidence. The more confident students are in themselves, the easier it is for them to solve problems. Conversely, the less confident students are, the more difficult they are to solve problems. This is reinforced by the findings of Septhiani (2022) that there is a positive correlation between the ability to solve problems and self-efficacy. Good problem-solving ability is also influenced by a good level of self-efficacy as well.

However, the reality in the field shows that there are still many elementary school students who have difficulty in solving science problems and have low self-efficacy. The results of the 2015 TIMSS (Trends in International Mathematics and Science Study) study show that Indonesian students' ability to solve science problems that require problem-solving skills is still below the international average (Hadi et al., 2019).

Based on these problems, this study aims to analyze the initial problem solving ability and self-efficacy of students in IPAS subjects at the elementary school level. The results of this study are expected to provide an in-depth picture of the actual conditions of the two variables, and can be used as a basis for building better learning methods to improve problem solving skills.

Method

The type of research used is qualitative research with descriptive methods. In this study, descriptive analysis was carried out by describing how students solve problems. This discussion is limited to Magnetism, Electricity, and Technology for Life materials. The subjects involved in this study are fifth grade students of Insan Inanam Progress CLC who have different abilities.

Problem Solving Ability

The research instrument used in measuring students' problem solving ability is the test technique. The test was conducted by giving questions to students. The questions were given in the form of essays totaling 4 questions. The maximum score of the question is 100, with a time duration of 2 x 60 minutes. Each problem has four indicators of problem solving according to Polya.

Table 1. Research Instrument Grid

Problem Solving Ability Indicator	Problem Solving Stages Indicator
Understand the problem	Identifying the content of the question
Planning	Developing steps to solve the problem
Implementing the plan	Answering the problem based on the planned strategy
Checking back	Summarizing the answer

Students are said to be complete if they reach the KKM score of 75. The completeness score is based on the scores set by the teachers at the Insan Inanam Progress CLC school. The success rate of students' problem-solving ability through Polya's strategy can be seen in Table 2.

Table 2. The Level of Success of Students' Problem Solving Ability through Polya's Strategy

Value Range	Qualification
≥ 80%	Very good
66% - 79%	Good
56% - 65%	Fair
46% - 55%	Deficient
≤ 45%	Very Poor

The formula used to calculate the percentage (%) of Criteria for Achievement of Learning Objectives is as follows:

$$P = \frac{\Sigma X}{N} \, x \, 100\% \quad (1)$$

Description:
P = Percentage
ΣX = Number of students who completed
N = Total number of students

Self-efficacy

The research instrument used for measuring student self-efficacy is a non-test instrument, namely a self-efficacy questionnaire. Questionnaires are compiled and developed based on level (level of difficulty of the problem), strength (resilience) in solving problems, and generality (breadth). The self-efficacy questionnaire items in this study were modified from Siregar's research instrument, (2023) entitled "Development of Electronic Books (E-Books) for High School Chemistry Class XI Semester I Integrated with the STEM (Science, Technology, Engineering, and Mathematics) Approach to Improve Learning Outcomes and Self-Efficacy of Learners". The questionnaire has also been validated by the supervisor.

In this study, the student self-efficacy questionnaire scale consists of 4 statement items, namely Strongly

Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS). The scoring of each statement option is based on the scoring in table 3.

Table 3. Self-efficacy Questionnaire Rating Scale

Alternative Answer	Score	
	Positive Statement	Negative Statement
Strongly Agree (SS)	4	1
Agree (S)	3	2
Disagree (TS)	2	3
Strongly Disagree (STS)	1	4

The student self-efficacy questionnaire uses data conversion through a Likert scale as in table 1. Sugiyono (2015) says that the Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group about something referred to as a variable. This scale is given gradational weighting from positive values to negative values.

Minimum value: 1 x 20 (descriptors assessed) = 20

Maximum score: 4 x 20 (assessed descriptors) = 80

Table 4. Criteria for Student Self-Efficacy Level

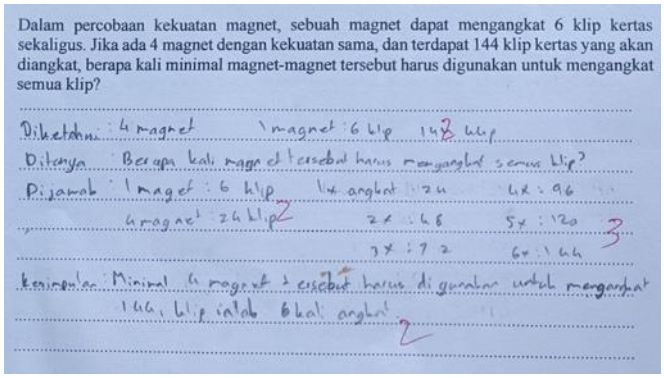
Value obtained	Criteria
61-80	High
41-60	Medium
21-40	Fair
1-20	Less

Result and Discussion

Problem Solving Ability

After the research was conducted, the highest score was 92.5. So that out of 20 students, the percentage of the success rate of students' problem solving ability is 36%. The number of students who get the KKM ≥ 75 is 2 people. While students who get the KKM ≤ 75 are 18 people. The highest percentage of problem solving ability is in the indicator of understanding the problem, which is 51.7%. At this stage students can organize and identify the elements contained in the problem, seen with scribbles on the student answer sheet (Azhar et al., 2021). While the lowest percentage is in the indicator of implementing the plan, which is 24.6%. This is due to constraints in the process of understanding the problem, which results in constraints in planning the problem and inhibits the process of implementing the plan (Azhar et al., 2021).

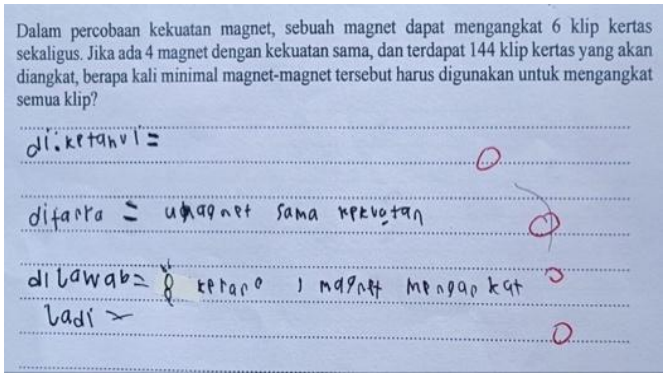
In Figure 1, it can be seen that the procedure performed by the NS subject is correct based on the four indicators of problem solving ability. At the stage of understanding the problem, NS has been able to identify the content of the problem. NS students are able to understand the meaning of the problem given, and have been able to explain the work steps clearly and well, so as to get the right answer. This is corroborated by research Azhar et al. (2021) that students with a high level of problem solving ability can understand the problem, plan, implement the plan, and re-examine the results of their work.


Dalam percobaan kekuatan magnet, sebuah magnet dapat mengangkat 6 klip kertas sekaligus. Jika ada 4 magnet dengan kekuatan sama, dan terdapat 144 klip kertas yang akan diangkat, berapa kali minimal magnet-magnet tersebut harus digunakan untuk mengangkat semua klip?

Diketahui : 4 magnet 1 magnet 6 klip 144 klip
Ditanya : Berapa kali magnet tersebut harus mengangkat semua klip?
Dijawab : 1 magnet : 6 klip 1x angkat : 24 4x : 96
4 magnet 24 klip 2x : 48 5x : 120
3x : 72 6x : 144
Kesimpulan: Minimal 4 magnet tersebut harus digunakan untuk mengangkat 144 klip ialah 6 kali angkat

Figure 1. Test results of NS subject

Figure 2 on subject RX shows that subject RX has not been able to understand the problem, so RX does not identify the contents of the problem. Students have difficulty converting story problems into numbers (Fauziah et al., 2022). Subject RX wrote down the indicators of working on the problem, but did not write down the content of the steps of the problem. This is in line with previous research which states that students with low problem solving skills are less able to understand problems, and plan solutions to problems so that in the process of carrying out the plan results in improper completion (Chabibah et al., 2019).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di: ketahui =
ditanya = 4 magnet sama kekuatan
dijawab = 8 kertas 1 magnet mengangkat
jadi =

Figure 2. Test results of RX subject

Based on the results of data analysis, it is obtained that the level of solving ability of each student is different. In addition, data analysis proves that students' problem solving skills are still relatively low, especially at the stage of implementing the plan. This is in line with previous research which reveals that the ability of elementary school students in problem solving is still low, more specifically at the stage of implementing the plan (Pratiwi et al., 2022). Further research revealed that

student errors in the problem solving process were in the process of planning and carrying out calculations (Rambe & Afri, 2020).

Self-efficacy

Analysis of student self-efficacy is measured by several aspects or levels, including level of difficulty (level), resilience (strength), and breadth (generality). Based on the results of filling out the student self-efficacy questionnaire, the results showed that there were 15 students with a high level of self-efficacy, namely 75% of the total number of students. As well as 5 students with a moderate level of self-efficacy, namely 25% of the total number of students. A description of the levels of indicators measuring the level of student self-efficacy can be seen in Table 5.

Table 5. Self-efficacy Questionnaire Grid

Self-efficacy variable	Indicator	Questionnaire Item Number
Level of task difficulty *(level)*	Efficacy expectancy at task difficulty level	1,2,3
	Analysis of behavioral options to be attempted (feeling able to perform)	4,5,6
	Avoidance of situations and behaviors beyond ability limits	7,8,9,10
Degree of stability, belief or expectation *(strengh)*	Weak expectations, unfavorable experiences	11,12,13,14
	Steady expectations persist in their efforts	15,16,17
Broad field of behavior (*generality)*	Expectations only in specific areas of behavior	18,19,20

Based on Graph 1, in general it can be concluded that students have a fairly high and varied level of self-efficacy. In the indicator of efficacy expectations at the level of task difficulty, students have high efficacy expectations, reaching 81.30%. This shows that students have strong beliefs to complete tasks with a fairly high level of difficulty. In the indicator of analyzing the choice of behavior to be tried, around 78.30% of students feel able to do it. This means that students believe that they can do certain things that can support achieving their goals. In the indicator of avoiding situations and behaviors beyond the limits of ability, the level of student self-efficacy is 73.40%. This indicates that students mostly have the ability to recognize and avoid situations that are beyond their limits.

In the indicator of weak expectations or unfavorable experiences, the level of student self-efficacy is 73.10%. This indicator is the lowest when compared to other indicators. This means that this indicator needs further attention to improve students' overall self-efficacy. In the steady expectation indicator, the persistence in the effort is 87.10%. This means that students have a way to survive in running their business or activities. This is in line with research (Rahayu et al., 2022) that students have strong beliefs and expectations of themselves in doing their business. In the expectation indicator only in specific areas of behavior, 81.30% of students show specific self-efficacy and are not too broad in various fields of behavior.

Therefore, it can be concluded that students' self-efficacy has different strengths and weaknesses in various aspects. This is a concern in order to develop appropriate interventions to improve students' self-efficacy comprehensively.

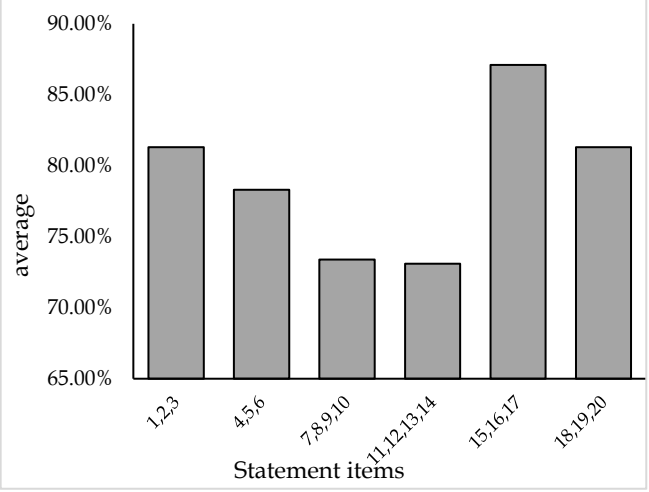

Figure 3. Average Student Self-Efficacy

Although the average student self-efficacy is in the high criteria, it is not in line with the students' problem solving ability which is in the very low criteria. The situation that occurs is not in accordance with the statement (Agumuharram et al, 2021) that student self-efficacy and student problem solving ability have a positive relationship which means that if students have high self-efficacy, their problem solving ability is also high. Students' weaknesses in problem solving are caused by several factors including, students have not been able to understand the meaning of a reading, students' lack of mathematics skills, students are not used to solving problem solving problems, students lack patience in solving problems, students' lack of accuracy in solving problems, students do not ask questions if they have difficulty working on problems, the learning methods applied by the teacher do not increase student activeness in learning, students do not repeat lessons at home, lack of parental assistance when students study at

home. All of these circumstances ultimately have an impact on the relationship between students' problem solving skills and students' self-efficacy.

Conclusion

Based on the research and discussion that has been described, it is concluded that the problem-solving ability of elementary school students at the Insan Inanam Progress CLC is at a very low criterion. While student self-efficacy is at a high criterion. The relationship between students' high self-efficacy is not directly proportional to students' problem-solving ability. Therefore, a comprehensive approach is needed to overcome the difference between student self-efficacy and student problem-solving ability. So as to encourage the development of students' academic potential and thinking skills.

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Conflicts of Interest
This research is conducted in the form of assignments given by lecturers, with the aim of improving resources.

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