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The Implementation of Problem-Based Learning Approach to Improve Students' Motivation and Learning Outcomes in Information and Communication Technology Subject

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A B S T R A C T

This classroom action research aimed to improve students' learning motivation and academic achievement through the implementation of the Problem-Based Learning (PBL) model in Grade VII at SMP Advent Medan. Employing a descriptive qualitative approach, the research was conducted over two cycles, each consisting of four stages: planning, implementation, observation, and reflection. The subjects of the study were all students in the selected class. The research variables included the PBL model, students' learning motivation, and learning outcomes. Data were collected using observation sheets, questionnaires, and achievement tests. The findings revealed that the application of the PBL model significantly enhanced students' motivation to learn and improved their learning outcomes in the Information and Communication Technology subject.

1. Introduction

Education is a lifelong process aimed at developing individuals by imparting knowledge, skills, and nurturing human potential (Situmorang & Sari, 2023). It plays a crucial role in human life and is inseparable from the continuous growth and development of individuals (Hasil et al., 2023). The success of the learning process is often measured by students' academic achievement (Murdani & Handayani, 2022).

Problem-Based Learning (PBL) is an instructional model that presents students with authentic and meaningful problem situations, serving as a stimulus for inquiry and investigation (Kusnandar, 2019). The ultimate goal of education is to develop learners' potential to become individuals who are faithful, moral, healthy, knowledgeable, creative, independent, and responsible for their actions (Dayeni et al., 2017).

Students' learning motivation is a critical factor in achieving educational objectives, particularly in subjects like Information and Communication Technology (ICT). Motivation is defined as a change within an individual marked by emotional states and responses towards a goal. Low levels of learning motivation negatively impact students' academic performance during instruction (Sa'diyah, 2020). A student's motivation can be considered strong if they actively engage in classroom activities, complete assignments diligently, bring necessary materials, and participate actively during lessons. Therefore,

learning strategies that foster problem-solving and encourage active engagement are essential to enhance students' interest and motivation (Handayani et al., 2022).

At SMP Advent Medan, a preliminary study conducted in Grade VII revealed that 24 out of 36 students (66.66%) scored below the minimum competency standard (KKM) in ICT. This indicates that students' achievement in ICT remains unsatisfactory. Many students perceive ICT as a difficult and uninteresting subject, leading to low enthusiasm for learning. This condition is closely related to how the learning process is implemented in the classroom.

In line with the 2013 Curriculum, which emphasizes authentic learning processes and assessments to develop students' attitudes, knowledge, and skills, there is a pressing need to improve instructional approaches. Strengthening students' abilities in observation, inquiry, experimentation, association, reasoning, and communication requires more innovative teaching methods. One promising approach is the implementation of Problem-Based Learning (PBL).

Based on the background described, this study aims to collaborate with teachers to enhance the ICT learning process in Grade VII at SMP Advent Medan through the application of the Problem-Based Learning model. Specifically, the objectives of this study are: (1) to examine the implementation of the PBL model in teaching ICT materials on hardware and software to seventh-grade students at SMP Advent Medan, and (2) to analyze students' motivations for learning ICT.

2. Research Methods

This study employed a Classroom Action Research (CAR) design, aimed at improving the quality of the teaching and learning process through systematic observation and reflection (Sari & Rosidah, 2023). The research used a descriptive method to portray the phenomenon under study. Conducted at SMP Advent Medan during the 2023/2024 academic year, the research focused on seventh-grade students and the ICT teacher. The participants consisted of 36 students, including 14 male and 22 female students. The key variables studied were the implementation of the Problem-Based Learning (PBL) model, students' learning motivation, and their learning outcomes.

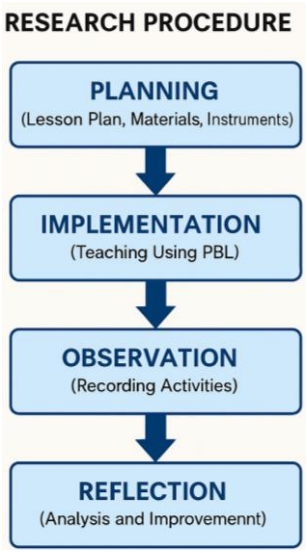

Figure 1. Classroom action research method

The research was carried out over two cycles, each consisting of four stages: planning, implementation, observation, and reflection. During the planning stage, lesson plans, learning materials, and research instruments were developed. In the implementation stage, teaching was conducted using the PBL model. Observations were made to document the teaching and learning activities, while the reflection phase involved analyzing the collected data to improve subsequent cycles.

Data collection techniques included observations, questionnaires, and tests. Observation sheets were used to record teacher and student activities during the learning process. Questionnaires measured students' learning motivation, while tests (pre-test and post-test) were employed to assess their learning outcomes. The collected data were analyzed using both quantitative and qualitative approaches. Quantitative data were analyzed by calculating percentages and descriptive statistics, while qualitative data from observations were interpreted to identify patterns and improvements in classroom practices.

3. Results and Discussion

This learning activity is typically conducted with the goal of enhancing students' competencies (Nurkhaeroni, 2022). A high category score is determined based on students' self-assessment through questionnaires. Table 1 presents the questionnaire data collected from all students.

Table 1. Results of the student learning motivation questionnaire

Cycle	Category	Range	Number of Students	Percentage
I	Low	10-19	0	0%
	Medium	20-29	8	22,22%
	High	30-40	28	77,78%
II	Low	10-19	0	0%
	Medium	20-29	0	0%
	High	30-40	36	100%

Based on the students' self-assessment through the questionnaires provided by the teacher, it was found that the percentage of students' learning motivation increased from the first cycle to the second cycle. In the first cycle, the percentage of students with high learning motivation was 77.78%, while those in the moderate category reached 22.22%, and none were classified in the low category. In Cycle I, 8 out of 36 students exhibited moderate motivation. This was indicated by an average score of 2.5 on indicators related to students' persistence in the learning process and their responsibility in completing independent learning tasks. Self-evaluations revealed that some students still showed a lack of diligence in studying the learning material. This condition may have been caused by less effective teaching strategies that reduced students' interest in learning. Moreover, the level of responsibility during independent learning remained unsatisfactory, as evidenced by students copying answers from peers during assignments and tests. This issue stemmed from a lack of understanding of the material presented by the teacher.

Problem-Based Learning (PBL) taps into students' intrinsic motivation, although external factors can also influence it. Teachers can enhance student motivation by assigning grades for assignments, providing rewards and feedback, creating a supportive and enjoyable learning environment, and setting clear, attainable learning goals (Gulo, 2022). Active student participation is essential in PBL-based activities.

The improvement observed during the second cycle demonstrated that a greater number of students had developed stronger motivation and a greater drive to learn. Students who were previously less active began to show confidence and courage in expressing their ideas during discussions, actively listened to the teacher's explanations, and consistently brought their textbooks to class. These findings indicate that most of the seventh-grade students at SMP Swasta Advent Medan achieved the expected improvement in learning motivation anticipated through this research. Furthermore, the implementation of PBL appears to have the potential to sustain and further enhance students' enthusiasm for learning over time (Nurkhaeroni, 2022).

Data analysis also revealed improvements across cognitive, affective, and psychomotor domains. Detailed results are presented in Table 2.

Table 2. Student learning outcomes

Cycle	Knowledge		Skills		Attitude	
	Final Score	Predicate	Final Score	Predicate	Final Score	Predicate
I	2,93	B	3,47	B	3,59	SB
II	3,43	A	3,54	A	3,64	SB

The findings of this study indicate that the implementation of the Problem-Based Learning (PBL) model in teaching software and hardware topics has significantly enhanced both students' motivation and learning outcomes in Grade VII at SMP Advent Medan. This research examined the three learning domains: cognitive (knowledge), affective (attitudes), and psychomotor (skills).

Analysis of cognitive learning outcomes revealed improvement across Bloom's taxonomy levels: C1 (remembering), C2 (understanding), and C3 (applying). In the first cycle, the average cognitive score was 2.94, with 26 out of 36 students achieving the minimum score of 3.00. In the second cycle, the average score increased to 3.43, with 32 students meeting or exceeding the 3.00 threshold. This 0.49-point improvement in the average score indicates a positive impact of the PBL approach on students' academic achievement.

The PBL model specifically aims to encourage students' active participation in the learning process. Evidence from classroom observations confirmed that students demonstrated increased enthusiasm for learning, which directly contributed to improved cognitive outcomes.

In terms of affective learning outcomes, students' attitude scores also showed improvement from the first to the second cycle. In Cycle I, all 36 students met the satisfactory criteria with an average score of 3.59. In Cycle II, the average increased slightly to 3.64, with all students again achieving scores of at least 2.51. This increase is attributed to the teacher's strategy of involving students in meaningful learning activities such as data collection, data processing, and problem-solving tasks, which fostered deeper engagement and intrinsic motivation. Additionally, the teacher provided opportunities for all students to observe and reflect on learning activities, which helped reinforce positive attitudes.

Table 2 illustrates that the application of PBL effectively enhanced students' affective domain achievement. The model emphasizes the role of students' beliefs and attitudes toward the learning process, which is critical for sustainable motivation and engagement.

Regarding psychomotor domain outcomes, the results also show noticeable improvement between the two cycles. In Cycle I, the average skills score was 3.46, while in Cycle II it improved to 3.54, with all 36 students achieving a score of at least 3.00. This confirms that PBL contributed positively to students' skills development, as they were given opportunities to apply their knowledge through real-world problem-solving tasks. The improvement observed in Cycle II reflects a deeper mastery of practical skills.

Finally, the effectiveness of the teacher's application of the PBL model was also evaluated. These results are presented in Table 3 below.

Table 3. Observation Results of the Implementation of the Problem Based Learning Model

Cycle	Observer I	Observer II	Average	Criteria
I	28	26	27	Good
II	29	28	28,5	Good

The results of the data analysis regarding the implementation of the Problem-Based Learning (PBL) model by students are presented in Table 4 below.

Table 4. Observation Results of the Implementation of the Problem Based Learning Model

Cycle	Observer I	Observer II	Average	Criteria
I	27	27	27	Good
II	28	28	28	Good

The results indicate that the implementation of the Problem-Based Learning (PBL) model for hardware and software material in Grade VII at SMP Advent Medan successfully improved the learning process, enhancing both teacher and student activities. Learning in schools must facilitate interaction (Robiyanto, 2021) between teachers and students, as well as among the students themselves.

Based on observational data of teacher activities (Nurjanah, 2021), it can be understood that teaching performance improved by 1.5 points, from an average of 27 in the first cycle to 28.5 in the second cycle, achieving a satisfactory standard in both cycles. Similarly, students' learning activities improved by 1 point, from an average score of 27 to 28.5, also reaching a satisfactory standard.

Each phase of the Problem-Based Learning model includes specific activities for teachers and students, as described below:

1. Stage 1: Orienting Students to the Problem

   In both cycles, teachers were tasked with explaining learning objectives and formulating problems. In the first cycle, teacher performance was suboptimal, as objectives were merely written on the board without thorough explanation. Only a few students recorded these objectives in their notebooks. As a reflection, in the second cycle, teachers not only wrote but also explained the objectives clearly, resulting in improved student engagement.

2. Stage 2: Organizing Students for Learning

   Teachers assigned and organized tasks related to hardware and software issues, arranged students into groups, and clarified the tasks. Students engaged actively with the assigned tasks during the second cycle, reflecting better management and communication by the teacher.

3. Stage 3: Guiding Individual and Group Investigations

   Teachers observed and guided students during investigations. In the first cycle, teachers struggled to supervise all groups effectively, limiting guidance to only five groups. By the second cycle, improvements were made as teachers managed to monitor and guide all groups more systematically.

4. Stage 4: Developing and Presenting Products

   Teachers assisted students in preparing reports of their observations and presenting their findings. Initially, guidance was limited to three groups in the first cycle. After reflection, in the second cycle, teachers provided equal support to all groups, although challenges remained in managing time and attention across all student groups.

5. Stage 5: Analyzing and Evaluating Problem-Solving Processes

   Teachers helped students draw conclusions based on observations and related them to the formulated problems. They also conducted written evaluations covering hardware and software material. Although performance was satisfactory in the first cycle, difficulties emerged in guiding students to connect their conclusions effectively to the given problems in the second cycle. Nevertheless, written evaluations were carried out properly.

According to Daryanto (2008), evaluation is a process of measuring and assessing collected data to improve learning activities. Teacher performance showed notable improvement in the second cycle due to reflections and revisions from the first cycle. Furthermore, the application of the Problem-Based Learning model significantly enhanced the quality of the teaching-learning process.

4. Conclusion

By implementing the Problem-Based Learning (PBL) model, ICT instruction is expected to support students in understanding the concepts being taught and applying them to more complex, real-world situations. This instructional model demonstrates significant improvements, such as clearly articulating learning objectives, guiding students in presenting their observation reports, and enhancing the learning outcomes of Grade VII students at SMP Advent Medan.

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