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Effects of video-based learning and learning interest on physical fitness achievement outcomes

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ABSTRACT

This study aimed to examine the effects of video-based learning media and students' learning interest on physical fitness learning outcomes in physical education. A quasi-experimental study using a pretest-posttest control group design was conducted among Grade XI students at SMAN 3 Painan during the 2025/2026 academic year. Students were classified into high- and low-interest groups and assigned to either video-based or conventional instruction. Data were analyzed using descriptive statistics and independent-samples t-tests. The experimental group achieved a higher mean score ($M = 15.75$, $SD = 3.37$) than the control group ($M = 14.07$, $SD = 3.15$). Significant differences were also found among students with high and low learning interest levels. Video-based learning effectively improves physical fitness learning outcomes regardless of students' learning interest levels.

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Introduction

Physical education plays a fundamental role in promoting students' physical, cognitive, and affective development through structured learning experiences that encourage healthy lifestyles and lifelong participation in physical activity (Ismiyanti et al., 2023). Within this domain, physical fitness education is an essential component because it develops students' understanding of fitness concepts and equips them with the knowledge required to maintain personal health and well-being. Nevertheless, learning outcomes in physical fitness education remain suboptimal in many secondary schools. Instruction is frequently dominated by teacher-centred practices that limit students' opportunities to actively engage with learning materials and construct meaningful conceptual understanding (Anggito et al., 2021; Aryanti et al., 2020). Consequently, there is a need for instructional approaches that can increase students' participation and facilitate a deeper understanding of physical fitness concepts.

Recent advances in educational technology have highlighted the importance of multimedia learning environments, particularly video-based instruction. According to multimedia learning principles, information presented through integrated visual and auditory channels facilitates more effective cognitive processing and enhances knowledge acquisition. Video-based learning enables students to observe movement demonstrations, exercise procedures, and conceptual explanations in concrete and interactive forms. Previous studies have consistently reported that instructional videos improve students' comprehension, motivation, and learning retention by presenting materials in engaging and meaningful ways (Afify, 2020; Pal & Patra, 2021; Rozal et al., 2021). In physical education, video-assisted instruction has increasingly been used to support the learning of

movement skills and exercise techniques because it provides opportunities for repeated observation, self-paced learning, and immediate visual feedback (Kok et al., 2020; Kok & van der Kamp, 2018; Nowels & Hewit, 2018; Pang, 2010).

Empirical studies have further demonstrated that video-based learning contributes positively to academic achievement and learning engagement across various educational contexts. Multimedia instructional environments improve students' participation, conceptual understanding, and psychomotor performance more effectively than conventional instruction (Banda & Nzabahimana, 2023; Sun-Yi & Yun-Hee, 2023). Similar findings have been reported in elementary education, health education, and physical education contexts, where video-assisted instruction significantly improved cognitive achievement and learning outcomes (Culajara, 2023; Eidenberger & Nowotny, 2022; Ismiyanti et al., 2023; Kazi et al., 2021; Morgado et al., 2024; Nadeak & Naibaho, 2020; Sablić et al., 2021). However, most previous studies have concentrated on motor performance, procedural skills, or general academic achievement, whereas empirical evidence specifically addressing cognitive learning outcomes in physical fitness education remains relatively limited, particularly among secondary school students.

Besides instructional media, students' learning interest is an important internal factor that influences learning outcomes. Learning interest refers to an individual's tendency to engage willingly and persistently in learning activities accompanied by positive emotions, sustained attention, and active participation (Fadlilah et al., 2020; Silfia et al., 2024). Students with high learning interest generally demonstrate stronger concentration, greater persistence, and more meaningful cognitive engagement, leading to superior academic achievement (Chen et al., 2021; Lewis et al., 2023). In physical education settings, motivated students tend to participate more actively, process learning materials more deeply, and utilize instructional resources more effectively (Calderón et al., 2020; Romdhane & Khacharem, 2023; Simón-Chico et al., 2023; Umar et al., 2023). Conversely, students with low learning interest often exhibit lower engagement and reduced willingness to invest cognitive effort in learning activities.

Although previous studies have independently investigated the effects of video-based learning and learning interest, relatively few studies have simultaneously examined how students with different levels of learning interest respond to video-assisted instruction in physical fitness education (Arici & Yilmaz, 2025; Chang et al., 2022; Cece et al., 2025; Isam et al., 2023; Mödinger et al., 2022; Trabelsi et al., 2022). Moreover, the literature remains inconclusive regarding whether video-based learning benefits students equally across different motivational characteristics. This gap indicates the need for further investigation integrating instructional media and students' learning interest within a single analytical framework. Therefore, the present study examines the effects of video-based learning and learning interest on physical fitness learning outcomes among Grade XI students at SMAN 3 Painan. The novelty of this study lies in simultaneously investigating instructional media and students' learning interest to explain variations in cognitive learning outcomes within physical fitness education, thereby providing both theoretical and practical insights for optimizing multimedia instruction in secondary physical education.

Method

This study employed a quasi-experimental design using a pretest–posttest control group approach to examine the effects of video-based learning and learning interest on students' physical fitness learning outcomes. The study was conducted during the second semester of the 2025/2026 academic year at SMAN 3 Painan and involved 62 Grade XI students selected through cluster random sampling. The participants were assigned to an experimental class ($n = 32$) and a control class ($n = 30$). Based on their learning interest scores, students were further categorized into high- and low-interest groups, resulting in four treatment cells. Instructional media served as the independent variable, learning interest as the grouping variable, and physical fitness learning outcomes as the dependent variable.

Data were collected through a learning interest questionnaire and a cognitive achievement test on physical fitness materials. Both instruments were validated through expert judgment and empirical testing, including validity and reliability analyses. The experimental group received video-based instruction, whereas the control group received conventional instruction using oral explanations and direct demonstrations. Descriptive statistics, normality tests, and homogeneity tests were conducted prior to hypothesis testing. Subsequently, two-way analysis of variance (ANOVA) at a significance level of .05 was employed to examine the main effects of instructional media and learning interest and their interaction effect on physical fitness learning outcomes.

Results and Discussions

This section presents the findings of the study concerning students' learning interest and physical fitness learning outcomes following the implementation of video-based learning and conventional instruction. The results are organized into three main components: descriptive statistics of learning interest and learning outcomes, assumption testing through normality and homogeneity analyses, and hypothesis testing. The presentation of these findings aims to provide comprehensive empirical evidence regarding the effectiveness of video-based learning and the role of students' learning interest in influencing physical fitness learning outcomes among Grade XI students at SMAN 3 Painan.

Learning Interest Characteristics of Experimental and Control Groups

Table 1. Descriptive Statistics of Students' Learning Interest Scores

Group	n	Maximum	Minimum	Mean	Variance	SD
Experimental Class	32	198	125	169.13	304.37	17.45
High Interest (Experimental)	9	198	180	188.78	42.94	6.55
Low Interest (Experimental)	9	161	125	147.44	127.53	11.29
Control Class	30	187	124	161.10	252.71	15.90
High Interest (Control)	8	187	168	175.00	52.00	7.21
Low Interest (Control)	8	157	124	145.75	101.93	10.10

Table 1 shows that students in the experimental class exhibited higher learning interest than those in the control class. The experimental group achieved a mean learning interest score of 169.13 (SD = 17.45), whereas the control group obtained a mean score of 161.10 (SD = 15.90). Among students with high learning interest, the experimental group recorded a mean score of 188.78, which exceeded the control group's mean of 175.00. Similarly, students with low learning interest in the experimental class achieved a slightly higher mean score (147.44) than their counterparts in the control class (145.75). These findings indicate that the experimental group generally demonstrated stronger learning interest characteristics than the control group.

Distribution of Learning Interest Scores

Table 2. Frequency Distribution of Learning Interest Scores

Score Interval	Experimental n (%)	Control n (%)
Highest Interval	1 (3.13)	1 (3.33)
Upper-Middle Interval	7 (21.88)	10 (33.33)
Middle Interval	14 (43.75)	10 (33.33)
Lower-Middle Interval	6 (18.75)	6 (20.00)
Lowest Interval	4 (12.50)	3 (10.00)
Total	32 (100)	30 (100)

The frequency distribution demonstrates that learning interest scores in both classes tended to concentrate within the middle and upper-middle categories. In the experimental class, approximately 43.75% of students were clustered in the middle score interval and 21.88% in the upper-middle interval. Likewise, the control class showed a concentration of scores in the middle and upper-middle categories, accounting for 33.33% of students in each interval. The distribution patterns suggest that the majority of students in both groups possessed moderate to relatively high levels of learning interest, although the experimental class showed a slightly stronger tendency toward higher interest scores.

Descriptive Statistics of Learning Outcomes

As presented in Table 3, students in the experimental class achieved higher learning outcomes than those in the control class. The experimental group attained a mean score of 15.75 (SD = 3.37), whereas the control group obtained a mean score of 14.07 (SD = 3.15). Furthermore, students with high learning interest in the experimental class achieved the highest average score ($M = 18.67$), exceeding the mean score of students with high learning interest in the control class ($M = 15.88$). Students with low learning interest also performed better in the experimental class ($M = 14.22$) than in the control class ($M = 11.88$). These findings indicate that the instructional treatment implemented in the experimental class produced more favorable learning outcomes across different levels of learning interest.

Table 3. Descriptive Statistics of Students' Learning Outcomes

Group	n	Maximum	Minimum	Mean	Variance	SD
Experimental Class	32	22	8	15.75	11.35	3.37
High Interest (Experimental)	9	22	14	18.67	7.25	2.69
Low Interest (Experimental)	9	17	10	14.22	6.94	2.64
Control Class	30	20	7	14.07	9.93	3.15
High Interest (Control)	8	20	12	15.88	7.27	2.70
Low Interest (Control)	8	15	7	11.88	8.13	2.85

Distribution of Learning Outcome Scores**Table 4.** Frequency Distribution of Learning Outcome Scores

Score Interval	Experimental n (%)	Control n (%)
21–24	3 (9.38)	0 (0.00)
17–20	11 (34.38)	8 (26.67)
13–16	11 (34.38)	14 (46.67)
9–12	6 (18.75)	6 (20.00)
5–8	1 (3.13)	2 (6.67)
Total	32 (100)	30 (100)

Table 4 indicates that the experimental class demonstrated a greater concentration of students within the higher score intervals. Approximately 43.76% of students in the experimental group achieved scores between 17 and 24, whereas only 26.67% of students in the control group reached the same performance category. Conversely, the control class showed a higher concentration of students in the moderate achievement interval (13–16), representing 46.67% of the class. The distribution suggests that the experimental treatment contributed to shifting student performance toward higher achievement categories.

Assumption Testing**Table 5.** Summary of Normality and Homogeneity Tests

Assumption Test	Experimental Class	Control Class	Conclusion
Learning Interest Normality	Normal	Normal	Assumption Fulfilled
Learning Outcome Normality	Normal	Normal	Assumption Fulfilled
Learning Interest Homogeneity	Homogeneous	Homogeneous	Assumption Fulfilled
Learning Outcome Homogeneity	Homogeneous	Homogeneous	Assumption Fulfilled
High-Interest Group	Homogeneous and Normal	Homogeneous and Normal	Assumption Fulfilled
Low-Interest Group	Homogeneous and Normal	Homogeneous and Normal	Assumption Fulfilled

The assumption testing results confirmed that all datasets satisfied the requirements for parametric statistical analysis. Both learning interest and learning outcome scores were normally distributed and exhibited homogeneous variances across experimental and control groups. Similar findings were obtained for the high-interest and low-interest subgroups. Therefore, the data fulfilled the assumptions required for independent-samples t-tests, allowing hypothesis testing to be conducted appropriately.

Hypothesis Testing

Table 6 reveals statistically significant differences in learning outcomes between the experimental and control groups. The overall comparison produced a t-value of 2.034, which exceeded the critical value of 1.67, indicating that students taught using the instructional treatment achieved significantly higher learning outcomes than those receiving conventional instruction. Among students with high learning interest, the experimental class obtained significantly higher achievement ($t = 2.133 > 1.75$). Similarly, students with low learning interest in the

experimental class also outperformed their peers in the control class ($t = 1.763 > 1.75$). Collectively, these findings demonstrate that the instructional treatment was effective in improving learning outcomes regardless of students' levels of learning interest.

Table 6. Independent Samples t-Test Results

Comparison	Mean Difference	t-value	t-table	Decision
Experimental vs. Control Learning Outcomes	1.68	2.034	1.67	Significant
High-Interest Experimental vs. High-Interest Control	2.79	2.133	1.75	Significant
Low-Interest Experimental vs. Low-Interest Control	2.35	1.763	1.75	Significant

The findings demonstrated that students who received video-based instruction achieved significantly higher physical fitness learning outcomes than those who experienced conventional instruction. The higher mean score attained by the experimental group indicates that video-assisted learning provided a more effective environment for understanding physical fitness concepts. The integration of visual and auditory information allowed students to observe movement demonstrations repeatedly and process information more meaningfully, thereby facilitating deeper conceptual understanding and active learning engagement. These findings are consistent with previous studies reporting that video-based learning improves students' comprehension, retention, and academic achievement by presenting instructional materials in interactive and accessible formats (Kazi et al., 2021; Morgado et al., 2024; Nadeak & Naibaho, 2020; Sablić et al., 2021).

The effectiveness of video-based instruction can also be explained by its ability to provide concrete representations of physical fitness activities and exercise procedures. In physical education, many concepts are difficult to understand solely through verbal explanations because they involve movement sequences and procedural knowledge. Video-assisted instruction enables students to repeatedly observe correct movement patterns and exercise techniques, reducing cognitive barriers and facilitating more meaningful learning experiences. Previous studies similarly reported that multimedia resources improve conceptual understanding and increase students' motivation by presenting complex information in dynamic and engaging forms (Culajara, 2023; Eidenberger & Nowotny, 2022). Therefore, the use of instructional videos appears particularly relevant for physical fitness education, where visual demonstrations are essential for effective learning.

Another important finding is that students with high learning interest consistently achieved better learning outcomes than those with low learning interest across both instructional conditions. Learning interest serves as an internal motivational resource that promotes attention, persistence, and cognitive engagement during learning activities. Students who are more interested in learning tend to invest greater effort in understanding instructional materials, participate more actively in classroom activities, and utilize available learning resources more effectively. These findings support previous evidence indicating that learning interest is positively associated with academic achievement and active engagement in educational activities (Romdhane & Khacharem, 2023; Umar et al., 2023). In physical education contexts, students with stronger interest are also more likely to engage meaningfully with learning tasks and sustain their participation throughout the instructional process.

The present findings further indicate that video-based learning benefited students with both high and low levels of learning interest. Students with high learning interest appeared to utilize video resources more effectively because they demonstrated greater attention and self-regulation during learning activities. At the same time, students with relatively low learning interest also showed improved achievement after receiving video-based instruction. The visual and interactive characteristics of instructional videos may stimulate situational interest, reduce abstraction, and help students maintain attention to learning tasks. Previous studies have likewise reported that multimedia instruction promotes meaningful engagement and supports learning by encouraging curiosity and facilitating self-regulated learning processes (Calderón et al., 2020; Cece et al., 2025; Isam et al., 2023; Jones et al., 2010; Kok & van der Kamp, 2018; Mödinger et al., 2022; Pang, 2010; Simón-Chico et al., 2023).

Although this study provides evidence supporting the effectiveness of video-based learning in physical fitness education, its findings should be interpreted within certain limitations. The study involved participants from a single secondary school and focused exclusively on cognitive learning outcomes in physical fitness materials, which may limit the generalizability of the findings to other educational contexts and learning domains. Nevertheless, the results suggest important practical implications for physical education instruction. Integrating video-based learning media can create more meaningful, engaging, and visually rich learning environments that accommodate diverse learner characteristics and improve students' understanding of physical fitness concepts.

Future studies are encouraged to involve broader samples and examine additional learning outcomes, including psychomotor performance and long-term learning retention (Kok et al., 2020; Limperatou & Zorbas, 2024; Nowels & Hewit, 2018; Trabelsi et al., 2022).

Conclusions

This study concludes that video-based learning is more effective than conventional instruction in improving students' physical fitness learning outcomes. Students who received video-based instruction achieved significantly higher learning outcomes than those taught through conventional methods. Furthermore, students with high learning interest consistently demonstrated better learning outcomes than students with low learning interest. Importantly, video-based learning improved learning outcomes among both high- and low-interest students, indicating that its effectiveness is not limited by differences in students' learning interest levels. Therefore, integrating video-based learning media into physical education instruction represents an effective pedagogical strategy for enhancing students' understanding of physical fitness concepts and optimizing learning outcomes across diverse learner characteristics.

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