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Enhancing junior high students' understanding of gross motor skills with traditional game play in PE

Peningkatan pemahaman keterampilan motorik kasar siswa smp melalui permainan tradisional dalam pembelajaran PJOK

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ABSTRACT

This study aims to improve junior high school students' understanding of gross motor skills. This study used an experimental method with a questionnaire instrument administered before and after treatment (pretest and posttest) to 170 seventh-grade students at SMP Negeri 18 Surakarta. The population consists of all seventh-grade students, totaling 170. The sample size is 170 seventh grade students, with a sampling technique using total sampling. The treatment consisted of a combination of socialization of gross motor skills material and activities using traditional games. Data collection was conducted during the pretest and posttest using a questionnaire instrument. Data analysis was performed using prerequisite tests (normality and homogeneity tests) and a t-test using paired samples. The results of the study showed a statistically significant increase ($p < 0.001$) in students' understanding of gross motor skills, with their average score increasing from 53.62 to 57.9. Additionally, the percentage of students with "Very Good" understanding increased from 50% to 77.6%. The distribution of students' scores also became more even (homogeneous), as evidenced by the decrease in the standard deviation (from 6.046 to 3.448). In conclusion, the integrated approach combining the use of traditional games with targeted socialization has proven highly effective in significantly improving both the level and evenness of middle school students' understanding of gross motor skills in Physical Education (PE) learning.

Key words: Gross motor skills; traditional game; physical education.

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INTRODUCTION

The development of gross motor skills plays a fundamental role during adolescence, especially for junior high school students, as this is a crucial period for the formation of movement patterns that will significantly influence participation in physical activity throughout life (Otero & Pérez, 2015). In addition to the ability to execute physical movements, mastery of gross motor skills involves a deep cognitive dimension. In this context, "understanding gross motor skills" is defined as a construct that includes conceptual knowledge of movements, the ability to analyze situations carefully, and the capability to make strategic decisions relevant to the context of the physical activity being performed (Kohl et al., 2013). Emphasis on this aspect of understanding is

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important to distinguish the focus of the study from merely improving physical performance. Physical Education, Sports, and Health (PE) in the school curriculum structure has a central role as the main vehicle, not only to train students' psychomotor aspects, but also to instill conceptual understanding (Bukhari et al., 2019). This is in line with the broader objectives of PE, which is to develop individuals who are not only physically active, but also have sufficient knowledge to make wise decisions regarding physical activity and health (Lounsbery & McKenzie, 2015). The emphasis on understanding in PE signifies a shift in orientation. This approach goes beyond the traditional focus on physical performance, toward the development of individuals who possess motor intelligence and the ability to participate actively in physical activities on an ongoing basis (Kohl et al., 2013).

The background for this study is the existence of various indications suggesting that the level of comprehensive understanding of junior high school students at SMP N 18 Surakarta regarding gross motor skills may not have reached an optimal level. This condition underscores the urgency of conducting research aimed at identifying and testing the effectiveness of innovative physical education teaching approaches that not only improve the average level of understanding of gross motor skills but also contribute to the equalization of understanding among all students. This understanding gap can be understood because of physical education teaching methods that may have not placed sufficient emphasis on the cognitive aspects of gross motor skills or failed to actively and deeply involve students in the process of learning movement concepts.

In an effort to develop gross motor skills in physical education, various approaches have been applied (Anggara & Purnomo, 2025). Gross motor skills are crucial for the daily activities of students and play a significant role in their development (Amaliya et al., 2025). However, this study explores the potential of traditional games as a pedagogical tool rich in benefits. Previous studies, as summarized in this research discussion, have documented that traditional games are not only beneficial for the development of gross motor skills but also positively contribute to cognitive aspects such as strategic planning and situational analysis, increased learning motivation, strengthening cultural relevance in learning, and the development of students' social skills (Aliriad et al., 2024). In addition to traditional games, socialization activities or explicit instruction on gross motor skills were also identified as other crucial elements in the designed intervention (Maulidiyyah & Purwoko, 2023). This socialization activity plays an important role in building students' explicit knowledge base regarding the principles of gross motor skills, applicable rules, effective strategies, and the benefits of mastering gross motor skills themselves, while facilitating the cognitive stage in the motor learning process (Pomohaci & Sopa,

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2016). The novelty offered in this study lies not only in the use of traditional games or the implementation of separate socialization sessions, but also in the approach to PE learning itself, which synergistically combines both elements. The synergy between socialization, which prepares the cognitive foundation, and traditional games, which provide a meaningful and motivational arena for practical application, is the key to the effectiveness of this approach. In addition, utilizing the cultural relevance inherent in traditional games has the potential to increase students' cognitive engagement and intrinsic motivation, which in turn can encourage and strengthen students' conceptual understanding of motor skill material (Apriyanda et al., 2024). Also physical activity programs with a gross motor skill approach can have a positive effect on students' physical fitness and motor skills if given with adequate intensity and duration (Fatoni et al., 2021).

The main objective of this scientific article is to comprehensively report the results of research that has investigated and demonstrated the effectiveness of an integrated learning approach, which integrates the use of traditional games with activities for socializing gross motor skills, to improve gross motor skills in junior high school students. This study aims to provide solutions to the identified problems, namely the gap and suboptimal level of students' gross motor skills. The expected contributions of this study include practical and theoretical aspects. In practical terms, the results of this study are expected to provide strong empirical evidence for physical education teachers regarding innovative and effective learning strategies that can be adapted and implemented in daily teaching practices. In addition, this study also aims to enrich scientific literature on the educational role of traditional games in the context of modern physical education, particularly in relation to improving gross motor skills.

METHOD

This study used an experimental method with a pretest and posttest design Stratton (2019) to improve the understanding of gross motor skills among students at SMP N 18 Surakarta. The study was conducted at Junior High School 18 Surakarta on 170 seventh-grade students. The subjects and sample of this study were all seventh-grade students at Junior High School 18 Surakarta, totaling 170 students.

The instruments and data collection techniques used in this study were questionnaires about understanding gross motor skills, which were given before and after the treatment (pretest and posttest). Data collection was carried out by giving the questionnaires to the students. The treatment given between the pre-test and post-test was a combination of socialization of gross motor skills and activities using traditional games.

The data analysis technique used was statistical analysis (Choudhary et al., 2024). The pretest and posttest data were analyzed descriptively to see the

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increase in the average score, median score, minimum score, maximum score, and total score (Green et al., 2023). Changes in standard deviation were also observed to see the homogeneity of the score distribution. The percentage of students in the "Very Good," "Good," "Fair/Average," "Poor," and "Very Poor" categories was also calculated and compared before and after the treatment.

Table 1. Research instrument scale indicators

Category	Result Range
Very Good	56 – 60
Good	51 – 55
Fair/Average	46 – 50
Poor	41 – 45
Very Poor	35 – 40

Additionally, normality and homogeneity tests were conducted on the gross motor skill test results. A t-test was also used to assess the significance of differences in results before and after treatment to test the research hypothesis (Tello & Crewson, 2003; Shen & Li, 2019).

FINDINGS AND DISCUSSIONS

Findings

Based on the descriptive statistical data in Table 2. below, the results of gross motor skill comprehension in 170 students at Junior High School 18 Surakarta showed a positive increase after being given an intervention in the form of socialization activities on gross motor skills material as well as activities involving gross motor skills using a traditional game approach.

Table 2. Statistical descriptive data of students' pretest and posttest results

	Pretest	Posttest
Valid	170	170
Median	55.5	60.00
Mean	53.62	57.9
Std. Deviation	6.046	3.448
Minimum	35	40
Maximum	60	60
Sum	9115	9859

This increase was clearly seen in several aspects. The mean score for students' understanding increased from 53.62 in the pretest to 57.9 in the posttest. Similarly, the median score also showed a significant increase, from 55.5 in the pretest to 60.00 in the posttest, indicating that half of the students scored 60 or higher after the intervention. Improvements were also seen in the

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lowest scores achieved by students, where the minimum score increased from 35 in the pretest to 40 in the posttest. Meanwhile, the maximum score achieved by students remained at 60 in both the pretest and posttest, which is likely the highest score that can be achieved in the test.

Furthermore, the decrease in standard deviation from 6.046 in the pretest to 3.448 in the posttest is very important. This indicates that the intervention was not only successful in improving overall understanding (reflected in the increase in the mean and median), but also in making students' understanding more uniform and consistent at a higher level. In other words, the distribution of student scores on the posttest became more homogeneous and concentrated around a higher average value. The total number of scores (Sum) also increased from 9,115 in the pretest to 9,859 in the posttest, consistent with the increase in the average score for the same number of students.

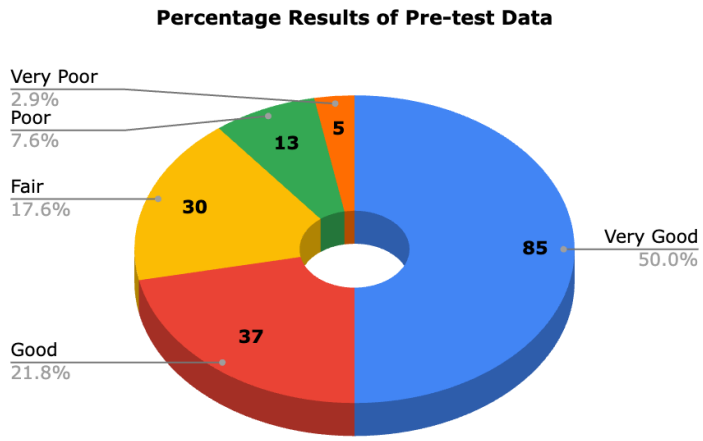

Figure 1. Percentage results of pretest data

Based on the results in Figure 1, the frequency distribution of the pre-test results shows variations in the level of understanding among students. A total of 85 students (50%) showed "Very Good" understanding. Meanwhile, 37 students (21.8%) were categorized as "Good." Additionally, 30 students (17.6%) were in the "Average/Fair" category, 13 students (7.6%) in the "Poor" category, and 5 students (2.9%) in the "Very Poor" category. The presence of students in the "Fair," "Poor," and "Very Poor" categories, which collectively total 48 students (or approximately 28.24% of the total students), reinforces the argument that the planned intervention has significant potential to improve gross motor skill understanding more evenly and comprehensively among students. In other words, although the average score indicates the "Good" category, efforts to improve the understanding of students still in the lower categories are crucial to achieving optimal understanding overall.

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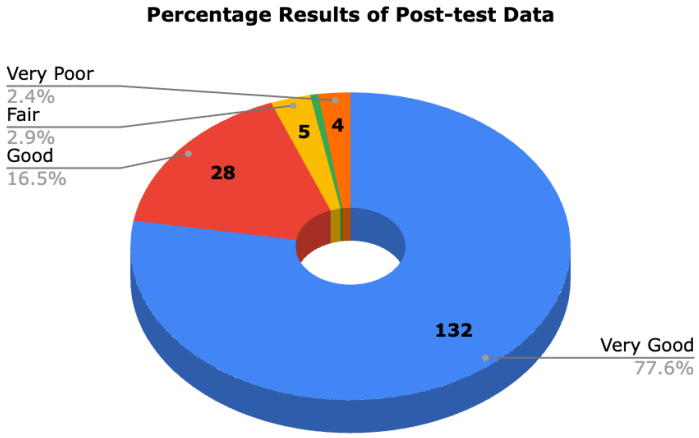

Figure 2. Percentage results of posttest data

Based on the data in Figure 2. above, after the intervention period that integrated socialization related to gross motor skills and traditional games into PE learning, there was an increase in the average post-test score of students to 57.9. Based on this average score, it can be indicated that students' understanding has increased to the "Very Good" category.

This improvement is further reflected in the frequency distribution of post-test results. Many students, totaling 132 students (77.6%), achieved the "Very Good" category. Additionally, 28 students (16.5%) were in the "Good" category. The most significant finding is the drastic decrease in the number of students in the lower categories. Only 5 students (2.9%) are in the "Average/Fair" category. Furthermore, only 1 student (0.59%) is in the "Poor" category, and 4 students (2.4%) are in the "Very Poor" category.

This data clearly demonstrates the effectiveness of the intervention. Not only did the average score increase significantly to reach the "Very Good" category, but there was also a major shift in the distribution of students' understanding, with most students now concentrated in the highest category. This indicates that the socialization and implementation of traditional games successfully improved students' understanding of gross motor skills in a more equitable and profound manner.

Table 3. Student normality test results

Data	Sig.	Description
Gross motor skills test results	0.200	Normal

In addition, based on Table 3, the normality test results show that the data on "gross motor skill test results" are normally distributed with a value of score 0.200. The description "normal" given in the table is in line with the

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interpretation of the p-value, which means that the distribution of the students' gross motor skill test results is considered to follow a normal curve.

Table 4. Student homogeneity test results

Data	Sig.	Description
Gross motor skills test results	0.642	Homogeneous

Based on the data in Table 4, the homogeneity test results show that the data on "gross motor skill comprehension test results" are homogeneous with a significance value (sig.) of 0.642. The description "homogeneous" given in this table is consistent with the interpretation of the p-value (sig.).

Table 5. Results of gross motor skills assessment

Data	Sig.	T Value	Description
Results of gross motor skills assessment	0,000	7,918	Hypothesis Accepted

The T-test results on Table 5. for assessing gross motor skill comprehension shows a statistically significant difference. A significance value of 0.000 (meaning $p < 0.05$) together with a t-value of 7.918 provides strong evidence that the intervention has a statistically significant impact on changing the results regarding gross motor skill comprehension.

Discussion

The results of this study comprehensively show that the designed intervention, consisting of a combination of socialization activities on gross motor skills and the implementation of activities involving gross motor skills through a traditional game approach, successfully had a significant positive impact on improving the understanding of gross motor skills in 170 students at Junior High School 18 Surakarta. These findings directly address the research questions and achieve the main objectives of the study, which were to improve students' understanding of the concepts and application of gross motor skills in the context of Physical Education (PE) learning. The success of the intervention is clearly reflected in various descriptive statistical parameters. The average score for students' understanding increased from 53.62 in the pretest to 57.9 in the posttest. Furthermore, the minimum score achieved by students also increased from 35 to 40, indicating that the intervention was able to improve the understanding of students at the lowest level. This quantitative improvement serves as concrete evidence of the achievement of the research objectives. The effectiveness of the intervention was also confirmed through an analysis of the distribution of students' understanding categories.

Before the intervention, 85 students (50%) were in the "Very Good" category. After the intervention, the number of students in this category jumped

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to 132 students (77.6%). Conversely, there was a drastic decrease in the number of students in the lower understanding categories ("Fair," "Poor," and "Very Poor"). For example, students in the "Fair" category decreased from 30 students (17.6%) to only 5 students (2.9%). This significant shift indicates that the intervention not only improved average scores but also qualitatively transformed the overall competency profile of students, with the majority now concentrated in the highest understanding category. The validity of these findings is reinforced by statistical test results. The data from the gross motor skill test results were normally distributed (sig. 0.200) and homogeneous (sig. 0.642). Furthermore, the t-test results showed a significance value of 0.000 ($p < 0.05$) with a t-value of 7.918, meaning that the research hypothesis was accepted. This statistical support provides a strong scientific basis that the observed changes were indeed caused by the intervention and not due to chance factors. The increase in "understanding" of gross motor skills observed in this study goes beyond a mere improvement in the ability to perform physical movements.

The term "understanding" implies the involvement of deeper cognitive aspects, such as conceptual knowledge about movements, the ability to analyze situations, and strategic decision-making within the context of physical activities (Bullock, 2001). The intervention, which consisted of "socialization activities involving gross motor skills" and "activities involving gross motor skills using traditional game approaches," appears to have successfully addressed both dimensions. Socialization activities likely play a role in building an explicit knowledge base regarding the principles of gross motor skills, rules, strategies, and their benefits. Meanwhile, traditional games provide a setting for students to apply this knowledge practically, internalize concepts through direct experience, and receive dynamic feedback in a fun and meaningful context (Widiana et al., 2018).

The dual role of socialization and traditional games likely contributes synergistically to improved understanding. Referring to the stages of motor learning, socialization activities can facilitate the cognitive stage, in which students attempt to understand the essence of the movement task, its purpose, and basic strategies (Shi & Feng, 2022). At this stage, students build initial mental representations of the skills being learned. Subsequently, traditional games provide an ideal platform for entering the associative stage. In this stage, students practice skills repeatedly in various game situations, begin to connect movements with desired outcomes, identify and correct errors, and refine movement patterns to become more efficient and consistent (Ismoyo et al., 2024).

The findings of this study significantly reinforce and align with various theoretical frameworks and previous empirical research results in the field of

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physical education and motor learning. First, the success of this intervention provides strong support for the theory of experiential learning. Traditional games, as the core of the intervention, are a real manifestation of the experiential learning cycle, in which students are directly involved in concrete experience (trying the game), reflective observation (reflecting on what happened, strategies that worked or failed), forming abstract conceptualization (understanding the principles behind movements and tactics), and engaging in active experimentation (trying new strategies or variations of movements) (Krath et al., 2021). The improvement in gross motor skill understanding achieved shows that learning is highly effective when students actively do, feel, and reflect on their actions in authentic and meaningful contexts, as facilitated by traditional games (Gustian, 2021).

Second, these findings are consistent with theories regarding the positive role of traditional games in physical education. Previous studies have documented the benefits of traditional games in developing not only gross motor skills but also cognitive aspects such as strategic planning and situational analysis, increased learning motivation, and the development of social skills such as cooperation and sportsmanship (Gultom et al., 2022). This study enriches this evidence by specifically highlighting improvements in the "understanding" of gross motor skills among students at Junior High School 18 Surakarta, an aspect that may not have been explored in depth in the context of traditional games. The use of traditional games with strong cultural roots in Indonesia may also increase students' cognitive engagement. This familiarity and cultural relevance has the potential to increase intrinsic motivation, which in turn encourages deeper information processing related to the rules, strategies, and motor demands of the game, thereby strengthening the conceptual understanding conveyed through the socialization sessions (Dewi, 2025).

Third, the relevance of the "socialization activity" component in this intervention is also supported by theory and practice. Socialization, which includes the explicit delivery of material or instructions regarding motor skills, aligns with the objectives of the Indonesian Physical Education curriculum, which focuses not only on the psychomotor domain but also on the cognitive domain, including understanding movement concepts, strategies, and health aspects (Fizi et al., 2023). Explicit knowledge gained through socialization can accelerate skill acquisition and improve motor performance quality. Additionally, socialization activities in a group context can develop communication skills, collaboration, and positive social interactions, which further support effective learning in cooperative game activities (Chatzipanteli & Adamakis, 2022). The combination of socialization (explicit/declarative knowledge) and traditional games (practical/procedural application) appears to create a comprehensive learning approach targeting various dimensions of understanding.

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Fourth, these findings are also consistent with the basic principles of motor learning theory. Motor learning theory emphasizes the importance of meaningful practice, feedback, and motivation in skill acquisition (Bertollo et al., 2020). Traditional games provide abundant opportunities for practice in varied and enjoyable contexts, which inherently increase student motivation. Feedback can be intrinsic (felt directly by students while playing) or extrinsic (from teachers or peers). The emphasis on "understanding" is also consistent with the view that motor learning is not merely mechanistic but involves active cognitive processes in constructing internal representations (schemas or general motor programs) of the skills being learned (Muratori et al., 2013). Interventions that combine explicit instruction with play experiences appear to optimize various key factors that support these cognitive and motor processes. Furthermore, the findings of this study have several important implications, both practically for the implementation of PE learning and theoretically for the development of sports science. The most important practical implication is for PE teachers.

The results of this study strongly recommend that teachers more frequently and systematically integrate traditional games into the learning process. However, this integration will be more optimal if combined with socialization or discussion sessions aimed at deepening students' understanding of the gross motor skill concepts involved in the games. To support this, a professional training and development program for PE teachers is needed. This training should focus on how to design, implement, and evaluate effective traditional game-based learning to achieve the goal of improving understanding, not merely for fun or physical activity alone (Adipat et al., 2021).

Furthermore, there are implications for the development of PE teaching materials. It is necessary to develop learning modules, teacher guides, or other learning resources that explicitly integrate traditional games with the target achievement of motor skill concepts. These teaching materials should provide concrete examples of how teachers can facilitate discussion, reflection, and analysis related to the motor skills practiced through games.

Although this study produced significant and promising findings, limitations must be acknowledged to provide a balanced perspective and as a reference for further research. Since this study did not use a control group, this is a major limitation in drawing strong causal conclusions. Without comparison with a group that did not receive the intervention, it is difficult to completely rule out the possibility that the observed improvements were influenced by factors other than the intervention, such as the effects of other regular PE learning. Based on the findings and limitations identified, several suggestions for further research can be proposed to deepen and broaden the understanding of the effectiveness of traditional games in the context of PE.

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Further research should use a more robust experimental design, ideally a randomized controlled trial (RCT), involving a control group. The control group could be a group that receives standard PE learning (active control) or a group that does not receive any specific intervention (passive control), to validate the effectiveness of the intervention more convincingly. In addition, to determine the long-term impact of the intervention, a longitudinal study is needed. Such studies can track the development of students' motor skill understanding (Caruana et al., 2015), their level of participation in physical activities, and their overall mastery of motor skills some time after the intervention is completed. Overall, the results of the study confirm that interventions that integrate the socialization of gross motor skill material with the implementation of traditional games are significantly and uniformly effective in improving gross motor skill understanding in students at Junior High School 18 Surakarta.

The improvement is not only reflected in average scores but also in a more homogeneous distribution of understanding and a shift of most students to higher understanding categories. These findings are consistent with various learning theories, particularly experiential learning, and supported by previous empirical research highlighting the holistic benefits of traditional games.

CONCLUSION

The results of this study indicate that an integrated approach, combining the teaching of gross motor skills with traditional games, has proven effective in improving the understanding of gross motor skills among students at Junior High School 18 Surakarta. The success of this study is evident from the overall improvement in students' understanding, including significant progress among students who initially had low levels of understanding. Furthermore, this intervention succeeded in creating more equitable and consistent understanding among students; many students advanced to higher levels of understanding, while the number of students with low understanding decreased dramatically. Although these findings are valuable, further research could deepen and broaden the results.

It is recommended that future research use an experimental design that includes a control group to ensure that the observed improvements are indeed the result of the intervention provided. Additionally, longitudinal studies are needed to determine how long these improvements persist over time and their sustained impact on students' participation in physical activities and their overall motor skill development. The positive outcomes of this study also highlight the importance for educators to consider systematically integrating traditional games rich in cultural values, combined with targeted learning sessions, into physical education curricula. This aims to support deeper conceptual learning while developing students' physical skills.

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