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RESEARCH ARTICLE

Integrating discovery learning with ward wall games to enhance elementary students' engagement in energy transformation topics

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ABSTRACT
This study aims to enhance the learning engagement of fourth-grade students at SD Negeri Lamklat, Aceh Besar, on energy transformation by applying the Discovery Learning model integrated with Ward Wall games. The Classroom Action Research (CAR) was conducted over two cycles, each comprising the stages of planning, implementation, observation, and reflection. The research involved 25 fourth-grade students as subjects. Data were collected through observation sheets on learning engagement, learning outcome tests, and field notes. The findings revealed that integrating Discovery Learning with Ward Wall games effectively increased students' engagement. In the first cycle, the average engagement level was 67%, which improved to 84% in the second cycle. Additionally, students' learning outcomes demonstrated significant improvement. Thus, integrated with Ward Wall games, the Discovery Learning model proved an effective strategy for enhancing student engagement and learning outcomes in energy transformation topics.

KEYWORDS
Discovery Learning, Ward Wall, learning engagement, energy transformation

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1. Introduction

21st-century learning demands innovation in the learning process. This can help students become more active as the main subject in learning. Learning activity is the

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key to encouraging meaningful learning experiences (Rizal, & Faradilla, 2024). However, according to Supriyadi (2019), many studies show that traditional learning approaches remain dominant, resulting in students tending to be passive during the learning process. This causes students to be less involved in lessons such as energy transformation material.

One of the topics in science learning is energy transformation material, which requires conceptual understanding and critical thinking skills. According to Rahmawati et al. (2020), creative science learning must allow students to conduct active research and help them find ideas independently. This process has been proven successful with the Discovery learning model, which can increase student activity through exploratory and investigative activities.

Learning media, in addition to learning models, are very important to increase students' interest and involvement in learning. Educational games are one creative way to attract students' attention. For example, the Ward Wall game organizes relevant keywords to help students understand concepts interactively. Putri et al. (2021) stated that incorporating games into learning can increase students' desire to participate in learning actively.

Conditions at SD Negeri Lamklat, Aceh Besar show that students still need to improve in science learning. Initial observations show that students are passive when learning, especially about energy transformation material. Teachers still use lectures as the main method, making students less likely to participate actively. This is in line with the results of research conducted by Hidayat & Suryani (2018), which found that conventional learning approaches often limit student engagement.

Combining the Discovery learning model with Ward Wall game media is expected to solve the problem effectively. The Discovery Learning model encourages students to discover concepts through direct experience. At the same time, the Ward Wall game offers interactive features that encourage students to learn actively. According to Wahyuni et al. (2022), learning methods that combine creative models with interactive media can significantly improve student learning outcomes.

Based on the above explanation, this study aims to implement the Discovery Learning model integrated with the Ward Wall game in science learning on energy transformation material in grade IV of SD Negeri Lamklat. This study also wants to examine how much this approach can increase student learning activity.

2. Literature review

2.1. Discovery learning

The Discovery Learning approach places students as the main subjects in learning. Students are encouraged to actively seek and discover ideas through direct experience, which enhances their understanding. Discovery Learning helps students learn to think critically and analytically, according to Bruner (Rahayu et al., 2021). Stimulation, problem identification, data collection and processing, proof, and generalization are steps in this approach (Trianto, 2020). Discovery Learning can improve students' abilities in the science process and their understanding of science learning concepts (Putri et al., 2021).

2.2. Educational games in learning

Educational games are a type of interactive learning media that are intended to encourage students to learn more. Prasetyo & Utami (2020) state that games can help students understand concepts better and make learning fun. For example, the Ward Wall game involves grouping relevant keywords to help students understand the material. This aligns with research by Rahmawati et al. (2020), which found that games can increase student engagement by up to 85% in class.

2.3. Student learning activity

One measure of learning success is learning activity. Students who are active in learning will find it easier to understand and remember what is taught, according to Supriyadi (2019). Asking, answering, speaking, and conducting independent exploration are learning activities. Discovery Learning and student-centered learning approaches are very effective because they allow students to participate actively at every stage of learning (Wahyuni et al., 2022).

2.4. Energy transformation learning

To carry out energy transformation, you need to understand the concept well and be able to think critically. As stated by Hidayat & Suryani (2018), science learning, especially related to this topic, must be designed in a way that allows students to associate concepts with things that happen in everyday life. Interactive exploratory methods help students understand energy transformation. For example, heat energy can be converted into kinetic energy, and chemical energy can be converted into electrical energy.

2.5. Integration of discovery learning and educational games

According to research by Wahyuni et al. (2022), integrating Discovery Learning with educational games is an ideal combination to improve student activity and learning outcomes. This approach allows students to learn independently, be actively

involved in the exploration process, and be motivated by the game's interactive elements. Games like Ward Wall can help students reinforce the ideas they discover during Discovery Learning.

2.6. Conceptual framework for discovery learning research

The conceptual framework used in this study is that innovative and interactive learning methods can improve students' learning activity. While the discovery learning model provides a basis for independent exploration, the Ward Wall game helps understand the concept. As a result, the combination of the two is expected to improve student's learning activity and outcomes regarding energy transformation material. One of the main topics taught in elementary schools, especially in Social Sciences (IPS), is the diversity of Indonesian culture. This material aims to inform students about the diversity of culture, ethnicity, language, and local customs as a national treasure that must be preserved and appreciated. As Saputra (2020) stated, students' understanding of cultural diversity can shape tolerance, mutual respect, and love for the homeland.

3. Methods

This classroom action research (CAR) aims to improve student learning activity in energy transformation material by applying the Discovery Learning model integrated with the Ward Wall game. This research was conducted in two cycles, each consisting of the planning, implementation, observation, and reflection stages (Kemmis & McTaggart, 1988).

The subjects of this study were 25 fourth-grade students of SD Negeri Lamklat, Aceh Besar. The selection of subjects was based on initial observations, which showed that students' learning activity in science learning was still low. The study was conducted at SD Negeri Lamklat, Aceh Besar, for three months, from preparation to implementation and data analysis.

3.1. Research procedures

The research process consists of several steps. First, planning. Then, a learning implementation plan (RPP) based on Discovery Learning should be integrated with the Ward Wall game. Next, learning media, such as Ward Wall game devices, should be made in accordance with the energy transformation material. Finally, make research instruments, such as learning activity observation sheets, learning outcome test questions, and field notes. Learning is carried out according to the designed

RPP. Students are asked to find ideas about energy transformation during the Discovery Learning section. They are then assisted with activities related to the Ward Wall game. Observation: Use the learning activity observation sheet to track student activity during the lesson. Collect learning outcome data through tests given at the end of each cycle. Then, think about what you see and test learning outcomes, and correct your mistakes in the next cycle.

3.2. Research instruments

The instruments used in this study include a learning activity observation sheet used to measure student engagement during learning. A learning outcome test measures students' understanding of energy transformation material.

3.3. Data analysis

The data were analyzed using qualitative and quantitative descriptive techniques, and learning activity data were analyzed descriptively to see the increase from cycle I to cycle II. Learning outcome data were analyzed quantitatively by calculating the average student score and the percentage of learning completion.

4. Results

This research was conducted in two cycles, each consisting of planning, implementation, observation, and reflection stages. The data obtained include student learning activity and learning outcomes on energy transformation material. This research was conducted in two cycles. The following are the results obtained.

4.1. Student learning activity

The observation showed that student learning activity increased from cycles I to II. In the first cycle, indicators such as asking, answering questions, discussing, and using learning media were still uneven, and the average student learning activity reached 67%. In the second cycle, learning activity increased to 84%, with most students actively involved in every stage of learning.

4.2. Student learning outcomes

In addition, there was a significant increase in student learning outcomes. The percentage of students who achieved a minimum passing grade (≥70) was 72% in Cycle I and 88% in Cycle II. The average student score also increased from 68 to 82 in cycle I (Figure 1).

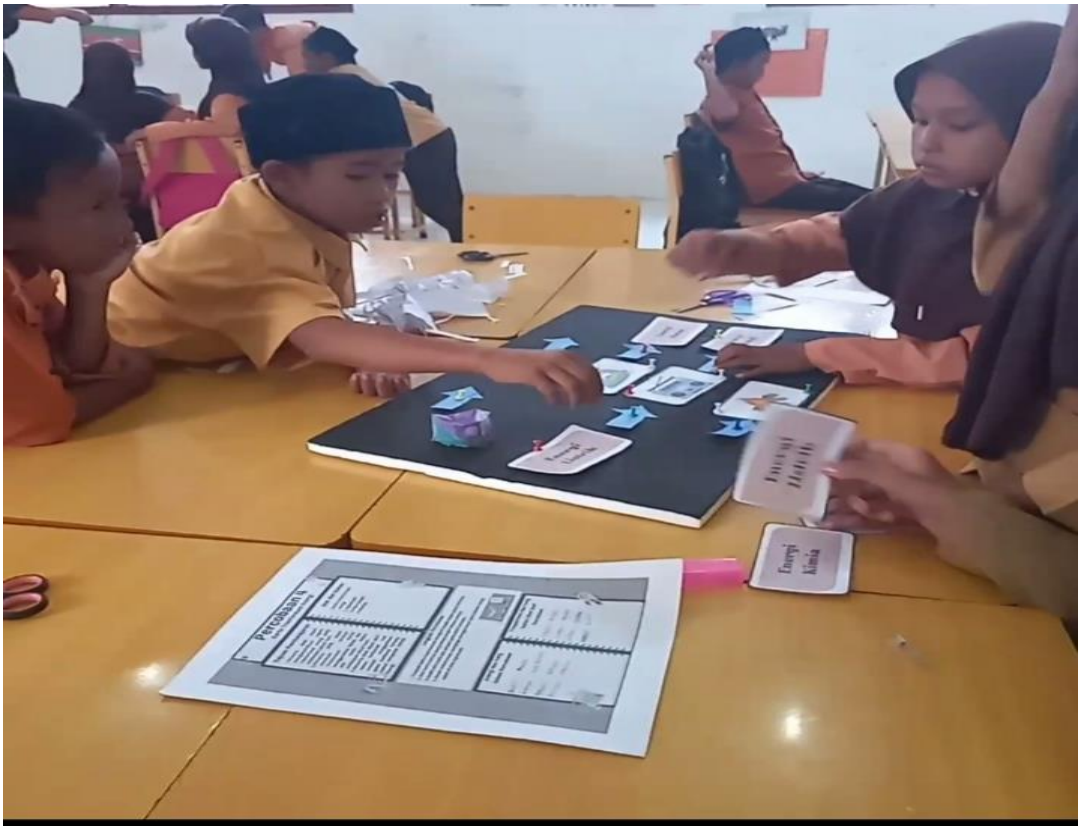

Figure 1. Image of students performing a task

5. Discussion

5.1. Improvement student learning activity

Implementing the Discovery Learning model, which encourages students to explore and discover ideas actively, increases student learning activity. This model allows students to participate in experience-based learning, according to Rahayu et al. (2021), which means they can increase their active participation in education. In addition, the Ward Wall game has been proven effective as an interactive learning medium to attract students' attention and encourage them to participate (Prasetyo & Utami, 2020).

5.2. Improvement of student learning outcomes

As shown by the research of Wahyuni et al. (2022), the combination of educational games and Discovery Learning improves students' learning outcomes and enhances students' understanding of energy transformation. Through keyword grouping activities, the Ward Wall game helps students remember and understand concepts. This is in line with the principles of visual and kinesthetic learning.

5.3. Relevance to previous research

This study's results align with the research of Putri et al. (2021), which found that using Discovery Learning can improve science process skills and student activeness in science learning. In addition, Rahmawati et al. (2020) found that incorporating games into learning can increase student motivation and engagement by up to 85%. Thus, combining these two approaches significantly increases student activeness and learning outcomes.

5.4. Reflection and implications

In cycle I, the main obstacle was that students did not understand the stages of Discovery Learning, which caused some students to remain passive. However, in cycle II, students became more engaged with more explicit guidance and integrated the Ward Wall game more systematically. This shows how important it is for teachers to design interesting and organized learning (Trianto, 2020).

This study shows that Discovery learning and the Ward Wall game can improve students' activeness and learning outcomes on energy transformation material. This finding can be applied in other classes, especially in science learning, which requires a deep understanding of concepts (Rizal & Faradilla, 2023; Rizal et al., 2017).

5. Conclusion

This study shows that implementing the Discovery Learning model integrated with the Ward Wall game can effectively improve student activity and learning outcomes in the energy transformation material in grade IV of SD Negeri Lamklat, Aceh Besar. Student learning activity increased from an average of 67% in cycle I to 84% in cycle II. Students became more active in asking, answering, discussing, and using learning media. Student learning outcomes also showed a significant increase, with the percentage of students achieving completeness scores increasing from 72% in cycle I to 88% in cycle II. The combination of Discovery Learning and the Ward Wall game

creates interactive and enjoyable learning to encourage optimal student involvement. Thus, this approach can be an alternative for teachers to improve the quality of science learning, especially in materials that require deep conceptual understanding.

Conflict of interest

The authors declare that they have no conflict of interest.

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