

The Influence of The Probing Prompting Learning Model on The Development of Students' Critical Thinking Ability

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Abstract

It still has to be enhanced since students' critical thinking abilities on the subject matter of rotational dynamics and equilibrium of rigid bodies are still an issue. The purpose of this study is to ascertain the impact of the probing prompting learning model on students' capacity for critical thought with regard to the rotational dynamics and equilibrium of rigid bodies content. A total of 90 children from one of schools made up the sample for this study, which was performed there for four weeks in January 2023. The study approach employed was a quasi-experiment with a design for the control group that was not comparable. The Mann Whitney U examine was used to examine the validity of the hypothesis, and the findings revealed that H_0 was rejected. The critical thinking abilities of students who study using the probing prompting model are significantly different from those of students who learn using traditional learning. In the experimental class, students' critical thinking scores increased more than those of the control class students. More than 80% of students expressed interest in using the probing prompting learning methodology. This study demonstrates how the probing prompting learning paradigm significantly enhances students' capacity for critical thought.

Keywords: students, critical thinking abilities, probing prompting model, school

Abstrak

Kemampuan berpikir kritis siswa pada materi dinamika rotasi dan kesetimbangan benda tegar masih perlu ditingkatkan. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh model pembelajaran probing prompting terhadap kemampuan berpikir kritis siswa pada materi dinamika rotasi dan kesetimbangan benda tegar. Sebanyak 90 siswa dari salah satu sekolah menjadi sampel dalam penelitian ini, yang dilaksanakan selama empat minggu pada bulan Januari 2023. Pendekatan penelitian yang digunakan adalah eksperimen semu dengan desain kelompok kontrol yang tidak sebanding. Uji Mann Whitney U digunakan untuk menguji validitas hipotesis, dan hasil penelitian menunjukkan bahwa H_0 ditolak. Kemampuan berpikir kritis siswa yang belajar menggunakan model probing prompting berbeda secara signifikan dengan siswa yang belajar menggunakan pembelajaran tradisional. Di kelas eksperimen, skor berpikir kritis siswa meningkat lebih tinggi dibandingkan dengan siswa kelas kontrol. Lebih dari 80% siswa menyatakan ketertarikannya untuk menggunakan metode pembelajaran probing prompting. Penelitian ini menunjukkan bagaimana paradigma pembelajaran probing prompting secara signifikan meningkatkan kemampuan berpikir kritis siswa.

Kata Kunci: siswa, kemampuan berpikir kritis, probing prompting model, sekolah

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INTRODUCTION

Learning physics cannot be separated from mastering physics concepts. The physics curriculum equips students to have a number of thinking skills, one of which is critical thinking skills.

Critical thinking skills are very important in the physics learning process, so as to achieve optimal results. Optimal critical thinking skills enable a person to make wise decisions in everyday life (Anisah & Carlian, 2020). Physics as a science that studies natural behavior can be used as a means to train critical thinking skills through the application of the scientific method. Critical thinking skills are very important to be trained and developed in students (Dianto et al., 2023). Choosing an inappropriate learning method can interfere with students' thinking process. Learning methods that only teach knowledge without training critical and analytical thinking skills can make students vulnerable to making wrong reasoning. Students who do not have critical thinking skills will not be able to make decisions and solve problems in school, personal life, and the work environment later. However, in practicing critical thinking skills students are still constrained by several factors. First, often physics learning is still centered on the teacher, so students tend to be passive and less explore their thinking skills (Riyantiet al., 2023).

According to the results of pre-observational studies and pre-interviews, students' critical thinking abilities are still only moderately high since they lack conceptual mastery and lack the necessary training (Sudrajat, 2019). On the basis of this, students need to be provided with critical thinking abilities during the learning process so they can examine and resolve issues they would encounter in daily life. Students will be better equipped to answer analytical physics questions and then come to a conclusion if they have the capacity to think critically (Afandi & Pranajaya, 2022). The correct learning framework can help students develop their critical thinking abilities (Pranajaya et al., 2023).

Efforts to increase students' absorption have not been achieved due to the lack of interaction between teachers and students, and between students and students, in addition to improving critical thinking skills (Fatmawati et al., 2014). The learning process with the teacher reduces the activity of students and only accepts what the teacher gives. The selection of an inappropriate learning model is one of the causes of the problem. Problems that arise during learning require an educator who uses creative ways to deal with them (Septiana et al., 2018). One of them is by applying a learning model that trains students' ability to solve the problems given (Pranajaya et al., 2020). One of the learning models that can be applied in the teaching and learning process is the Probing Prompting learning model. Suherman in Huda said that, "the Probing Prompting learning model is a question-based learning model" (Handriani et al., 2015).

Probing Prompting is a learning process that allows educators to ask a series of questions, guide and explore, and develop thinking processes that connect new knowledge learned (Pranajaya et al., 2022). Probing Prompting gives learners the opportunity to actively participate in the development and understanding of material through individual thinking processes and collaborative work in class discussions (Khaeruddin et al., 2018). This is in line with the theory that requires learners to actively explore their knowledge (Pratiwi et al., 2019). This study aims to determine the effect of probing

prompting learning model on students' critical thinking skills on the material of rotational dynamics and equilibrium of rigid bodies.

METHOD

This study employs an associative research type with a quantitative methodology. 90 students, 45 from the control class and 45 from the experimental class, made up the total sample for this study, which was conducted in a city for four weeks in January 2023 using saturation sampling. In this work, a control class and an experimental class are employed in a quasi-experiment with a research design of nonequivalent control group design. While the control class only received standard learning methods, the experimental class received therapy in the form of probing prompting learning approach. The pre-test and post-test in each class were used to collect the data for this study, which used tests that were administered to the students.

RESULT AND DISCUSSION

Students' Initial and Final Critical Thinking Ability

The results showed that for all aspects of critical thinking indicators, the control group obtained higher scores than the experimental group. Strategies and tactics indicators obtained higher scores for both groups and basic support indicators obtained the lowest scores for both groups. The percentage of pupils with critical thinking markers in the control group's and the experimental group's pretest scores did not differ significantly. Since there is no discernible difference in the initial capacity of students' critical thinking between the control group and the experimental group, it may be argued that there is no substantial difference between the two groups.

The results show a bar chart recapitulating the value of post-test results of control group students and experimental groups in each critical thinking indicator. The experimental group obtained higher results for all aspects of critical thinking compared to the control group. These results show that the percentage of critical thinking indicators of students in both groups has a significant difference. Thus it can be concluded that there is a significant difference between the critical thinking of students in the control group and the experimental group. So it can be concluded that critical thinking students in both groups have different final abilities.

Prerequisite Test Results

According to the findings of the normality test, the pretest data for the experimental class and the control class both have significance values over 0.05, indicating that the data is normally distributed. The posttest results for both the experimental class and the control class are above 0.05, indicating that the data are normally distributed. The homogeneity test results show that the pretest data has a value of 0.05 and posttest data below 0.05. So that the pretest data is homogeneous while the posttest data is not homogeneous.

Results

According to the findings, the pretest data's sig value (2-tailed) is 0.05. There is no difference in the average score of students' pretests in the control group and experimental group, according to the 2-tailed pretest data of 0.109. (2) Two-tailed posttest results are less than 0.05, sig value. There is a difference between the average posttest score of students in the control group and the experimental group, as shown by the 2-tailed posttest data of 0.000.

The results also showed differences in the average N-gain value of critical thinking indicators in the control group and the experimental group. The average N-gain value of the control group on the critical thinking indicator provides a simple reason of 0.13, builds basic skills 0.14, concludes 0.21, makes further explanations 0.03, strategies and tactics 0.24. All critical thinking indicators in the control group, the N-gain value is categorized as low. The average N-gain value of the experimental group on critical thinking indicators gave a simple explanation of 0.37, built basic skills 0.29, concluded 0.59, made further explanations 0.23 strategies and tactics 0.45. Critical thinking indicators in the experimental group were categorized in medium and low. Indicators categorized as low in building basic skills and making further explanations. While indicators classified as moderate in providing simple explanations, concluding and strategies and tactics. These results indicate that the increase in critical thinking based on critical thinking indicators in the experimental group that was treated was higher than the control group that was not treated.

Discussion

The initial critical thinking skills of students in the experimental and control groups were still relatively low. The low initial ability of students can be seen from the achievement of the average pretest score of both groups which is still below half of the ideal score they should get. During the pretest, the average critical thinking score in the experimental group was almost the same as the average critical thinking score of the control group. Because the score equation obtained for the control group and the experimental group is almost the same, it can be said that the initial ability of students between the two groups has the same initial ability.

The initial ability of students based on the pretest results for each critical thinking indicator investigated in this study is still in the low category. This happens because the average student does not understand the meaning of what the question means with the problems that occur which are connected to existing concepts. This is in line with what Nurmayani stated that the learning process that has taken place so far has not been able to improve critical thinking skills because cognitive aspects only emphasize results not cognitive aspects that involve students' critical thinking skills. The same thing is also expressed by Septiana, that the teacher center learning process does not provide access for students to develop independently in discovering their own knowledge so that it has an impact on higher-level thinking skills, especially on low critical thinking skills. The cause of this is

that students are never trained to think critically in learning and cognitive aspects are only in the form of theory and memorization.

The low ability of students on the indicator of providing elementary clarification is that students do not understand the application of the concept of the moment of force (torque) of a homogeneous rod, students cannot apply the concepts and methods that a ballet dancer must do related to the concept of angular momentum to the dance movements performed. After being given treatment and based on the data obtained, critical thinking indicators in the experimental group increased 61.11%. This is because students are accustomed to linking and exploring various phenomena that occur from various points of view and connecting them to the environment of everyday life.

The low ability of students in the indicator of building basic skills (basic support) is that students cannot apply the concept of torque on a bicycle tire when the bicycle tire is going slow and fast related to rotational motion and translational motion, as well as the sequence of ballet dance movements related to the concept of angular momentum and moment of inertia. After the treatment, this increased by 57.29%. After this learning, students can understand the application of torque on bicycle tires when going slow and fast, and can come up with ideas that relate the concept of angular momentum to ballet dance movements.

The low ability of students in the inference indicator is that students cannot find ideas, ideas and unique ways of applying the concept of equilibrium on a seesaw, the application of the concept of torque to different treatments when opening a door and the relationship between the energy needed to move a cylindrical object. After the treatment, the inference indicator increased by 69.21%. This shows that students have been able to connect the concept of balance of rigid objects to everyday life and also find many approaches that can stimulate logic so that they can think broadly.

The low ability of students in the indicator of making advanced clarification is that students cannot specify in detail the requirements of the equilibrium of a rigid body and the relationship of the concept of torque to the application of cartol in life. After being given treatment, there was an increase of 57.64%. This shows that students have been able to apply the concept of equilibrium of rigid bodies. After going through learning, students have been able to connect phenomena with the concepts in the problem so that they can answer the existing problems along with the steps.

The low ability of students in the strategies and tactics indicator is that they cannot find the right idea and cannot detail the details on the equilibrium of a firm body and problems related to the concept of the weight point. After the treatment, this indicator experienced a large increase of 84.72%. This is indicated by students being able to work on problems with the concept of weight point and detailing details related to the equilibrium of a rigid body. It can be seen that students have been able to organize the right strategy in making works related to the concept of equilibrium of rigid objects. Students are also accustomed to exploring their environment from various points of view so that they

can relate the material to the application that occurs in everyday life. This is in line with research conducted by Anisah that the average student results in the experimental group were higher than the control group, with an average experimental group of 66.67% and an average control group result of 33.33%.

CONCLUSION

The posttest findings on critical thinking of the experimental group are influenced by the probing prompting learning model in the areas of indicators offering simple explanations (61.11%), fundamental abilities (57.29%), inference (69.21%), creating additional explanations (57.64%), and strategies and tactics (84.72%). Based on the N-gain result of 0.56, the experimental group's improvement in critical thinking falls into the medium category. The rise in students' critical thinking indicators on measures of offering straightforward explanations (elementary clarification) was 0.37 (medium), fundamental skills (basic support) 0.29 (low), inference 0.59 (medium), offering further explanations 0.23 (low), and strategies and tactics 0.45 (medium). With a proportion of 82.71%, most students responded favorably to the use of the probing prompting model in lessons about the dynamics of rotation and equilibrium of rigid bodies.

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