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Implementation of the Nested Integrated Learning Model in IPAS Material for 4th Grade

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Abstract

This study explores the Nested Integrated Learning Model as part of the Fogarty approach and its application in teaching Natural Sciences and Social Studies (IPAS) within the context of the independent curriculum. The primary focus is to analyse the impact of this model on students' comprehension, utilising the Classroom Action Research (CAR) method across multiple cycles. The research findings indicate that the nested integrated learning model positively influences students' understanding of IPAS subjects. The hierarchical and nested approach in delivering the content provides a more in-depth understanding. The study also highlights the crucial role of collaboration among teachers in effectively implementing this model. This research contributes to our understanding of the effectiveness of the Nested Integrated Learning Model, particularly in enhancing students' comprehension of interdisciplinary concepts. Practical implications include the potential adoption of this model within the independent curriculum at the elementary school level. By strengthening the empirical foundation, this research can serve as a guide for educational practitioners and policymakers in designing a curriculum that is holistic and relevant to student's development in the current educational landscape.

Keywords: Integrated learning, Nested, IPAS

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INTRODUCTION

Science and Social Studies (IPAS) is a field of study that examines living and non-living things in the universe and their interactions. It also explores human life as both individuals and social beings interacting with their environment. In general, knowledge is defined as the combination of various logically and systematically organised information, considering cause and effect. (Agustina et al., 2022). This knowledge encompasses natural and social sciences. IPAS education plays a vital role in realising the *Pancasila Student Profile*, an ideal representation of Indonesian students.

IPAS helps students develop curiosity about phenomena in their surroundings. This curiosity can lead students to understand how the universe operates and interacts with human life on Earth. Such understanding can be utilised to identify challenges and devise solutions to achieve sustainable development goals. Basic principles of scientific methodology in IPAS learning cultivate scientific attitudes (high curiosity, critical thinking, analytical ability, and drawing accurate conclusions), fostering wisdom in students. (Budiwati et al., 2023).

As a country rich in culture and local wisdom, Indonesia's IPAS curriculum aims to encourage students to explore local knowledge related to IPAS and apply it to problem-solving. Therefore, the main focus of IPAS learning in elementary schools is not merely

the amount of content students can absorb but rather the extent to which students can use their knowledge effectively. Considering that elementary school students view everything concretely, holistically, and integratively, science and social studies have been simplified into one subject: IPAS. This approach also accommodates their stage of concrete thinking, holistic comprehension, and simplicity.

To enhance the effectiveness of IPAS learning, implementing an integrated learning model is an essential aspect to consider. One promising model is the *nested* integrated learning model, which emphasises cross-disciplinary integration. This approach significantly benefits the creation of more cohesive and relevant learning experiences for students. The nested integrated learning model highlights the interconnection of subjects, enabling students to see relationships between concepts and their applications in real-life contexts. By integrating various disciplines, students can develop a deeper and more contextual understanding of the material.

A key advantage of this approach is providing students with a broader context. They not only learn isolated facts but also understand how knowledge from different fields complements each other to form a more comprehensive picture. For example, when discussing environmental issues, students can integrate knowledge from natural sciences, economics, and sociology for a holistic understanding. Moreover, the nested model fosters cross-disciplinary skills, such as problem-solving, critical thinking, and collaboration. Students are encouraged to connect concepts across subjects, stimulating comprehensive cognitive development. (Marwa et al., 2023).

However, implementing this model can be challenging, requiring collaboration among teachers from various disciplines and integrated curriculum planning. Despite these challenges, the potential benefits of better conceptual understanding, increased motivation, and 21st-century skills development make the nested model an attractive alternative for more effective and relevant learning. By focusing on interconnection, this model prepares students to tackle real-world complexities with a more profound understanding.

In the context of globalisation, the demand for cross-disciplinary skills has become increasingly critical. Modern society faces complex and dynamic challenges, requiring individuals with not only deep expertise in specific fields but also the ability to think critically and creatively and apply their knowledge holistically. The importance of cross-disciplinary skills reflects a paradigm shift in education. Traditional models that isolate subjects are no longer sufficient. Instead, education must adopt learning models that promote knowledge integration across disciplines, fostering environments that support 21st-century skill development.

This approach can be realised through integrated curricula, cross-disciplinary collaborative projects, and an emphasis on critical and creative thinking development. Teachers should act as learning facilitators, encouraging students to connect concepts across subjects. Additionally, technology can serve as an effective tool for supporting cross-disciplinary learning, integrating resources from various fields, and providing students access to explore topics with cross-subject relevance.

By adopting models emphasising cross-disciplinary skills, education can better prepare graduates to face the complex and unpredictable challenges of the future. Students trained with this approach are expected to become innovators, problem solvers, and leaders capable of adapting to changes in society and the global workforce. Thus, education has a strategic role in shaping human resources relevant to and prepared for the dynamics of globalisation. (Wijayanti & Ekantini, 2023).

The Fogarty integrated learning model, designed by James R. Fogarty, emerges as an innovative and appealing approach to education. This approach emphasises the integration of concepts from various subjects to create a holistic and relevant learning experience for students. Teachers are invited to connect different disciplinary concepts

naturally through curriculum design that focuses on themes or topics that can link various subjects, creating a cohesive context. Guiding questions become a key element in designing this integrated curriculum, such as questions about how concepts from different subjects can be integrated and how the theme can motivate students to learn more deeply. Collaboration among teachers is also very important in this model, as it allows for a comprehensive learning experience and avoids fragmented learning. In this model, assessment plays a crucial role in evaluating students' understanding of cross-disciplinary concepts and their ability to apply that knowledge in different contexts. Additionally, active and authentic learning is another pillar of this model, where students are not just listening to the teacher's explanations but also engaging in challenging projects or tasks that require deep understanding and the application of these concepts in real-life situations. (Sardjo et al., 2017).

In addition to the Fogarty integrated learning model, there is also the nested integrated learning model, which uses a hierarchical or nested structure in delivering content. In this model, concepts or learning topics are presented in depth, with one concept situated within the context of another. This nested integrated learning model aims to create a learning structure that allows students to understand concepts as part of a more complex system. Basic concepts may be presented at the outer level, while more complex concepts are nested within. One of the advantages of this model is its ability to provide students with a deeper understanding, as they can see how concepts are interconnected and form a larger framework of knowledge. In its implementation, this model encourages students to think contextually and recognise the interrelationships between concepts, thereby expanding their understanding. Collaboration among teachers is key in this model, as it ensures that the nested integrated curriculum can be applied consistently and coherently across all levels of education.

In the context of the Merdeka Curriculum, the subjects of Natural Science (IPA) and Social Science (IPS) have been combined into one subject known as Integrated Natural and Social Science (IPAS). The IPAS subject explores living organisms, inanimate objects, and their interactions with the universe while also studying human life as individuals and social beings interacting with their environment. With the combination of these two subjects, IPAS has new goals, including fostering students' curiosity about natural and social phenomena, introducing the interactions that occur in the universe and between humans and the environment, and training students to identify problems and find solutions. This subject also aims to develop students' scientific attitudes, emphasising high curiosity, critical thinking, and analytical skills while equipping students with knowledge and skills to actively participate in preserving the environment and nature. (Sardjo et al., 2017).

The elements of IPAS learning include an understanding of science and social concepts, focusing on facts, principles, theories, and models established by scientists. Additionally, process skills such as diagnosing situations, formulating problems, critiquing, and experimenting are also important parts of IPAS learning. By combining both fields of knowledge, students can learn about the natural world and their social lives simultaneously, providing them with a more comprehensive understanding of the world around them and the relationships between nature and humanity.

Research reveals that the nested integrated learning model can help students develop a deeper understanding of IPAS concepts and encourage higher-order thinking skills. This study aims to fill the gap in knowledge and contribute to elementary-level educational development.

The study investigates the effectiveness of the nested integrated learning model in teaching Science and Social Studies to 4th-grade students. The research employs an experimental design, with a control group receiving conventional learning and an experimental group applying the nested integrated learning model.

The study's objectives are to assess the model's effectiveness in improving conceptual understanding of IPAS and analyse students' responses to its implementation. By applying the nested integrated learning model to 4th-grade IPAS material, the study hopes to contribute significantly to improving elementary-level education quality. Integrating concepts from various disciplines is expected to help students develop a more holistic and profound understanding of IPAS material.

Furthermore, this research aims to identify the strengths and challenges of the nested integrated learning model, serving as a foundation for future educational model development. Thus, this study not only contributes to understanding IPAS concepts at the elementary level but also establishes a basis for developing innovative and relevant education in line with current demands.

METHODS

In this study, the method chosen is Classroom Action Research (CAR), conducted through several cycles. CAR is a research approach designed to improve the quality of learning through iterative actions within specific cycles. This method is considered suitable for the classroom context, where changes and improvements can be directly observed.

The data collection instruments used include classroom observations, interviews, and student comprehension tests. Classroom observations were conducted to monitor the learning process, student participation, and interactions between teachers and students. Interviews were carried out to gather direct insights from teachers regarding the implementation of the nested integrated learning model and students' responses to the learning activities. Student comprehension tests were utilised as tools to measure the extent to which students understood IPAS (Integrated Natural and Social Sciences) concepts after the implementation of the nested integrated learning model.

The data analysis process involved two aspects: qualitative and quantitative analysis. Qualitative analysis was used to explore in-depth understanding from classroom observations and interviews. This included identifying patterns and findings and interpreting the meaning of the collected data. Meanwhile, quantitative analysis was applied to the data from student comprehension tests to produce numbers or statistics that reflect students' level of understanding in numerical terms. (Sugiyono, 2013).

By using the CAR method and a combination of data collection instruments and holistic analysis, this research is expected to provide an in-depth understanding of the effectiveness of the nested integrated learning model at the fourth-grade level. The results of this analysis will serve as a foundation for evaluating and refining the implementation of the nested integrated learning model to impact IPAS learning at MI Ma'arif NU Penaruban positively.

RESULTS & DISCUSSION

Results

In this study, the Classroom Action Research (CAR) method with several cycles was implemented to evaluate the application of the nested integrated learning model in Natural Science (IPAS) instruction for fourth-grade students at MI Ma'arif NU Penaruban. This method was chosen to provide a comprehensive overview of the changes occurring during the learning process.

1. First Cycle (Planning and Implementation)

The first cycle focused on planning and implementing the nested integrated learning model in Natural Science (IPA) instruction for the fourth grade. Three main topics covered included "What is matter?", "What are the forms of matter?" and "How does matter change its form?". The initial competencies expected were recognising matter and its characteristics, studying the characteristics of forms of matter, and understanding how changes in the forms of matter occur.

From the observations, it was evident that adjustments to the new learning model occurred during the learning process. The interaction between teachers and students was less effective as students were still trying to adapt to the new nested model. This was due to the students' prior habits of engaging only with monotonous teaching methods, such as lectures or conventional discussions.

Challenges included students' initial lack of understanding of the nested integrated learning model. Over time, students were expected to become more familiar and comfortable with this new approach. Thus, improvement and adjustment steps during the cycle were crucial for enhancing the effectiveness of learning.

The researcher, as the implementer of the learning process, considered additional strategies to help students overcome their initial discomfort, such as providing supplementary resources, clarifying concepts, or involving students in practical activities that support the taught concepts.

Additionally, the researcher documented students' responses and experiences during the learning process, which served as valuable evaluation tools for further refining this learning model. By focusing on adjustments and development during the first cycle, the effectiveness of interactions during learning could be improved, ensuring better concept comprehension among students.

2. Second Cycle (Adjustment and Improvement)

In the second cycle, adjustments and improvements to the nested integrated learning model were made based on reflections from the previous cycle. The teacher responded to observation results by developing better strategies to integrate cross-disciplinary concepts and tailoring the learning approach to students' needs.

Evidence of the effectiveness of these adjustments was observed in the students' comprehension test results at the end of the second cycle. Quantitative data showed an increase in the average scores of students' comprehension of Natural Science (IPA) material. Table 1. illustrates the quantitative data from the students' comprehension tests at the end of the second cycle.

The improvement in students' comprehension could be attributed to changes in teaching approaches, the provision of more relevant learning materials, or the use of evaluation methods better suited to students' needs. This success reflects the positive outcomes of the adjustment strategies implemented by the teacher.

The second cycle also provided opportunities to continue collecting feedback from students and observe positive impacts or changes in their learning motivation. This evaluation could serve as a basis for further adjustments or development of the nested integrated learning model in the future.

Table 1. Results of Comprehension Tests

Name	Initial Score	Final Score	Improvement
S1	75	90	15
S2	80	88	8
S3	65	75	10
S4	70	82	12
S5	72	92	20
S6	68	78	10
S7	85	94	9
S8	75	85	10
S9	78	88	10
S10	90	95	5
S11	72	80	8
S12	85	92	7
S13	70	78	8
S14	88	96	8

3. Next Cycle: Consolidation and Evaluation

The subsequent cycle, the Consolidation and Evaluation stage, focused on maintaining the improvement in students' comprehension and evaluating the effectiveness of the nested integrated learning model. Consolidation activities involved students in group discussions and practical experiments to support their understanding of Natural Science concepts. Meanwhile, the evaluation of the learning model was conducted through feedback from teachers and students, classroom observations, and monitoring students' comprehension through formative tests.

Further adjustment plans were developed based on evaluation results, including additional strategies and relevant changes in approaches. Parental involvement and engagement with other stakeholders were also encouraged through open communication and meetings to support the implementation of the nested integrated learning model.

Data analysis combining qualitative and quantitative approaches showed significant improvements in students' understanding of Natural Science (IPAS) concepts. The results of students' comprehension tests across cycles indicated clear progress, reflecting the effectiveness of the nested integrated learning model in transferring conceptual knowledge.

General findings suggested that the nested integrated learning model encouraged increased student motivation. Through a more interactive and contextual approach, students became more engaged in the learning process, enhancing their interest in the subject matter. This was evident from students' positive responses to learning activities that included creative and exploratory tasks.

The data also showed that students experienced the development of higher-order thinking skills, including analysis, synthesis, and evaluation abilities. The nested integrated learning model provided opportunities to connect concepts from various disciplines, stimulating critical thinking and helping students develop a deeper understanding.

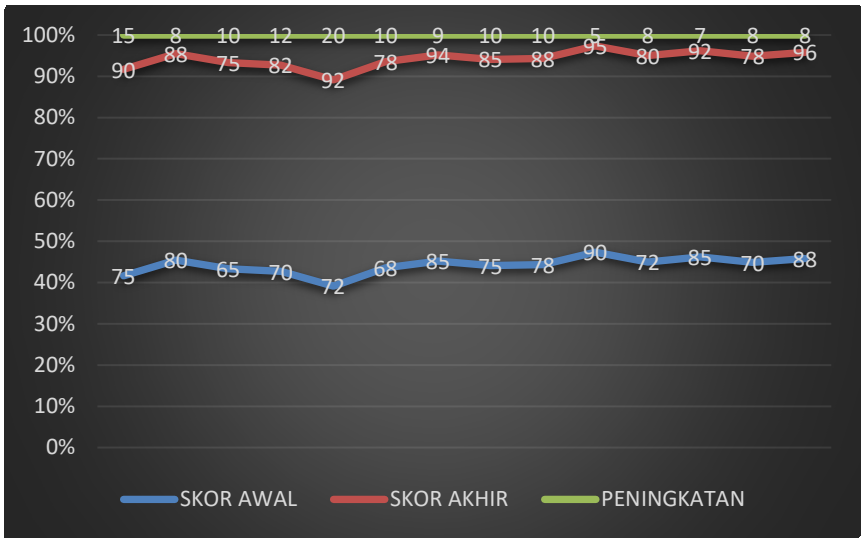

Figure 1. Data Graphics

A comparison graph of students' test scores from cycle to cycle provides concrete evidence of a significant improvement. This quantitative data visualises the positive changes in students' understanding of IPAS material as the implementation of the nested integrated learning model progresses.

Positive feedback from both students and teachers regarding the nested integrated learning approach was also recorded in reflection notes and interviews. Students expressed enthusiasm and satisfaction with the more engaging and meaningful learning experiences, while teachers reported improvements in student engagement and a more dynamic classroom atmosphere.

Through a combination of qualitative and quantitative data analysis and concrete evidence, these findings support the successful implementation of the nested integrated learning model in enhancing students' understanding, learning motivation, and higher-order thinking skills in science education.

Discussion

The Fogarty Integrated Learning Model and the Nested Integrated Learning Model both offer approaches that focus on integrating various subjects in the learning process. The Fogarty Model, designed by James R. Fogarty, emphasises the merging of concepts from relevant disciplines to create a holistic and contextual learning experience. This approach encourages students to see the connections between different concepts and apply them in real-life situations. In its development, Fogarty emphasises the importance of collaboration among teachers to create coherent and integrated learning experiences, allowing students to understand the relationships between subjects, which enriches their understanding. (Priscylio & Anwar, 2019).

Meanwhile, the Nested Integrated Learning Model, which is also rooted in the concept of integrated learning, emphasises the use of nested or hierarchical structures in delivering material. In this model, learning concepts are arranged in a way that they are interconnected, facilitating students to develop a deeper and more comprehensive understanding of a topic. This model encourages students to think contextually, understand the relationships between different concepts being taught, and apply them in their daily lives. This concept aligns with the principles of constructivism, which emphasise the

importance of active learning based on students' experiences. (Asmar & Suryadarma, 2021).

Experts' theories also provide a strong foundation for the implementation of these integrated learning models. Jean Piaget, a prominent cognitive psychologist, argued that children's cognitive development occurs in structured stages. Piaget's theory emphasises the importance of direct experiences in learning and how children build their understanding of the world through interaction with their surrounding environment. In the context of integrated learning, this model provides space for students to connect concepts from various disciplines through real-life experiences that are relevant to their lives, enriching their knowledge construction process according to their cognitive developmental stages.

Lev Vygotsky, known for his social development theory, also made significant contributions to understanding learning dynamics in a social context. Vygotsky argued that learning occurs through meaningful social interactions. The Zone of Proximal Development (ZPD) is a space where students can maximise their potential with the right guidance from teachers or peers. In the integrated learning model, collaboration between teachers and students, as well as collaboration among students themselves, becomes a crucial aspect for achieving a deeper and more comprehensive understanding. This collaboration can create meaningful social interactions, which in turn encourages students to think more critically and creatively when linking the concepts they are learning. (Vigotsky et al., 2018).

In this study, the importance of integrating various subjects to create a comprehensive learning experience aligns with the constructivist principles outlined by Piaget and Vygotsky. The Nested Integrated Learning Model, with its hierarchical structure, provides opportunities for students to organise and link their knowledge in a more structured way while still allowing for the flexible and applicable development of understanding. This concept provides a solid foundation for applying learning that is more contextual, interdisciplinary, and relevant to students' real lives, in line with the development of modern educational theories that emphasise context- and experience-based learning. (Astriani, 2020).

The implementation of this model in teaching Natural Science and Social Studies (IPAS) within the Merdeka Curriculum is also in line with the philosophy of education that emphasises integrated and contextual learning. IPAS learning, which combines scientific knowledge with social skills, offers students the opportunity to develop higher-order thinking skills, such as analysis, synthesis, and evaluation, which align with the goals of 21st-century education. Thus, the Nested Integrated Learning Model can serve as an effective tool to enhance students' understanding of IPAS concepts in a holistic and applicable way. (Bahri et al., 2020).

Overall, this study demonstrates that the Nested Integrated Learning Model, combined with active and collaborative approaches, not only enhances students' understanding of the material being taught but also fosters the development of critical thinking and social skills. The concepts taught are not only understood in the context of individual disciplines but also relation to students' everyday lives, creating learning that is more relevant and meaningful. This research makes an important contribution to the development of a more holistic and integrated curriculum and teaching methods, which can be adapted in various educational contexts, particularly in the implementation of the Merdeka Curriculum. (Alimuddin, 2023).

Continuing the discussion, this study also highlights the crucial role of teachers in implementing the integrated learning model, especially the Nested Integrated Learning Model. Teachers play a central role in facilitating meaningful learning, both in traditional contexts and in more integrated learning. In the integrated learning model, teachers are not only information providers but also facilitators who guide students in connecting various

concepts and creating relationships across disciplines (Bandura, 1989). This aligns with constructivist learning theory, which emphasises that knowledge is not passively received but constructed through social interaction and meaningful experiences.

Collaborative approaches among teachers also become one of the main advantages of this model. Collaboration among teachers can enrich students' learning experiences. In the context of the Nested Integrated Learning Model, this collaboration enables the integration of various perspectives from different subjects so that students not only learn concepts within the boundaries of one subject but understand those concepts in a broader context. For example, in IPAS learning, students can study natural phenomena not only from a scientific perspective but also from social, economic, and cultural perspectives, allowing them to see problems more comprehensively. (Devi et al., 2023).

Additionally, the Nested Integrated Learning Model emphasises developing higher-order thinking skills (HOTS), which align with the demands of 21st-century education. Critical, creative, and analytical thinking skills are crucial for preparing students to face an increasingly complex world. As explained by Anderson and Krathwohl in the revised Bloom's taxonomy, learning that focuses on higher-order thinking skills helps students analyse, evaluate, and create new ideas. In the Nested Integrated Learning Model, students are encouraged to think more deeply and comprehensively, not only understanding basic concepts but also linking them to broader concepts. (Ulfah & Arifudin, 2023).

One important aspect is the assessment in the Nested Integrated Learning Model. Assessment in the context of integrated learning not only focuses on measuring students' understanding of the concepts taught but also on their ability to integrate and apply knowledge in real-world situations. Authentic assessment, which involves projects or tasks based on real-life contexts, helps students better understand the importance of the concepts they learn and how those concepts are applied in the real world. This authentic assessment can provide a more accurate picture of students' understanding and skills compared to traditional assessments that only measure students' ability to recall information. (Fadlilah & Nasrudin, 2020).

Along with the development of the Merdeka Curriculum, which emphasises more flexible and competency-based learning, the Nested Integrated Learning Model can be an effective choice to create more holistic and relevant learning. The Merdeka Curriculum prioritises the development of character, skills, and continuous knowledge, all of which can be strengthened through an integrated and contextual learning approach. Thus, this model can play a significant role in addressing current educational challenges, such as the fragmentation of subjects, and creating more comprehensive learning experiences for students.

Moreover, the Nested Integrated Learning Model provides a foundation for the development of learning based on life values. As Kohlberg explained, the development of morals and character in students can be influenced by how they perceive the relationships between various concepts they learn. By connecting different disciplines through an integrated approach, students gain not only academic knowledge but also values that can be applied in their everyday lives, such as cooperation, ethics, and social responsibility. (Kohlberg, 1966). This learning model allows students to understand that knowledge is not separate from their social and cultural contexts, which in turn can help them develop better character.

Finally, the implementation of the Nested Integrated Learning Model in the context of IPAS within the Merdeka Curriculum not only creates more engaging and relevant learning experiences but also can increase student motivation. Intrinsic motivation in students can be enhanced when they feel that the learning they undergo is directly related to their experiences and interests. Integrated learning, which involves various subjects and

real-life contexts, can spark students' curiosity, encouraging them to delve deeper and actively participate in the learning process (Gitadewi et al., 2022).

Overall, this research provides a significant contribution to the development of more holistic and relevant education, proposing the Nested Integrated Learning Model as an approach that can be adopted in elementary school curricula. With an emphasis on collaboration among teachers, integrating cross-disciplinary concepts, and contextual learning experiences, this model has the potential to improve students' understanding, higher-order thinking skills, and motivation to learn. The findings of this research can serve as a foundation for more effective educational policies that can address the challenges of 21st-century education and create a generation better prepared for the future.

CONCLUSION

This study delves into the nested integrated learning model, an integral part of Fogarty's Integrated Learning Model, and its impact on learning Natural and Social Sciences (IPAS) within the context of the Kurikulum Merdeka. Fogarty's integrated learning approach emphasises the integration of learning concepts across subjects, creating holistic and relevant learning experiences for students. Teachers are encouraged to pose guiding questions that lead to concept integration, and collaboration among teachers is prioritised to prevent fragmented learning. The nested integrated learning model, as part of Fogarty's approach, adopts a nested or hierarchical structure in delivering material. Its strength lies in its ability to provide a deeper understanding to students by presenting material within a nested structure. Teacher collaboration is key to effectively implementing this model, ensuring consistency and coherence in the learning approach. The results of the study, using the Classroom Action Research (CAR) method, show that the nested integrated learning model successfully improves students' understanding of IPAS material. The planning and implementation processes involved collaboration with teachers, with necessary adjustments made during the learning process, showing a significant increase in students' understanding of test scores. The consolidation and evaluation stages confirmed that this model can sustain and continue to enhance students' understanding. Student engagement in the learning process, in line with active learning and constructivist theories, is a primary focus. The nested integrated learning model creates an environment that encourages students to think critically, ask questions, and connect learning concepts contextually. This aligns with the principles of experts such as Jean Piaget and Lev Vygotsky, who proposed theories of constructivism and cognitive development. Overall, this research provides a significant contribution to understanding the effectiveness of the Nested Integrated Learning Model in enhancing students' comprehension of IPAS concepts. Its practical implications include the potential adoption of this model within the Kurikulum Merdeka in elementary schools, guiding education practitioners and policymakers in designing a more holistic and relevant curriculum for student development in today's educational era.

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