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Original Article Research

Digitizing Physical Education Instruction Using Quizizz for 10th-Grade Physical Fitness at High School

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Abstract

This research aimed to analyze the effectiveness of digitized Physical Education (PJOK) learning using Quizizz in physical fitness material for 10th-grade students at SMA Negeri 1 Pegandon. Employing a quantitative methodology within a one-group pretest–posttest framework, the inquiry examined a cohort of 32 participants from class X 2. Empirical data were gathered through pre- and post-intervention cognitive assessments alongside psychomotor evaluations measuring motor skill execution. Analytical procedures encompassed descriptive statistics, the Shapiro-Wilk test to verify distribution normality, a paired-samples t-test for hypothesis testing, and an N-Gain calculation. Statistical outcomes revealed normality coefficients of 0.170 (pretest) and 0.067 (posttest), establishing normal distribution across both datasets ($p > 0.05$). Subsequently, a paired-samples t-test yielded a statistically significant score ($p = 0.000 < 0.05$), confirming that gamified digital integration exerted a substantial impact on academic performance. Post-intervention cognitive scores escalated to a mean of 84.06, corresponding to a normalized gain (N-Gain) index of 0.4474, which denotes improvement within the moderate category. Complementing these cognitive gains, psychomotor appraisals demonstrated that most participants executed the physical fitness routines proficiently. Ultimately, these insights offer a valuable benchmark for physical education practitioners seeking to leverage interactive digital media, foster technology-enhanced pedagogy, and guide educational researchers in designing modern instructional tools tailored to the contemporary digital landscape.

Keywords: Learning outcomes, Physical education, Quizizz, Physical fitness, Students

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1. INTRODUCTION

Physical education serves as a cornerstone of a high-quality, activity-driven curriculum aimed at fostering holistic individual development across physical, mental, social, and emotional domains. According to (Tri Fitrianto, 2023), a holistic curriculum that emphasizes physical activity and promotes individuals' comprehensive physical, mental, social, and emotional development. Physical education aims to facilitate optimal growth and development in individuals

through structured movement experiences, with a focus on improving physical fitness, motor skills, understanding of health and safety, and fostering a positive attitude toward physical activity (Saputra et al., 2025). Students are considered successful in their studies if they have achieved their academic and learning goals (Luh Putu Indrawathi et al., 2021). Consequently, teachers play a pivotal role as mentors, immersing students in learning experiences that encompass cognitive, affective, and psychomotor dimensions (Fatmawati, 2021).

The overarching goal of physical education is to cultivate an engaging environment that motivates skill acquisition (Astuti et al., 2026). In reality, however, physical education in high school still focuses on outdoor physical activities, while theoretical aspects are often overlooked. The low level of physical fitness among Indonesian children highlights the need for effective interventions through modifications to teaching materials to optimize the contribution of physical education classes. Educators can transform the delivery of course material into a more meaningful learning experience by utilizing various formats, such as visual, audio, and audiov isual media (Najwa Ammara Jauza & Meyniar Albina, 2025). Interactive media, in particular, offers an efficient avenue to boost student enthusiasm and optimize physical education learning outcomes (Ali et al., 2025).

Learning outcomes are the results students achieve after completing the learning process, as assessed by evaluating their knowledge, attitudes, and skills (Yogi Fernando et al., 2024). Learning outcomes can also refer to the extent to which students master the school curriculum, as reflected in the scores they receive on tests covering the entire curriculum (Simbolon & Dicky Hendrawan, 2022). One of the benchmarks used is learning outcomes based on cognitive, affective, and psychomotor perspectives (Cahyaningtyas et al., 2023). These assessments provide information for teachers to develop individual profiles that facilitates the identification of learning difficulties and then to correct those difficulties accordingly. Hopefully, the students will be motivated to get the optimum achievement in learning by cultivating their internal motivation.

To enhance these outcomes, integrating digital technology into Physical Education, Sports, and Health (PJOK) instruction has emerged as a strategic initiative to heighten student motivation and cognitive grasp of physical fitness concepts (Marzuki, 2025). As technology continues to evolve, educational practices should adapt to these developments to provide broader learning opportunities and improve the quality of instruction (Sesmiarni, 2025). Utilization of digital technology specifically addresses the challenge of low student engagement in monotonous Physical Education theory lessons by providing a more meaningful and enjoyable learning environment (Ketaren et al., 2025). Media in the learning process can give opportunities and provide students with both moving forward and supporting learning resources, internet access, to access more comprehensive information, developing critical thinking in students, and problem solving in terms of communication and collaboration (Hasna Nur Alifah et al., 2023). Implementing digital learning is an innovative approach to overcoming various challenges in delivering physical education to students. The effective use of educational media is crucial, as teaching without media tends to be less efficient (Rakhman et al., 2024).

Quizizz, a web-based learning platform, enables educators to construct game-based interactive quizzes and conduct real-time mobile assessments. The use of this platform serves as an innovative strategy to reduce student boredom with conventional assessment methods, while fostering their enthusiasm for independently understanding indicators of physical fitness (Darma et al., 2025). The interactive learning platform Quizizz has been shown to be effective in boosting

cognitive learning outcomes and active participation in physical education classes, creating a "gamification" effect for the students (Pristilia & Hanafi, 2025). Quizizz is a learning application that is designed in the form of a game and gives the atmosphere in the classroom more interactive and fun because there are various learning activities carried out in it (Citra & Rosy, 2020). Thus, employing Quizizz in PJOK serves not only as a cognitive assessment tool but also aligns technological innovation with dynamic pedagogical needs (Nurholifah et al., 2023).

Previous studies have provided consistent affirm the benefits of Quizizz in educational settings. A study by Aksir et al. (2023) found that Quizizz is an effective assessment tool for measuring students' cognitive achievement in learning. In addition, Adista et al. (2024) showed that using Quizizz as an interactive learning media improved the students' understanding of the material in the classroom. Nasywa Salsabiela et al. (2025) which resulted in Quizizz's positive effect on students' learning outcomes. However, most previous investigations have primarily on cognitive aspects or were conducted in other learning contexts. Using psychomotor data as supporting evidence in Quizizz in physical education, especially in physical fitness is still limited.

Addressing this gap, the present study aims to analyze the effectiveness of Quizizz as a digital learning media for PJOK physical fitness modules in improving the academic achievement of Class X-2 students at SMA Negeri 1 Pegandon. The physical fitness is an essential element that affects pupils' learning capacities. In Physical Education (PJOK) learning, it is expected to occur not only in the students' cognitive achievement but also psychomotor achievement regarding physical skills. Thus both of those elements need to be considered in learning assessments in order that learning goals can be met optimally. Ultimately, this study seeks to advance digital physical education practices and provide PE educators with a reference for implementing gamified tools to elevate student achievement.

2. METHOD

This study aimed to examine the effect of digitizing Physical Education (PJOK) instruction using the Quizizz platform on the physical fitness learning outcomes of tenth-grade students at SMA Negeri 1 Pegandon. Employing a quantitative approach, the study adopted a Single-Group Pretest–Posttest Design. Under the framework, participants completed a baseline assessment (pretest) prior to the instructional intervention and a final assessment (posttest) upon its completion. Instructional efficacy was evaluated by analyzing students' assessment results to determine the impact of Quizizz integration on student performance.

2.1 Participants

The research population comprised 288 tenth-grade students at SMA Negeri 1 Pegandon. To fulfill the study's objectives, a sample of 32 students from Class X 2 was selected using a purposive sampling method. Participants were selected based on predetermined characteristics and were deemed suitable for this study.

2.2 Research Design

The study utilized a Single-Group Pretest–Posttest Type. Initially, a paper-based pretest was administered to measure students' baseline cognitive comprehension of physical fitness concepts. The intervention was conducted using Quizizz as a digital learning medium over four meetings. In the first meeting, students learned about muscular strength through Quizizz-based learning activities. In the second meeting, students participated in a psychomotor assessment

using the sit-up test to measure muscular strength. The third meeting was a learning activity using Quizizz and post-test using Quizizz to look at the cognitive learning outcomes after learning. During the fourth meeting, students underwent psychomotor testing: Shuttle run agility test. The results of learning effectiveness of Quizizz-based learning model were found by comparing the students' learning outcomes in the physical fitness materials. Research design is represented as below:

$O_1 \rightarrow X \rightarrow O_2$

Description:

O_1 : Pretest

X : Treatment using a Quizizz

O_2 : Posttest

2.3 Instruments

This study adopted the test instruments for data collecting which are cognitive test and psychomotor test. Evaluation of the Quizizz learning media was conducted by a lecturer that is a learning media expert, while the cognitive test consisted of a 20 question multiple choice exam validated by a physical education teacher and the psychomotor test was the sit-up test to see the strength of the abdominal muscles with a duration of 60 seconds and the shuttle run test for agility was done 4 times 10 meters which was also validated by a physical education lecturer. In gathering data, pretest was given before the study and the test was based on written instruments (test sheet) while in posttest, written instruments (test sheet) were also given but with Quizizz based learning platform after the implementation. Over four instructional sessions, participants were evaluated across cognitive and psychomotor dimensions to observe their physical fitness proficiency.

2.4 Procedures

The independent variable comprised the implementation of the Quizizz digital learning platform as an interactive instructional tool in Physical Education (PJOK) classes. This platform delivered gamified content, quizzes, and instantaneous feedback to enhance student comprehension of physical fitness principles, components, and maintenance routines. The dependent variables consisted of the students' cognitive and psychomotor learning outcomes derived from pre- and post-intervention assessments.

Before conducting the study, the researcher observed the participants' initial learning conditions and prepared the research instruments, including lesson plans, Quizizz-based learning materials, paper-based pre-test sheets, Quizizz post-test questions, and physical fitness test instruments. The study was carried over four meetings. During the first meeting, students completed a paper-based pre-test to assess their initial knowledge of physical fitness, followed by digital learning activities on the topic of muscular strength using Quizizz. During the second meeting, students participated in a psychomotor assessment of muscular strength using the sit-up test. During the third meeting, the researcher conducted digital learning activities on the topic of agility using Quizizz. During the fourth meeting, students completed a post-test through Quizizz to evaluate their cognitive learning outcomes and participated in a psychomotor assessment of agility using the shuttle run test. Since all Grade X students in the study sample received the same

instructional treatment, no control or comparison groups were established. All participants were involved in every activity conducted by the researcher

At each stage of the study, the researcher served as the designer of Quizizz-based learning activities, a facilitator who guided students throughout the learning process, an observer who monitored students' participation during both digital learning and practical activities, and an evaluator who assessed students' cognitive and psychomotor learning outcomes. Before each meeting began, students were given instructions that included an explanation of the learning objectives, guidance on using the Quizizz platform, procedures for completing the paper-based pre-test, instructions for the Quizizz post-test, procedures for conducting the sit-up and shuttle run tests, and safety guidelines for all practical activities. Students were encouraged to participate actively and complete all learning activities throughout the study

The students were given orientation about the learning objectives and how Quizizz is used as a digital learning medium at the orientation prior to the study. They then completed learning activities, studied their physical fitness material, Quizizz learning activities and class discussion were then completed. After the learning sessions students took the cognitive assessments; a paper-based pre-test prior to the intervention and a Quizizz post-test following the intervention. There were also psychomotor assessments of sit-up test to check muscular strength and shuttle run test to check agility among the students. By the end of the study the researcher examined and assessed the students' cognitive and psychomotor learning outcomes and gave suggestions on how they could do better and ended learning.

2.5 Data Analysis

IBM SPSS Statistics 22 is used to analyze the data that has been collected. The steps taken in the data analysis included, calculating such as mean, minimum, maximum, range and standard deviation of students`. The statistical analysis of data prior to hypothesis testing was checked by normality test (Shapiro–Wilk test). If the data was found to be normal, a paired-samples t-test was performed to examine whether a significant difference existed between students' scores before and after the treatment. Additionally, using N-Gain test, Student achievement has improved after the Quizizz application was tested. The N-Gain results are then interpreted based on the criteria as Low, Moderate or High according their interpretation.

3. RESULTS

Table 1.

Desrciption of the pretest and posttest

Variable	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest	32	30	55	85	70,31	6,713
Posttest	32	25	70	95	84,06	6,530
Valid	32					

Based on Table 1 of the descriptive analysis result, research sample consisted of 32 students`. The pretest results showed a mean score of 70.31, with scores ranging from 55 to 85 and a standard deviation of 6.713. Following the implementation of the Quizizz-assisted

instructional intervention, the post-intervention cognitive assessment (*posttest*) demonstrated a substantial increase in the mean score to 84.06, with scores spanning from 70 to 95 and a standard deviation 6.530. These findings demonstrate that students achieved higher learning outcomes after participating in Quizizz assisted learning.

Table 2.

Normality test Shapiro-Wilk

	Kolomogorov- smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,175	32	,014	,953	32	,170
Posttest	,162	32	,033	,938	32	,067

a.Lilliefors Significance Correction

According to Table 2, significance values obtained from the Shapiro-Wilk test are 0.170 for pretest and 0.067 for posttest. Given that both probability values exceed the standard significance threshold ($\alpha = 0.05$), the pretest and posttest datasets satisfy the assumption of univariate normality (p>0.05). So the data was acceptable with respect to assumption needed for doing paired sample t-test.

Table 3.

Paired Sample t-test

		Paired Difference					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre - Post	-13,750	8,132	1,438	-16,682	-10,818	-9,565	31	,000

As delineated in Table 3, the paired-samples t-test produced a significance value of $p = 0.000$ (p<0.05). This statistical outcome dictates the rejection of the null hypothesis (H_0) and provides empirical support to accept the alternative hypothesis (H_a). These findings confirm a statistically significant difference between pre- and post-intervention cognitive scores, indicating that the implementation of Quizizz significantly influences the improvement in learning outcomes for physical fitness material among students in Class X 2 at SMA Negeri 1 Pegandon.

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Table 4.

N Gain

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Pretest	32	30	55	85	70,31	6,713
Posttest	32	25	70	95	84,06	6,530
Ngain	32	,88	,00	,88	,4474	,22212
Valid N (listwise)	32					

As detailed in Table 4, student academic achievement demonstrated a marked improvement following the implementation of Quizizz-assisted instruction. The mean N-Gain score was calculated to be 0.4474, which is categorized as moderate. Specifically, the cognitive mean score rose from 70.31on the baseline pretest to 84.06 on the post-intervention posttest. These empirical findings underscore that the integration of the Quizizz platform exerted a substantial positive effect on student learning outcomes, establishing both statistical significance and a moderate magnitude of pedagogical effectiveness.

Table 5.

Description of psychomotor test

	N	Minimum	Maximum	Mean	Std. Deviation
Sit Up	32	20	44	28,94	6,21
Shuttle Run	32	10,30	19,73	15,32	2,57
Valid	32				

Descriptive analysis revealed that based from Table 5, the average number of sit up test is 28.94 with a minimum of 20 repetition and maximum of 44 repetition. In the meantime, the shuttle run test had an average of 15.32, a minimum of 10.30 and a maximum of 19.73. These results show that in physical education class, the students have ranged psychomotor abilities measuring the strength and agility of the students carrying out sit up and shuttle run exercise.

4. DISCUSSIONS

The empirical findings of this investigation revealed a baseline pretest mean score of 70.31, which substantially increased to a posttest mean score of 84.06 following the instructional intervention. Hypothesis testing yielded a significance value of $p = 0.000$ (p<0.05), validating the acceptance of the alternative hypothesis. These findings demonstrate the us of Quizizz significantly influenced students learning outcomes of Class X 2 students at SMA Negeri 1 Pegandon. The post-intervention score gain indicates that Quizizz effectively deepened student comprehension of physical fitness concepts. Consequently, embedding Quizizz into Physical Education (PJOK) instruction serves as an effective digital platform for enhancing cognitive achievement. Furthermore, the Normalized Gain test produced a mean skor of 0.4474, classifying

the pedagogical improvement within the moderate category and confirming Quizizz as a valuable instructional tool for conceptual development.

In addition to improvements in cognitive learning outcomes, the learning process was also supported by physical fitness exercises performed by the students during the study, including a 60-second sit-up test and a shuttle run. These practical exercises enabled students not only to understand the theoretical concepts of physical fitness but also to apply them in real learning situations. They have the ability to connect the ideas they learn with the physical activities they engage in directly, which makes the learning process more meaningful.

These align closely with existing literature. Nasywa Salsabiela et al. (2025), which shows that Quizizz can help students understand physical education material through more interactive learning In addition, a study by Muhamad Afiful Umam et al. (2024) also revealed that physical fitness learning can be enhanced through new methods. On the other hand, in this study, Quizizz was incorporated as part of the digitization of Physical Education (PJOK) instruction on physical fitness material, yielding an N-Gain score of 0.4474 which is classified as being in the moderate category. Collectively, these findings affirm that leveraging digital instructional media stimulates active student involvement and fosters academic performance.

The study has a number of limitations. This study was conducted in only one class that is Class X 2 SMA Negeri 1 Pegandon totaling 32 students. This means that conclusions can't necessarily be drawn from the results to other communities. The study was also of a single group pretest post test design lacking a control group precludes direct comparative analysis against traditional instructional methods. Therefore, learning outcomes of students were not comparable to that of the learning using the other methods. Future research should encompass larger, more diverse sample sizes and incorporate a randomized control group to establish more robust evidence regarding the comparative efficacy of Quizizz in physical education instruction.

5. CONCLUSIONS

The findings of this study indicate that the digitization of Physical Education (PJOK) instruction utilizing the Quizizz platform exerted a substantial positive effect on the learning outcomes of Class X 2 students at SMA Negeri 1 Pegandon. These results confirm that integrating Quizizz as an interactive digital tool effectively enhances student academic achievement in physical fitness topics. Beyond cognitive gains, supporting data from the psychomotor domain demonstrate that students actively engaged in the instructional process and performed physical fitness routines proficiently. Consequently, digitizing physical education through Quizizz serves as a viable, technology-integrated pedagogical approach capable of elevating student performance and engagement in physical education.

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