Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika
https://journal-center.litpam.com/index.php/e-Saintika/index

July 2025 Vol. 9, No. 2
e-ISSN: 2615-6881
pp. 256-279

The Impact of Outdoor Activity-Based Learning on Elementary School Students' Motivation and Social Skills Development

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Received: May 2025; Revised: July 2025; Published: July 2025

Abstract

This study examines the impact of outdoor activity-based learning on student motivation, responsibility, and cooperation in physical education, focusing on two specific activities: Pirates' Treasure and Team Tail Tag. The increasing recognition of outdoor learning as a tool to enhance both cognitive and social development in elementary education provides the backdrop for this research. The purpose of the study was to investigate how different outdoor activities affect students' learning motivation, particularly in relation to their levels of responsibility and cooperation. A total of 48 students from an elementary school in Ampenan participated, categorized into four treatment groups based on pre-assessed responsibility and cooperation levels. The study employed a 2x2 factorial experimental design, with pretest and posttest assessments to measure changes in motivation. The findings revealed that students with high responsibility and cooperation (A1B1) showed the greatest improvement in motivation when engaging in Pirates' Treasure, while those with higher cooperation, particularly in Team Tail Tag (A2B2), exhibited the most significant gains. The study also identified a significant interaction between activity type and students' social traits, suggesting that outdoor activities that promote collaboration are more effective in increasing motivation, particularly for students with initially lower levels of cooperation. However, the research also highlighted several challenges, including limited resources, inadequate teacher training, and resistance to integrating outdoor learning in the curriculum. The study recommends further exploration of the long-term effects of outdoor activities, the effectiveness of various outdoor learning methods, and strategies to overcome implementation barriers, particularly through teacher training and resource allocation.

Keywords: Outdoor Activity; Motivation; Responsibility; Cooperation; Physical Education; Elementary School

How to Cite: Maulidin, M., Hidayatullah, M. R., & Darisman, E. K. (2025). The Impact of Outdoor Activity-Based Learning on Elementary School Students' Motivation and Social Skills Development. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, *9*(2), 256–279. https://doi.org/10.36312/e-saintika.v9i2.3181

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INTRODUCTION

Outdoor activity-based learning has increasingly been recognized as a crucial method for promoting both cognitive and social development in primary education. Numerous studies highlight the significant benefits of outdoor learning, particularly in fostering social skills and enhancing academic competencies. Marchant et al. (2019)

emphasize that outdoor learning is an effective means of achieving curricular goals, stressing the necessity of fully integrating it into educational practices rather than treating it as an auxiliary activity. Mann et al. (2022) corroborate this by showing that outdoor learning enhances social skills such as teamwork and self-confidence, alongside increasing student engagement. Khan et al. (2020) also highlight that outdoor-environments can improve students' comprehension in subjects like math and science, as students find outdoor education more interactive and collaborative compared to traditional classroom settings. These findings support the integration of outdoor activities into the curriculum as a core component of effective teaching strategies, not just as an add-on (Patchen et al., 2024; Scott et al., 2022).

Integrating outdoor activities into physical education is not only beneficial for boosting student motivation but also for providing a comprehensive and enriching learning experience. Physical education should focus not only on developing physical skills but also on nurturing students' emotional and social development. As noted by Marchant et al. (2019), outdoor learning should be central to the curriculum, offering numerous opportunities for holistic development, including social, cognitive, and emotional growth. In this regard, outdoor learning environments create rich contexts for experiential learning and emotional connections with nature, which are vital for students' emotional development (Mann et al., 2021). These insights resonate with findings from this study, which emphasize the urgent need to integrate outdoor activity-based learning into primary education, especially in settings where resources may be limited. Irmansyah et al. (2020) highlight similar concerns, noting that in many schools, the focus remains disproportionately on technical sports skills and performance, rather than fostering a more balanced and holistic development in students.

Outdoor activity-based learning profoundly impacts both social and cognitive development in students. As Ma and Mazlan (2024) found, outdoor learning contributes significantly to social skills, such as teamwork and self-confidence, while also increasing student engagement and motivation. This is crucial for fostering a collaborative and positive learning environment, where students can work together, share ideas, and engage in meaningful interactions. The emphasis on these social aspects is especially important in primary education, where social and emotional skills form the foundation for lifelong learning and personal growth. Lawson (2020) point out that while physical education in many schools focuses on skill development, it often overlooks the broader need for social skill development, which can be more effectively addressed through outdoor learning activities.

Moreover, Ābele et al. (2021) observed that outdoor learning spaces encourage cooperation and curiosity among children, contributing to both social and cognitive development. The multifaceted learning environment provided by outdoor activities allows students to engage with their surroundings, promoting collaboration and communication within group settings. Norling and Sandberg (2015) further noted that these outdoor experiences support language development by connecting cognitive growth with social interaction in natural environments. These findings underscore the idea that outdoor learning plays an essential role in promoting well-rounded student development, ensuring that their physical, cognitive, and social needs are met.

Despite the proven benefits of outdoor activity-based learning, its implementation in Indonesia faces several challenges, particularly in rural and

conservative settings. Traditional educational systems often resist change, with many educators and policymakers still prioritizing sports performance over holistic student development (van Dijk-Wesselius et al., 2020). Additionally, limited resources and insufficient training for educators hinder the widespread adoption of outdoor learning methods (Waddell et al., 2024). The lack of governmental support and investment in outdoor education exacerbates these challenges, resulting in infrequent outdoor educational initiatives in underserved regions. Irmansyah et al. (2025) similarly note that physical education often faces these systemic barriers, including inadequate facilities, outdated pedagogical practices, and a lack of alignment between curriculum theory and classroom reality, particularly in rural areas.

To address these barriers, several strategies have been proposed. Edwards-Jones et al. (2018) stress the importance of community engagement and collaboration among educators, parents, and local leaders to foster enthusiasm for outdoor education programs. Additionally, training teachers in outdoor pedagogical techniques and integrating outdoor learning into existing curricula can help bridge the gap, ensuring that educators are well-equipped to create meaningful outdoor experiences for students (Frances et al., 2024). Moreover, feedback from educators and parents can help tailor outdoor activities to local cultural values, making them more acceptable within conservative educational frameworks, which can enhance their effectiveness.

One of the key barriers to the effective implementation of outdoor activity-based learning is the lack of adequate teacher training. As highlighted by Frances et al. (2024), teachers often struggle to design and implement outdoor learning experiences that meet the developmental needs of students. This challenge is particularly pronounced in primary education, where the focus is often on technical skills and sports performance rather than fostering the holistic development of students. Irmansyah et al. (2021) highlight the lack of comprehensive teacher training in Indonesia as a major issue, noting that many physical education teachers are ill-prepared to incorporate outdoor learning into their teaching practices. To overcome this issue, it is essential for governments and educational institutions to provide comprehensive training for teachers, equipping them with the necessary skills and knowledge to effectively integrate outdoor learning into the curriculum.

Effective outdoor learning should also take into account the cultural context of students. In Indonesia, as in many other countries, traditional games can be effectively used to enhance student engagement and promote cultural identity. Games such as *gobak sodor*, *engklek*, and *bentengan* not only preserve cultural heritage but also serve as valuable tools for developing motor skills, teamwork, and social competencies in students (Kurniawan et al., 2025; Mujriah et al., 2022). Patchen et al. (2024) found that incorporating local games into outdoor learning not only increases student engagement but also makes the learning experience more enjoyable and meaningful. This approach bridges the gap between traditional educational practices and more innovative, student-centered learning methods, ensuring that outdoor education is both culturally relevant and effective.

The implementation of outdoor activity-based learning faces several challenges, particularly in resource-limited settings. The lack of adequate facilities, limited teacher training, and resistance to change within the educational system all contribute to the underutilization of outdoor learning in primary schools (Frances et al., 2024; Remmen & Iversen, 2023). However, by addressing these challenges through targeted teacher

training, increased community involvement, and improved access to resources, the potential for outdoor learning to enhance the quality of education can be fully realized. (Waddell et al. (2024) emphasize the need for sustained governmental support to ensure that outdoor learning becomes an integral part of the educational system, particularly in underserved regions.

This research aims to explore the effectiveness of outdoor activity-based learning in physical education, specifically in enhancing student motivation, responsibility, and teamwork in primary schools. The study seeks to identify how two outdoor games, Pirates' Treasure and Team Tail Tag (Sport New Zealand et al., 2021), can impact student motivation and the development of social skills. By examining the factors that support or hinder the implementation of outdoor learning in primary education, this research provides valuable insights for developing more effective and integrated teaching models that align with the needs and conditions in educational environments.

Pirates' Treasure is a team game where one player acts as the sailor protecting the treasure, while pirates attempt to steal it without being tagged. The pirates work together to steal the treasure from the hoop in the middle of the play area and take it out, while the sailor tries to stop them. This game teaches skills in teamwork, attacking tactics, speed, and coordination. Progressions can be added, such as increasing the number of sailors or giving pirates special roles to increase the challenge. Beyond fun, it helps children develop strategy and communication within a team. Whereas, Team Tail Tag is a fast-paced game where four teams try to steal tails from others while protecting their own. Played on one-third of a netball court, players wear colored bands with tails tucked into their shorts. The goal is to collect as many tails as possible from other teams. Players must tag opponents to steal their tails, while evading being tagged themselves. Teamwork is crucial, as players strategize and support each other. The game develops skills like chasing, evading, and teamwork. In the second round, teams must collect all different colored tails for added challenge.

The novelty of this research lies in its focus on offering research-based solutions that address the specific challenges faced by schools with limited resources. It fills a significant gap in the existing literature, particularly in regions with similar challenges, offering practical solutions for improving the quality of physical education in primary schools. This study is expected to contribute meaningfully to ongoing efforts to improve the quality of teachers and physical education learning resources, providing a foundation for future research and policy-making in the field.

METHOD

Research Design

This study adopts an experimental method using a 2x2 factorial design (Haegele & Hodge, 2015) to evaluate the impact of outdoor activity-based learning on student motivation and social skills, specifically focusing on responsibility and cooperation. The factorial design is particularly advantageous in educational research as it allows the simultaneous evaluation of multiple variables and their interactions. This approach is essential in contexts like outdoor education, where environmental factors play a significant role in shaping students' learning experiences (Warouw et al., 2023). Factorial designs, such as the 2x2 model used in this study, enable a comprehensive understanding of how outdoor learning affects both academic and social outcomes,

including teamwork, motivation, and engagement, all of which have been identified as critical components in student development (Mann et al., 2022).

This design is well-suited to investigate the effects of two outdoor activities—Pirates' Treasure and Team Tail Tag—on two attributes, responsibility and cooperation, which were selected based on prior studies that highlight their ability to foster teamwork and interpersonal skills in students. Pirates' Treasure and Team Tail Tag were chosen because they emphasize social interaction and collaboration, key skills that align with the goals of this study. These games have been shown to significantly enhance students' social skills, making them ideal interventions for investigating the role of outdoor activities in fostering responsibility and cooperation (Ma & Mazlan, 2024).

Table 1. 2x2 Factorial Experimental Research Design

Outdoor Activity-based Learning	**Pirates' Treasure (A1)**	**Team Tail Tag (A2)**
Social Skills		
High responsibility and cooperation (B1)	A1B1	A2B1
Low responsibility and cooperation (B2)	A1B2	A2B2

Description:

A1B1: Group of students with high responsibility and cooperation, given an intervention using Outdoor Activity (*Pirates' Treasure*).

A1B2: Group of students with low responsibility and cooperation, given an intervention using Outdoor Activity (*Pirates' Treasure*).

A2B1: Group of students with high responsibility and cooperation, given an intervention using Outdoor Activity (*Team Tail Tag*).

A2B2: Group of students with low responsibility and cooperation, given an intervention using Outdoor Activity (*Team Tail Tag*).

Population and Sample

The population for this study consists of elementary school students from an elementary school in Mataram Indonesia, specifically from grades IV, V, and VI. A stratified purposive sampling technique (Onwuegbuzie & Collins, 2017) was used to select students based on their levels of responsibility and cooperation. Stratified purposive sampling is an effective method in educational research, particularly when dealing with complex variables like cooperation and responsibility, as it ensures that different subgroups within the population are adequately represented. This enhances the reliability and validity of the findings (Britton et al., 2023).

From a total population of 136 students in grades IV, V, and VI, students were grouped based on the results of a validated questionnaire measuring responsibility and cooperation. The top 27% of students with the highest scores formed the high responsibility and cooperation group (B1), and the bottom 27% formed the low responsibility and cooperation group (B2). This method allows for a clear comparison between students with differing levels of responsibility and cooperation. Following the identification of these strata, students from each group were randomly selected to ensure a lack of selection bias, resulting in a total sample size of 48 students. The

sample was divided into four groups, each consisting of 12 students: two groups for the Pirates' Treasure intervention (A1B1 and A1B2) and two groups for the Team Tail Tag intervention (A2B1 and A2B2). This sampling method ensures proportional representation from both high and low responsibility and cooperation groups, improving the generalizability of the findings and allowing for a nuanced analysis of how outdoor activity-based learning affects social and behavioral outcomes (Faro et al., 2025).

Research Instruments

The instruments used in this study were designed to assess responsibility, cooperation, and student motivation in the context of outdoor activity-based learning. These instruments were developed based on established theoretical frameworks in educational psychology and outdoor education. The responsibility and cooperation instruments include eight indicators measuring students' behaviors in individual and group contexts, such as initiative in completing tasks, fairness in task distribution, maintaining cleanliness, respecting others' opinions, and helping peers. These indicators assess both personal responsibility and the ability to collaborate effectively with others, as these are essential competencies for students' overall development (Mann et al., 2021).

The motivation instrument is designed to measure both intrinsic and extrinsic motivation in the context of outdoor learning. Intrinsic motivation is assessed through students' enjoyment, satisfaction, and enthusiasm for learning in outdoor environments, as well as their desire to explore and engage with their surroundings. Extrinsic motivation evaluates external factors, such as rewards, praise, or peer influence, which might drive students' participation in outdoor activities (Cenić et al., 2023).

For the validity and reliability of the instruments, a content validity analysis was performed, ensuring that the items on the questionnaire were representative of the constructs being measured. Experts in the field of physical education and educational psychology reviewed the instruments to ensure they accurately captured the intended variables. Reliability testing was conducted using Cronbach's alpha coefficient. The reliability results indicated that both the responsibility ($\alpha = 0.89$) and cooperation ($\alpha = 0.87$) instruments demonstrated high internal consistency. For the motivation instrument, both the intrinsic ($\alpha = 0.91$) and extrinsic ($\alpha = 0.88$) subscales also showed strong reliability, supporting the consistency of the measures across different respondents.

Data Collection Technique

Data collection was carried out using a combination of questionnaires and observations. The questionnaire was distributed to students in the selected schools after obtaining informed consent from the participants and their guardians. The students were asked to respond to the responsibility, cooperation, and motivation items based on their experiences with the outdoor activities. The questionnaires were administered before the outdoor activity interventions (pre-test) and after the activities were completed (post-test) to assess changes in the students' behavior and motivation.

In addition to the questionnaires, observations were conducted during the outdoor activity sessions to gather qualitative data on students' behavior and

interactions in the learning environment. Trained observers used a structured observation checklist to assess students' participation, cooperation, and leadership behaviors during the games. The observational data provided additional insights into how students interacted with peers and engaged with the tasks, complementing the data gathered from the questionnaires.

Data Analysis

The data analysis techniques in this study are designed to ensure that the results obtained are valid and relevant to the research objectives. The analysis is carried out in several stages, starting from descriptive statistics, prerequisite tests for analysis, and finally hypothesis testing. Below is an explanation of each stage:

Descriptive Statistics

Descriptive statistics were first employed to summarize the data and provide an overview of the characteristics of the key variables: responsibility, cooperation, and student motivation. This step involved calculating the mean, standard deviation, and frequency distributions for each of these variables. These statistics provided a preliminary understanding of the data, allowing for the identification of trends and patterns within the sample. For example, by assessing the average scores for responsibility and cooperation across different groups, we could determine if there were general differences in students' behaviors before and after the interventions. Descriptive statistics also helped identify any potential outliers or anomalies that might require further investigation or data cleaning before proceeding to more complex analyses.

Prerequisite Analysis Tests

Before conducting the main hypothesis testing, two essential prerequisite tests were performed to ensure that the data met the necessary assumptions for a valid Analysis of Variance (ANOVA). The first test was the normality test (Rochon et al., 2012), which was conducted using the Shapiro-Wilk test. This test assessed whether the data followed a normal distribution, an assumption required for conducting parametric tests like ANOVA. If the data was found to be normally distributed, we could proceed with ANOVA; if not, non-parametric methods or data transformations would be considered . The normality assumption was satisfied if the significance value (p-value) was greater than 0.05, indicating that the data did not significantly deviate from a normal distribution.

The second prerequisite test was the homogeneity of variance test (Parra-Frutos, 2013), conducted using Levene's Test. This test checked whether the variances between the different groups were similar, an assumption that is crucial for the validity of ANOVA results . Homogeneity of variance ensures that differences in scores across groups are not due to variability in group sizes or spread. If the significance value from Levene's Test was greater than 0.05, it confirmed that the variances were homogeneous, allowing us to proceed with the main analysis.

Hypothesis Testing

After confirming that the data met the necessary assumptions, hypothesis testing was performed using two-way Analysis of Variance (ANOVA) (Cohen et al., 2018). This method was chosen to examine the main effects and interactions between the two independent variables: the type of outdoor activity (*Pirates' Treasure* vs. *Team Tail Tag*)

and the levels of responsibility and cooperation among students. The two-way ANOVA allowed for the assessment of how these two factors, both independently and in interaction, influenced the dependent variables (students' responsibility and cooperation). This approach also enabled us to examine whether the effects of the outdoor activities varied across students with different levels of responsibility and cooperation, as measured by the pre-test.

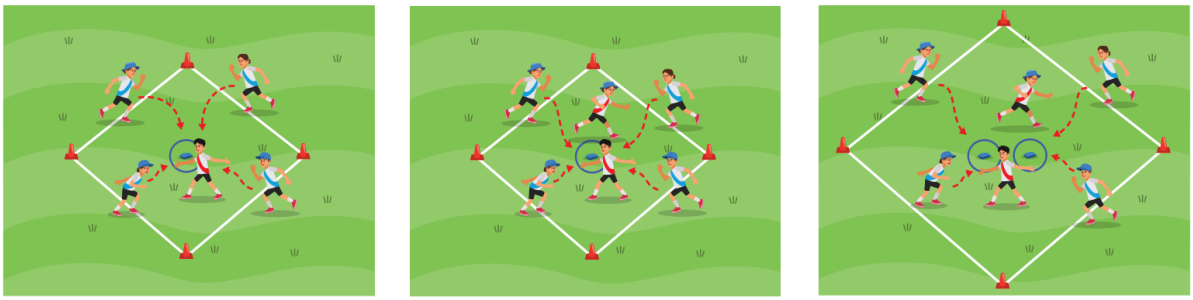
If significant effects were found in the ANOVA, post-hoc analyses were conducted using Tukey's HSD test to identify where specific differences occurred between the groups. Tukey's HSD test is particularly useful when comparing multiple groups, as it controls for Type I errors and allows for precise identification of significant differences between pairs of groups. The significance level for all statistical tests was set at 0.05, ensuring that the findings were robust and reliable. This analysis was essential in understanding the impact of outdoor activities on the students' development of responsibility and cooperation, as well as the interaction between these variables. Together, these data analysis techniques provided a comprehensive framework for evaluating the effects of outdoor activity-based learning on student outcomes, ensuring that the results were both statistically valid and meaningful in the context of the study's objectives.

Implementation of Outdoor Learning Activities and Rationale for Game Selection

This study utilized two structured physical games—Pirates' Treasure and Team Tail Tag—to operationalize the outdoor activity-based learning intervention. Both games were implemented progressively over three stages, incorporating variations to ensure increasing levels of challenge, engagement, and social interaction. The selection of these games was informed by previous research highlighting their effectiveness in promoting responsibility, cooperation, and group coordination among school-age children (Ma & Mazlan, 2024).

Pirates' Treasure Game

This game emphasizes strategic movement, collaborative planning, and turn-taking, all of which align closely with the development of responsibility and cooperation. The implementation occurred in three escalating steps (see Figure 1): (1) Step One (4 vs. 1): One student acts as the "sailor" guarding the treasure (a hoop with beanbags), while four "pirates" attempt to retrieve the treasure without being tagged. Roles were rotated to ensure every participant experienced both offensive and defensive responsibilities; (2) Step Two (4 vs. 2): A second sailor and an additional hoop with treasure were introduced. This modification encouraged peer communication and shared responsibility between sailors and increased cooperative strategies among pirates; and (3) Step Three: Multiple variations were introduced, such as using beanbags of different colors to represent different treasures (gold, pounamu, rubies) and assigning pirates additional roles (e.g., hopping on one leg as a "peg leg" pirate). These variations encouraged students to negotiate strategies, adapt to constraints, and coordinate efforts to achieve team goals—key indicators of cooperation and responsible behavior.



Step One:
Play the game with one sailor and four pirates – 4 v 1. Swap pirates and sailors roles so that all the children have a turn at being the sailor.

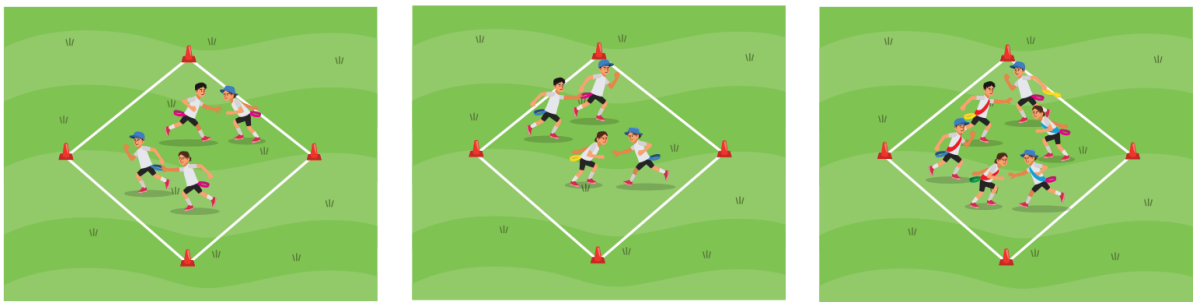
Step Two:
Introduce a second sailor and maybe a second hoop with more treasure – 4 v 2.

Step Three:
Use variations such as: three different pieces of treasure (bean bags of different colours – yellow is gold, green is pounamu, red is rubies); create a larger ship; vary the number of pirates; give the pirates different roles, such as a 'peg leg' where the pirate has to hop on one leg or a 'parrot on shoulder' where the pirate has to place their left hand on their right shoulder.

Figure 1. Pirates' Treasure Game Procedures Implemented in this Study

Team Tail Tag Game

Team Tail Tag was selected for its focus on team-based goal setting, real-time decision-making, and equitable competition. It is especially effective for cultivating mutual respect and rule adherence. Implementation followed a similar three-step approach (see Figure 2): (1) Step One: Two color teams (e.g., red and blue) collaborated as one unit to collect tails (waistbands) from opposing teams within a time limit. Success depended on synchronized movements and role distribution; (2) Step Two: All four teams competed individually, each working to collect as many tails from others while protecting their own. This stage introduced a competitive dimension requiring self-regulation and cooperation within teams; and (3) Step Three: The challenge evolved to require each team to obtain one tail of each color and return to base. This final level promoted goal-oriented collaboration, strategic planning, and collective problem-solving—reinforcing interpersonal responsibility under time pressure.



Step One:
Combine the red and blue teams and have them work as one team to get as many green and yellow tails (bands) as possible in the time limit. The winning team is the one that has more of their oppositions' bands. Their own bands don't count.

Step Two:
Each colour works as a team on their own to chase and be chased by the other three teams while trying to get as many tails as possible from them. The winning team is the one that has more of the other teams' bands. If there is a draw, the team that also has more of their own team's bands wins.

Step Three:
The children again work in their own teams, but the goal is now to get a tail of each colour and get back to their corner. The team that has one of each colour and is first to hold all four up wins.

Figure 2. Team Tail Tag Game Procedures Implemented in this Study

Justification for Game Selection

The decision to use Pirates' Treasure and Team Tail Tag was grounded in both theoretical and practical considerations: (1) Both games are physically engaging, easily modifiable, and familiar to elementary-age students; (2) They are rich in embedded social skill components, including teamwork, communication, empathy, and mutual accountability; and (3) The progressive structure and variations allow controlled observation of behavior changes over time while maintaining student interest. By implementing these games in structured stages and incorporating variation, the study ensured ecological validity and maximized the potential for measuring authentic shifts in responsibility and cooperation within a real-world school context.

Ethical Statement

This study was conducted in accordance with established ethical standards for research involving human participants. Prior to data collection, informed consent was obtained from all student participants and their legal guardians. Participation was voluntary, and students had the right to withdraw at any time without penalty. The research activities, including the administration of questionnaires and observation during outdoor games, were designed to ensure the physical and psychological well-being of the students. All data collected were kept confidential and used solely for research purposes. Ethical approval was obtained from the relevant institutional or school authorities before the study commenced.

RESULTS AND DISCUSSION

Descriptive Statistics

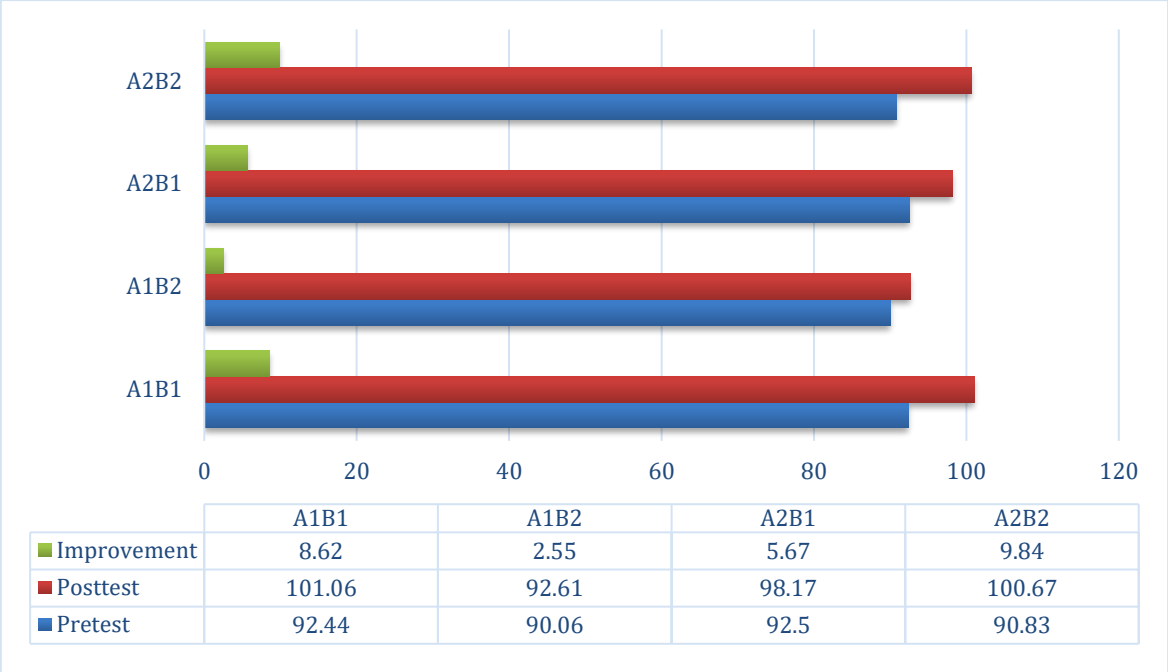
Table 2 shows the descriptive statistics for the improvement in learning motivation from pretest to posttest across four treatment groups: *Pirates' Treasure* and *Team Tail Tag*, categorized by high and low levels of responsibility and cooperation.

Table 2. Descriptive Statistics of Treatment Group Improvement from Pretest and Posttest Learning Motivation Results

Treatment Group	Responsibility and Cooperation Level	Stc.	*Pretest*	*Posttest*	Improvement
Outdoor Activity (Pirates' Treasure)	**High A1B1**	**Total**	1664	1819	155
		Mean	92.44	101.06	8.62
		SD	2.94	5.17	2.23
	Low A1B2	**Total**	1621	1667	46
		Mean	90.06	92.61	2.55
		SD	3.44	4.50	1.06
Outdoor Activity (Team Tail Tag)	**High A2B1**	**Total**	1665	1767	102
		Mean	92.50	98.17	5.67
		SD	3.93	6.09	2.16
	Low A2B2	**Total**	1635	1812	177
		Mean	90.83	100.67	9.84
		SD	4.19	5.08	0.89

The *Pirates' Treasure* - High Responsibility and Cooperation (A1B1) group showed an improvement of 155 points, with the mean score increasing by 8.62 points (from 92.44 to 101.06), and the standard deviation rising from 2.94 to 5.17, indicating

greater variability in posttest scores. In contrast, the *Pirates' Treasure* - Low Responsibility and Cooperation (A1B2) group had a smaller improvement of 46 points, with a mean increase of 2.55 points (from 90.06 to 92.61) and a slight increase in the standard deviation from 3.44 to 4.50. The *Team Tail Tag* - High Responsibility and Cooperation (A2B1) group improved by 102 points, with a mean increase of 5.67 points (from 92.50 to 98.17) and the standard deviation rising from 3.93 to 6.09. The *Team Tail Tag* - Low Responsibility and Cooperation (A2B2) group showed the largest improvement of 177 points, with a mean increase of 9.84 points (from 90.83 to 100.67) and the standard deviation increasing from 4.19 to 5.08. Overall, *Team Tail Tag* showed more consistent improvements, particularly for students with initially low responsibility and cooperation.



	A1B1	A1B2	A2B1	A2B2
Improvement	8.62	2.55	5.67	9.84
Posttest	101.06	92.61	98.17	100.67
Pretest	92.44	90.06	92.5	90.83

Figure 3. Histogram of Treatment Group Improvement from Pretest and Posttest Learning Motivation Results

Figure 3 visualizes the improvement in learning motivation across the treatment groups, highlighting that *Team Tail Tag* consistently led to greater improvements, especially among students with initially lower responsibility and cooperation levels. This visual representation supports the conclusion that outdoor activities, particularly those involving collaborative elements like *Team Tail Tag*, play a significant role in increasing student motivation and cooperation.

Prerequisite Analysis Tests

Normality Test

The normality test was conducted to ensure that the data obtained from the pretest and posttest results follow a normal distribution, which is a prerequisite for performing ANOVA analysis. The results of the Shapiro-Wilk test are shown in Table 3, which indicates that the data from both pretest and posttest for all treatment groups (*Pirates' Treasure* and *Team Tail Tag*) exhibit a normal distribution, as the significance values (p-values) are greater than 0.05. Based on the Shapiro-Wilk test results, all groups (A1B1, A1B2, A2B1, and A2B2) show p-values greater than 0.05 for both pretest

and posttest data, indicating that the data is normally distributed. This supports the assumption of normality required for ANOVA analysis.

Table 3. Normality Test Results from Pretest and Posttest Learning Motivation

Treatment	Responsibility and Cooperation Level	Data	Shapiro-Wilk			Sig. (P)	Normality
			Stc.	df	Sig.		
Outdoor Activity (Pirates' Treasure)	High A1B1	Pretest	.949	18	.416	P > 0.05	**Yes**
		Posttest	.973	18	.859		
	Low A1B2	Pretest	.936	18	.249		
		Posttest	.905	18	.071		
Outdoor Activity (Team Tail Tag)	High A2B1	Pretest	.961	18	.614		
		Posttest	.920	18	.128		
	Low A2B2	Pretest	.957	18	.540		
		Posttest	.902	18	.063		

Homogeneity Test

The homogeneity test ensures that the variance across the groups is homogeneous, which is a critical assumption for conducting ANOVA. **Table 4** shows the results of Levene's Test, which assesses the equality of variances. The p-values for both the pretest and posttest data are greater than 0.05, indicating that the variances are homogeneous across the treatment groups. Since the p-values for both the pretest and posttest data are greater than 0.05, we conclude that the variances are homogeneous across the groups. This confirms that the assumption of homogeneity of variance is met for the ANOVA analysis.

Table 4. Homogeneity Test Results from Pretest and Posttest Learning Motivation

Test of Homogeneity of Variance		Levene Statistic	df1	df2	Sig.	Sig. (P)	Con.
Pretest	Based on Mean	.673	3	68	.572	P > 0.05	**Homogenous**
Posttest		.945	3	68	.424		

Hypothesis Testing

Hypothesis 1*: There is a significant difference in the learning motivation of students who participate in Outdoor Activity (Pirates' Treasure) and Outdoor Activity (Team Tail Tag) in physical education.*

The results of the Analysis of Variance (ANOVA) test for the two outdoor activities are shown in Table 5. The dependent variable being tested is student learning motivation. The mean scores and their corresponding standard errors and confidence intervals are provided for both Outdoor Activity (*Pirates' Treasure*) and (*Team Tail Tag*). The results of the Univariate Tests are shows in Table 5 and Figure 4.

The F-value for the contrast is 4.374, with a significance (p-value) of 0.040, which is less than the threshold of 0.05. This indicates that there is a statistically significant difference in learning motivation between the students participating in *Pirates' Treasure* and *Team Tail Tag*.

Table 5. Results of the Variance Analysis for Outdoor Activity (*Pirates' Treasure*) and Outdoor Activity (*Team Tail Tag*) on Learning Motivation

Learning Model	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Outdoor Activity (Pirates' Treasure)	96.833	.873	95.090	98.576
Outdoor Activity (Pirates' Treasure)	99.417	.873	97.674	101.160

Univariate Tests

Sum of Squares		df	Mean Square	F	Sig.
Contrast	120.125	1	120.125	4.374	.040
Error	1867.722	68	27.467		

Figure 4. Profile Plots for Outdoor Activity (*Pirates' Treasure*) and Outdoor Activity (*Team Tail Tag*) on Learning Motivation

The profile plot for learning motivation indicates the difference in motivation between the two groups (Figure 4), further supporting the finding that *Team Tail Tag* had a higher average motivation score compared to *Pirates' Treasure*. This suggests that the type of outdoor activity significantly influences the learning motivation of students in physical education.

Hypothesis 2*: There is a significant difference in the learning motivation between students with high responsibility and cooperation compared to those with low responsibility and cooperation.*

The results of the Analysis of Variance (ANOVA) test for responsibility and cooperation levels (high vs. low) on learning motivation are shown in Table 6. The dependent variable tested is student learning motivation. The mean scores and their corresponding standard errors and confidence intervals are provided for both high and low responsibility and cooperation levels.

Table 6. Results of the Variance Analysis for Responsibility and Cooperation (High vs. Low) on Learning Motivation

Responsibility and Cooperation	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
High	99.611	.873	97.868	101.354
Low	96.639	.873	94.896	98.382

Univariate Tests

Sum of Squares		df	Mean Square	F	Sig.
Contrast	159.014	1	159.014	5.789	.019
Error	1867.722	68	27.467		

The F-value for the contrast is 5.789, with a significance (p-value) of 0.019, which is less than the threshold of 0.05. This indicates that there is a statistically significant difference in the learning motivation between students with high and low responsibility and cooperation.

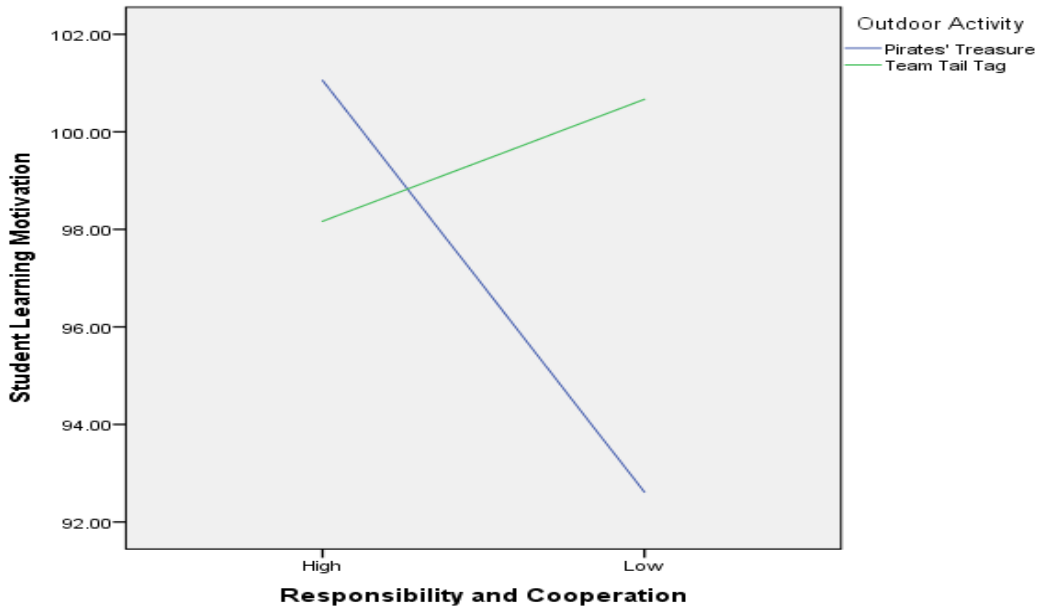


Figure 5. Profile Plots for Responsibility and Cooperation (High vs. Low) on Learning Motivation

The profile plot illustrates the significant difference in learning motivation between the high and low responsibility and cooperation groups. Students with high responsibility and cooperation exhibited significantly higher motivation than those with low responsibility and cooperation, further emphasizing the importance of these traits in influencing learning outcomes.

***Hypothesis 3**: There is a significant interaction between Outdoor Activity (Pirates' Treasure and Team Tail Tag) and levels of responsibility and cooperation (high and low) on students' learning motivation in physical education.*

The results of the Analysis of Variance (ANOVA) for the interaction between the two outdoor activities and responsibility and cooperation levels on learning

motivation are shown in Table 7. The dependent variable tested is student learning motivation. The analysis reveals a significant interaction effect, indicating that the impact of the outdoor activities on learning motivation depends on the students' levels of responsibility and cooperation.

Table 7. Results of the Variance Analysis for Outdoor Activity (*Pirates' Treasure* and *Team Tail Tag*) and Responsibility and Cooperation Levels (High vs. Low) on Learning Motivation

Outdoor Activity	Responsibility and Cooperation Level	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Outdoor Activity (Pirates' Treasure)	High (A1B1)	101.056	1.235	98.591	103.521
	Low (A1B2)	92.611	1.235	90.146	95.076
Outdoor Activity (Team Tail Tag)	High (A2B1)	98.167	1.235	95.702	100.632
	Low (A2B2)	100.667	1.235	98.202	103.132

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	818.153[a]	3	272.718	9.929	.000
Intercept	693253.125	1	693253.125	25239.948	.000
A	120.125	1	120.125	4.374	.040
B	159.014	1	159.014	5.789	.019
A * B	539.014	1	539.014	19.624	.000
Error	1867.722	68	27.467		
Total	695939.000	72			
Corrected Total	2685.875	71			

The F-value for the interaction term (A * B) is 19.624, with a significance (p-value) of 0.000, which is less than the threshold of 0.05. This indicates that there is a significant interaction between the type of outdoor activity and the students' levels of responsibility and cooperation on their learning motivation.

Table 8. Multiple Comparisons Analysis for Interaction between Groups

(I) Interaction	(J) Interaction	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A1B1	A1B2	8.4444*	1.74695	.000	3.8435	13.0454
	A2B1	2.8889	1.74695	.356	-1.7121	7.4899
	A2B2	.3889	1.74695	.996	-4.2121	4.9899
A1B2	A1B1	-8.4444*	1.74695	.000	-13.0454	-3.8435
	A2B1	-5.5556*	1.74695	.012	-10.1565	-.9546
	A2B2	-8.0556*	1.74695	.000	-12.6565	-3.4546
A2B1	A1B1	-2.8889	1.74695	.356	-7.4899	1.7121
	A1B2	5.5556*	1.74695	.012	.9546	10.1565
	A2B2	-2.5000	1.74695	.485	-7.1010	2.1010
A2B2	A1B1	-.3889	1.74695	.996	-4.9899	4.2121
	A1B2	8.0556*	1.74695	.000	3.4546	12.6565
	A2B1	2.5000	1.74695	.485	-2.1010	7.1010

The multiple comparisons analysis reveals several statistically significant differences between treatment groups, as indicated by the asterisk (*) in the results, meaning these differences are unlikely to have occurred by chance due to p-values less than 0.05. Significant interactions include the comparison between students with high responsibility and cooperation (A1B1) and those with low responsibility and cooperation (A1B2), with A1B1 students showing significantly higher motivation (mean difference = 8.4444, p = 0.000). A similar pattern was observed when comparing A2B2 (low responsibility but higher cooperation) and A1B2, where students in A2B2 had significantly higher motivation (mean difference = 8.0556, p = 0.000). The comparison between A2B1 (high responsibility and cooperation in *Team Tail Tag*) and A1B2 also showed a significant difference (mean difference = 5.5556, p = 0.012), with A2B1 students displaying higher motivation.

On the other hand, no significant differences were found between A1B1 and A2B1 (mean difference = 2.8889, p = 0.356), suggesting that the type of outdoor activity did not significantly affect motivation for students with high responsibility and cooperation. Similarly, the comparison between A2B2 and A2B1 (mean difference = 2.5000, p = 0.485) and between A1B1 and A2B2 (mean difference = 0.3889, p = 0.996) did not show any significant differences in motivation.

These findings suggest that learning motivation in physical education is influenced by both the type of outdoor activity and the students' levels of responsibility and cooperation. Specifically, students with high responsibility and cooperation showed the greatest motivation when engaged in *Pirates' Treasure*, while those with low responsibility and cooperation exhibited the least motivation. However, students with higher cooperation, particularly in *Team Tail Tag*, showed more motivation, highlighting certain combinations of activity type and responsibility/cooperation levels lead to increased motivation, with *Team Tail Tag* being particularly beneficial for students with higher cooperation.

Discussion

The findings of this study underline the significant impact that outdoor activity-based learning can have on student motivation and social skill development, especially in the context of physical education. The research specifically focused on two outdoor activities—*Pirates' Treasure* and *Team Tail Tag*—and their influence on students' learning motivation, with a particular emphasis on how the students' levels of responsibility and cooperation interacted with these activities. The results indicate that students with higher levels of responsibility and cooperation benefitted significantly from engaging in these activities, which is consistent with numerous studies that highlight the positive effects of outdoor learning on both academic and social outcomes. This study provides valuable insights into how outdoor learning can be utilized to improve motivation and social skills, which are essential components of holistic student development.

The results of this study align with a growing body of literature that supports the integration of outdoor activities into educational settings. Marchant et al. (2019) emphasized that outdoor learning can effectively achieve curricular goals by fostering social and academic development. They argued that outdoor learning should not be treated as an auxiliary or supplementary activity but as an integral part of the educational experience (Mettis & Väljataga, 2021). The present study supports this

view, demonstrating that outdoor learning activities significantly enhance student motivation and social behavior, particularly in physical education, which is often focused primarily on physical skills.

Similarly, Mann et al. (2022) provided evidence that outdoor learning environments increase student engagement, social interaction, and self-confidence. Their findings showed that students who participated in outdoor activities demonstrated enhanced social skills such as teamwork and cooperation (Mackenzie et al., 2018), which is reflected in the results of this study. In particular, students in the A2B2 (low responsibility, high cooperation) group showed significant improvements in motivation when engaging in *Team Tail Tag*, which involved cooperative elements. This finding supports the idea that outdoor learning, particularly activities that encourage collaboration, plays a vital role in fostering social skills that contribute to improved motivation and engagement.

Gray (2018) also underscored the importance of outdoor activities in promoting both intrinsic and extrinsic motivation, particularly in early childhood education. The present study adds to this by demonstrating that students with lower levels of responsibility and cooperation (A1B2) exhibited the least improvement in motivation. This highlights the importance of student personality traits, such as responsibility and cooperation, in determining how effective outdoor activities are in enhancing motivation. In essence, students who possess stronger social traits tend to gain more from outdoor learning experiences, a finding supported by previous studies (Taş & Gülen, 2019).

A key finding in this study is the significant interaction between the type of outdoor activity and students' levels of responsibility and cooperation. The results indicated that students with high responsibility and cooperation (A1B1) experienced the greatest improvement in motivation when engaging in *Pirates' Treasure*, while those with low responsibility and cooperation (A1B2) exhibited the least motivation. In contrast, students in the *Team Tail Tag* group, particularly those with higher levels of cooperation (A2B2), showed significant improvements in motivation, which suggests that the type of outdoor activity plays a crucial role in determining how effectively it enhances motivation.

This interaction effect is consistent with Ma and Mazlan (2024) findings, which highlighted the role of outdoor education in fostering soft skills such as teamwork, responsibility, and cooperation. In their study, students with higher levels of these traits showed more significant gains in motivation and social skills when participating in outdoor education activities. This is similarly reflected in the present study, where students with higher responsibility and cooperation (A1B1) showed the most significant improvements when engaged in an outdoor activity that required problem-solving and individual initiative (*Pirates' Treasure*). In contrast, A2B2 students, who had lower responsibility but higher cooperation, showed the largest improvement in *Team Tail Tag*, which involved more collaborative tasks.

The interaction between these variables underscores the importance of tailoring outdoor learning activities to suit the social traits of students. It suggests that certain combinations of activity type and students' levels of responsibility and cooperation can lead to higher learning motivation, as observed in the A2B2 group participating in *Team Tail Tag*. This also aligns with the findings of Taş and Gülen (2019), who

confirmed that outdoor education positively impacts cooperative skills and motivation, particularly in students who exhibit high levels of cooperation.

One of the significant contributions of this study is its exploration of the dual impact of outdoor activities on both social and cognitive development. As noted by Khan et al. (2020), outdoor learning not only enhances students' comprehension in subjects like math and science but also improves their ability to collaborate and interact with peers. This study reinforces that outdoor-activities such as *Pirates' Treasure* and *Team Tail Tag* not only foster social skills like teamwork and cooperation but also promote critical thinking, decision-making, and problem-solving, which are essential for cognitive development.

The cognitive benefits of outdoor learning were highlighted by Lazaridis et al. (2023), who conducted a long-term study of a two-year outdoor adventure program and found that teamwork helped mitigate interpersonal conflicts and enriched the social environment. In the current study, the *Team Tail Tag* group, which involved cooperative problem-solving, showed significant improvements in motivation, particularly for students with higher cooperation levels (A2B2), suggesting that outdoor activities enhance both cognitive and social skills. The ability of outdoor activities to promote critical thinking and problem-solving is essential in helping students develop the necessary skills for both academic success and social cohesion (Townley et al., 2024; Truelove et al., 2018).

Furthermore, Khan et al. (2020) emphasized that outdoor activities enhance students' creativity and cooperative abilities, reinforcing the idea that experiential learning in natural environments has long-lasting benefits in both social behavior and academic engagement. The present study also supports this, as *Team Tail Tag*—an activity based on team dynamics and social interaction—resulted in significant increases in motivation for students, especially those with higher cooperation levels. This indicates that outdoor activities can serve as powerful tools for fostering creativity, collaboration, and problem-solving among students, which are critical skills for their future personal and academic success.

While the benefits of outdoor activity-based learning are well-documented, several challenges hinder its widespread adoption, particularly in regions with limited resources. As noted by van Dijk-Wesselius et al. (2020), many traditional educational systems resist the integration of outdoor learning, often due to a focus on academic performance and skill-based assessments. The present study found that outdoor activities such as *Pirates' Treasure* and *Team Tail Tag* are not universally implemented, particularly in rural and underserved areas where resources are scarce and teacher training is insufficient (Sport New Zealand et al., 2021). This gap in outdoor learning opportunities highlights the need for structural changes in educational systems to better integrate outdoor learning activities into the curriculum.

Espoz-Lazo et al. (2020) similarly pointed out that physical education in many schools focuses more on technical skills and performance rather than fostering broader social and emotional skills. The emphasis on sports performance often limits the opportunity to implement outdoor learning activities that promote collaboration and responsibility. This study further confirms that outdoor activities with a strong social element, such as *Team Tail Tag*, can be more effective in fostering cooperation and motivation, especially in students with initially low cooperation levels. However,

the lack of infrastructure and teacher training in many schools poses a significant barrier to the successful implementation of such activities.

Frances et al. (2024) also highlighted the need for professional development programs that equip teachers with the knowledge and skills required to integrate outdoor learning into their teaching practices. Many teachers are not adequately trained in outdoor pedagogical techniques, which hampers the effectiveness of outdoor activities in improving student motivation and social skills. Therefore, it is essential for educational institutions and policymakers to provide comprehensive training and resources to teachers, enabling them to create engaging outdoor learning experiences that align with students' developmental needs.

The findings from this study have several important implications for educational practice. First, it is evident that outdoor activity-based learning plays a vital role in enhancing student motivation and social skills, particularly in physical education. Educators should consider integrating outdoor activities that promote collaboration, responsibility, and cooperation into their curriculum, especially in primary education (Marchant et al., 2019). By doing so, they can foster a more holistic learning environment that addresses students' cognitive, emotional, and social development.

Future research should further explore the long-term effects of outdoor learning on student outcomes, particularly in terms of academic achievement and social skills development. Additionally, research should focus on understanding the barriers to implementing outdoor learning in various educational contexts, including resource limitations and teacher preparedness. Studies examining the impact of outdoor learning across different age groups and educational settings would provide valuable insights into how these activities can be tailored to meet the needs of diverse student populations.

Moreover, the integration of culturally relevant outdoor activities could enhance student engagement and make the learning experience more meaningful. As noted by Patchen et al. (2024), incorporating local games and traditions into outdoor learning can help preserve cultural heritage while simultaneously enhancing students' social and academic development. This approach could be particularly beneficial in regions like Indonesia, where cultural diversity plays a crucial role in shaping students' identities and learning experiences.

CONCLUSION

This study highlights the significant impact of outdoor activity-based learning on enhancing students' motivation, responsibility, and cooperation in physical education. The results demonstrate that students with higher levels of responsibility and cooperation showed the greatest improvement in motivation when engaging in outdoor activities, particularly Pirates' Treasure and Team Tail Tag. Students with high responsibility and cooperation exhibited notable gains in motivation when participating in Pirates' Treasure, while those with higher cooperation levels showed better motivation in Team Tail Tag. This suggests that the type of outdoor activity, when tailored to students' social traits, can lead to more effective learning outcomes.

However, the study also identifies several challenges in implementing outdoor learning in educational settings. Limited resources, insufficient teacher training, and a lack of sufficient support for outdoor education hinder its widespread adoption. Additionally, the focus of many schools on technical skill development rather than

holistic student growth can impede the integration of outdoor learning activities. To address these issues, it is essential to provide teachers with proper training and resources to effectively implement outdoor learning activities. Furthermore, incorporating culturally relevant activities can enhance engagement and make the learning experience more meaningful. Overall, this research underscores the importance of integrating outdoor activity-based learning into the curriculum, as it provides valuable opportunities to support the holistic development of students, fostering both academic and social growth.

RECOMMENDATIONS

Based on the findings of this study, several recommendations for future research and educational practice can be made. First, it is recommended that future studies investigate the long-term effects of outdoor activity-based learning on not only student motivation but also academic performance and social behavior. Given that this study focused on short-term improvements, exploring how sustained outdoor learning impacts students' overall development would provide valuable insights. Additionally, research should explore the effectiveness of different types of outdoor activities beyond Pirates' Treasure and Team Tail Tag, particularly those designed to foster specific skills such as leadership, communication, and problem-solving. Studies comparing various outdoor activities and their impact on students with different levels of responsibility and cooperation could help identify the most effective approaches for diverse student groups.

Another important recommendation is to conduct research in a wider range of settings, including schools with varying levels of resources, and to include a larger and more diverse sample. This would help to better understand the broader applicability of outdoor learning and identify potential barriers to its implementation, especially in under-resourced educational contexts. Furthermore, research should focus on addressing the challenges related to teacher training, providing comprehensive professional development programs for educators to effectively incorporate outdoor learning into their teaching practices. Finally, it would be beneficial to explore the integration of local cultural elements into outdoor activities to make the learning experience more relevant and engaging for students, particularly in regions with rich cultural traditions. This approach could not only enhance student engagement but also help preserve cultural heritage while fostering collaboration and social cohesion.

Author Contributions

Each author has read and approved the published version of the manuscript, has contributed sufficiently to the study, and agrees with the findings and conclusions.

Funding

This research did not receive any external funding.

Conflict of interests

The author declares that there are no conflicts of interest in this study.

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