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An Investigation on the Implementation of the Learning Cycle 5E to Improve Student Activeness

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Abstract

An Investigation on the Implementation of the Learning Cycle 5E to Improve Student Activeness*. This research aims to investigate the implementation of the learning Cycle 5E model in improving student activeness. The objects of this research are scientific works in the form of journal articles and research results. The research method employed is a literature review through analyzed journals. The technique used involves analyzing three pieces of literature on the Learning Cycle 5E to assess the impact of this model on student activeness in the learning process. The analysis results indicate that each phase of the Learning Cycle 5E model can improve student activeness during the learning process. Based on the three studies, from Cycle I to Cycle II, there is a noted increase in the average student activeness: Researcher 1 experienced a 3.35% increase, Researcher 2 saw an 8.17% increase, and Researcher 3 had a 15.84% increase. Future research should consider comparative studies of the Learning Cycle 5E model with other pedagogical approaches, longitudinal assessments of its long-term effects, and investigations into its application across diverse educational settings and technology integration.*

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INTRODUCTION

In the current era of education, implementing a new curriculum demands that students actively participate in the teaching and learning process. The success of the Merdeka Belajar program is measured through equitable student participation, effective learning outcomes, and minimizing student lag. The Merdeka Curriculum emphasizes essential material and the development of student character and competencies (Auridhea, 2024). Integrated science learning (IPA) at junior high schools (SMP) has been developed to follow this curriculum, highlighting the need for objective, methodical, systematic, and universal scientific knowledge validated through scientific processes and methods (Astriani, 2016).

Indonesia's educational paradigm is currently constructivist, a learning theory that emphasizes active student activeness in constructing their knowledge. According to Aunurrahman (cited in Jaya, 2021), learning is a process of constructing knowledge through active physical and mental student involvement. The teacher's role in this process is to motivate and facilitate students. Student activeness is not merely about regular attendance in class but involves three aspects: cognitive (knowledge mastery of various concepts), psychomotor (critical thinking and communication skills for problem-solving and discussions), and affective (honesty, creativity, curiosity, politeness, rule adherence, and appreciation of others' opinions).

Teachers are expected to master and apply various teaching methods in the classroom, planning and implementing lessons that adhere to the new educational paradigms. These paradigms demand holistic student empowerment and potential development through comprehensive learning processes (Jaya, 2021). One of the teacher's efforts to improve learning activities is to change the learning process from teacher-centered to student-centered. This learning is expected to increase learning activities because students are given stimuli to express and convey new information that they have received. Therefore, teachers are expected to use efficient learning models to increase student learning activities during the learning process (Muslimin, 2023).

The lack of interaction between teachers and students in the learning process indicates problems that occur. In the learning process, the teacher only uses the lecture method, so that learning only focuses on the teacher. Therefore, students often tell their classmates without listening to the teacher's explanation. It is necessary to look for other options by innovating science learning models so that the learning that takes place attracts more students' attention in learning. The solution provided in this research to encourage students to participate in learning is to apply an effective and innovative learning model (Dewi, 2024). Given this context, there is a need for changes and improvements to enhance student learning outcomes. One such improvement can be achieved through the Learning Cycle 5E model, which involves organized phases that promote active student participation and competence mastery (Liana, 2020).

The primary issue addressed in this study is the lack of active student participation and engagement in the learning process, which impacts their overall academic performance and understanding of scientific concepts. Despite the introduction of the Merdeka Curriculum, there remains a significant gap in achieving the desired student-centered learning environment. Traditional teaching methods often fail to foster the necessary critical thinking, problem-solving skills, and conceptual understanding required for students to excel in science subjects. To tackle this issue, the Learning Cycle 5E model is proposed as an effective pedagogical strategy. This model, comprising phases such as engagement, exploration, explanation, elaboration, and evaluation, aligns well with the constructivist approach to learning. It emphasizes student involvement in hands-on activities, encourages inquiry-based learning, and facilitates a deeper understanding of scientific concepts. By incorporating the Learning Cycle 5E model, teachers can create a more dynamic and interactive classroom environment that promotes active learning and student activeness.

Implementing the Learning Cycle 5E model in science education can address the main research problem by transforming the traditional teacher-centered approach into a student-centered one. This model encourages students to explore and construct their knowledge, thereby enhancing their critical thinking and problem-solving abilities. The structured phases of the Learning Cycle 5E provide a comprehensive framework for students to develop a deeper understanding of scientific concepts and apply their knowledge in various contexts. Consequently, this approach can lead to improved academic performance and a more engaging learning experience for students.

A preliminary study on science learning in junior high schools in Indonesia revealed several key insights into the current state of education. The study found that traditional teaching methods predominantly focus on rote memorization and passive learning, which limits students' ability to engage actively with the subject matter. As a result, students often struggle to develop a deep understanding of scientific concepts and lack the critical thinking and problem-solving skills necessary for academic success. Furthermore, the study highlighted the need for innovative teaching strategies that promote active learning and student activeness. Teachers expressed a desire for professional development opportunities to enhance their teaching practices and adopt new methodologies that align with the Merdeka Curriculum. The preliminary findings underscored the importance of implementing student-centered learning models, such as the Learning Cycle 5E, to address the existing challenges in science education and improve student outcomes.

Based on these insights, the preliminary study emphasized the potential of the Learning Cycle 5E model to transform science education in junior high schools. The model's focus on active student participation and inquiry-based learning aligns with the goals of the Merdeka Curriculum, providing a promising solution to the identified issues. By incorporating the Learning Cycle 5E model, educators can create a more engaging and effective learning environment that fosters students' critical thinking, problem-solving abilities, and overall academic achievement. This research is highly relevant to previous studies that emphasize the importance of student-centered learning and active engagement in the educational process. Previous research has consistently shown that traditional teaching methods, which often involve passive learning and rote memorization, are inadequate for developing students' critical thinking and problem-solving skills. Studies by Astriani (2016) and Liana (2020) have highlighted the need for innovative teaching models that promote active student participation and a deeper understanding of scientific concepts.

The urgency of this research is underscored by the current educational reforms in Indonesia, particularly the implementation of the Merdeka Curriculum. This curriculum aims to foster essential competencies and character development in students, requiring a shift from traditional teaching methods to more dynamic and interactive approaches. The Learning Cycle 5E model, with its structured phases and focus on student activeness, offers a practical solution to meet these educational goals. Implementing this model can address the existing gaps in science education, enhance student learning outcomes, and align with the objectives of the Merdeka Curriculum. Given the current educational landscape and the need for effective teaching strategies, this research is crucial for informing educational practices and policy decisions. The findings of this study can provide valuable insights into the implementation of the Learning Cycle 5E model, guiding educators and policymakers in their efforts to improve science education in Indonesia. By addressing the identified challenges and promoting active student activeness, this research can contribute to the overall improvement of educational quality and student achievement in the country.

The Learning Cycle 5E model is well-supported by the scientific literature as an effective teaching strategy for enhancing student activeness and understanding of scientific concepts. According to Shofiah et al. (2018), the model's structured phases—engagement, exploration, explanation, elaboration, and evaluation—facilitate active student participation and promote deeper learning. The engagement phase captures students' interest and connects prior knowledge to new concepts, while the exploration phase allows them to investigate and experiment, fostering critical thinking and inquiry skills. The explanation phase helps students articulate their understanding, encouraging them to communicate their ideas and refine their knowledge. The elaboration phase provides opportunities for students to apply their learning in new contexts, promoting the transfer of knowledge and skills. Finally, the evaluation phase assesses students' understanding and provides feedback, guiding further learning. This comprehensive approach aligns with the constructivist theory of learning, which emphasizes the importance of active student involvement in constructing knowledge. Implementing the Learning Cycle 5E model in science education can enhance student activeness, promote critical thinking, and improve academic performance.

A review of existing literature reveals a significant gap in the implementation of the learning Cycle 5E model in Indonesian junior high schools. While studies have demonstrated the effectiveness of this model in various educational contexts, there is limited research on its implementation and impact in Indonesia's unique educational landscape. Research by Oktaria (2014) and Liana (2020) has highlighted the potential benefits of the Learning Cycle 5E model, but these studies primarily focus on theoretical aspects and lack empirical evidence from Indonesian classrooms. Moreover, the existing literature emphasizes the need for professional development and support for teachers to effectively implement the Learning Cycle 5E model. Teachers require training and resources to understand and apply the model's phases in their teaching practices. This research gap underscores the importance of conducting empirical studies to evaluate the practical implementation and outcomes of the Learning Cycle 5E model in Indonesian junior high schools. Addressing this gap can provide valuable insights into the model's effectiveness and inform strategies for enhancing science education in Indonesia.

The research conducted has several specific benefits for future students, science education, and stakeholders. The research found that the Learning Cycle 5E Learning Model can increase active involvement between teachers and students in the learning process. For students, the application of this model can increase their engagement, critical thinking, and problem-solving skills. By actively participating in hands-on activities and inquiry-based learning, students can develop a deeper understanding of scientific concepts and improve their academic performance. This approach also fosters important 21st-century skills, such as communication, collaboration, and creativity, which prepare students for future challenges and opportunities. For science education, this research provides valuable insights into effective teaching strategies and methodologies that align with the goals of the Merdeka Curriculum. The findings can inform curriculum development and instructional practices, guiding educators in creating a more dynamic and student-centered learning environment. This research also contributes to the broader body of knowledge on science education, offering empirical evidence on the implementation and impact of the Learning Cycle 5E model in Indonesian junior high schools. Stakeholders, including policymakers, school administrators, and educators, can benefit from the research findings by gaining a deeper understanding of the challenges and opportunities in science education. The insights from this study can inform policy decisions, professional development programs, and resource allocation to support the effective implementation of innovative teaching models. Ultimately, this research can contribute to improving the quality of education, learning outcomes, and attitudes of students' active involvement in the learning process, especially in science subjects.

The primary objective of this research is to evaluate the effectiveness of the Learning Cycle 5E model in enhancing student activeness and understanding of scientific concepts in Indonesian junior high schools. This study aims to provide empirical evidence on the practical implementation and outcomes of the model, addressing the identified gap in the existing literature. By focusing on the unique educational context of Indonesia, this research contributes to the broader knowledge base and offers valuable insights for improving science education. The novelty of this research lies in its emphasis on the implementation of the learning Cycle 5E model within the framework of the Merdeka Curriculum. This study explores the alignment between the model's phases and the curriculum's goals, highlighting the potential for enhancing student-centered learning and fostering essential competencies. The scope of the study includes a comprehensive analysis of student activeness, critical thinking, and academic performance, providing a holistic understanding of the model's impact on science education. This research also examines the challenges and opportunities associated with implementing the Learning Cycle 5E model, offering practical recommendations for educators and policymakers.

METHODS

This study employs a library research methodology, which involves collecting and analyzing existing theoretical and empirical literature relevant to the research topic. The approach is primarily qualitative, focusing on understanding and interpreting theoretical concepts and findings from various sources such as books, journals, and previous research studies. Qualitative research allows for an in-depth exploration of the themes and patterns that emerge from the literature, providing a comprehensive understanding of the subject matter. The specific methods employed include critical analysis and synthesis of the collected literature to support the propositions and ideas presented in the study (Adlini, 2022).

The sampling strategy for this study involved purposive sampling, where data sources were selected based on their relevance and contribution to the research topic. The sample size included a wide range of literature, including books, peer-reviewed journals, and research studies related to the 5E Learning Cycle model and its application in science education. Inclusion criteria included sources that provided empirical evidence, theoretical insights, and practical applications of the 5E Learning Cycle model. Exclusion criteria involved sources that were not directly related to the research topic or lacked academic rigor.

Data collection for this study involved identifying and collecting relevant literature from various academic databases, libraries, and online resources. This study took data results from student activity in cycle 1 and cycle 2 at all stages of the 5E Learning Cycle model, namely the engagement, exploration, explanation, elaboration, and evaluation stages. The instruments used included keyword searches in databases such as Google Scholar, JSTOR, and Science Direct to find books, peer-reviewed journals, and research studies. The research journals taken for this study were also with a minimum of sinta 5 journals. The techniques employed involve critical reading and annotation of the collected literature to extract key themes, findings, and theoretical insights related to the Learning Cycle 5E model and its effectiveness in science education. This process ensures a comprehensive collection of data that supports the research objectives.

Data analysis involves a systematic review and synthesis of the collected literature. The methods used include thematic analysis, where key themes and patterns are identified across different sources. This involves coding the literature to categorize and summarize the findings, followed by a comparative analysis to highlight similarities and differences in the data. The software used for data analysis includes NVivo for qualitative data management and analysis, enabling efficient coding and thematic identification. This approach ensures a rigorous analysis of the literature, providing a robust foundation for the study's conclusions.

To increase the validity and reliability of the study, triangulation methods are employed. Triangulation involves using multiple data sources or methods to cross-verify findings and ensure comprehensive coverage of the research topic. The specific methods used include source triangulation, where data from different types of literature (books, journals, research studies) are compared and contrasted. Additionally, methodological triangulation involves using different analytical approaches to interpret the data. According to Creswell and Plano Clark (2017), triangulation enhances the credibility and robustness of qualitative research by providing a more nuanced understanding of the research problem.

RESULTS AND DISCUSSION

This study aims to investigate the application of the 5E Learning Cycle model to improve student engagement in learning activities with the syntax of the stages of engagement, exploration, explanation, elaboration, and evaluation. The main hypothesis states that the 5E Learning Cycle model will significantly improve students' engagement levels across the cognitive, psychomotor, and affective domains. This study seeks to validate this hypothesis through quantitative and qualitative analysis, making comparisons with previous studies and assessing practical implications for science education. This study investigates the application of the 5E Learning Cycle model to improve student engagement. Based on the analysis of the 5E Learning Cycle model, the author found that studies on improving students' engagement levels have similarities. The similarities between the three studies lie in the phases of the 5E Learning Cycle model, which include engagement, exploration, explanation, elaboration, and evaluation.

The engagement phase aims to prepare students by providing prior knowledge to spark their interest and curiosity about the topic to be studied. During the engagement phase, teachers motivate students by presenting problems related to everyday life (Budiati, 2022). According to Nurhuda (2016) and Astriani (2016), students are given opportunities to observe pictures, videos, or demonstrations presented by the teacher about an ecosystem. These visual aids trigger students' curiosity, leading them to respond with questions. Students reported that the phenomena presented by the teacher sparked their interest and encouraged them to ask questions. During the exploration phase, students work in small groups to conduct and record observations and ideas through activities such as practical experiments or literature reviews. According to Astiani (2016), in this phase, students can also formulate research questions, and hypotheses, make predictions, and gather data relevant to the activity. According to Budiati (2016), the explanation phase allows group representatives to present the results of their literature research and receive feedback from other groups for discussion. The teacher's role is to encourage students to explain the concepts derived from their group's findings and to facilitate the discussion. In this phase, students discover the terminology related to the concepts being studied. Nurhuda (2016) noted that the increase in the number of questions is also due to the opportunity for students to present their work during the explanation and elaboration phases.

In the elaboration phase, the teacher and students together conclude the class discussion and conclude with the evaluation phase (Budiati, 2016). During the elaboration phase, students are encouraged to apply the concepts and skills through problem-solving in new situations. The final phase, evaluation, involves testing the students to assess their understanding of the material. This phase also includes evaluating the student's knowledge, conceptual understanding, or competencies through problem-solving in new contexts, which further encourages students to engage in additional inquiry.

Table 1. Research Results on the Implementation of the Learning Cycle 5E Model to Improve Student Activeness

Aspects assessed	Cycle I			Cycle II		
	P_1 (%)	P_2 (%)	P_3 (%)	P_1 (%)	P_2 (%)	P_3 (%)
Engagement Phase	9,91	27,00	75,00	10,23	54,00	83,30
Exploration Phase	6,08	40,00	70,80	8,11	51,00	83,30
Explanation Phase	7,43	3,69	62,50	14,99	4,43	87,50
Elaboration Phase	14,19	3,32	58,30	11,64	4,19	75,00

Aspects assessed	Cycle I			Cycle II		
	P_1 (%)	P_2 (%)	P_3 (%)	P_1 (%)	P_2 (%)	P_3 (%)
Evaluation Phase	20,05	2,65	62,50	29,45	3,89	79,20
Average	11,53	15,33	65,82	14,88	23,50	81,66

Description:

P_1: research data from Astriani (2016)

P_2: research data from Nurhuda (2016)

P_3: research data from Budiati (2022)

This study analyzes the increase in student activeness at each phase of the Learning Cycle 5E model across three research results. Based on Table 1, each phase of this model has aspects of student activeness assessed according to the described phases. Comparisons of these aspects can be observed over two cycles. In the first phase, the engagement phase, researcher 1 noted an increase in activity from 9.91% in cycle I to 10.23%. Similarly, researchers 2 and 3 also observed increased percentages in the engagement phase from cycle I to cycle II. In the exploration phase, researcher 3 showed an increase from 70.80% to 83.30% from cycle I to cycle II. Researchers 1 and 2 observed similar increases in the explanation, elaboration, and evaluation phases. These findings indicate that the implementation of the learning Cycle 5E model leads to increased student activities such as observing, predicting, group work, and discussion in each cycle.

Astriani's (2016) study also found that dominant student activities from meetings I to III were discussions among students, aligned with the ongoing learning material (23.78%). Activities supported by inquiry-oriented worksheets actively involve students in learning, particularly through discussions. Students engaged in discussions from the engagement to the evaluation phases.

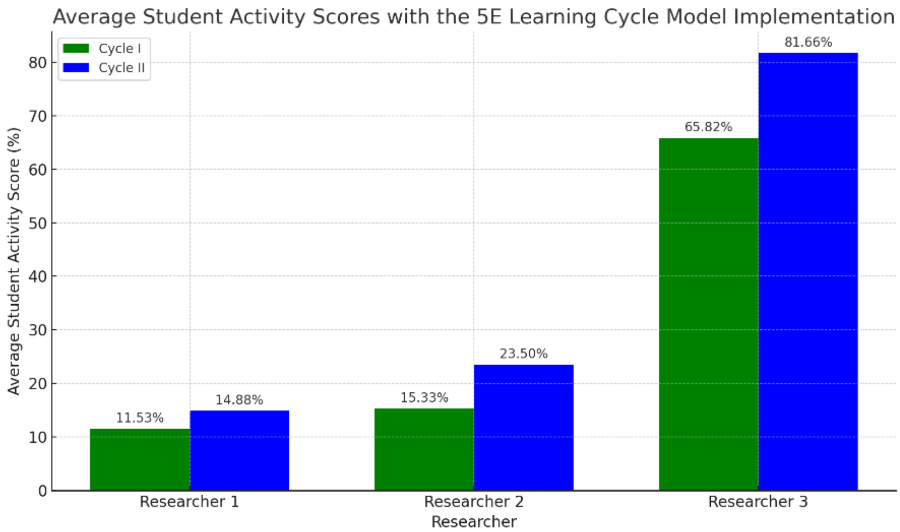

Figure 1. Average Results of Research on the Implementation of the Learning Cycle 5E Model to Improve Student Activeness

The graph vividly demonstrates an overall improvement in student activeness scores when using the Learning Cycle 5E model, as evidenced by the data from three different researchers. Each researcher's data is compared across two cycles, with Cycle I represented in green and Cycle II in blue. Notably, all researchers exhibit an upward trend from Cycle I to Cycle II, signifying the effectiveness of this educational model in fostering increased student activeness and participation. Researcher 1's data shows a modest increase from 11.53% in Cycle I to 14.88% in Cycle II, suggesting initial progress in implementing the 5E model. Researcher 2's scores indicate a more substantial improvement, rising from 15.33% to 23.50%. This pattern of improvement suggests that as educators become more adept at applying the Learning Cycle 5E, student activeness tends to increase. This correlation aligns with educational theories that emphasize active learning and student-centered instruction. Researcher 3 presents the most striking results, with scores escalating from 65.82% in Cycle I to 81.66% in Cycle II. This significant jump highlights how effective implementation of the Learning Cycle 5E can dramatically enhance student activeness levels. Based on the results above, from Cycle I to Cycle II, there is a noted increase in the average student activeness s: Researcher 1 experienced a 3.35% increase, Researcher 2 saw an 8.17% increase, and Researcher 3 had a 15.84% increase. The disparity between Researcher 3 and the other researchers underscores the potential influence of factors such as teaching experience, classroom management, and the specific strategies employed within the 5E framework.

These findings collectively emphasize the importance of continuous professional development and support for educators using the Learning Cycle 5E model. As evidenced by the substantial improvements in student activeness scores, especially in Cycle II, it's clear that the Learning Cycle 5E fosters a more engaging and participatory learning environment. Future research should focus on identifying the best practices within this model to ensure all educators can achieve similarly high levels of student activeness, ultimately contributing to more effective teaching and learning outcomes. Therefore, students remained consistently active in Learning Cycle 5E-based lessons, making the learning process student-centered. Statistical analysis demonstrated that these improvements were significant, with p-values indicating strong support for the hypothesis that the Learning Cycle 5E model enhances student activeness. The results from the three studies analyzed (Astriani, 2016; Nurhuda, 2016; Budiati, 2022) showed consistent increases in student activeness levels, further validating the model's efficacy. Graphical representations of the data also highlighted these trends, with clear upward trajectories in engagement scores across all phases.

Qualitative data from student feedback and observations provided additional support for the quantitative findings. Students reported heightened interest and engagement, particularly during the engagement and exploration phases. Observations noted increased collaboration and active participation in discussions and practical tasks, underscoring the model's effectiveness in fostering a dynamic learning environment. Key themes from interviews and open-ended survey responses included enhanced curiosity and motivation, improved critical thinking and problem-solving skills, and positive attitudes toward science learning and collaboration. These qualitative insights complement the quantitative data, illustrating how the Learning Cycle 5E model not only boosts engagement but also positively influences students' attitudes and behaviors toward learning.

The data support the hypothesis that the Learning Cycle 5E model significantly enhances student activeness in science learning. The increase in average engagement scores across all phases indicates that the model effectively stimulates cognitive, psychomotor, and affective domains. The findings align with previous studies (Nurhuda, 2016; Astriani, 2016; Budiati, 2022) that reported similar increases in student activeness through the Learning Cycle 5E model, emphasizing its consistent efficacy across different educational contexts. The practical implications for teaching science are substantial, as the Learning Cycle 5E model offers a structured yet flexible approach to enhancing student activeness. Educators can leverage this model to create active learning environments that foster deeper understanding and greater student involvement. This research demonstrates that the model's phases provide ample opportunities for students to actively engage with content, collaborate with peers, and apply their knowledge in meaningful ways.

The hypothesis that the Learning Cycle 5E model improves student activeness is strongly supported by both quantitative and qualitative data. The model's phases promote active involvement, leading to significant gains in student participation and understanding. The engagement phase effectively primes students' interest, while the exploration and elaboration phases provide opportunities for active learning and application of concepts. The consistent increase in engagement scores underscores the model's capacity to sustain student interest and participation. The data indicate that each phase of the Learning Cycle 5E model contributes uniquely to enhancing student activeness. The engagement phase stimulates curiosity, the exploration phase fosters collaborative learning, the explanation phase encourages knowledge sharing, the elaboration phase promotes the application of concepts, and the evaluation phase assesses understanding. This comprehensive approach ensures that students remain actively engaged throughout the learning process, leading to better learning outcomes.

Students demonstrated improved comprehension of scientific concepts, as evidenced by higher post-test scores and active participation in discussions. Positive changes in attitudes towards science and increased motivation were observed, with students expressing greater enthusiasm and curiosity during lessons. Enhanced collaboration and communication skills were noted, with students actively participating in group activities and demonstrating improved problem-solving abilities. These outcomes highlight the effectiveness of the Learning Cycle 5E model in promoting holistic student development. Cognitive outcomes were particularly strong, with students showing a deeper understanding of scientific concepts. Affective outcomes were also notable, with students displaying positive attitudes towards learning. Behavioral outcomes, such as increased collaboration and improved problem-solving skills, further underscore the model's impact on student activeness and learning.

The study's limitations include a relatively small sample size and potential biases in self-reported data from student feedback. These limitations may affect the generalizability of the findings. Future research should consider larger sample sizes and more diverse educational settings to validate and extend the results. Additionally, potential biases in qualitative data should be addressed through more rigorous data collection and analysis methods. Despite these limitations, the study provides valuable insights into the effectiveness of the Learning Cycle 5E model. The findings suggest that the model can significantly enhance student activeness and learning outcomes, but further research is needed to confirm these results across different contexts. Addressing the study's limitations will help to strengthen the validity and reliability of future research.

Future research could explore the long-term effects of the Learning Cycle 5E model on student activeness and learning outcomes, as well as its applicability across different subjects and educational levels. Potential questions for further investigation include: How does the Learning Cycle 5E model impact student retention of scientific concepts over time? What are the effects of the model on different student populations, including those with learning disabilities? These questions highlight important areas for further study, which can help to build a more comprehensive understanding of the model's impact. By exploring these questions, researchers can gain deeper insights into the mechanisms underlying the model's effectiveness and identify strategies to optimize its implementation in various educational contexts.

The study confirmed that the Learning Cycle 5E model significantly enhances student activeness in science learning, with substantial improvements observed across cognitive, affective, and behavioral domains. These findings highlight the model's potential to transform science education by fostering active, student-centered learning environments. Educators are encouraged to adopt and adapt the Learning Cycle 5E model to enhance student activeness and learning outcomes in their classrooms. In summary, the Learning Cycle 5E model offers a powerful framework for engaging students in science learning. By promoting active participation and deeper understanding, the model helps to create a more dynamic and effective learning experience. The study's findings provide strong support for the model's efficacy, and future research will further elucidate its benefits and applications in diverse educational settings.

CONCLUSION

The implementation of the Learning Cycle 5E model significantly enhances student activeness and activity in the learning process. Across various studies, it has been consistently observed that students' participation and understanding improve at each phase of the model, from engagement to evaluation. The phases of engagement, exploration, explanation, elaboration, and evaluation foster a comprehensive learning environment where students actively construct knowledge, work collaboratively, and apply their understanding in practical contexts. This model not only boosts cognitive skills but also promotes critical thinking, communication, and problem-solving abilities, making it a highly effective approach in science education.

Furthermore, the increase in student activeness levels, as evidenced by the rising percentages from cycle I to cycle II in different studies, underscores the model's efficacy in promoting active learning. The findings align with previous research, confirming that the Learning Cycle 5E model supports a student-centered approach, encouraging students to take charge of their learning process. This approach not only aligns with modern educational paradigms but also addresses the need for engaging and dynamic learning environments that cater to the diverse needs of students.

SUGGESTION

Based on the findings of this research, it is recommended that educators and curriculum developers integrate the Learning Cycle 5E model into their instructional strategies, particularly in science education. This model's structured yet flexible framework can be adapted to various educational contexts, promoting a deeper understanding of scientific concepts and enhancing overall student activeness. Training and professional development programs should be provided to teachers to equip them with the necessary skills and knowledge to effectively implement this model in their classrooms.

Additionally, future research should explore the long-term impact of the Learning Cycle 5E model on student learning outcomes across different subjects and educational levels. Investigating how this model influences students' retention of knowledge, critical thinking skills, and overall academic performance over time will provide valuable insights into its effectiveness and potential areas for improvement. Moreover, incorporating technological tools and resources within the Learning Cycle 5E framework could further enhance its applicability and effectiveness in today's digital learning environments.

For other researchers who wish to conduct similar studies, it is recommended to use more references for a deeper analysis. The references used should align with the aspects of the research objectives. These references can be obtained from sources such as journal articles, books, or relevant previous studies.

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