The Influence of the Deep Learning Approach on Responses and Participation in the Learning of Natural and Social Sciences for Fifth Grade in Elementary School

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ABSTRACT

This study aims to determine the effect of the deep learning approach on students' responses and participation in natural and social sciences learning at the elementary school level and to identify the magnitude of its effect. This research employed a quantitative approach using a quasi-experimental method with a nonequivalent control group design. The research subjects consisted of two classes, namely an experimental class that implemented the deep learning approach and a control class that applied conventional learning. Data were collected through a students' response and participation questionnaire, and data analysis was conducted using statistical tests with the assistance of SPSS software. The results indicated that the implementation of the deep learning approach had a significant effect on students' responses and participation in natural and social sciences learning, as evidenced by a significance value (Sig. 2-tailed) of less than 0.05, leading to the rejection of H_0 and acceptance of H_a. Furthermore, students in the experimental class demonstrated higher levels of response and participation compared to those in the control class. Therefore, it can be concluded that the deep learning approach is effective in improving students' responses and participation in natural and social sciences learning at the elementary school level.

Keywords: Deep Learning, Natural and Social Sciences, Student Participation, Student Response, Elementary School

INTRODUCTION

Education plays a fundamental role in shaping human resources and preparing individuals to face increasingly complex global challenges. Through education, students are not only expected to acquire knowledge but also to develop critical thinking skills, creativity, and the ability to adapt to rapid changes in science and technology. In this context, the quality of the learning process becomes a key factor in determining educational success. One of the important indicators of effective learning is the level of students' responses and participation during classroom activities.

Educational staff are members of the community who are appointed to support the teaching and learning process. Educational staff in the elementary school environment include: the Principal, Teachers, and School staff or employees who play a role in the school environment in administrative activities and other activities carried out by the school (Lativa Qurrotaini, 2021).

Students' responses and participation reflect their active involvement in the learning process, encompassing cognitive, emotional, and behavioral dimensions. Active participation allows students to engage in meaningful learning, construct their own understanding, and interact with both teachers and peers. Conversely, low participation often indicates that learning is not optimally engaging, which can negatively affect students'

understanding and academic achievement. Therefore, increasing students' responses and participation is a critical concern in improving the quality of education, particularly at the elementary school level.

In the context of Natural and Social Science (IPAS) learning, which integrates scientific concepts with real-life social phenomena, active student engagement is especially important. IPAS requires students not only to understand theoretical concepts but also to apply them in real-world contexts through observation, analysis, and problem-solving. However, in practice, many classrooms still experience challenges related to low student participation. Students tend to be passive, less involved in discussions, and show limited initiative in completing learning tasks such as worksheets or group activities.

Several studies have identified that these issues are often caused by external factors, including the use of teacher-centered instructional methods, monotonous learning activities, and a lack of stimulating learning environments (Santosa & Us, 2016). Such conditions reduce students' motivation and limit their opportunities to actively engage in the learning process. As a result, students may rely more on memorization rather than developing a deeper understanding of the subject matter. This situation highlights the need for innovative instructional approaches that can foster active learning and meaningful engagement.

One approach that has gained significant attention in recent years is deep learning. Unlike surface learning, which focuses on memorization, deep learning emphasizes the development of meaningful understanding, critical thinking, and the ability to connect new knowledge with prior experiences. It encourages students to analyze information, reflect on their learning, and apply knowledge in various contexts (Diputera et al., 2024). This approach is considered highly relevant to the demands of 21st-century education, which require students to possess higher-order thinking skills and lifelong learning abilities.

The implementation of deep learning can be facilitated through various student-centered strategies, such as project-based learning, inquiry-based learning, case studies, and real-life simulations. These methods provide opportunities for students to actively participate in the learning process, collaborate with peers, and solve authentic problems. In IPAS learning, for example, students can explore environmental issues, conduct simple experiments, or develop solutions to real-world problems, thereby making learning more meaningful and engaging.

Previous research has demonstrated the positive impact of deep learning on students' engagement and participation. Nurhadi et al. (2020) found that this approach encourages students to be more active in discussions and enhances their critical thinking skills. Similarly, Wijaya and Lestari (2019) reported that the application of deep learning in elementary science learning significantly improves students' cognitive, emotional, and behavioral involvement. Despite these promising findings, studies focusing specifically on the influence of deep learning on students' responses and participation in integrated IPAS learning at the elementary level remain limited.

This gap indicates the need for further investigation to better understand how deep learning can be effectively implemented to improve student engagement in IPAS classrooms. Therefore, this study aims to analyze the effect of the deep learning approach on students' responses and participation in IPAS learning at the elementary school level. The findings of this study are expected to contribute to the development of more effective and engaging instructional practices, particularly in fostering active student participation and improving learning outcomes.

LITERATURE REVIEW

Learning Approach and Deep Learning Concept

Education plays a crucial role in developing human resources and improving the quality of a nation. In Indonesia, educational reforms continue to evolve, particularly with the implementation of the Merdeka Curriculum, which emphasizes flexibility, student-centered learning, and the development of 21st-century

competencies (Setiawan et al., 2022; Kurniati, 2022). In this context, the selection of an appropriate learning approach becomes essential to support effective teaching and learning processes.

A learning approach refers to the overall perspective or framework used by teachers in organizing instructional activities to facilitate students' understanding (Anjani et al., 2020). Traditional teacher-centered approaches tend to position students as passive recipients of information, limiting their opportunities to think critically and actively participate (Prasetyo, 2021). Therefore, there is a growing need to shift toward more student-centered approaches that encourage active engagement and meaningful learning experiences.

One such approach is deep learning, which focuses on developing a thorough understanding of subject matter rather than mere memorization. Deep learning emphasizes meaningful learning experiences, where students actively engage cognitively and emotionally in constructing knowledge. It also encourages reflection, critical thinking, and the integration of new knowledge with prior experiences (Ragoonaden, 2015; Putri, 2024).

Characteristics and Aspects of Deep Learning

Deep learning is characterized by several key aspects that reflect meaningful learning processes. According to Biggs et al. (2011), one primary aspect is conceptual understanding, where students aim to understand ideas deeply rather than memorize facts. Another important aspect is relating ideas, which involves connecting new knowledge with prior knowledge or real-life experiences (Case et al., 2009).

Additionally, deep learning promotes critical and reflective thinking, enabling students to analyze information and evaluate their learning processes. It also emphasizes application in real-life contexts, where knowledge is used to solve authentic problems (Fullan et al., 2013). Furthermore, intrinsic motivation and self-regulated learning are essential components, as students develop internal motivation and take responsibility for their own learning (Ramsden et al., 2003).

Implementation of Deep Learning in Classroom Learning

The implementation of deep learning requires systematic and well-designed instructional steps. These include defining learning objectives, determining success criteria, designing experiential learning activities, and conducting authentic assessments. Learning activities should integrate real-life contexts, collaboration, and the use of digital technology to create meaningful learning experiences.

Deep learning can be applied through various strategies, such as project-based learning, inquiry-based learning, case studies, and simulations. These strategies provide opportunities for students to actively explore knowledge, engage in problem-solving, and collaborate with peers. Assessment in deep learning should also go beyond traditional tests and include performance-based evaluation, portfolios, and reflective activities to measure students' holistic development.

Students' Responses and Participation in Learning

Students' responses and participation are important indicators of successful learning. Response refers to students' reactions to learning activities, including motivation, engagement, and attitudes toward learning (Hasan, 2017). Meanwhile, participation refers to students' active involvement in classroom activities, such as asking questions, contributing to discussions, completing tasks, and collaborating with peers (Pahrun, 2021).

Active participation involves multiple dimensions, including cognitive, emotional, and behavioral engagement. Students who actively participate tend to demonstrate higher motivation, better understanding, and improved learning outcomes. Conversely, low participation may hinder the learning process and make it difficult for teachers to identify students' difficulties (Novitasari, 2021).

Several factors influence students' responses and participation, including teaching methods, learning environment, and students' internal motivation. A supportive and interactive learning environment can

encourage students to express ideas, ask questions, and engage more actively in the learning process (Muhsam et al., 2021).

Natural and Social Science (IPAS) Learning

Natural and Social Science (IPAS) is an integrated subject that combines natural sciences and social sciences, particularly at the elementary school level under the Merdeka Curriculum. The purpose of IPAS learning is to develop students' curiosity, critical thinking skills, and scientific attitudes, while also fostering their understanding of the relationship between natural phenomena and social life (Kemendikbud, 2022).

IPAS learning emphasizes real-world relevance, where students are encouraged to observe, analyze, and solve problems related to their environment. This subject also supports the development of the Pancasila Student Profile, which includes critical thinking, collaboration, and environmental awareness.

The Relationship Between Deep Learning and Student Participation

Previous studies have shown that deep learning has a significant positive impact on students' engagement and participation. Deep learning encourages students to actively construct knowledge, engage in discussions, and apply concepts in meaningful ways (Nurhadi et al., 2020). It also promotes collaborative learning and critical thinking, which are essential for active participation.

Furthermore, research by Wijaya and Lestari (2019) indicates that the application of deep learning in elementary science education increases students' cognitive, emotional, and behavioral involvement. This suggests that deep learning is an effective approach to improving students' responses and participation in classroom learning.

METHODOLOGY

This study employed a quantitative approach using a quasi-experimental method and a nonequivalent control group design. This design was selected to examine the effect of the deep learning approach on students' responses and participation in Science and Social Studies (IPAS) learning without randomly assigning participants. The study involved an experimental group that received instruction using the deep learning approach and a control group that received conventional instruction (Sugiyono, 2017). The study was conducted at SDN Kebon Bawang 03, Jakarta, during the 2025/2026 academic year. The study population consisted of 100 fifth-grade students. Purposive sampling was used to select 50 students from two classes: Class VB served as the experimental group and Class VD as the control group, with 25 students in each group. The classes were selected based on the suitability of the participants' characteristics and the practical arrangements for conducting the study at the school. The independent variable was the deep learning approach, while the dependent variables were students' responses and participation in IPAS learning. The experimental group received instruction using the deep learning approach, which emphasizes meaningful learning, active engagement, critical thinking, and the application of knowledge to real-life situations. Learning activities included group discussions, exploration, problem-solving, presentations, and reflection. The control group, meanwhile, received conventional instruction. The intervention was implemented over five sessions, each lasting 70 minutes (2 × 35 minutes). Data were collected using a four-point Likert-scale questionnaire administered before and after the intervention. The questionnaire comprised 20 statements designed to measure two dimensions: students' responses and participation in learning. Before its use, the instrument underwent expert judgment to establish content validity. Empirical validity was subsequently tested using SPSS. The results indicated that 17 of the 20 statements met the validity criteria. Reliability testing using Cronbach's alpha yielded coefficients of 0.710 for students' responses and 0.760 for participation, indicating acceptable internal consistency (Sugiyono, 2021).

To minimize potential research bias, the same instrument and measurement procedures were used for both groups. The questionnaire was completed under comparable conditions, and the intervention was delivered according to predetermined instructional procedures. Data analysis involved several stages. Descriptive statistics were used to report the means and standard deviations of pre-test and post-test scores for each group. Before inferential analysis, the normality assumption was examined using the Shapiro–Wilk test, and

homogeneity of variance was assessed using Levene's test. Given the possibility of differences in students' baseline abilities, analysis of covariance (ANCOVA) was recommended. This analysis compares post-test scores between the experimental and control groups while controlling for pre-test scores. The analyses were to be conducted separately for the student-response and student-participation variables. Results should be reported using the F statistic, exact p-value, partial eta squared, and confidence intervals where available. The significance level was set at 0.05. The intervention was conducted over five sessions, each lasting 70 minutes (2 × 35 minutes). The experimental group received instruction based on the deep learning approach, integrating three core principles: meaningful learning, mindful learning, and joyful learning. Meaningful learning encourages students to connect new knowledge with prior experiences and real-life situations. Mindful learning emphasizes students' awareness, active engagement, and reflection throughout the learning process. Joyful learning, meanwhile, fosters a supportive and enjoyable classroom environment through engaging and interactive learning experiences. These three principles were integrated into IPAS learning activities to encourage students to respond actively, express their ideas, interact with peers, and participate in classroom activities. The control group received conventional instruction. Both groups completed the same questionnaire before and after the intervention to measure students' responses and participation separately. The intervention was implemented in the same school environment and academic period to maintain comparable research conditions. Questionnaire administration procedures were also standardized across both groups.

RESULTS AND DISCUSSION RESULTS

The findings were obtained by analyzing questionnaire scores for students' responses and participation, collected before and after the intervention from the experimental and control groups. Descriptive statistical analysis showed an increase in mean scores in both groups following instruction. In the experimental group, the mean score increased from 62.76 at pre-test to 65.96 at post-test, representing an increase of 3.20 points. In the control group, the mean score increased from 61.64 to 65.16, representing an increase of 3.52 points.

These findings indicate that scores increased in both groups. However, the descriptive results show that the numerical increase in the control group was slightly greater than that in the experimental group. Therefore, descriptive statistics alone are insufficient to conclude that the deep learning approach produced a greater improvement than conventional instruction.

Table 1. Comparison of Mean Pre-test and Post-test Scores

Group	Pre-test	Post-test	Mean difference
Experimental	62.76	65.96	3.2
Control	61.64	65.16	3.52

Before inferential statistical analysis, normality and homogeneity tests were conducted. The Shapiro–Wilk test indicated that the data met the normality assumption, with significance values greater than 0.05. Levene's test also yielded a significance value of 0.579, which is greater than 0.05. Thus, the homogeneity-of-variance assumption was satisfied.

Because the groups differed in their pre-test scores, comparisons of post-test outcomes should account for students' baseline status. Accordingly, ANCOVA was recommended to determine whether the deep learning approach had a statistically significant effect on students' responses and participation after controlling for pre-test scores. The statistical results should be reported separately for each dependent variable, including the adjusted mean, F statistic, exact p-value, partial eta squared, and 95% confidence interval. Final interpretation of the hypotheses should be based on adjusted statistical results rather than descriptive differences in mean scores alone.

DISCUSSION

The findings indicate that students' response and participation scores increased in both the experimental and control groups following instruction. The experimental group showed an increase of 3.20 points, whereas the

control group showed an increase of 3.52 points. These findings should be interpreted cautiously because the numerical increase in the control group was slightly greater than that in the experimental group.

Accordingly, the effectiveness of the deep learning approach cannot be established solely by comparing the differences between pre-test and post-test mean scores. A more comprehensive analysis is required that accounts for differences in students' baseline status. In this regard, ANCOVA is an appropriate analytical approach for examining the effect of the intervention while controlling for pre-test scores.

Conceptually, the deep learning approach emphasizes three principles: meaningful learning, mindful learning, and joyful learning. These principles encourage students to connect new knowledge with prior experiences, engage actively in learning activities, and develop a deeper understanding of the subject matter. In IPAS learning, these principles can be implemented through observation, exploration, collaborative discussion, problem-solving, and reflection. Such activities provide students with opportunities to express opinions, ask questions, exchange ideas, and participate in the construction of knowledge. Therefore, the deep learning approach has the potential to support students' learning responses as well as their behavioral participation in classroom activities. Nevertheless, the increase observed in the control group suggests that factors beyond the instructional approach may also contribute to students' responses and participation. These factors may include students' initial characteristics, classroom interactions, teacher facilitation, the learning environment, and students' level of understanding of the learning material. Therefore, the findings should be interpreted with consideration of the possibility that improvements in the two groups may have resulted from different factors. The findings also highlight the importance of distinguishing between students' responses and participation as two related but distinct aspects of learning engagement. Students' responses may reflect their perceptions, feelings, and attitudes toward learning, whereas participation is more closely associated with their behavioral involvement in classroom activities. Analyzing these two dimensions separately can provide a more comprehensive understanding of student engagement in IPAS learning. This study has several limitations. First, it involved only 50 students from one elementary school, which limits the generalizability of the findings to other schools and educational contexts. Second, the use of purposive sampling and a nonequivalent control group design may introduce selection bias because participants were not randomly assigned. Third, using a questionnaire as the primary instrument for measuring students' responses and participation may be subject to students' subjective perceptions. Fourth, the relatively short intervention period may have limited the opportunity to observe sustained changes in student engagement. Future studies should involve larger samples from multiple schools, use additional data-collection methods such as classroom observations and interviews, and examine the long-term effects of implementing the deep learning approach. These improvements are expected to provide stronger evidence regarding the effectiveness of this approach in elementary-level IPAS learning.

CONCLUSION

This study examined the implementation of the deep learning approach in relation to students' responses and participation in IPAS learning at the elementary-school level. Descriptive results showed that mean scores increased in both the experimental and control groups. The experimental group's mean score increased by 3.20 points, while the control group's mean score increased by 3.52 points. These results indicate that the numerical increase in the experimental group was not greater than that in the control group. Therefore, conclusions regarding the effectiveness of the deep learning approach should be based on further statistical analysis that accounts for differences in students' baseline scores. ANCOVA is recommended to determine whether the intervention had a statistically significant effect on students' responses and participation after controlling for pre-test scores. The deep learning approach offers a pedagogical framework that emphasizes meaningful, mindful, and joyful learning through active engagement, exploration, collaboration, and reflection. These characteristics offer opportunities to create more interactive and student-centered IPAS learning experiences. However, the findings should be interpreted in light of the study's limitations, particularly its relatively small sample size, the inclusion of only one elementary school, and the use of purposive sampling. Further research involving larger samples across multiple schools is needed to strengthen the evidence concerning the effectiveness of the deep learning approach in elementary education.

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