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Application of the Problem Based Learning Model Combined with Think Pair Share to Improve Conceptual Understanding and Applied Physics Learning Outcomes for Electrical Engineering Students

Doni Setiawan[1*], Nina Faoziyah[1], Fahmy Ferdian Dalimarta[1], Didi Kusaeri[2]
Prodi Teknik Elektro, Politeknik Muhammadiyah Tegal

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Abstract
This research aims to improve understanding of physics concepts and learning outcomes of Electrical Engineering students at the Politeknik Muhammadiyah Tegal by using the Problem Based Learning model combined with Think Pair Share on dynamic electrical material. The research instruments used were lecturer and student observation sheets, worksheets and test question sheets. In the analysis of students' conceptual understanding, an increase of 8.58% was obtained from cycle I to cycle II. Meanwhile, in the analysis of student learning outcomes in cycle I, the number of students who passed was 61.76%, and in cycle II the number of students who passed was 82.35%. The results of this research show that the application of the Problem Based Learning model combined with Think Pair Share can improve students' understanding of concepts and learning outcomes.

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Abstrak
Penelitian ini bertujuan untuk meningkatkan pemahaman konsep dan hasil belajar fisika mahasiswa Teknik Elektro Politeknik Muhammadiyah Tegal dengan menggunakan model *Problem Based Learning* dipadu dengan *Think Pair Share* pada materi listrik dinamis. Instrument penelitian yang digunakan berupa lembar observasi dosen dan mahasiswa, LKS dan lembar soal tes. Pada analisis pemahaman konsep mahasiswa diperoleh peningkatan sebesar 8,58% dari siklus I ke siklus II. Sedangkan pada analisis hasil belajar mahasiswa pada siklus I jumlah mahasiswa yang lulus sebanyak sebesar 61,76 %, dan pada siklus II jumlah mahasiswa yang lulus sebesar 82,35%. Hasil penelitian ini menunjukkan bahwa penerapan model *Problem Based Learning* dipadu *Think Pair Share* dapat meningkatkan pemahan konsep dan hasil belajar mahasiswa

Corresponding Author:
Doni Setiawan
Politeknik Muhammadiyah Tegal
Email: donisukisno@gmail.com

1. INTRODUCTION

Physics is a science that studies the nature and phenomena of nature or natural symptoms and all the interactions that occur therein. Apart from providing knowledge to students, physics courses are a vehicle for developing thinking skills and solving problems in everyday life. According to Sumanto et al. [1] science is a way of systematically finding out about nature to master knowledge, facts, concepts, principles, discovery processes, and have a scientific attitude.

Physics is a science that requires more understanding than memorization. In learning physics, the ability to understand concepts is an absolute requirement for achieving success in learning physics. By understanding physics concepts, all physics problems can be solved, both physics problems in everyday life and physics problems in the form of physics questions at school. However, many students say that physics is a subject that is considered scary, especially by Electrical Engineering students. Students think that physics is a difficult subject and not easy to study because it is difficult to understand physics concepts.

Based on the results of observations made during physics learning at the Tegal Muhammadiyah Polytechnic electrical engineering study program in October 2023, the problem that occurs in the learning process is that the majority of students are not able to understand the concepts being studied. So far, students have thought that physics is a subject that is difficult to understand. Students' views on physics material are identical to calculation formulas, making it difficult for students to understand applied physics concepts. This affects student learning outcomes. Apart from that, the learning model which is still lecturer-centered makes students less active in learning.

To overcome this problem, one alternative that can be applied is to use innovative learning models which are widely applied in learning, especially in science. One application of an innovative learning model is a combination of the Problem Based Learning (PBL) model with the Think Pair Share (TPS) method. Problem Based Learning (PBL) combined with Think Pair Share (TPS) aims to increase students' understanding of concepts in learning which has an impact on student learning outcomes.

Problem Based Learning (PBL)

According to [2], the Problem Based Learning model is learning that uses authentic problems as a learning source, so that students are trained to think at a higher level and develop personalities through problems in everyday life. According to Nurhadi (2014) in mrsigitblog.wordpress.com, PBL is a learning model that uses real world problems as a context for students to learn about critical thinking and problem-solving skills, as well as gaining essential knowledge and concepts from lecture material (Putra, 2013).[3], states "Problem Based Learning is characterized by students working in pairs or small groups to investigate real world problems". The formation of groups in the learning process is expected to help students to be able to solve the problems they face, and to easily acquire the knowledge and concepts they study.

The steps of the Problem Based Learning model were also put forward by [4] as written in the following table.

Table 1. Stages of Problem Based Learning

Phases	Lecturer behavior
Phase 1: Provide orientation about the problem to students	Lecturers convey learning objectives, describe various important logistical needs and motivate students to get involved in problem-solving activities
Phase 2: Organizing students to research	Lecturers help students define and organize learning tasks related to their problems
Phase 3: Assist with independent or group investigations	Lecturers encourage students to get the right information, carry out experiments and look for explanations and solutions
Phase 4: Develop and present artifacts and exhibits	Lecturers assist students in planning and preparing appropriate artifacts, such as reports, video recordings and models and help them to convey them to others
Phase 5: Analyze and evaluate the problem-solving process	Lecturers help students reflect on their investigations and the processes they use

Think Pair Share

The Think Pair Share method is a method where the lecturer has provided learning material through short presentations in front of the class or has assigned students to read lecture material.

According to [5] Think Pair Share, namely:

a. Stage 1: Thinking

The lecturer asks questions or issues related to the lecture, then students are asked to think about the questions or issues independently for a few moments.

b. Stage 2: Pairing

The lecturer asks students to pair up with other students to discuss what they have thought in the first stage. Interaction at this stage is expected to be able to share answers if a question has been asked, or share ideas if a specific problem has been identified. Usually, the lecturer gives 4-5 minutes for pairs.

c. Stage 3: Sharing

At this stage, the lecturer asks the pairs to share with the whole class what they have discussed. This is quite effective if done by rotating pair by pair, and continuing until about a quarter of the pairs have had the opportunity to report.

Concept Understanding

[6] stated that understanding is the basis for students to build insight. He also stated that understanding is an indicator of work that is ready to be criticized and reflected upon by others. According to Rosser [7] a concept is an abstraction that represents a class of objects, events, or relationships that have the same attributes. Concepts are internal presentations of stimuli. Concepts are the basis for higher mental processes to formulate principles and generalizations. Thus, a concept is the result of the thoughts of a person or group of people expressed in legal definitions and theories. [8]

Increasing understanding of concepts can be done by linking learning material to problems that exist around students.

Learning outcomes

Suprijono (2009), states that learning outcomes are changes in overall behavior, not just one aspect of human potential. [9] states Learning outcomes are the abilities that students have after receiving their learning experience. This learning outcome refers to the definition of learning regarding changes in behavior that are expected to occur after students' study which includes patterns of behavior, values, attitudes, appreciation and skills.

2. RESEARCH METHOD

This type of research is Class Action Research (PTK) or (Classroom Action Research (CAR). According to Bahri[10], classroom action research is an activity carried out to observe events in the classroom to improve practice in learning so that it is more quality in the process so that learning outcomes are good. This research was conducted over two cycles. Classroom action research consists of 4 stages, namely (1) formulating problems and planning actions, (2) carrying out actions, (3) making observations, (4) reflection.

This classroom action research was conducted at the Muhammadiyah Tegal Polytechnic. The subjects of this research were students from the Electrical Engineering study program in the first semester of the 2023/2024 academic year with a total of 24 students. The data collected in the research are the implementation of the learning process, students' understanding of concepts, and student learning outcomes. The instrument of this research is the learning process implementation sheet of *Problem* Based Learning combined with Think Pair Share by students and lecturers, student observation sheets, worksheets and written test question sheets at the end of each cycle. LKS are used as supporting data for students' conceptual understanding results.

3. RESULTS AND DISCUSSION

Implementation of the Learning Process

Based on data analysis, the percentage of implementation of the learning process for lecturers and students has increased as in table 1 below.

Table 2. Percentage of lecturer and student activities in Cycle I and Cycle II

No	Activity	Cycle I	Cycle II
1	lecturer	88.67 %	97.32 %
2	student	76.38 %	94.11 %

Based on this table, there was an increase from the implementation of actions in cycle I to cycle II. The implementation of actions in cycle I and cycle II were carried out face to face twice each. Tests are given at the end of each cycle. The increasing success rate of actions by lecturers shows that lecturers have tried to carry out learning activities in accordance with the Learning Implementation Plan (RPP). Student learning activities also increased after participating in learning activities using the Problem Based Learning model combined with Think Pair Share.

In the implementation of cycle I, there were still several shortcomings, namely at the discussion stage, if not guided by the lecturer, students still spoke outside the lecture material. Many students still lack interaction with other groups because students are busy with their own groups, it is still difficult for students to have an opinion. In the implementation of cycle II, the results obtained have increased compared to the implementation of cycle II. In cycle II, students were more able to be conditioned during group discussions, this was because students had started to be bolder in their opinions. The solution to the problem above is that lecturers must maximize guidance when students discuss and make time more effective so that students can focus on discussions and learning activities can be in accordance with the RPP that has been prepared.

Understanding student concepts

Based on the results of the average calculation on the results of the LKS scores completed by students, in cycle II there was an increase of 8.58% compared to cycle I as seen in table 2. This increase shows that students' answers are more complete when discussing in groups compared to when working individually. individual.

Table 3. Cycle I and II LKS scores

Cycle I	Cycle II
82.78 %	91.36 %

Based on these results, it appears that students have experienced an increase in understanding physics concepts in Dynamic Fluid material and are able to solve problems related to the surrounding environment collaboratively through the application of the PBL model combined with TPS.

The application of PBL combined with TPS can make students understand the concepts they learn through direct and real experiences that connect concepts in Natural Sciences (IPA) and real problems in everyday life collaboratively.

Learning outcomes

Learning outcomes come from students' cognitive scores, measured based on the number of students whose test scores reached the KKM determined by the school, namely 75. The results of the final test in cycle I showed that 61.76% of students' scores had reached the KKM, while in cycle II it was 82.35%. The research is said to be successful if the average

number of students' scores reaching the KKM increases in each cycle. Data on the percentage of End of Cycle Test Results can be seen in Table 3 below.

Table 4. End of Cycle Test Results Percentage Data

Student grades	Cycle I	Cycle II
Value <75 (not finished)	38.24% of students	17.65% of students
Score ≥ 75 (complete)	61.76% student	82.35 % student

Based on the student test results data, there were 38.24% of students who completed the KKM in cycle I, while 38.24% of students did not complete it. In cycle II, 82.35% of students completed the KKM, while 17.65% of students did not complete it. This shows that student learning outcomes increased from cycle I to cycle II.

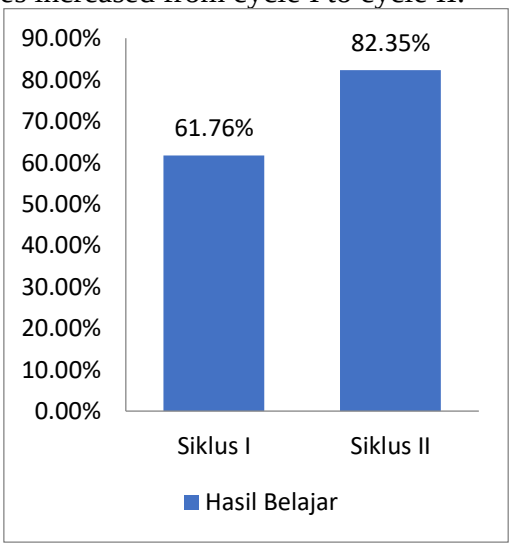

Figure 3. End of cycle Test Improvement Chart

The graph above shows the increase in student learning outcomes from cycle I to cycle II. This is shown in the difference in percentage numbers from cycle I to cycle II of 20.59%. The increase in learning outcomes shown by students shows that students are able to adapt to the learning model applied.

Several obstacles were experienced at the start of this research, including students who were still less interested in participating in the learning process. Many students do not pay attention to explanations from lecturers and students feel reluctant to work on the worksheets given by lecturers, so lecturers have to look for other initiatives to attract students' interest in taking part in the learning process.

4. CONCLUSION

Based on the results of the research and discussion above, it can be concluded that:

1. The implementation of the Problem Based Learning model combined with Think Pair Share by lecturers increased by 8.65%. Meanwhile, the implementation of the Problem Based Learning model combined with Think Pair Share by students increased by 17.73%.
2. The application of Problem Based Learning combined with Think Pair Share can increase students' understanding of concepts in dynamic electricity material, with an increase from

cycle I to cycle II of 8.58%. This increase indicates that students' answers are more complete when discussing in groups using the Problem model. Based Learning combined with Think Pair Share, compared to working individually.

3. Based on data from student final test results, it shows an increase from the final test results from cycle I to cycle II by 20.59%. This increase indicates that the application of the Problem Based Learning model combined with Think Pair Share in cycle II was more implemented in accordance with the planning and reflection of learning in cycle I.

5. SUGGESTION

Suggestions that can be given for another research are as follows.

1. Lecturers are expected to be more active in monitoring the progress of observations and group discussions so that students do not talk outside the lecture material so that the focus of students' attention is focused on learning activities.
2. Lecturers are expected to be able to manage their time well so that learning activities can run in accordance with the RPP that has been created, especially at the stage of developing and presenting work results.

6. BIBLIOGRAPHY

[1] S. R. Putra, "Desain Belajar Mengajar Kreatif Berbasis Sains.," *Jogjakarta Diva Press Sudjana. 2005. Metod. Stat. Bandung Tarsito*, 2013.

[2] N. Uno, H. B., dan M., "Belajar dan Pendekatan Paikem.," *Jakarta Bumi Aksara*, 2011.

[3] E. W. Pratiwi, E. T., & Setyaningtyas, "Kemampuan berpikir kritis siswa melalui model pembelajaran problem based learning dan model pembelajaran project based learning.," *J. Basicedu, 4(2), 379-388.*, 2020.

[4] A. Suprijono, "Cooperative Learning (Teori & Aplikasi Paikem).," *Yogyakarta: Pustaka Pelajar*, 2013.

[5] A. Majid, "Strategi Pembelajaran.," *Bandung PT. Remaja Rosdakarya*, 2013.

[6] & W. Purnama, R. A., "Kelekatan (attachment) pada ibu dan ayah dengan kompetensi sosial pada remaja.," *J. Psikologi, 13(1), 30-40.*.

[7] Hamdani, "Penerapan Pembelajaran Konstruktivisme model Fisika untuk Meningkatkan Pemahaman Konsep dan Hasil belajar nahasiswa kelas X SMA Negeri 5 Palu," *Skripsi tidak dipublikasikan.Palu FKIP UNTAD*, 2012.

[8] N. Triana, "Penerapan StrategiRelating,Experiencing, Applying,Cooperating, dan Transferring (REACT) Untuk Meningkatkan Pemahaman Konsep Fisika nahasiswa Kelas X MIA 5 SMA Negeri 2 Sigi.," *Skripsi Progr. Stud. Pendidik. Fis. FKIP UNTAD*, 2016.

[9] Sudjana, "Metoda Statistika.," *Bandung: Tarsito*, 2005.

[10] F. N. Arifah, "Panduan Menulis Penelitian Tindakan Kelas & Karya Tulis Ilmiah Untuk dosen," *Yogyakarta: Araska*, 2017.