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The Impact of Outdoor-Based Contextual Teaching and Learning on Elementary Students' Science Learning Outcomes

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Abstract

The background of this study is that the science learning process remains teacher-centered and relies on lecture-based methods, resulting in students being less active and suboptimal learning outcomes. Additionally, the surrounding environment has not been fully utilized as a learning resource. This study aims to determine students' science learning outcomes before and after implementing an outdoor-based Contextual Teaching and Learning (CTL) model, as well as to examine the effect of this model on the science learning outcomes of fourth-grade students at Mathlaul Anwar Islamic Elementary School. This study employs a quantitative approach using an experimental method and a pretest-posttest control group design. Data collection techniques include tests, observations, and documentation. The results of the study show that the average pre-test score for the experimental class was 40,90 it increased to 67,50 on the post-test. Meanwhile, the control class's score increased from 35,23 to 56,23. Based on the hypothesis test using the Independent Samples T-Test, a significance value (2-tailed) of 0.000 ≤ 0.05 was obtained, so Ha was accepted and Ho was rejected. Thus, the outdoor-based Contextual Teaching and Learning (CTL) model has a positive effect on the science learning outcomes of Grade IV students at MI Mathlaul Anwar.
Keywords: Contextual Teaching and Learning (CTL); Outdoor Learning; Science Education; Learning Outcomes; Elementary School.

Abstrak

Latar belakang masalah pada penelitian ini yaitu proses pembelajaran IPA masih berpusat pada guru dengan metode ceramah sehingga peserta didik kurang aktif dan hasil belajar belum optimal. Selain itu, lingkungan sekitar belum dimanfaatkan secara maksimal sebagai sumber belajar. Penelitian ini bertujuan untuk mengetahui hasil belajar IPA peserta didik sebelum dan sesudah menggunakan model pembelajaran Contextual Teaching and Learning (CTL) berbasis outdoor serta mengetahui pengaruh model tersebut terhadap hasil belajar IPA kelas IV MI Mathlaul Anwar. Penelitian ini menggunakan pendekatan kuantitatif dengan metode eksperimen dan desain pretest-posttest control group design. Teknik pengumpulan data dilakukan melalui tes, observasi, dan dokumentasi. Hasil penelitian menunjukan bahwa rata-rata nilai pretest kelas eksperimen sebesar 40,90 meningkat menjadi 67,50 pada

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posttest, sedangkan kelas kontrol meningkat dari 35,23 menjadi 56,23. Berdasarkan uji hipotesis menggunakan Independent Samples T-Test diperoleh nilai signifikansi (2-tailed) sebesar 0,000 ≤ 0,05 sehingga Ha diterima dan Ho ditolak. Dengan demikian, model pembelajaran Contextual Teaching and Learning (CTL) berbasis outdoor berpengaruh positif terhadap hasil belajar IPA siswa kelas IV MI Mathlaul Anwar.
Kata kunci: *Contextual Teaching and Learning (CTL); Outdoor Learning; Pendidikan Sains; Hasil Belajar; Sekolah Dasar.*

INTRODUCTION

Education plays a vital role in human life. It is the most important aspect of a nation and state, serving to ensure the nation's survival, intellectual growth, progress, and development; education is the first step for students toward a bright future (Asmahasanah et al., 2023). One subject that plays a significant role is Natural Sciences (IPA). The teaching of Natural Sciences aims not only to provide a theoretical understanding of concepts but also to help students comprehend natural phenomena in their surroundings through hands-on learning experiences. Natural sciences are a branch of knowledge consisting of facts, concepts, principles, and theories that are the products of the scientific process (Triwoelandari & Yatini, 2024). Therefore, science education in elementary school should ideally be conducted in an active and contextual manner so that students gain meaningful learning experiences and are able to improve their learning outcomes.

However, in reality, the implementation of science education in elementary schools has not yet fully aligned with the ideal learning model. Instruction remains largely teacher-centered and relies heavily on lecture-based methods, resulting in students being less actively engaged in the learning process. This issue is supported by previous research findings indicating that students' science learning outcomes remain relatively low. Previous research revealed that there are still students who score below the Minimum Passing Grade (MPG) in science due to a lack of understanding of the learning material. Additionally, student learning outcomes in science education remain teacher-centered. Generally, teachers rely solely on written learning materials such as textbooks as the primary learning resource, delivering lessons through lecture-based methods (Mutiara, 2024).

One learning model that can be applied is Contextual Teaching and Learning (CTL). CTL is a learning concept that helps teachers connect the material they teach to students' real-world situations and encourages students to make connections between their existing knowledge and its application in daily life (Nababan & Sipayung, 2023). The application of

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the CTL model is closely related to nature-based learning; one approach that brings students closer to nature is outdoor learning. Outdoor learning refers to school-based activities conducted outside the classroom or school premises in natural settings, such as playing on school grounds, in parks, in agricultural or fishing villages, camping, and adventure-based activities that foster the development of relevant knowledge (Zahroh in Fakhriyah, 2025).

Nevertheless, previous studies have generally examined the effectiveness of CTL and outdoor learning separately. Some studies have reported that CTL improves students' motivation, conceptual understanding, and learning outcomes through contextual classroom activities, while other studies have demonstrated the benefits of outdoor learning in enhancing students' engagement, environmental awareness, and scientific process skills. However, empirical studies integrating CTL principles with outdoor learning into a single instructional model, particularly in elementary science education, remain limited. This indicates a clear research gap regarding how the integration of contextual learning and authentic outdoor experiences influences elementary students' science learning outcomes.

This study offers novelty by integrating the principles of Contextual Teaching and Learning (CTL) with outdoor learning into a unified instructional approach. Rather than applying CTL only through classroom contexts or implementing outdoor activities without a contextual learning framework, this study combines both approaches to enable students to construct scientific knowledge through direct interaction with real environmental phenomena. The integration is expected to provide more meaningful learning experiences, strengthen conceptual understanding, and improve science learning outcomes among elementary school students.

Based on these considerations, this study aims to determine the effect of an outdoor-based Contextual Teaching and Learning (CTL) model on the science learning outcomes of fourth-grade students at Mathlaul Anwar Islamic Elementary School.

RESEARCH METHODS

The method used was a quantitative approach employing a quasi-experimental design. A quasi-experimental design is a research method aimed at testing the cause-and-effect relationship between variables without fully randomizing the research subjects. It utilizes a pretest-posttest control group design. Data were collected through pre-tests and post-tests to measure differences in learning outcomes before and after the intervention (Anantasia & Rindrayani, 2025). The research design used was a Nonequivalent Control Group Design

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involving an experimental class and a control class; the experimental class was treated using an outdoor-based Contextual Teaching and Learning (CTL) model, while the control class used conventional learning. The study was conducted at MI Mathlaul Anwar in the fourth grade.

The population in this study consisted of all fourth-grade students at Mathlaul Anwar Islamic Elementary School. The sample was selected using a purposive sampling technique because the researcher used the existing fourth-grade classes determined by the school. The experimental class consisted of 30 students, while the control class consisted of 30 students. Thus, the total population comprised 60 fourth-grade students.

Before being used in the study, the test instruments were first tested for validity and reliability to determine their suitability for the research. The instrument consisted of 25 multiple-choice items, and item validity was tested using the Pearson Product-Moment correlation. The results showed that 16 items study. Instrument reliability was assessed using Cronbach's Alpha, yielding a coefficient of 0,846, which indicates a very high level of reliability.

The research stages include the preparation stage, the implementation stage, and the final stage. During the preparation stage, the researcher developed teaching materials and research instruments. The implementation stage involved applying an outdoor-based Contextual Teaching and Learning (CTL) model in the experimental class, while the control class used conventional teaching methods. The final stage involved administering a post-test and analyzing the research data.

Data analysis was conducted using normality and homogeneity tests as preliminary tests. After the data were confirmed to be normally distributed and homogeneous, the analysis continued using a t-test to determine the effect of the learning model on student learning outcomes. The t-test was used to determine the effect of a treatment by testing the significance of the difference in means between two samples (Pasaribu et al., 2022).

RESULTS AND DISCUSSION

This section will address the research question: Does the outdoor-based Contextual Teaching and Learning (CTL) model affect the science learning outcomes of fourth-grade students at Mathlaul Anwar Islamic Elementary School? Students in both classes took a post-test to assess improvements in learning outcomes following the instructional activities. Based on the data collected, the average pre-test score for the control class was 35.23, while that for

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the experimental class was 40.90. After the learning intervention, the average post-test score in the control class increased to 46.70, while in the experimental class it increased to 67.50. To clarify the comparison of the improvement in student learning outcomes between the control and experimental classes, see the following diagram:

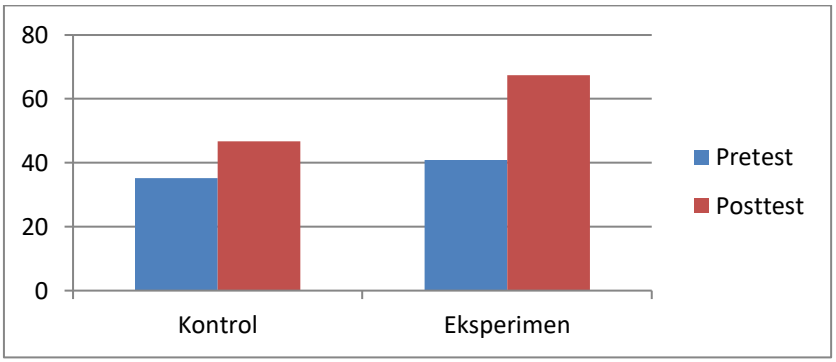

Chart 1. Comparison of Learning Outcomes

Based on the diagram, it can be seen that the scores in the experimental class showed a greater increase than those in the control class. The greater increase in the experimental class indicates that the implementation of the outdoor-based Contextual Teaching and Learning (CTL) model contributed more significantly to the improvement in science learning outcomes among fourth-grade students at Mathlaul Anwar Islamic Elementary School.

Before conducting hypothesis testing, prerequisite tests namely the normality test and the homogeneity of variances test were first performed. The normality test was conducted to determine whether the research data were normally distributed, while the homogeneity of variances test was conducted to determine whether the variances between the experimental and control classes were equal. In this study, the normality test was performed using the Shapiro-Wilk test with the assistance of SPSS software. The test criterion was that the data were considered normally distributed if the significance value was greater than 0.05. Before conducting hypothesis testing, prerequisite tests namely the normality test and the homogeneity of variances test were first performed. The normality test was conducted to determine whether the research data were normally distributed, while the homogeneity of variances test was conducted to determine whether the variances between the experimental and control classes were equal. In this study, the normality test was performed using the

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Shapiro-Wilk test with the assistance of SPSS software. The test criterion was that the data were considered normally distributed if the significance value was greater than 0.05.

Table 1. Normality test

Data	Sig.	Description
PretestKontrol	.467	Normal
PosttestKontrol	.440	Normal
PretestKontrol	.083	Normal
PosttestKontrol	.090	Normal

Based on the results of the normality test, the research data was found to be normally distributed. Next, a homogeneity test will be conducted using Levene's Test to determine whether the data from the two classes have homogeneous variances.

Table 2. Homogeneity Test

Data	Sig.	Description
Results	0,621	Homogen

Based on the results of the homogeneity test, a significance value (sig) of 0.621 ≥ 0.05 was obtained in the test based on the mean; therefore, it can be concluded that the learning outcome data of students in the control class and the experimental class have homogeneous variances. Since both datasets are normally distributed and homogeneous. The next step is to test the research hypothesis. This hypothesis testing was conducted using the independent samples t-test method via IBM SPSS Statistics version 26.

Table 3. Independent Sample T-test

Variabel	Sig. (2-tailed)	Description
Learning Outcomes	0,000	There is a significant difference

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Based on the results of the hypothesis test using the t-test, the Independent Samples T-test yielded t = -6.321 with df = 58 Sig. (2-tailed) value of 0.000 ≤ 0.05 was obtained. This indicates that there is a significant difference between the learning outcomes of students in the control class and the experimental class. Since the p-value is less than 0.05, Ha is accepted and Ho is rejected. Thus, the outdoor-based Contextual Teaching and Learning (CTL) model has an effect on the science learning outcomes of fourth-grade students at MI Mathlaul Anwar.

Learning outcomes reflect the changes and development of students as a result of the learning experiences they have undergone during the teaching and learning process. In this study, the improvement in students' learning outcomes is evident from the difference in pre-test and post-test scores between the two classes. The greater improvement in learning outcomes in the experimental class indicates that the instructional model used plays a significant role in helping students understand the material. This suggests that the use of an appropriate instructional model can provide a more meaningful learning experience, enabling students not only to memorize the material but also to deeply understand the concepts.

The findings of this study align with the Contextual Teaching and Learning (CTL) theory, which states that learning aims to enhance students' motivation by linking instructional content to real-life contexts, thereby enabling students to actively engage in discovering connections between the material being studied and their own life experiences (Syupriyanti in Tandiling, 2022). Furthermore, the implementation of outdoor-based learning also supports improved learning outcomes due to its alignment with CTL; outdoor study emphasizes the connection between learning materials and real-world realities. CTL learning utilizes natural conditions and real-world phenomena that students encounter in their daily lives as learning resources (Noi & Lukum, 2025).

In this study, the significant improvement in learning outcomes in the experimental class was attributed to the implementation of an outdoor-based Contextual Teaching and Learning (CTL) model, which actively engaged students in the learning process. This active engagement made it easier for students to understand the concepts of plant parts because they experienced the learning process firsthand. In addition, the outdoor learning environment provided an enjoyable experience, thereby increasing students' motivation to learn.

These findings are consistent with the principles of Contextual Teaching and Learning (CTL), which emphasize that knowledge is constructed through meaningful learning experiences rather than passive information transfer. According to CTL theory,

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students learn more effectively when they actively relate new concepts to real-life situations. In this study, outdoor learning provided authentic contexts that enabled students to observe natural phenomena directly, discuss scientific concepts collaboratively, and construct their own understanding. Consequently, students became more engaged in the learning process, resulting in better science learning outcomes than those taught through conventional instruction.

Based on the research findings, it can be concluded that the implementation of an outdoor-based Contextual Teaching and Learning (CTL) model has a positive and significant effect on the science learning outcomes of fourth-grade students at Mathlaul Anwar Islamic Elementary School. This is demonstrated by the higher learning outcomes of students in the experimental class compared to those in the control class.

CONCLUSION

The results of this study indicate that the implementation of an outdoor-based Contextual Teaching and Learning (CTL) model has a positive effect on the science learning outcomes of fourth-grade students at MI Mathlaul Anwar. By connecting learning activities with the surrounding environment, the model provides meaningful learning experiences that enhance students' engagement and understanding of science concepts.

Practically, this model can serve as an alternative instructional approach for teachers and schools to create more active and contextual science learning. However, this study was limited to one school and focused only on fourth-grade students' science learning outcomes. Future studies are recommended to involve larger samples, different educational levels, and examine other learning variables such as critical thinking, learning motivation, and scientific attitudes.

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