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Improvement of Science Learning in Class VI Conductor and Insulator Materials With Core Method

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Abstract: The problem studied in this study is the low learning outcomes of students in science subjects. Factors that influence can come from students or teachers themselves. This study aims to determine the improvement of student learning outcomes using the CORE (Connecting Organizing Reflecting Extending) model in science subjects with the main material of Conductors and Isolators in class VI UPT SD Negeri 117 Sampetua. This type of research is Classroom Action Research. This research was conducted at UPT SD Negeri 117 Sampetua, Onan Ganjang District, Humbang Hasundutan Regency, Academic Year 2024/2025. This research was conducted from April to May. The subjects in this study were 16 class VI students consisting of 6 boys and 10 girls with the object being student learning outcomes in science subjects using the CORE (Connecting Organizing Reflecting Extending) model. The research was conducted in two cycles with each cycle consisting of one meeting. In cycle I, planning, implementation, observation, and reflection were carried out. The results of reflection in cycle I will be used as a reference for conducting cycle II. The data collection techniques used are observation and testing. The data obtained are analyzed using the percentage of student learning completion. Individually, students are said to have completed if they meet the KKM value determined by the school for science subjects, which is 70. It can be concluded that the Connecting Organizing Reflecting Extending (CORE) learning model can help improve student learning outcomes in science lessons on the main material of Conductors and Isolators in class VI of UPT SD Negeri 117 Sampetua. So, it is expected that teachers can use the Connecting Organizing Reflecting Extending (CORE) model in an effort to improve student learning outcomes.

Keywords: core method; learning outcomes; observation

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Introduction

The development of development in our country has increased. Sustainable development that covers all aspects of community life, including social, economic, political, and cultural aspects, with the main goal of improving the welfare of society as a whole. In the development process, the role of education is very strategic. Education is able to create quality human resources that have a positive impact on development (Cong, 2025; Sudarwati, 2021) . Therefore, improving the quality of human resources must be done through education.

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential. Education in Indonesia is divided into three main paths, namely formal, non-formal, and informal. Education is also divided into four levels, namely early childhood education, elementary education, secondary education, and higher education.

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Elementary school is the most basic level of formal education in Indonesia. There are five compulsory subjects at the elementary education level (SD), namely Indonesian, Mathematics, Science, Social Studies, and Civics.

Basically, learning activities in education that take place in schools are active interactions between students and teachers. Teachers are not only the center of learning activities. Student involvement is no less important to find out how much students' mastery of the material being taught so that it has a big impact on student learning outcomes. However, in reality, the education received by students in schools through learning is not optimal. Because many interactions in learning are only one way, namely from teacher to student, the function and role of the teacher become very dominant. On the other hand, students only hear and listen to information or knowledge given by the teacher which makes students passive.

The teaching and learning process is a learning system that contains a number of components that are interdependent on each other to achieve goals (Brusn, 1998; Johnson & Johnson, 2008). Therefore, in developing a teaching and learning activity, teachers do not only pay attention to materials, methods and evaluations. But must pay attention to the creation of a learning process that teaches students. Moreover, in science learning, active learning is needed to understand each subject matter. So teachers do not only explain the material, but teachers must be able to increase student participation in learning.

Basically, children learn through concrete objects. So, the use of learning media is also no less important in the teaching and learning process because the media facilitates interaction between teachers and students so that learning activities are more effective and efficient. The use of learning media in the teaching and learning process can generate motivation and stimulate learning activities. However, in reality, the use of learning media by teachers in PBM is still rare, which results in students not having the desire and being less motivated to participate in teaching and learning activities.

Science is an important subject because its knowledge can be applied directly in society. Some of the reasons why science subjects are important are that science is useful for life or work in the future, part of the nation's culture, trains children to think critically, and has educational values, namely having the potential to shape the child's personality as a whole. Therefore, science education should be implemented properly in the learning process at school considering the importance of the subject. Science learning is said to be successful if all predetermined learning objectives can be achieved, which is revealed in the results of science learning.

But in reality, there are still students who have low science learning outcomes because they have not reached the predetermined completion standards. The learning methods used by teachers in the science learning process are lectures, Q&A, and assignments. This causes science learning to take place monotonously or lack variation. Learning that takes place monotonously will make students feel bored and pay less attention to the lesson being delivered.

Student learning outcomes are greatly influenced by the quality of learning carried out by teachers. And one of the things that determines the quality of learning is the use of appropriate learning models with the material being taught. However, there are still many teachers who pay less attention to the use of learning models in every teaching performance. If learning activity conditions like this are allowed to drag on, it will cause the quality of student learning outcomes to remain low because the lessons are boring and uninteresting.

Based on this, teachers need to develop a learning model that can improve student learning outcomes. One of them is by using the Connecting Organizing Reflecting Extending (CORE) learning model. Connecting Organizing Reflecting

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Extending (CORE) is a learning model that includes four aspects of activities, namely connecting, organizing, reflecting, and extending. The four aspects are: (1) Connecting (C) is an activity to connect old-new information and between concepts; (2) Organizing (O) is an activity to organize ideas to understand the material; (3) Reflecting (R) is an activity to rethink, deepen, and explore information that has been obtained; (4) Extending (E) is an activity to develop, expand, use, and find. With this learning model, it is expected to improve student understanding which has an impact on improving student learning outcomes as a whole.

Method

This study employed Classroom Action Research (CAR), which was conducted in two cycles: Cycle I and Cycle II. Each cycle consisted of four stages: planning, acting, observing, and reflecting (Bramantya et al., 2024; Nawawi et al., 2025; Prihantoro & Hidayat, 2019) . These stages were implemented systematically to improve students' learning outcomes through the Connecting, Organizing, Reflecting, and Extending (CORE) learning model. Each cycle was designed based on the learning objectives and the improvements needed to achieve the established success indicators.

In Cycle I, the planning stage involved establishing competency standards and basic competencies, selecting appropriate learning materials, preparing the lesson plan, providing learning resources and media, developing observation sheets, and preparing evaluation instruments. During the implementation stage, the teacher explained the learning objectives, motivated students, and applied the CORE model by connecting new material with prior knowledge (Connecting), guiding students to organize their ideas (Organizing), facilitating heterogeneous group discussions, encouraging students to reflect on their findings (Reflecting), and evaluating learning outcomes through a post-test (Extending).

Students were also guided to summarize the lesson and received information about subsequent learning activities. Observations were conducted throughout the learning process to document the teacher's implementation of the model, students' participation, and any strengths or weaknesses encountered.

The reflection stage of Cycle I involved discussing the observation results to evaluate the effectiveness of the implemented actions and identify areas requiring improvement. These findings served as the basis for planning Cycle II, which focused on addressing the weaknesses identified in the previous cycle. The planning stage of Cycle II included identifying problems, determining alternative solutions, refining the lesson plan and learning activities, preparing learning resources and observation instruments, and establishing achievement indicators. The implementation followed the CORE learning sequence, with adjustments based on the reflection results from Cycle I, followed by a post-test to assess students' learning outcomes.

During Cycle II, observations were again conducted to collect data on the implementation of the learning model, students' engagement, and the effectiveness of the instructional improvements. The reflection stage evaluated the strengths, weaknesses, and challenges encountered during the cycle and determined whether the established success indicators had been achieved. If the learning outcomes met the predetermined criteria, the research was concluded without proceeding to another cycle. Otherwise, further improvements would be considered to enhance the effectiveness of the learning process.

Results

Cycle I

The first cycle began with a planning stage based on the initial test results, which indicated that students' learning outcomes were low. To address this issue, the researcher, acting as the teacher, prepared

a lesson plan using the Connecting, Organizing, Reflecting, and Extending (CORE) learning model. The researcher also prepared teaching materials, learning resources, and observation sheets to evaluate teacher performance and student participation during the learning process. The lesson focused on conductors and insulators and was conducted on Monday, May 4, 2020, for one meeting lasting 2 x times 35 minutes.

During the implementation stage, the teacher opened the lesson by greeting students, checking attendance and readiness, conducting apperception, motivating students, and explaining the learning objectives. However, some students did not pay sufficient attention to the teacher's explanation, requiring the teacher to repeat the instructions. The learning activities then followed the CORE model, beginning with connecting the new material to students' prior knowledge (Connecting) and guiding students to express and organize their ideas about the topic (Organizing).

The teacher subsequently divided students into several groups and provided discussion materials. Students collaborated to discuss the assigned topics, and representatives from each group presented their findings to the class. The teacher then guided students to reconsider, deepen, and explore the information obtained during group discussions (Reflecting). Following these activities, the teacher directed the discussion toward the main concepts, clarified information that had not been addressed, and encouraged students to summarize the material they had learned.

Observations of student activities revealed that their readiness to participate in learning and their collaboration within study groups were classified as good. Students generally brought their learning materials, listened to instructions, participated in group discussions, completed worksheets, and respected their peers' opinions. However, their performance in the Connecting stage remained relatively low, as students needed further encouragement to observe learning media, respond to questions, express opinions, and relate new material to previously learned concepts.

Similarly, the Organizing stage required improvement because students were not yet sufficiently active in expressing and organizing their ideas. The Reflecting and Extending stages also remained relatively weak. All 16 students, representing 100% of the class, received sufficient scores for reflection activities. Students also needed further guidance in presenting group results, asking questions about material they did not understand, completing individual exercises, and drawing conclusions from the lesson.

The teacher observation results produced a score of 70 out of 100, equivalent to 70%. Several aspects of teaching performance required improvement, including checking students' readiness, using songs related to the learning material, exploring students' prior knowledge through media, encouraging participation, guiding students in organizing their ideas, facilitating reflection, and clarifying difficult concepts. These findings indicated that the implementation of the CORE learning model had not yet achieved the expected level of effectiveness.

Based on the reflection stage, the researcher concluded that improvements were necessary in both teacher performance and student participation. The difficulties identified during Cycle I became the basis for revising the instructional strategy in Cycle II, particularly by strengthening students' engagement, providing clearer guidance during learning activities, and improving the implementation of each stage of the CORE learning model.

Cycle II

The planning stage of Cycle II was developed by considering the weaknesses identified during Cycle I. The researcher revised the lesson plan using the CORE learning model, prepared the necessary teaching materials and learning resources, developed observation sheets, and

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constructed a post-test to assess students' learning outcomes in the topic of conductors and insulators. These improvements were intended to strengthen the learning process and help students participate more actively in classroom activities.

During implementation, the teacher began the lesson by greeting students, asking about their condition, leading the opening activities, preparing the classroom, checking attendance, motivating students, and explaining the learning objectives. Students were then directed to sit according to their respective groups and review the experiments conducted during the previous meeting. Through question-and-answer activities, the teacher encouraged students to connect their previous experiences with the material being studied (Connecting) and express their opinions about the experimental results (Organizing).

The learning activities continued with group presentations, particularly by groups that had not presented their work during the previous meeting. After the presentations, students were guided to reconsider, deepen, and explore the information obtained through group discussions (Reflecting). The teacher and students then engaged in question-and-answer activities to correct misunderstandings and reinforce students' understanding of the material. Finally, the teacher administered a post-test to evaluate students' learning outcomes as part of the Extending stage.

Observations during Cycle II showed improvements in students' participation across all learning indicators. Their readiness to participate in classroom activities was classified as good, as demonstrated by their preparation of learning materials and attention to the teacher's explanations. Students also showed better performance in connecting prior knowledge with new concepts, expressing opinions, organizing ideas, and participating in discussions. These findings indicated that the improvements introduced after Cycle I had helped students engage more effectively with the learning process.

Student collaboration also remained good, with students participating in group activities, completing worksheets, respecting their peers' opinions, and sharing information with group members. Improvements were particularly evident in the Reflecting stage, where students became more capable of reconsidering discussion results and presenting their reflections. In the Extending stage, students demonstrated greater participation in presenting group work, asking questions, completing individual exercises, and drawing conclusions. The observation results classified these learning indicators as good, while students' performance on the assessment activities indicated improved understanding of conductors and insulators.

The observation of teacher performance in Cycle II produced a score of 85 out of 100, equivalent to 85%, compared with 70% in Cycle I. This represented an increase of 15 percentage points in the teacher observation score. The results indicated that the teacher had improved the implementation of the CORE learning model, particularly in facilitating learning activities, guiding group discussions, encouraging student participation, supporting reflection, and evaluating learning outcomes.

The reflection stage confirmed that students were increasingly able to answer questions about conductors and insulators. Their participation in classroom activities also improved, including that of students who had obtained low scores in Cycle I. Based on the observation results and the reported improvements in student learning outcomes, the implementation of the CORE learning model in Cycle II was considered successful and consistent with the research objectives. Consequently, the researcher concluded that the instructional improvements had positively contributed to the learning process, and no further cycle was considered necessary according to the reported findings.

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Discussion

Based on the research conducted at SD Negeri 173442 Batunagodang, students' learning outcomes in science, particularly on the topic of conductors and insulators, improved following the implementation of the Connecting, Organizing, Reflecting, and Extending (CORE) learning model. Before the intervention, all 16 students had not achieved the minimum passing grade. This finding indicated that the existing learning process had not adequately supported students in understanding the subject matter. Therefore, the implementation of the CORE model was intended to provide a more structured learning experience by encouraging students to connect previous knowledge with new concepts, organize their ideas, reflect on their understanding, and apply the knowledge they had acquired.

During Cycle I, students' learning outcomes began to improve following the implementation of the CORE model. Nevertheless, the learning process had not achieved the expected level of effectiveness because several students had not yet reached the minimum passing grade and their participation in classroom activities remained limited. The observations indicated that students experienced difficulties in connecting prior knowledge with new material, expressing their opinions, organizing ideas, and presenting the results of their discussions. These findings suggest that introducing an innovative learning model does not automatically guarantee optimal learning outcomes; its effectiveness also depends on how consistently the teacher facilitates each stage and supports students throughout the learning process.

The results of Cycle I also revealed that students participated more effectively in group activities than in individual and reflective tasks. Although they were able to work collaboratively and complete group worksheets, they still required guidance to articulate their understanding, ask questions, and draw conclusions independently. This situation highlights the importance of balancing collaborative learning with opportunities for individual thinking and reflection. In the CORE model, the Connecting and Organizing stages provide opportunities for students to activate prior knowledge and structure new information, while the Reflecting and Extending stages encourage them to evaluate their understanding and apply concepts beyond the initial learning activity.

The CORE learning model assisted by audiovisual media among fourth-grade elementary school students (Dewi et al., 2020). Their study reported a positive effect on mathematics learning outcomes, suggesting that the CORE model can support learning when students are encouraged to establish connections between concepts and engage with learning materials. Although their research focused on mathematics rather than science, the underlying instructional principle is relevant to the present study: students need opportunities to connect new information with existing knowledge to develop a more meaningful understanding of the subject matter.

Furthermore, the improvement observed after the implementation of the CORE model can be understood through its emphasis on active student participation. In the Connecting stage, students are encouraged to relate the topic of conductors and insulators to their previous experiences and familiar objects in everyday life. For example, teachers can ask students why metal cooking utensils become hot when exposed to heat or why the handles of certain utensils are made from materials that do not conduct heat easily. Such questions can help students recognize the relationship between scientific concepts and practical situations. In the Organizing stage, students can classify materials according to their properties, discuss their reasoning with classmates, and develop a more systematic understanding of conductors and insulators.

Another findings are also supported this finding, who reported that the CORE learning model assisted by Edmodo had a

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significant effect on students' critical-thinking skills (Nubhan et al., 2022) . Their findings reinforce the importance of learning activities that encourage students to express ideas, examine information, and construct explanations rather than merely receive information from the teacher. In the context of the present study, these activities are particularly relevant because understanding conductors and insulators requires students to identify material properties, compare examples, and explain why particular materials are suitable for specific purposes. However, because Nubhan et al. investigated critical thinking in a different educational context, their findings provide supporting evidence for the instructional approach rather than direct proof of its effect on science achievement among elementary school students.

The improvement in learning outcomes following Cycle II further demonstrates the importance of reflection and instructional adjustment in classroom action research. Based on the weaknesses identified in Cycle I, the teacher improved the implementation of the learning activities by providing clearer guidance, encouraging students to participate in discussions, facilitating presentations, addressing misunderstandings, and reinforcing essential concepts. The teacher observation score increased from 70% in Cycle I to 85% in Cycle II, representing an improvement of 15 percentage points. This increase indicates that the teacher's implementation of the learning model became more effective and that the instructional improvements were accompanied by greater student engagement. Nevertheless, teacher observation scores should be interpreted as evidence of improved instructional implementation rather than as a direct measure of students' academic achievement.

Comparable findings were reported by Hardianto et al. (2024), who investigated the CORE learning model in teaching flora and fauna conservation. Their study examined learning outcomes using pre-test and post-test data and provides additional evidence that the CORE model may be useful in subject matter requiring students to understand and organize information (Hardianto et al., 2024) . Similarly, Amindri et al. (2026) reported that the CORE model assisted by Lumio by Smart media significantly affected students' critical-thinking abilities and physics learning outcomes at the senior high school level (Amindri et al., 2026). Although the students, subject matter, and instructional settings differed from those of the present research, these studies provide broader support for the potential of CORE-based instruction to improve learning outcomes when its stages are implemented systematically.

The increase in student participation across the two cycles also suggests that the CORE model can create a more interactive learning environment. Through group discussions and presentations, students have opportunities to communicate their understanding, consider alternative explanations, and learn from their classmates. Meanwhile, the reflection stage enables them to reconsider information obtained during discussions, identify misunderstandings, and refine their explanations. The extending stage then provides opportunities to demonstrate individual understanding through exercises, questions, and conclusions. These interconnected activities may help students develop a more coherent understanding of scientific concepts rather than relying solely on memorization.

Overall, the findings indicate that implementing the CORE learning model contributed to improvements in students' learning outcomes and classroom participation at SD Negeri 173442 Batunagodang. The progress observed from Cycle I to Cycle II suggests that the model was most beneficial when accompanied by deliberate instructional improvements based on classroom observations and reflection. However, because this study involved only 16 students in one classroom and was conducted through classroom action

research, the findings should be interpreted within that specific context. The results do not establish that the CORE model will produce identical outcomes in every classroom, but they demonstrate its practical potential as an alternative approach to improving elementary science learning, particularly when teachers provide structured opportunities for connecting concepts, organizing ideas, reflecting on learning, and extending understanding.

Conclusions

Based on the results of the research conducted at UPT SD Negeri 117 Sampetua, it can be concluded that the implementation of the Connecting, Organizing, Reflecting, and Extending (CORE) learning model in Cycles I and II improved students' learning outcomes in Natural Sciences, particularly in the topic of conductors and insulators, among Grade VI students during the 2024/2025 academic year.

Suggestion and Recommendation

Based on the research findings and conclusions, several suggestions are proposed for students and teachers. Students are expected to improve their participation and engagement when learning through the CORE model by expressing their opinions, connecting new material with previously learned concepts, organizing ideas to develop their understanding, completing group worksheets, reflecting on their learning experiences, presenting the results of their reflections and group discussions, asking questions about concepts they do not understand, and drawing conclusions from the learning activities.

Meanwhile, teachers are encouraged to enhance their ability to implement the CORE learning model by introducing songs related to the learning material, explaining learning objectives, exploring students' existing knowledge through appropriate media, engaging students in question-and-answer activities, connecting prior knowledge with new concepts, guiding students in organizing their ideas, encouraging them to express their opinions, facilitating group discussions, supporting students in reflecting on their learning experiences and presenting their reflections, guiding groups in presenting their work, encouraging students to ask questions about difficult concepts, providing exercises to reinforce understanding, and allowing students to summarize the material at the end of each lesson.

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