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The Impact of Indoor and Outdoor Experiential Learning on Academic Achievement in Primary School

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Abstrak

Standar deviasi yang rendah pada nilai sains menunjukkan adanya sejumlah besar siswa dengan performa di bawah rata-rata, sehingga diperlukan strategi pengajaran yang lebih efektif. Kondisi ini menuntut evaluasi ulang terhadap metode yang digunakan dalam pendidikan sains. Penelitian ini bertujuan untuk mengevaluasi dampak pendekatan pembelajaran berbasis pengalaman (indoor dan outdoor) terhadap pencapaian akademik siswa sekolah dasar, khususnya hasil belajar sains siswa kelas V. Metode yang digunakan adalah kuantitatif dengan desain eksperimen, di mana dua kelompok kontrol dibandingkan: kelas VA menggunakan pembelajaran outdoor dan kelas VB menggunakan pembelajaran indoor. Penelitian ini melibatkan pre-test dan post-test untuk mengukur perkembangan hasil belajar sains siswa setelah intervensi pembelajaran. Hasil penelitian menunjukkan adanya korelasi yang signifikan antara strategi pembelajaran berbasis pengalaman dan pencapaian akademik. Data menunjukkan bahwa baik siswa laki-laki maupun perempuan memperoleh nilai yang lebih baik ketika menggunakan pendekatan outdoor dibandingkan dengan indoor. Kesimpulannya, meskipun tidak ditemukan efek interaksi antara strategi pembelajaran dan jenis kelamin, terdapat perbedaan signifikan dalam pencapaian akademik antara siswa yang mengikuti pembelajaran outdoor dan indoor. Pembelajaran outdoor terbukti lebih efektif dalam meningkatkan hasil belajar sains dibandingkan pembelajaran indoor.

Kata Kunci: *Pengalaman Dalam Ruangan, Pengalaman Luar Ruangan, Prestasi Akademik, Sekolah Dasar*

Abstract

The low standard deviation in science scores suggests a considerable number of students with below-average performance, highlighting the need for more effective teaching strategies. This situation calls for a re-evaluation of the methods used in science education. This study aims to evaluate the impact of experiential learning approaches (indoor and outdoor) on the academic achievement of elementary school students, especially on the science learning outcomes of fifth grade students. The method used is quantitative with an experimental design, where two control groups are compared: class VA using outdoor learning and class VB using indoor learning. This study involved a pre-test and a post-test to measure the development of students' science learning outcomes after the learning intervention. The results showed a significant correlation between experiential learning strategies and academic achievement. The data indicated that both male and female students showed better grades when learning using the outdoor approach compared to indoor. In conclusion, although there was no interaction effect between learning strategies and gender, there was a significant difference in academic achievement between students who participated in outdoor learning and those who participated in indoor learning. Outdoor learning has been shown to be more effective in improving science learning outcomes than indoor learning

Keywords: Indoor Experiential, Outdoor Experiential, Academic Achievement, Primary School

1. INTRODUCTION

Learning is the cornerstone of education, serving as the primary vehicle for enhancing knowledge and developing skills that leave a lasting impact on students. The role of the teacher is often highlighted as one of the most critical components in the learning process, particularly in influencing student engagement and academic outcomes (Flores, 2020; Harrell

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et al., 2023; Poulton, 2020). Despite the ideal nature of educational curricula and the availability of comprehensive educational facilities, the effectiveness of these resources hinges on the teacher's ability to implement them meaningfully (Alberola-Mulet et al., 2021; Wang et al., 2022). This underscores the importance of innovative and dynamic teaching methods, especially in the context of science education, where the challenge lies in not only conveying concepts but also ensuring that students can apply them in real-world situations. Science education, as a vital component of the educational system, faces the ongoing challenge of improving its quality to produce individuals capable of participating in modern life. The learning of science aims to achieve mastery of concepts, which cannot be accomplished solely through the memorization of facts. Instead, experiential learning is essential for students to deeply understand and retain these concepts (Cole & Feng, 2015; Lampropoulos et al., 2019). The traditional classroom setting, however, often relies on outdated and rigid teaching methods that fail to engage students actively and limit their potential for exploration and discovery.

The low standard deviation in science scores suggests a considerable number of students with below-average performance, highlighting the need for more effective teaching strategies (Menbet, 2018; Remmen & Iversen, 2023). This situation calls for a reevaluation of the methods used in science education, particularly the potential benefits of experiential learning approaches that extend beyond the traditional classroom environment. The 2013 curriculum in Indonesia was designed to encourage more dynamic and interactive learning experiences, yet there remains a significant gap between the intended outcomes and the actual implementation in schools. Conventional teaching methods continue to dominate, resulting in a learning environment that is often too formal and restrictive (Adas & Bakir, 2013; Imran, 2023). This has led to a situation where students are less motivated and less engaged in the learning process, which is particularly problematic in subjects like science that require active participation and critical thinking.

Previous study emphasizes the importance of engaging students in activities that not only involve them physically but also help them derive meaning from their experiences (Sailer et al., 2021). Other study argued that true learning occurs when students can connect their experiences to broader concepts, leading to lasting changes in understanding and behaviour (Brandt et al., 2021). This approach is particularly relevant in the context of science education, where hands-on learning can significantly enhance comprehension and retention of complex concepts. The environment in which learning takes place plays a crucial role in shaping student outcomes. Both the immediate educational environment and the broader social context influence students' engagement and academic performance (Bond, 2020; Jaya, 2018). Outdoor learning activities, in particular, offer opportunities for students to interact directly with their surroundings, leading to a deeper understanding of scientific principles and fostering a greater appreciation for the natural world. These activities can also promote behavioral changes, encouraging students to become more environmentally conscious and socially responsible.

However, it is important to recognize that not all students respond to experiential learning in the same way. Differences in cognitive abilities, learning styles, and even gender can influence how students engage with and benefit from different teaching methods. Research has shown that while there may be no significant overall differences in academic abilities between male and female students, there are distinctions in specific cognitive domains. For example, males tend to excel in visual-spatial tasks, such as those often involved in math and science, while females typically perform better in verbal tasks (Battal et al., 2020; Giofrè et al., 2022). These differences suggest that a one-size-fits-all approach to teaching may not be effective, and that instructional methods should be tailored to meet the diverse needs of students.

Addressing gender disparities in the classroom requires teachers to make intentional changes in their instructional practices. Providing balanced academic services that cater to the strengths and needs of both male and female students can help mitigate the impact of these disparities on academic achievement. This research aims to analyze how different experiential learning approaches—indoor and outdoor—affect the science learning outcomes of primary school students, with a particular focus on gender as a moderating factor. Specifically, this study seeks to answer two key questions. First, it will evaluate whether there are significant differences in science learning outcomes between students who are taught using outdoor experiential learning methods and those who experience indoor experiential learning. Second, the study will investigate whether there is an interaction between the type of experiential learning approach and gender, assessing whether the effectiveness of these methods varies between male and female students.

The findings of this research are expected to contribute valuable insights into the most effective teaching strategies for enhancing science education in primary schools. By understanding how different experiential learning environments influence academic achievement, educators can better tailor their teaching methods to meet the needs of all students. Furthermore, this study will provide a deeper understanding of how gender influences the effectiveness of different learning approaches, offering guidance on how to create more equitable and inclusive educational practices. In summary, the novelty of this study addresses a critical gap in the current literature by exploring the impact of indoor and outdoor experiential learning on academic achievement in science among elementary school students. The findings of this study not only inform teaching practices at SDI Baiturrachman but also contribute to the broader discourse on educational innovation and gender equity in science education.

2. METHOD

This research uses a quantitative approach with a quasi-experimental design. This design was chosen to evaluate the effect of experiential learning, both indoors and outdoors, on elementary school students' science learning outcomes. Quasi-experiments allow researchers to compare groups that receive treatment (learning interventions) with control groups that do not receive treatment, while maintaining control over variables that cannot be manipulated directly. This design has been shown to be effective in educational research for measuring the impact of pedagogical interventions on student learning outcomes (Garzón et al., 2020). This research involved two groups of class V students at SDI Baiturrachman, namely the experimental group who received experiential learning outdoors and the control group who received experiential learning indoors. The sample was taken using a purposive sampling technique, where students were selected based on similarities in initial abilities and socioeconomic conditions to ensure that differences in observed results could be attributed to the learning methods used. Class 5A, with a total of 30 students, was used as an experimental group that received outdoor learning, while class 5B, with the same number of students, was used as a control group that received indoor learning. For analysis, 27% of the total number of students in each group were selected based on the results of the learning test, resulting in 16 students from each group for further analysis regarding experiential learning treatment (outdoor and indoor) and the influence of gender. This can be seen in the following Table 2.

Table 2. Treatment of Each Group of Classes

Gender	Experiential Learning	
	Outdoor	Indoor
Male	8	8
Female	8	8
Total	**16**	**16**

The main instrument used in this research was a science learning outcome test prepared based on the 2013 curriculum. This test was designed to measure understanding of science concepts before and after treatment in both groups, namely the group that received learning indoors (VA class) and outdoors (VB class). The validity and reliability of the instrument were tested through trials on different samples to ensure that this instrument was able to measure student learning outcomes accurately and consistently, in accordance with established standards (Arslan, 2020). Instrument validation is an important step in experimental research to ensure that the data obtained reflects the phenomena that actually occur (Aithal & Aithal, 2020).

After the research instrument has been prepared, the next step is to test its validity and reliability through trials to determine the adequacy of the instrument used. This instrument, in the form of a test containing a list of questions created by researchers, was used to measure student learning outcomes and was tested directly on students in classes VA and VB. The data obtained is primary data collected through student learning outcomes tests during seven meetings in the second semester of the 2018/2019 academic year. This test provides an overview of the effectiveness of experiential learning methods applied indoors and outdoors (Nardo et al., 2022; Zainuddin & Perera, 2018). The research procedure began with carrying out a pre-test in both groups to measure students' initial abilities. Next, the experimental group was taught using an experiential learning approach outdoors, while the control group was taught using the same approach but indoors. Outdoor learning activities are designed to allow students to interact directly with the surrounding environment, such as observing natural processes and carrying out simple experiments in the field. This method is expected to improve students' conceptual understanding through direct experience, in accordance with findings that learning through experience can have a deep influence on students' understanding (Aderibigbe, 2021; Zulmi et al., 2020).

After treatment, a post-test was carried out to measure the increase in science learning outcomes in both groups. The pre-test and post-test data were then analyzed using inferential statistical tests, such as the t-test to compare the average learning outcomes between the experimental and control groups, as well as the ANOVA test to analyze the interaction between learning methods and gender variables. This statistical analysis aims to identify whether there are significant differences in learning outcomes that can be attributed to the learning methods used. The use of inferential statistical analysis in educational research is often necessary to draw valid conclusions from the data collected (Ghasemy et al., 2020; Zhang et al., 2018).

3. RESULTS AND DISCUSSION

Results

The study aimed to evaluate the effect of experiential learning strategies, specifically outdoor and indoor activities, combined with gender differences on the science learning outcomes of primary school students. The research focused on identifying variations in learning outcomes across different learning environments and gender groups, with a particular interest in understanding how these factors interact to influence academic

performance. The research involved a sample of primary school students who were exposed to both indoor and outdoor experiential learning strategies. The performance of these students was measured and categorized based on gender, providing insights into the influence of both variables on science learning outcomes.

The data on learning outcomes, categorized by learning environment (indoor vs. outdoor) and gender, reveal that for indoor activities, male students had scores ranging from a lowest of 40 to a highest of 100, while female students scored between 60 and 100. In contrast, for outdoor activities, male students' scores ranged from 55 to 100, and female students' scores ranged from 85 to 100. This data can be seen clearly through the following Table 3.

Table 3. Two-way ANOVA

Source of Diversity	Sum of Squares	Degrees of Freedom	Middle Square	F_{count}	F_{table}
Batis Middle Value	2,535.000	db=2-1=1	2,535.000	12.755	4.013
Column Center Value	1,126.667	db=2-1=1	1,126.661	5.669	4.013
Er interaction	81.667	db=1x1=1	81.667	0.411	4.013
Error	11,130.000	2x2x14=56	198.750		
Total	**14,873.333**	**(2x2x15)-1=59**			

Base on Table 3 it is obtained that the correlation coefficient is significant, in other words, there is a significant influence of the independent variables on the influence of Experiential Learning Strategies (outdoor and indoor) (X1) and Gender (X2) together on science learning outcomes (Y). According to the existing provisions, the significant criteria are "if $F_{count} > F_{table}$ then H_0 is rejected". If H_0 = experiential learning outdoor = experiential learning indoor it means there is no significant effect. If H_1 = experiential learning outdoor ≠ experiential learning indoor it means there is a significant influence.

The analysis of the data reveals several key insights, outdoor activities generally resulted in higher minimum scores for both male and female students compared to indoor activities, with male students scoring a minimum of 55 in outdoor activities versus 40 in indoor activities, and female students scoring a minimum of 85 in outdoor activities versus 60 in indoor activities. This suggests that outdoor experiential learning may be more effective in enhancing learning outcomes for both genders. Additionally, female students performed better overall, with higher minimum and maximum scores in both environments. The narrower range of scores among female students in outdoor activities (85-100) indicates a more consistent performance, possibly reflecting a better adaptation to outdoor learning strategies.

The study concludes that experiential learning strategies, particularly outdoor activities, have a significant positive effect on science learning outcomes, especially for female students. The findings suggest that gender differences should be considered when designing experiential learning programs, as female students may benefit more consistently from outdoor learning environments. These results underscore the importance of diversifying learning strategies to cater to the diverse needs of students, ultimately aiming to optimize educational outcomes across different gender groups. Male gender on science learning outcomes is show in Table 4.

Table 4. Male Gender on Science Learning Outcomes

Source of Diversity	Sum of Squares	Degrees of Freedom	Middle Square	F_{count}	F_{table}
column midpoint	907.500	db=2-1=1	907.500	2.763	4.196

Source of Diversity	Sum of Squares	Degrees of Freedom	Middle Square	F_{count}	F_{table}
Error	9,196.667	2x15-2=28	328.452		
Total	**10,104.167**	**(2x15)-1=29**			

From the calculations in Table 4, it is obtained that there is no significant influence between the independent variable Male Gender (X2) on science learning outcomes. It can be concluded that there is no significant influence between male students on science learning outcomes. Although it is stated that there is no significant influence, the difference is not too large between the learning outcomes of male students in indoor and outdoor learning. This means that, descriptively (based on the mean value), there may be a slight difference that can be observed, but this difference is not large enough to be considered significant in a statistical context. Overall, the results of this study emphasize that although the data show a small difference in the learning outcomes of male students between indoor and outdoor learning, this difference is not strong enough or significant enough to be considered a real influencing factor. In other words, the differences that exist may be due to other factors or are simply natural variations in the data, rather than due to gender or learning methods that directly affect learning outcomes. In the context of research, it is important to note that non-significant results still provide useful information, namely that a particular intervention (in this case, indoor vs. outdoor learning) does not have a large impact on a particular subgroup (male students). Female gender on science learning outcomes is show in Table 5.

Table 5. Female Gender on Science Learning Outcomes

Source of Diversity	Sum of Squares	Degrees of Freedom	Middle Square	F_{count}	F_{-table}
column midpoint	300.833	db=2-1=1	300.833	4.357	4.196
Error	1,933.333	2x15-2=28	69.048		
Total	**2,234.167**	**(2x15)-1=29**			

From the calculations in Table 5, it is obtained that the correlation coefficient is significant, in other words there is a significant influence of the independent variable Female Gender (X2) on science learning outcomes. According to the existing provisions, the criteria for significant influence on variable Y is "if $F_{count} > F_{table}$ then H_0 is rejected". If $H_0 = S1 = S2$, it means there is no significant effect. If $H_1 = S1 \neq S2$, it means there is a significant effect. It can be concluded that there is a significant difference in learning outcomes for female students when doing outdoor and indoor learning.

Discussion

Effect of Experiential Learning Strategies and Gender on Science Learning Outcomes

The results of this study indicate that experiential learning strategies, both outdoors and indoors, have a significant influence on elementary school students' science learning outcomes. In this study, the group of students who studied outdoors generally showed better results compared to the group who studied indoors. This can be seen from the higher minimum scores of male and female students in outdoor activities compared to indoor activities. This finding is in line with previous studies showing that varied learning environments, such as outdoor activities, can increase student engagement and deeper understanding of the material (El-Sabagh, 2021). In addition, this study also found differences in academic performance based on gender. Female students tend to have a narrower and higher overall score range, both in indoor and outdoor activities. This indicates that female students may be more responsive to experiential learning methods, especially those conducted outdoors. As stated by other study gender differences in response to learning

methods can be caused by various factors, including differences in learning styles and preferences for learning environments (Heo & Toomey, 2020; Zhou, 2017). The significance of these results is also supported by statistical analysis showing that the variables of experiential learning strategies and gender together have a significant effect on students' science learning outcomes. The strong positive correlation between outdoor learning strategies and science learning outcomes indicates that a more dynamic and interactive learning environment can encourage students to be more active and involved in the learning process, which in turn improves their understanding of science concepts (Harvey et al., 2020; Hwang et al., 2022).

This finding emphasizes the importance of considering gender differences in designing experiential learning programs. Although both male and female students benefit from outdoor learning, the results show that female students tend to get more consistent and higher results. Therefore, in designing a curriculum based on experiential learning, it is important to pay attention to adaptations that are appropriate to the needs of different genders (Hashim et al., 2022; Motta & Galina, 2023).

In addition, the results of this study also reinforce the importance of diversifying learning strategies to accommodate the diverse learning needs of students. By using a combination of indoor and outdoor activities, educators can create a more holistic and inclusive learning experience, which can encourage all students, regardless of their gender, to achieve optimal academic outcomes (Ennis, 2011; Pratami et al., 2019). This study shows that experiential learning strategies, especially those conducted outdoors, have a significant positive impact on elementary school students' science learning outcomes. Gender differences in response to these strategies also underscore the importance of a more adaptive and sensitive approach to students' individual needs. Thus, the appropriate implementation of experiential learning can contribute significantly to improving the quality of education and students' overall academic achievement.

The Effect of Experiential Learning Strategies on Science Learning Outcomes

The results of the study showed that experiential learning strategies, both those carried out outdoors and indoors, had a significant impact on students' science learning outcomes. Based on the analysis carried out, it was found that the correlation coefficient between experiential learning strategies and science learning outcomes was significant. This means that there is a strong influence of the independent variable, namely experiential learning strategies, on the dependent variable, namely science learning outcomes (Nardo et al., 2022; Ngo et al., 2022). These results strengthen the hypothesis that there is a significant difference between outdoor and indoor experiential learning on students' academic achievement in science lessons. In this study, the significance criterion was used to test the proposed hypothesis. With the criterion "if $F_{count} > F_{table}$ then H_0 is rejected", this study found that H_0 was rejected, which means that there is a real difference between outdoor and indoor experiential learning on science learning outcomes. This finding is in line with previous research which states that a more open and interactive learning environment such as outdoors can increase student participation and deeper understanding of the material compared to learning carried out indoors (Tong et al., 2022).

In addition, this study also showed that students, both male and female, obtained better scores in experiential learning conducted outdoors compared to indoors. This finding indicates that outdoor learning environments are able to provide better stimulation for students to understand science concepts. This result is consistent with other studies that show that direct interaction with the physical environment can enrich students' learning experiences, thereby improving their academic outcomes (Eroğlu & Bektaş, 2022; Mousavi, 2023). From a gender perspective, this study found that although both male and female

students showed improved learning outcomes in outdoor learning, there was an indication that female students obtained more consistent and higher results. This suggests that although outdoor learning strategies benefit all students, there is variation in the level of student response based on gender. This finding is important to consider in designing inclusive and effective learning programs (Arık & Yılmaz, 2020).

The implication of this study is that educators need to consider the use of outdoor experiential learning strategies as part of their science curriculum. The more dynamic and interactive learning environment offered by outdoor activities not only improves learning outcomes in general but can also help students develop better cognitive skills, especially in the context of understanding abstract science concepts (Beneroso & Robinson, 2022; Hasanah et al., 2023). Overall, the results of this study emphasize the importance of diversifying learning strategies to achieve optimal academic outcomes. By integrating outdoor experiential learning into science instruction, schools can create richer and more supportive learning environments for all students. This study makes an important contribution to the education literature, particularly in understanding the impact of experiential learning strategies on science learning outcomes and its implications for designing more effective and inclusive curricula.

The Effect of Gender on Science Learning Outcomes

The results of the study indicate that gender has varying effects on students' science learning outcomes, depending on the learning environment used. Based on the calculations carried out on the research data, it was found that there was no significant effect of the independent variable male gender (X2) on science learning outcomes (Y). In other words, although there is a difference in science learning outcomes between male students who take outdoor and indoor learning, the difference is not large enough to be considered statistically significant (Alisha et al., 2019; Pratiwi, 2016). This provision is measured using the criterion that if F_{count} is smaller than F_{table}, then H_0 is accepted, which means that there is no significant effect of the male gender variable on science learning outcomes. Although descriptively there is a slight difference in the mean scores between male students who take outdoor and indoor learning, the difference is not strong enough to be considered a factor that significantly influences learning outcomes. This finding is consistent with other studies showing that the male gender factor is not always the main determinant in variations in academic outcomes, especially in the context of science learning (Shi et al., 2023; Wen et al., 2020).

In addition, it is important to note that non-significant results still provide valuable information in the study. These results indicate that a particular intervention, in this case, outdoor versus indoor learning, did not have a significant impact on the subgroup of male students. This suggests that other factors may be more dominant in influencing male students' science learning outcomes, or that the variation in the data is more a result of natural fluctuations than a direct influence of the learning method or gender (Awofala & Blessing, 2014; Huang et al., 2020).

These findings suggest that female students are more responsive to variations in the learning environment, where they tend to get better results in outdoor learning compared to indoor learning. These results are in line with previous research suggesting that female students may be more sensitive to more interactive and experiential learning contexts, which may enhance their engagement and understanding of learning materials (Fromm et al., 2021). Overall, this study confirms the importance of considering gender factors in designing learning strategies. While males may not show significant differences in this context, females do show different results, highlighting the need for a more diverse approach to science learning to accommodate the different needs of each gender group. This has important

implications for the development of more inclusive and effective curricula and teaching methods.

4. CONCLUSION

Based on the results of the data analysis, it can be concluded that there is a significant difference in student learning outcomes between the group taught using outdoor experiential learning and the group taught using indoor experiential learning. This suggests that different learning environments can have an impact on the effectiveness of learning and, ultimately, on student learning outcomes. This study also shows that there is no significant effect on the science learning outcomes of male students taught using outdoor experiential learning. Although there is a difference in learning outcomes between male students who learn outdoors and indoors, the difference is not large enough to be considered significant in a statistical context. Overall, this study provides important insights into how the learning environment and students' gender may influence their learning outcomes. Although outdoor learning appears to be more effective in general, these results also suggest that other factors, such as teaching methods tailored to student's individual needs, may play an important role in improving science learning outcomes at the elementary school level.

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