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Implementation of the Nearpod-Assisted CORE Learning Model to Improve Students' Understanding of Class VII SMP Negeri 20 Pekanbaru's Concepts on Motion and Force Material

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Abstract- This research aims to describe the level of students' conceptual understanding after learning with the Nearpod-assisted CORE (Connecting, Organizing, Reflecting, Extending) learning model on motion and force material, and to determine the differences in conceptual understanding between classes using this model compared to conventional learning approaches. Using a quasi-experimental method with a posttest-only non-equivalent control group design, the study involved Grade VII students at SMP Negeri 20 Pekanbaru during the odd semester of 2024/2025. The experimental class was taught using the Nearpod-assisted CORE learning model, while the control class received conventional instruction. Data was collected through a conceptual understanding test and analyzed using descriptive and inferential statistics. Results showed that students in the experimental class achieved an average score of 70.95 (Good category), significantly higher than the control class average of 58.24 (Quite Good category). The independent t-test yielded a significance value of 0.002 < 0.05, confirming a significant difference between the two classes. This study demonstrates that the Nearpod-assisted CORE learning model effectively enhances students' conceptual understanding of motion and force material, providing an alternative teaching strategy that promotes active knowledge construction and higher-order thinking skills.

Keywords: *CORE learning model, Nearpod, conceptual understanding, motion and force, physics education*

1 Introduction

Education is one of the keys to success in making the Indonesian nation more advanced. As real evidence of the country's progress, development will continue to be carried out. To participate in development practices, each individual is expected to be able to improve their quality through learning which is part of education. However, when compared to other countries, the education system in Indonesia still offers relatively suboptimal teaching quality. The main factor is the still suboptimal efficacy, efficiency, and standardization of education (Agustang, 2021:12).

In this digital era, teachers need to integrate technology into learning to provide rich and diverse learning experiences to their students (Wyman et al., 2023:13). A comfortable and enjoyable educational environment can actively develop spiritual religious strength, self-control, character, intelligence, noble morals, and the potential to have the skills needed for themselves and society (Ujud et al., 2023:7915).

Physics is still considered difficult and less popular with students. Difficulties in learning physics are not only caused by students' lack of ability, but also by a learning approach that does not link physics material with natural phenomena around them, even though natural phenomena provide initial concepts related to physics (Guswina, 2020:183-192). The key to learning physics is the ability to understand the concepts, laws, and theories of physics. Students who do not understand the basic concepts of physics will have difficulty learning the subject.

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Based on the results of observations and interviews with teachers at SMP Negeri 20 Pekanbaru, although the KKM for science subjects is set at 76, the average daily science test scores, especially for motion and force material in 2023, are still below the KKM standard. This is due to the tendency of students to only focus on memorizing formulas without understanding the concept, coupled with the position of the material at the end of the odd semester which often clashes with the final semester exam. The low responsiveness of students in science learning, especially when using conventional methods, shows the need for innovation in learning to improve students' understanding and active involvement.

Understanding concepts is one of the main aspects that needs to be considered in physics learning. Quality education is very important to develop human resources who have the intelligence and qualifications to be able to survive in the era of globalization (Susi Susilawati, 2022:65). The learning process designed by teachers has a major impact on students' conceptual understanding. Teachers who can help students and create an interesting learning environment will indirectly stimulate students to pay more attention to the material they are studying (Desi & Hani, 2020:52).

Students' low conceptual understanding can be influenced by the use of inappropriate learning methods or models, low thinking skills, and a learning process that is still centered on the teacher (Bustami et al, 2019:451–457). One alternative that can be used is the Connecting, Organizing, Reflecting, Extending (CORE) learning model. The CORE model involves four main activities: Connecting (connecting current knowledge with new information), Organizing (organizing concepts to understand the material), Reflecting (critical analysis and examination of the information obtained), and Extending (expanding knowledge) (Roza & Dwina, 2024:166).

The CORE learning model has an impact on various aspects of learning, including problem-solving skills, creative thinking, learning outcomes, conceptual understanding, and communication skills (Sriwigati & Kurniawan, 2024:176). The use of Nearpod media in the CORE learning model can increase student interactivity and engagement. Nearpod allows teachers to create presentations with collaboration boards, games, and quizzes that encourage active learning (Perlawanan et al., 2023:2–3). The use of this media has been shown to significantly increase student engagement in the learning process (Inanta et al., 2022:423).

The material on motion and force is one of the concepts that is considered difficult for students because it contains many abstract concepts related to everyday life phenomena. This will be difficult to understand if the learning process only relies on reading methods or simple explanations. The application of the CORE learning model assisted by Nearpod is expected to be a solution to improve students' conceptual understanding of the material.

Based on the description of the problems above, this study aims to describe the level of students' conceptual understanding after learning using the CORE learning model assisted by Nearpod on the material of motion and force in class VII of SMP Negeri 20 Pekanbaru, and to determine the differences in students' conceptual understanding between classes that use the CORE learning model assisted by Nearpod and classes that apply conventional learning.

2 Research Methodology

This study used a quasi-experimental method with a posttest only non-equivalent control group design. There were two groups in this study: the experimental class that received the CORE learning model treatment assisted by Nearpod, and the control class that used conventional learning.

Description:

X = Treatment with Nearpod-assisted CORE learning;

O_1 = Post-test results of the experimental class;

O_2 = Post-test results of the control class

The study was conducted at SMP Negeri 20 Pekanbaru in the odd semester of 2024/2025. The study population included all 223 grade VII students from 6 classes. The sample was determined after a normality and homogeneity test of the previous material test scores was carried out.

Data collection used a concept understanding test instrument (posttest) which was arranged based on the indicators of motion and force material. Data analysis includes descriptive analysis to determine the level of students' conceptual understanding with the formula:

Score = (score obtained) / (maximum score) × 100%

The score results are categorized according to the criteria: Very Good (85-100), Good (70-84), Fairly Good (50-69), and Less Good (0-49). Inferential analysis uses an independent t-test to test the hypothesis, with the criterion H_0 rejected if the significance value ϱ <0.05, which means there is a significant difference in students' conceptual understanding between the two classes.

3 Results and Discussion

One of the learning models based on constructivist thinking, which states that students must be able to create their own knowledge through interaction with their environment, is the CORE model (Widiawati, 2023:28). CORE is a discussion-based learning methodology. The CORE model is a type of learning that involves students in CORE activities, which can have an impact on how much knowledge they gain. By using this learning paradigm, students are expected to be able to hone their critical thinking skills to answer the tasks given by the teacher. To achieve this, teachers not only give homework based on textbooks, but also ask students to work on the challenges they have created.

According to (Aldi & Yarman, 2023:173) this learning model consists of four phases of activity;

1) Connecting, students are helped in making connections between what they have learned or their experiences and what they will learn at the next meeting. This is because learning something based on previous knowledge will make it easier for students.
2) Organizing, students organize the knowledge they have learned to understand the subject matter. With the help of the teacher, students complete it themselves.
3) Reflecting, students are expected to reconsider the knowledge they learned during the organizing phase and determine whether the knowledge is still accurate or not. Students summarize the information they have learned in their own language.
4) Extending, asking students to apply the knowledge they have learned during the learning process. If students are able to use their knowledge to overcome their own challenges, the knowledge will stick with them.

Based on the description above, it can be concluded that there are four learning syntaxes with the CORE model, namely Connecting (connecting old information with new information or between concepts), Organizing (organizing the information obtained), Reflecting (rethinking the information that has been obtained), Extending (expanding knowledge). The steps for implementing the CORE learning model are:

a. The connecting process begins with the teacher asking about past learning concepts or their experiences in everyday life and relating them to the material to be studied.
b. Organizing is done by the teacher asking for opinions or ideas that students have regarding the concept to be studied.

c. After the delivery of the lesson material has been carried out, the next step is that the teacher divides the students into small groups. The small groups then discuss critically what was learned earlier.
d. At this stage, reflecting begins. Students in their groups rethink, explore, and dig deeper into information through group learning.
e. While at the extending stage, students are given individual tasks to expand, develop and use their understanding of the material that has been learned.

Conceptual understanding is an important component in education because it allows students to develop their skills in all academic areas. Here are some indicators that show conceptual understanding as part of learning outcomes according to (Atmaja, 2021:2051);

1) Interpreting

The ability of students to change information from one form to another, for example from words or concepts to equations, images, or graphs, and vice versa.

2) Exemplifying

The ability of students to be able to provide specific examples or examples of concepts in general, identifying the meaning of parts of general concepts.

3) Classifying

Students realize that an object belongs to a certain category. Detecting characteristics or patterns that indicate that the characteristics or patterns are consistent with a particular category or idea can also be understood as classification. Classifying begins with specific examples and asks students to find general concepts, while exemplifying begins with general concepts and asks students to find specific examples.

4) Summarizing

When students can summarize the material presented or the subject matter in general in a single statement, they are said to have the ability to summarize.

5) Making conclusions (inferring)

The ability to infer patterns from several case examples is known as inferring. If students can encode the relevant features of each case and more importantly if there is no correlation between the examples, they are considered to have the ability to infer the concept or principle that is part of the examples.

6) Comparing

The student's capacity to highlight differences and similarities between two or more objects. When students are able to identify similarities and differences between two or more objects, they are able to compare.

7) Explaining

The student's ability to generate and apply cause-and-effect models in a system. Using a model to determine the effects of changing one component of a system is part of the explaining process.

Nearpod is a web-based educational tool that can transform conventional learning into something more participatory and student-focused. Teachers can design presentations using text, graphics, videos, and group game quizzes in a virtual space. Students can use this platform to connect with each other and with other devices during the learning process by entering the class code that the teacher has provided. Students can engage in various interactive activities on Nearpod, including polling, drawing, experimenting with 3D visuals and answering questions. Teachers will have direct access to all student data and activities, which they can download at any time for use in class or for other purposes (Baalwi, Muhammad Assegaf, 2022:54–68).

Teachers can provide information interactively and facilitate discourse that goes beyond text and video by utilizing Nearpod's interactive features, which include collaborative boards, videos, open-ended questions, and images. Teachers and students can discuss openly, respond to questions, and answer open-ended questions on collaborative boards. Students can use handwriting and drawing to express their creativity. Real-time student performance reports, which show the percentage of students engaged in learning, are available through the Nearpod Report menu. The results can be downloaded in PDF format and distributed to students. The interactive features of the nerapod can be seen in Figure 1.

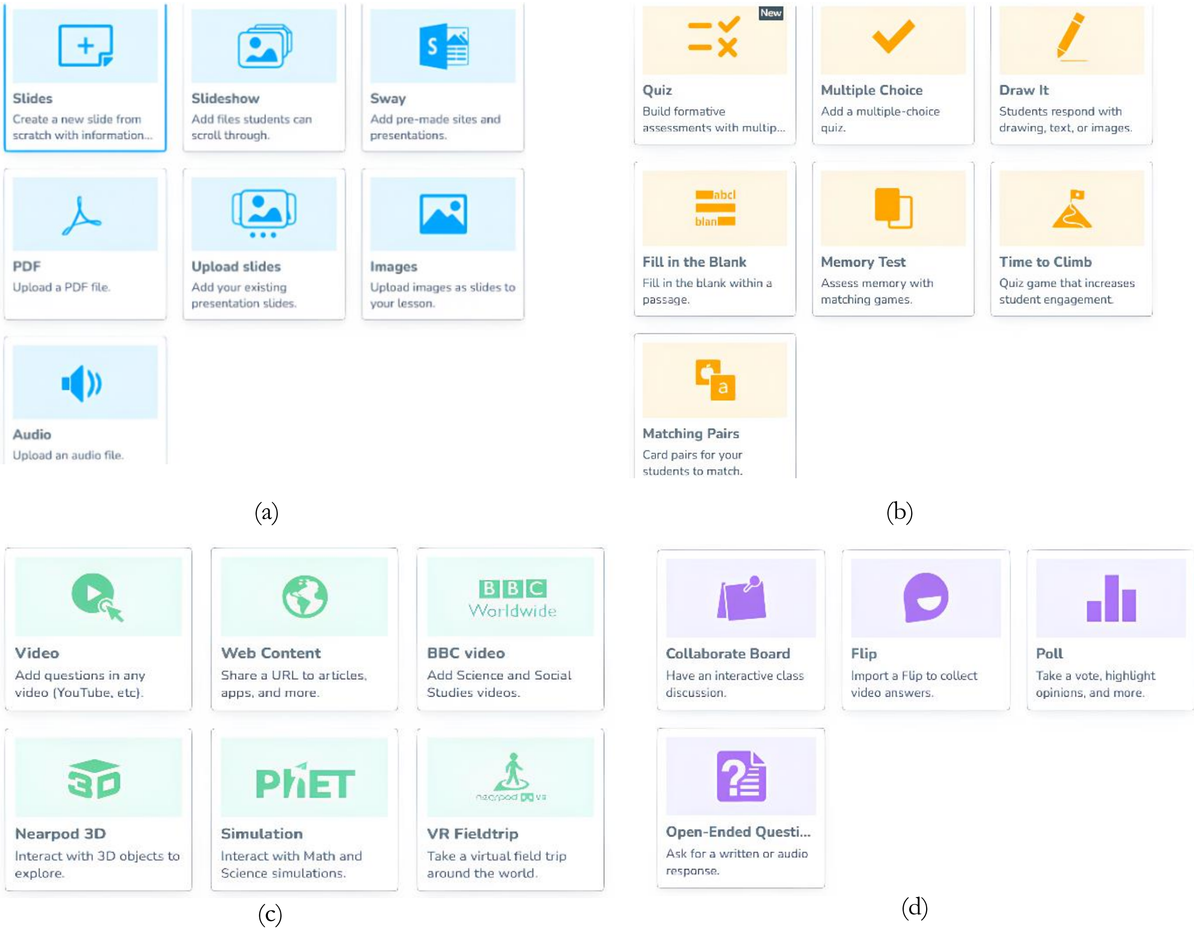

Figure 1 Interactive Features on Nearpod
(a) Create, (b) Quizzes & games, (c) Interactive, (d) Discussions

a) Create: Allows teachers to create interactive presentations by adding various types of content such as slides, videos, images, and activities.
b) Quizzes & games: Provides the option to create quizzes and educational games that can be integrated into lessons, increasing student engagement.
c) Interactive: Includes various interactive activities such as drawing, answering questions, and filling out forms, allowing active student participation during learning.s

Discussions: Facilitates real-time discussions between teachers and students or between students, encouraging collaboration and exchange of ideas in a virtual learning environment.

Based on the results of the research that has been conducted to determine the effectiveness of the Nearpod-assisted CORE learning model on students' conceptual understanding of motion and force material, data was obtained that showed a significant difference between the experimental class and the control class.

Descriptive Analysis

The results of the posttest of students' conceptual understanding of motion and force material showed a clear difference between the experimental class using the Nearpod-assisted CORE learning model and the control class using conventional learning. The experimental class obtained an average score of 70.95 with the category "Good", while the control class obtained an average score of 58.24 with the category "Quite Good". The significant difference in average scores of 12.71 showed the effectiveness of the Nearpod-assisted CORE learning model in improving students' conceptual understanding.

The distribution of student achievement in the experimental class showed that 23.68% of students were in the "Very Good" category, 34.21% of students were in the "Good" category, 34.21% of students were in the "Quite Good" category, and only 7.89% of students were in the "Less Good" category. Meanwhile, in the control class, only 2.70% of students were in the "Very Good" category, 24.32% of students were in the "Good" category, 45.95% of students were in the "Quite Good" category, and 27.03% of students were in the "Poor" category.

Comparison of student achievement in each indicator of conceptual understanding also shows the superiority of the Nearpod-assisted CORE learning model. In the explaining indicator, the experimental class reached 66.67% while the control class was only 52.25%. In the summarizing indicator, the experimental class reached 75.44% compared to the control class which was only 62.16%. A very significant difference was seen in the interpreting indicator, where the experimental class reached 81.58% while the control class was only 63.51%.

The classifying indicator showed almost the same results between the two classes, with the experimental class reaching 71.05% and the control class 71.17%. In the drawing inference indicator, the experimental class reached 63.82% while the control class was 63.51%. The biggest difference is seen in the exemplifying indicator, where the experimental class reached 71.05% while the control class was only 43.24%. In the comparing indicator, the experimental class reached 60.53% while the control class was only 46.85%.

The CORE learning model assisted by Nearpod has proven effective in improving students' conceptual understanding because it facilitates a more meaningful learning process. At the Connecting stage, students activate their prior knowledge of the concept of motion and force, creating a strong foundation for building new understanding. At the Organizing stage, students organize information through various interactive learning activities facilitated by Nearpod, forming a systematic knowledge structure. The Reflecting stage provides an opportunity for students to reflect on their understanding, identify strengths and weaknesses, and develop improvement strategies. At the Extending stage, students expand and apply knowledge into new contexts, strengthening conceptual understanding and making it more meaningful.

Nearpod as an interactive learning media strengthens the implementation of the CORE model with features that support the visualization of abstract concepts, simulations, and collaborative activities. This is in line with the research of Rahayu, Dinar et al. (2022:344-345) which shows that the use of interactive learning devices can increase students' interest in learning when compared to conventional teaching methods.

Inferential Analysis

The results of the normality test using Kolmogorov-Smirnov showed that the data from both classes were normally distributed, with a significance value of 0.059 for the experimental class and 0.057 for the control class (both > 0.05). The homogeneity test using Levene's Test showed a significance value of 0.558 > 0.05, which means that both classes have homogeneous variance.

In the hypothesis test using the Independent Samples t-test, a t value of 3.194 was obtained with a significance (2-tailed) of 0.002 < 0.05. These results indicate that there is a significant difference between the conceptual understanding of students who learn using the CORE learning model assisted by Nearpod and students who learn using the conventional learning model on the material of motion and force.

4 Conclusion

Based on the results of the research and discussion that have been conducted, it can be concluded that:

1. The application of the Nearpod-assisted CORE learning model has proven effective in improving students' conceptual understanding of the material on motion and force. This is evidenced by the average value of the experimental class (70.95) which is higher than the control class (58.24).
2. There is a significant difference between the conceptual understanding of students who use the Nearpod-assisted CORE learning model and students who use conventional learning on the material on motion and force. This is indicated by the results of the hypothesis test with a significance value of 0.002 <0.05.
3. The Nearpod-assisted CORE learning model has a positive impact on all indicators of conceptual understanding, with the most significant increase in the indicators of exemplifying (27.81%) and interpreting (18.07%).
4. The stages of the CORE learning model (Connecting, Organizing, Reflecting, Extending) implemented with the help of Nearpod facilitate students to actively construct their knowledge, develop high-level thinking skills, and increase student involvement in the learning process.

Thus, the implementation of the CORE learning model assisted by Nearpod can be an alternative effective learning strategy to improve students' conceptual understanding of motion and force material at the junior high school level.

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