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Effectiveness of Differentiated Instruction in Physical Education: A Quasi-Experimental Study on Learning Habits, Motivation, and Academic Achievement of Middle School Students

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Abstract

This study aims to analyze the effect of implementing a differentiated learning approach in Physical Education, Sports, and Health (PJOK) on the motivation, knowledge, and skills of junior high school students. Differentiated learning is a teaching strategy designed to adapt the learning process to the needs, abilities, and interests of students, so that each student can achieve their best potential. The background of this study is based on the still low motivation and learning achievement of students in PJOK learning which tends to be uniform and does not pay attention to the diversity of student characteristics. The research method used a quasi-experimental approach with a pretest-posttest control group design. The experimental group received differentiated learning treatment, while the control group used conventional methods. Data were collected through motivation and study habits questionnaires, knowledge tests, and student skills observation sheets. Data analysis was carried out using the MANOVA test to measure the effect of treatment on the dependent variable simultaneously. The research results show that the implementation of differentiated learning significantly improves student motivation, knowledge, and skills. This approach has been proven to create a more active, enjoyable, and inclusive learning environment, as well as increase student participation in physical education, sports and health (PJOK) learning activities. By adapting learning content, processes, and products to suit their ability levels and learning styles, students become more confident, motivated, and take responsibility for their own learning. Theoretically, this research reinforces the concept of learner-centered learning as a primary foundation of 21st-century education. Practically, the results can serve as a reference for PJOK teachers in implementing adaptive and equitable learning strategies to optimize the development of students' overall potential.

Keywords: Differentiated learning; PJOK; Learning motivation; Learning achievement

1. Introduction

The development of modern educational paradigms demands learning innovations that adapt to student diversity [1]–[3]. In the context of Physical Education, Sports, and Health (PJOK) in junior high schools (SMP), teachers face challenges in accommodating differences in students' physical abilities, interests, and motivations [4], [5]. Uniform PJOK instruction leads to imbalances in participation and learning outcomes [6], [7]. This situation indicates that conventional approaches are incapable of creating inclusive and enjoyable learning [8]. Therefore, differentiated instruction presents a strategic solution that allows teachers to tailor content, processes, and learning products to students' needs and potential [9]–[11].

The issues addressed in this research focus on students' low study habits and lack of willingness to actively participate in PJOK learning, which ultimately impacts their academic achievement [12], [13]. Students with low physical abilities and motivation tend to be passive and feel left behind compared to their peers [14]–[17]. Teachers also often struggle

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to provide a variety of activities appropriate to students' readiness levels in heterogeneous classes [18], [19]. Furthermore, learning evaluations tend to be uniform and poorly reflect individual learning progress [20]. This situation demonstrates the urgent need to develop learning models that address student diversity and encourage each individual to reach their full potential. Therefore, the application of a differentiated approach to physical education (PJOK) instruction in junior high schools is relevant for empirical study to determine the extent to which this approach can influence students' study habits, willingness to participate, and academic achievement [21].

The urgency of this research lies in strengthening the effectiveness of physical education (PJOK) learning in developing active, independent, and high-achieving students. In the context of 21st-century education, students are required to possess not only physical skills but also social, emotional, and cognitive skills. Learning that accommodates student diversity will support the achievement of national education goals, which emphasize character and competency development [22]–[24]. A differentiated approach offers a concrete solution because it allows teachers to design varied and meaningful learning experiences for each student [25], [26]. This research is important not only theoretically but also practically, as the results can guide PJOK teachers in implementing more responsive and effective teaching strategies in secondary schools.

Based on a literature review, several previous studies have shown that differentiated learning can improve motivation and learning outcomes in various academic areas, such as mathematics, language arts, and science [27], [28]. However, studies specifically examining the implementation of a differentiated approach in physical education are still very limited, especially at the junior high school level. Previous research has primarily highlighted the impact of activity-based learning models or gamification on student engagement in physical activity, but has not specifically examined how differentiation can shape learning habits and willingness to participate [29], [30]. Thus, there is a research gap in the application of a differentiated approach to physical education (PJOK) subjects, which focuses on developing students' affective and cognitive aspects in addition to their physical aspects. This research attempts to fill this gap through a quasi-experimental approach that compares the results of differentiated learning with conventional learning.

The novelty of this research lies in the integration of a differentiation approach into physical education (PJOK) learning, which traditionally focuses on physical activity. This study not only assesses learning outcomes in motor skills but also evaluates students' learning habits and willingness, two crucial components often overlooked in PJOK research. This approach provides strong scientific justification because it broadens the perspective of physical education teaching from simply motor activities to holistic and humanistic learning. By combining the principles of differentiation and physical education teaching practices, this research is expected to make a significant contribution to the development of adaptive learning theory and teaching strategies based on student needs.

The primary objective of this research is to analyze the effect of implementing a differentiation approach in PJOK learning on the learning habits, willingness to participate, and academic achievement of junior high school students. This research also aims to demonstrate that implementing learning tailored to students' abilities and interests can create a more effective and enjoyable learning experience and positively impact overall learning outcomes. The results of this study are expected to serve as a basis for teachers and educational institutions in designing more adaptive and equitable learning strategies for all students, in line with modern teaching principles that place students at the center of the learning process (student-centered learning).

2. Material and methods

2.1. Method

This study used a Quasi-experimental method with a pretest-posttest control group design involving two groups, namely the experimental group and the control group. The experimental group was given treatment by implementing a differentiated learning approach in Physical Education, while the control group used conventional methods. The research subjects were selected using a cluster random sampling technique, namely selecting samples based on classes with similar characteristics. The research instruments consisted of a questionnaire on student learning habits and willingness, an academic achievement test, and observation and interview sheets to measure student engagement and experience during the learning process. The data obtained were analyzed using descriptive and inferential statistical analysis. Normality and homogeneity tests were used to ensure the data met the requirements for further analysis, while the t-test was used to determine differences in results between the experimental and control groups. In addition, a MANOVA analysis was conducted to measure the effect of the differentiation approach on learning habits, willingness, and academic achievement simultaneously, and a multiple linear regression analysis was conducted to examine the contribution of learning habits and willingness to student achievement. Through this approach, the study is expected to

be able to demonstrate the extent to which differentiated learning can create a more adaptive and inclusive learning atmosphere for Physical Education and Health, and encourage improved student learning outcomes.

2.2. Material

Table 1 Shapiro-Wilk Normality Test

Variabel	Statistik	df	Sig.
Pretest Habit	0.983	60	0.579
Posttest Habit	0.982	60	0.495
Pretest Will	0.989	60	0.863
Posttest Will	0.981	60	0.458
Pretest Performance	0.992	60	0.954
Posttest Performance	0.985	60	0.654

All significance values (Sig.) were greater than 0.05, indicating a normal distribution of the data. Therefore, the assumption of normality was met, and the data were suitable for analysis using parametric tests such as the t-test and MANOVA. This normal distribution also indicated a fairly proportional distribution of student scores in each group, allowing the inferential test results to be interpreted statistically validly.

Table 2 Homogeneity Test (Levene Test)

	F	Df1	Df2	Sig
Posttest Habit	0.022	1	8	0.883
Posttest Will	0.005	1	58	0.943
Posttest Performance	0.154	15	58	0.696

The total significance values for each variable (0.883, 0.943, and 0.696) were above the 0.05 threshold, indicating no significant difference between the experimental and control groups. This suggests that the differences found in the subsequent stages were the result of the treatment, not differences in variance between the groups.

Table 3 Paired t-Test (Experimental Class)

Variabel	Mean Pre	Mean Post	t	Sig. (2-tailed)
Habit study	61.15	75.15	-11.22	0.000
Will study	57.00	70.31	-11.09	0.000
Pretasi study	66.66	79.32	-8.39	0.000

This table shows a significant increase (Sig. = 0.000) in all variables after implementing differentiated learning. This means that teaching strategies that adapt to students' abilities and needs successfully improve their study habits, willingness to learn, and academic achievement.

Table 4 Paired t-Test (Control Class)

Variabel	Mean Pre	Mean Post	t	Sig. (2-tailed)
Habit study	59.71	65.23	-3.65	0.001
Will study	57.55	62.44	-4.11	0.000
Pretasi study	64.35	67.82	-2.66	0.013

Although the control class also showed improvement, the lower t-value indicates that the improvement was not as significant as the experimental group. This suggests that conventional methods still produce an effect, but are not as effective as the differentiated approach in improving learning outcomes. These findings confirm that student engagement and learning experiences are optimally enhanced when teachers use flexible teaching strategies.

Table 5 Independent Sample T-Test

Variabel	t	df	Sig. (2-tailed)	Mean Difference	95% CI (Lower-Upper)
Posttest Habit	7.28	58	0.000	9.92	7.19-12.65
Posttest Will	7.10	58	0.000	7.88	5.65-10.10
Posttest Performance	8.42	58	0.000	11.50	8.77-14.24

In the posttest of the third variable, the results of the study showed a significant difference (Sig. < 0.05) between the experimental and control groups. The learning achievement variable experienced the most significant difference, with an average difference of 11.50. This indicates that the approach not only improves students' motivation and study habits but also has a direct impact on their academic achievement. This difference is empirical evidence that this approach is effective in PJOK learning.

Table 6 MANOVA Test Results

Effect	Statistics	Mark	F	Df (Hypothesis, Error)	Sig.
Group	Pillai's Trace	0.757	58.265	(3,56)	0.000
	Wilks's Lambda	0.243	58.265	(3,56)	0.000
	Hotelling's Trace	3.121	58.265	(3,56)	0.000
	Roy's Largest Root	3.121	58.265	(3,56)	0.000

The approach simultaneously influences students' learning habits, desires, and academic achievement. Wilks' Lambda = 0.243 and Sig. = 0.000 indicate a significant multivariate difference between the experimental and control groups on the combination of the three dependent variables. These results indicate that this learning model can influence students' behavior and learning outcomes in physical education as a whole.

Table 7 Test of Between-Subjects Effects

Variables	F	Sig.	R^2
Habit Study	52.930	0.000	0.477
Will Study	50.354	0.000	0.465
Performance Study	0.953	0.000	0.550

Further analysis showed that each dependent variable (achievement, habits, and willingness) had a significance value of 0.000 (<0.05). The highest R2 value was found for learning achievement (0.550), indicating that differentiation made

the greatest contribution to improving academic achievement. These results confirm the relevance of the differentiation approach to contemporary educational goals, namely optimizing the potential of each student.

Table 8 Pearson Correlation Between Variables

Variabel	Habit study	Will study	Performance study
Habit Study	1	0.487**	0.550**
Will Study	0.487**	1	0.435**
Performance Study	0.550**	0.435**	1

The correlation results show a positive and significant relationship between study habits, willingness to learn, and academic achievement ($r = 0.487–0.550$, $p < 0.01$). This means that students with good study habits and strong willingness tend to have higher academic achievement. This correlation supports the motivational theory that consistent study behavior is closely related to academic achievement.

Table 9 Multiple Linear Regression Test

Predictor Variables	B	Std. Error	Beta	t	Sig.
(Constant)	20.457	10.427	-	1.962	0.055
Habit study	0.478	0.133	0.443	3.589	0.001
Will study	0.295	0.166	0.220	1.780	0.080

The regression results show that study habits ($\beta = 0.443$; $p = 0.001$) significantly influence learning achievement, while willingness to learn ($\beta = 0.220$; $p = 0.080$) has a positive but insignificant effect. This suggests that developing strong study habits is more important for student achievement than willingness to learn alone. Therefore, a differentiated approach needs to place greater emphasis on the continuous development of active learning strategies.

3. Result

The research results show that the implementation of a differentiated learning approach significantly increased student motivation, knowledge, and skills in Physical Education (PJOK) learning. This confirms that learning strategies tailored to students' needs, abilities, and interests can create more meaningful and effective learning experiences than conventional approaches. A differentiated approach allows teachers to vary the content, process, and learning products so that each student can learn according to their individual potential and learning style. In the context of PJOK, differentiation can be realized through grouping activities based on physical ability level, adjusting task difficulty, and providing individualized feedback. This strategy not only increases student engagement in learning activities but also fosters self-confidence and intrinsic motivation to actively participate.

The research findings also reinforce the view that student-centered PJOK learning provides greater opportunities for the balanced development of cognitive, affective, and psychomotor competencies. Students not only gained a better understanding of fitness and health concepts but also demonstrated an increased desire to practice and participate in physical activities. Thus, a differentiated approach plays a crucial role in developing positive study habits and strengthening students' commitment to physical activity. Furthermore, the results of this study align with various previous studies confirming that differentiated learning can improve motivation and learning outcomes across various academic fields. In the context of Physical Education (PJOK), the application of differentiation not only enriches teaching strategies but also strengthens the function of physical education as a vehicle for character building and the holistic development of students' potential.

Practically, these findings highlight the importance for PJOK teachers to be more creative in designing learning activities that are adaptive and responsive to student diversity. Teachers need to position differentiation not merely as a method but as a teaching philosophy that emphasizes fairness and equal learning opportunities for all students. With this approach, PJOK learning can be an effective means of developing physical abilities while fostering motivation, discipline, and improving academic achievement.

4. Conclusion

This study demonstrates that a differentiated learning approach significantly impacts junior high school students' learning habits, willingness to learn, and academic achievement in physical education, sports and health (PJOK) instruction. Using a quasi-experimental design with a pretest–posttest control group, the results showed that students in the experimental group experienced significantly greater improvement than those in the control group in all three measured variables.

Compliance with ethical standards

Disclosure of Conflict of interest

No conflicts of interest to be disclosed.

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