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# Applying the Discovery Learning Model to Enhance Students' Learning Competence in Information and Communication Technology (ICT) Education

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**A B S T R A C T**

This study aims to improve students' understanding of the Computer Networks topic in the Information and Communication Technology (ICT) subject for Grade X at YAPIM Senior High School, Medan, through the application of the Discovery Learning model. The research method employed is Classroom Action Research (CAR), conducted over two cycles. Each cycle included planning, implementation, observation, and reflection phases. The results showed a significant improvement in students' comprehension, indicated by an increase in the average test scores from 58 in the first cycle to 83.8 in the second cycle. These findings suggest that the application of the Discovery Learning model is effective in enhancing students' understanding of Computer Networks material.



## 1. Introduction

Education serves as the fundamental foundation for shaping and developing human resource potential (Prasetyo & Abduh, 2021; Situmorang & Sari, 2022). Through education, societies can prepare the younger generation with the knowledge, skills, and attitudes necessary to meet future challenges. Therefore, it is essential to continuously update and improve instructional methods to ensure the effectiveness and relevance of material delivery to students.

One instructional model that has received widespread attention is Discovery Learning. Discovery Learning is a student-centered instructional model where learners are encouraged to solve problems presented by the teacher independently (Ekaputra, 2023). This model emphasizes the active role of students in constructing knowledge through exploration, observation, and problem-solving processes.

This article aims to explore the application of the Discovery Learning model to enhance students' learning abilities at the senior high school level. YAPIM Senior High School Medan, as an educational institution, carries a significant responsibility in building a strong knowledge foundation for students to advance to higher education levels. One of the primary challenges faced is how to create a learning environment that motivates students to think creatively, develop analytical skills, and improve their learning capacities.

Information and Communication Technology (ICT) is one of the subjects taught at YAPIM Senior High School Medan, with Computer Networks as a key topic. Based on observations conducted by the researcher in Grade X, it was found that many students reported difficulties in understanding the

material. This issue is partly due to the continued reliance on lecture-based teaching methods, which led to student boredom and a lack of engagement in the classroom.

The conventional teaching model, centered on the teacher as the primary source of information, has shown several limitations. Students often become passive and less actively involved in the learning process. Therefore, it is necessary to seek alternative learning models that can increase student participation and provide a more meaningful learning experience.

The selection of the Discovery Learning model in this study is based on several rational considerations. First, the model integrates the concept of active learning, encouraging students to construct their own understanding. Second, it promotes the use of real-life contexts and everyday situations within the learning process, thereby enhancing the relevance of the material. Furthermore, Discovery Learning has significant potential to stimulate student creativity and develop critical thinking skills. Thus, its application at YAPIM Senior High School Medan is expected to contribute significantly to improving students' learning abilities.

## 2. Research Methods

### 2.1. Research Design

This study employed a Classroom Action Research (CAR) methodology by implementing the Discovery Learning model to enhance students' learning quality. This model was chosen because it has proven more effective in improving students' learning outcomes compared to conventional methods (Aprilianingrum & Wardani, 2021). Classroom action research aims to obtain useful information to improve or enhance the quality of classroom learning and is conducted through multiple cycles until the research objectives are achieved.

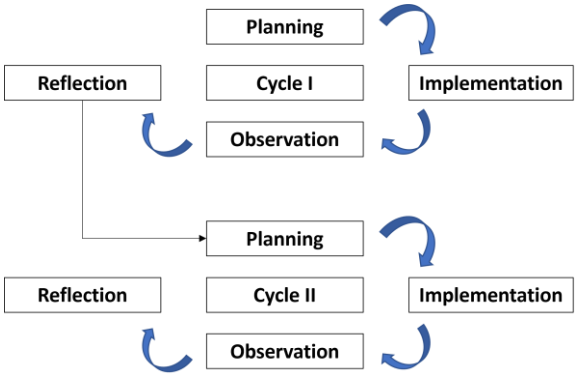


**Figure 1**. Classroom action research method

### 2.2. Time and Location of Research

The research was conducted during the odd semester of the 2022/2023 academic year at SMA YAPIM Medan, located at Jalan Air Bersih, Sudirejo I, Medan Kota District, Medan City, North Sumatra, 20218. The implementation coincided with the Field Experience Practice (PLP) program.

### 2.3. Research Target and Subjects

The research subjects consisted of 30 tenth-grade students of SMA YAPIM Medan, comprising 12 male and 18 female students.

### 2.4. Research Procedure

The research design was based on Kurt Lewin's action research model, which involves a cyclic process consisting of planning, action, observation, and reflection stages, with the possibility of continuing to subsequent cycles until satisfactory outcomes are achieved (Sari & Rahman, 2018).

## 3. Results and Discussion

This study employed the Classroom Action Research (CAR) method, conducted directly in the classroom with the primary goal of enhancing students' learning abilities through the application of the discovery learning model. The research was carried out over two cycles: Cycle I and Cycle II (Asriningsih, Sujana, & Darmawati, 2021).


**Figure 2**. Steps for implementing discovery learning

During the first cycle, the implementation of the Discovery Learning Model took place at SMA YAPIM Medan. The researcher developed lesson plans designed to actively engage students in the exploration of concepts. Classroom observations and monitoring of student activities indicated an increase in participation levels and improved interaction among students compared to the initial conditions prior to Cycle I implementation. The researcher also provided direct feedback, facilitated group discussions, and encouraged students to ask questions. Initial learning ability tests showed positive indications, providing a foundation for proceeding to the second cycle.

**Table 1**. Cycle 1 Results

| No | Score | Pass (P)/ Fail (F) | No | Score | Pass (P)/ Fail (F) |
|---|---|---|---|---|---|
| 1 | 55 | F | 16 | 40 | F |
| 2 | 50 | F | 17 | 69 | F |
| 3 | 60 | F | 18 | 59 | F |
| 4 | 81 | P | 19 | 60 | F |
| 5 | 30 | F | 20 | 54 | F |
| 6 | 55 | F | 21 | 65 | F |
| 7 | 40 | F | 22 | 90 | P |
| 8 | 55 | F | 23 | 85 | P |
| 9 | 39 | F | 24 | 60 | F |
| 10 | 55 | F | 25 | 65 | F |
| 11 | 40 | F | 26 | 45 | F |
| 12 | 80 | P | 27 | 67 | F |
| 13 | 70 | F | 28 | 55 | F |
| 14 | 60 | F | 29 | 66 | F |
| 15 | 45 | F | 30 | 45 | F |
| Total | 815 | 2 P/13 F | Total | 925 | 2 P/13 F |
| **Total Score** | **1740** | | **Average** | **58** | |

Following the implementation of the first cycle, a reflection session was conducted on the learning process. The researcher formulated reflective questions, evaluated the achievements, and identified areas for improvement. This reflection formed the basis for modifying the Discovery Learning Model implementation for the next cycle. Adjustments included refining the learning materials, enhancing student engagement through deeper questioning techniques, and increasing the use of learning resources.

The second cycle of the Classroom Action Research involved the application of changes identified during the first cycle's reflection. The researcher adapted learning strategies, strengthened student

interactions, and refined the evaluation approach. Observations and monitoring of student activities during this cycle indicated further improvements in participation and conceptual understanding, as evidenced by the test results on the Computer Networking material in the ICT subject. Learning ability tests at the end of Cycle II demonstrated a significant improvement compared to Cycle I.

**Table 2**. Cycle 2 Results

| No | Score | Pass (P)/ Fail (F) | No | Score | Pass (P)/ Fail (F) |
|---|---|---|---|---|---|
| 1 | 80 | P | 16 | 80 | P |
| 2 | 90 | P | 17 | 88 | P |
| 3 | 75 | P | 18 | 87 | P |
| 4 | 98 | P | 19 | 86 | P |
| 5 | 60 | F | 20 | 90 | P |
| 6 | 78 | P | 21 | 80 | P |
| 7 | 88 | P | 22 | 78 | P |
| 8 | 84 | P | 23 | 89 | P |
| 9 | 70 | F | 24 | 90 | P |
| 10 | 83 | P | 25 | 95 | P |
| 11 | 90 | P | 26 | 92 | P |
| 12 | 99 | P | 27 | 82 | P |
| 13 | 80 | P | 28 | 81 | P |
| 14 | 80 | P | 29 | 81 | P |
| 15 | 70 | F | 30 | 90 | P |
| Total | 1225 | 12 P/3 F | Total | 1289 | 15 P/0 F |
| **Total Score** | **2514** | | **Average** | **83.8** | |

A significant improvement in students' understanding was observed based on the test results. In Cycle I, the average student score was 58, which increased to 83.8 in Cycle II. The test results are illustrated in the following diagram:

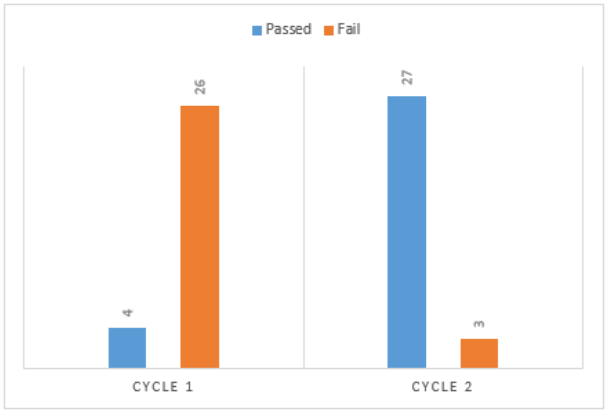


**Figure 3**. Number of Students Passing and Failing

The researcher evaluated the impact of the Discovery Learning Model on students' learning abilities and identified the supporting and inhibiting factors in its implementation. This final reflection provided a comprehensive overview of the effectiveness of the Discovery Learning Model at SMA YAPIM Medan. Overall, the evaluation indicated that the model successfully enhanced student engagement, conceptual understanding, and learning outcomes.

## 4. Conclusion

The implementation of the Discovery Learning model in the Information and Communication Technology (ICT) subject, specifically on the topic of Computer Networks, in Grade 10 at SMA YAPIM Medan proved to be effective in enhancing students' understanding. This effectiveness is

evidenced by the significant increase in the students' average test scores, from 58 in Cycle I to 83.8 in Cycle II. Therefore, the Discovery Learning model can be considered a viable instructional strategy to improve student learning outcomes, particularly for subjects that require deep conceptual understanding.

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