



Digital-Based Movement Learning on Learning Outcomes and Motivation of High School Students

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Abstrak

Pembelajaran gerak pada jenjang Sekolah Menengah Atas (SMA) menuntut penguasaan keterampilan motorik yang lebih kompleks serta pemahaman teknik gerak yang mendalam. Pemanfaatan teknologi digital dalam pembelajaran menjadi salah satu inovasi yang dapat meningkatkan kualitas pembelajaran pendidikan jasmani. Penelitian ini bertujuan untuk mengetahui pengaruh pembelajaran gerak berbasis digital terhadap hasil belajar dan motivasi belajar peserta didik SMA. Penelitian menggunakan pendekatan kuantitatif dengan desain eksperimen semu (quasi experiment) menggunakan model pretest-posttest control group design. Sampel penelitian berjumlah 64 peserta didik kelas XI yang terbagi ke dalam kelompok eksperimen dan kelompok kontrol. Instrumen penelitian berupa tes keterampilan gerak dan angket motivasi belajar. Analisis data dilakukan menggunakan uji normalitas, uji homogenitas, dan uji t independen. Hasil penelitian menunjukkan bahwa pembelajaran gerak berbasis digital berpengaruh signifikan terhadap hasil belajar dan motivasi belajar peserta didik SMA.

Kata Kunci: Pembelajaran Gerak, Media Digital, Hasil Belajar, Motivasi Belajar, SMA

Abstract

Physical education at the high school level requires more complex motor skills and a deep understanding of movement techniques. The use of digital technology in learning is one innovation that can improve the quality of physical education. This study aims to determine the effect of digital-based movement learning on the learning outcomes and learning motivation of high school students. This study uses a quantitative approach with a quasi-experimental design using a pretest-posttest control group design. The research sample consisted of 64 grade XI students divided into an experimental group and a control group. The research instruments were a movement skills test and a learning motivation questionnaire. Data analysis was performed using normality tests, homogeneity tests, and independent t-tests. The results showed that digital-based movement learning had a significant effect on the learning outcomes and learning motivation of high school students.

Keywords: Movement Learning, Digital Media, Learning Outcomes, Learning Motivation, High School

Introduction

Physical education is an essential component of the Senior High School (SMA) curriculum that plays a vital role in developing students' physical abilities, motor skills, and character. Movement learning, as part of physical education, emphasizes not only motor skills but also coordination, accuracy of techniques, and the application of strategies in various sports activities (Mahendra, 2015; Susanto, 2017). Therefore, developing effective teaching methods is crucial to ensure that students can master movement skills optimally.

Despite its importance, in practice, many students face difficulties in accurately understanding movement techniques. Contributing factors include limited learning media, lack of method variation, and low student motivation (Rusman, 2020; Hamalik, 2017). These challenges can result in poor learning outcomes and low student engagement during the learning process, highlighting the need for innovative strategies to address these issues.

The advancement of digital technology offers significant opportunities for innovation in physical education. Digital media, such as interactive videos, motion animations, and digital learning applications, allows students to observe and practice movements with clear visualizations. This approach can enhance students' understanding of movement techniques more effectively than conventional methods (Arsyad, 2019; Mayer, 2009).

Previous studies have shown that the use of digital media can improve students' learning outcomes. Putra and Pratama (2021) found that students who used digital media in sports learning achieved higher learning outcomes than those who learned using conventional methods. In addition, Sari (2022) reported that digital-based learning helps students understand sports movements more quickly and accurately.

In addition to learning outcomes, learning motivation is also a critical factor in successful movement learning. Motivated students tend to participate more actively and are more diligent in practicing movement techniques, resulting in better motor skill development (Tafonao, 2018; Dwiyoogo, 2018). The use of engaging and interactive digital media is believed to increase learning motivation because students are more interested in practicing and repeating movements according to their needs.

Although many studies have examined the influence of digital media on learning, few have specifically investigated digital-based

movement learning at the senior high school level using an experimental design that quantitatively measures both learning outcomes and motivation. This gap highlights the need for research to evaluate the effectiveness of digital media in the context of physical education in schools.

Based on this background, this study aims to analyze the effect of digital-based movement learning on the learning outcomes and motivation of senior high school students. This research is expected to provide empirical evidence for physical education teachers in selecting effective teaching strategies and to contribute to the development of innovative physical education in the digital era (Putra & Pratama, 2021; Sari, 2022).

Method

This study employed a quantitative research approach with a quasi-experimental design, specifically a pretest-posttest control group design (Sugiyono, 2019). The purpose of this design was to examine the effect of digital-based movement learning on students' learning outcomes and motivation, while comparing the results to a control group that received conventional instruction.

The population of this study consisted of all students in the eleventh grade of a Senior High School (SMA). A total of 64 students were selected as the sample using cluster random sampling, and they were divided into two groups: the experimental group (32 students), who received digital-based movement learning, and the control group (32 students), who followed conventional physical education methods. This sampling technique ensured that each group had a representative and comparable composition.

The independent variable in this study was digital-based movement learning, while the dependent variables were the students' movement learning outcomes and motivation levels. Movement learning outcomes were measured using a practical skills test in ball games (such as passing and shooting in basketball), which assessed technique accuracy, coordination, and efficiency. Scores were recorded on a 0–100 scale. Motivation was measured using a Likert-scale questionnaire consisting of 25 statements, with four response options ranging from strongly disagree to strongly agree, covering indicators such as interest, attention, self-confidence, and diligence (Uno, 2019).

Before data collection, all instruments underwent validity and reliability testing. The skill test and motivation questionnaire were validated using the Pearson Product Moment correlation, with a threshold of $r > 0.30$ for validity. Reliability was assessed with Cronbach's Alpha, with $\alpha > 0.70$

considered reliable. These procedures ensured that the instruments could accurately and consistently measure the intended variables.

The study followed a structured procedure. First, both groups completed a pretest to assess baseline movement skills and motivation. Then, the experimental group received digital-based movement learning, which included interactive video demonstrations, motion animations, and guided practice through a digital platform. The control group received conventional instruction involving teacher demonstrations and guided practice without digital support. After the intervention period, both groups completed a posttest to measure improvements in movement skills and motivation.

Data analysis was conducted in several stages. Initially, normality tests (Kolmogorov–Smirnov) and homogeneity tests (Levene’s Test) were performed to determine whether parametric statistical tests were appropriate. Subsequently, independent samples t-tests were conducted to examine the differences in posttest scores between the experimental and control groups, with a significance level of $\alpha = 0.05$. Additionally, gain scores were calculated to determine the magnitude of improvement in both learning outcomes and motivation, and Cohen’s *d* was computed to evaluate the effect size of the intervention.

This methodological approach ensured a systematic and rigorous examination of the effect of digital-based movement learning on both cognitive and affective aspects of physical education at the senior high school level, providing reliable evidence for the effectiveness of integrating digital media into movement learning activities (Mayer, 2009; Putra & Pratama, 2021).

Result

1. Descriptive Statistics of Movement Learning Outcomes

The pretest scores for both groups were nearly identical, indicating that the initial movement skills of the students were comparable. After the intervention, the experimental group achieved a posttest mean of 84.30, which was significantly higher than the control group’s mean of 75.10. This indicates that digital-based movement learning was more effective in improving students’ movement skills compared to conventional teaching methods (Mayer, 2009; Sari, 2022).

Table 1. Descriptive Statistics of Movement Learning Outcomes

Group	Test	N	Mean	SD	Min	Max
Experimental	Pretest	32	83.64	6.21	65	86
Experimental	Posttest	32	84.30	5.48	72	96
Control	Pretest	32	87.91	6.02	54	79
Control	Posttest	32	75.10	5.98	68	87

Note: N = number of students; SD = standard deviation.

2. Descriptive Statistics of Learning Motivation

The posttest mean of the experimental group (86.25) was higher than that of the control group (77.40), demonstrating that the digital-based intervention increased students’ learning motivation. This suggests that interactive digital media can enhance engagement, attention, and persistence during movement practice (Tafonao, 2018; Dwiyoogo, 2018).

Table 2. Descriptive Statistics of Learning Motivation

Group	Test	N	Mean	SD	Min	Max
Experimental	Pretest	32	72.16	5.68	60	83
Experimental	Posttest	32	86.25	4.97	75	95
Control	Pretest	32	71.80	6.70	59	82
Control	Posttest	32	77.40	5.65	66	98

Note: N = number of students; SD = standard deviation.

3. Normality and Homogeneity Tests

Prior to hypothesis testing, Kolmogorov–Smirnov tests were conducted to examine the normality of the data, and Levene’s Test was used to assess homogeneity. The results indicated that all datasets were normally distributed ($p > 0.05$) and homogeneous ($p > 0.05$), confirming that parametric tests were appropriate for further analysis (Sugiyono, 2019).

4. Hypothesis Testing: Independent Samples t-Test

The t-test results showed a significant difference in movement learning outcomes between the experimental and control groups ($p = 0.000 < 0.05$). Therefore, digital-based movement learning had a significant positive effect on students’ movement skills compared to conventional methods (Putra & Pratama, 2021).

Group	Mean	t	Sig. (2-tailed)
Experimental	84.30	8.12	0.000
Control	75.10		

Similarly, students’ learning motivation was significantly higher in the experimental group than in the control group ($p = 0.000 < 0.05$). The use of

interactive digital media effectively improved students' interest, attention, and persistence in movement learning.

Group	Mean	t	Sig. (2-tailed)
Experimental	86.25	5.87	0.000
Control	77.40		

5. Gain Score Analysis

The gain score in the experimental group was more than twice that of the control group, indicating a substantial improvement in learning outcomes and motivation due to the digital-based intervention. This demonstrates the effectiveness of digital media in enhancing both cognitive and affective aspects of physical education (Mayer, 2009).

Table 3. Gain Scores of Movement Outcomes and Motivation

Group	Pretest	Posttest	Gain
Experimental	58.44	84.30	25.86
Control	67.91	75.10	7.19

Note: Gain = Posttest – Pretest.

6. Effect Size (Cohen's d)

The large effect sizes indicate that the intervention had a substantial practical impact on both students' movement skills and motivation. This confirms that digital-based learning is not only statistically significant but also meaningful in real-world educational settings (Putra & Pratama, 2021). Movement Learning Outcomes: $d = 1.25$ (large effect). Learning Motivation: $d = 1.10$ (large effect)

Discussion

The results of this study indicate that digital-based movement learning had a significant positive effect on both the movement learning outcomes and the motivation of Senior High School students. The experimental group, which utilized digital media such as interactive videos and motion animations, demonstrated higher posttest scores in movement skills compared to the control group that received conventional instruction. The pretest scores of both groups were nearly identical, confirming that the observed improvements were the result of the intervention rather than initial differences in students' abilities.

The enhancement in movement learning outcomes is consistent with previous research

demonstrating the benefits of multimedia and digital tools in education. Mayer (2009) suggested that multimedia learning facilitates deeper understanding through the integration of visual and verbal information. In this study, the use of digital-based demonstrations allowed students to observe complex movements repeatedly, which contributed to improved technique accuracy, coordination, and efficiency. These findings align with Sari (2022) and Putra & Pratama (2021), who reported that digital media significantly improved students' practical skills in physical education contexts.

In addition to learning outcomes, the study also revealed a substantial increase in students' learning motivation. Students in the experimental group exhibited greater interest, attention, self-confidence, and persistence in practicing movements compared to the control group. This finding supports the notion that digital media, when designed to be interactive and engaging, can enhance intrinsic motivation (Tafonao, 2018; Dwiyoogo, 2018). The use of videos and animations made the learning process more dynamic, allowing students to take control of their practice pace, repeat difficult movements, and receive immediate visual feedback.

The gain score analysis further reinforces the effectiveness of digital-based learning. The experimental group's improvement was more than double that of the control group, demonstrating that the intervention had a strong and measurable impact on both cognitive and affective outcomes. Moreover, the large effect sizes (Cohen's $d = 1.25$ for learning outcomes, $d = 1.10$ for motivation) indicate that the intervention is not only statistically significant but also practically meaningful. These results suggest that integrating digital media into physical education can address common challenges such as low motivation and limited learning resources.

Overall, the findings of this study provide empirical evidence that digital-based movement learning can serve as an effective innovation in physical education at the senior high school level. It highlights the importance of leveraging technology to create more engaging, flexible, and effective learning environments. Additionally, this study emphasizes the need for teachers to adopt digital tools strategically to enhance both skill acquisition and student motivation.

Conclusion

The findings of this study clearly demonstrate that digital-based movement learning is an effective approach to improving both the learning outcomes and motivation of Senior High School students in physical education. Students who participated in the

digital-based intervention showed significantly higher posttest scores in movement skills compared to those who received conventional instruction, indicating that interactive videos, motion animations, and guided digital practice can enhance technique accuracy, coordination, and overall motor performance.

In addition to cognitive improvements, the intervention also had a notable impact on students' motivation. The experimental group exhibited greater interest, attention, self-confidence, and persistence during movement learning activities. This suggests that digital media not only facilitates skill acquisition but also fosters an engaging and motivating learning environment.

The gain scores and large effect sizes further highlight the practical significance of digital-based learning, showing that the intervention produced measurable and meaningful improvements in students' performance and engagement. These results provide strong empirical support for integrating digital technologies into physical education curricula, particularly as a strategy to overcome common challenges such as low student motivation, limited instructional resources, and difficulties in mastering complex movement skills.

Overall, this study concludes that digital-based movement learning represents a valuable innovation in physical education. By combining interactive media with guided practice, teachers can create more effective, engaging, and student-centered learning experiences that enhance both cognitive and affective outcomes. Therefore, educators are encouraged to adopt and adapt digital-based approaches to improve the quality of movement learning in Senior High School settings.

References

- Arsyad, A. (2019). *Media Pembelajaran*. Jakarta: Rajawali Pers.
- Astuti, R., & Wijaya, D. (2020). Media digital dalam pembelajaran pendidikan jasmani. *Jurnal Pendidikan Olahraga*, 7(1), 15–24.
- Bachtiar, I., & Hidayat, T. (2021). Pengaruh multimedia terhadap keterampilan motorik siswa. *Jurnal Penelitian Olahraga*, 8(2), 50–60.
- Budi, S. (2019). Efektivitas video pembelajaran dalam pendidikan jasmani. *Jurnal Teknologi Pendidikan*, 3(2), 45–53.
- Cahyono, B. (2018). Motivasi belajar siswa melalui media digital. *Jurnal Ilmiah Pendidikan*, 4(1), 30–38.
- Damanik, R. (2020). Pembelajaran berbasis teknologi pada SMA. *Jurnal Pendidikan Digital*, 2(2), 21–28.
- Dwiyogo, M. (2018). Pemanfaatan media digital untuk meningkatkan motivasi belajar siswa. *Jurnal Pendidikan*, 3(2), 45–52.
- Fauzi, A., & Wulandari, S. (2021). Pengaruh media interaktif terhadap hasil belajar olahraga. *Jurnal Pendidikan Olahraga Indonesia*, 9(1), 55–63.
- Gunawan, E. (2017). Media pembelajaran inovatif untuk pendidikan jasmani. *Jurnal Pendidikan Jasmani*, 5(2), 70–78.
- Hamalik, O. (2017). *Proses Belajar Mengajar*. Jakarta: Bumi Aksara.
- Hermansyah, S., Roni, R., Cromico, J., & Saleh, F. (2026). A COMPARATIVE ANALYSIS OF GRADE 7 AND GRADE 8 STUDENTS' CREATIVE THINKING SKILLS USING THE EXPERIENTIAL LEARNING MODEL. *La Ogi : English Language Journal*, 12(1), 66–73. <https://doi.org/10.55678/loj.v12i1.2602>
- Hidayat, F. (2019). Analisis efektivitas media digital pada pembelajaran. *Jurnal Pendidikan dan Teknologi*, 6(1), 10–18.
- Idris, K., & Rahman, M. (2020). Multimedia dan peningkatan motivasi belajar siswa. *Jurnal Pendidikan*, 7(2), 40–48.
- Jannah, L. (2018). Strategi inovasi pembelajaran jasmani di SMA. *Jurnal Pendidikan Olahraga*, 5(1), 20–29.
- Kurniawan, A. (2019). Pembelajaran gerak berbasis digital. *Jurnal Pendidikan Olahraga dan Kesehatan*, 8(2), 15–25.
- Lestari, P., & Suyanto, S. (2021). Efektivitas media digital dalam pembelajaran olahraga. *Jurnal Penelitian Pendidikan*, 7(1), 65–74.
- Mahendra, R. (2015). Pembelajaran gerak pada pendidikan jasmani. *Jurnal Pendidikan Jasmani*, 1(1), 12–20.
- Mayer, R. E. (2009). *Multimedia Learning*. New York: Cambridge University Press.
- Mudinillah, A., Kuswandi, D., Erwin, E., Sugiarni, S., Winarno, W., Annajmi, A., & Hermansah, S. (2024). Optimizing Project-Based Learning in Developing 21st Century Skills: A Future Education Perspective. *Qubahan Academic Journal*, 4(2), 86–101. <https://doi.org/10.48161/qaj.v4n2a352>
- M, U., & Hermansyah, S. (2026). The Effectiveness of the Use of Aldiko Book Reader in

- Indonesian Language Learning for Natural Sciences. *Journal of Paddisengeng Technology*, 1(4), 144–150.
<https://doi.org/10.65224/jopate.v1i3.79>
- Nugroho, D., & Santoso, T. (2020). Penggunaan aplikasi digital dalam pembelajaran gerak. *Jurnal Teknologi Pendidikan*, 5(1), 12–20.
- Nur Rahmah Wahyuddin, Nur Eva Yanti, Riska Arnas, Sam Hermansyah, Utilization of Artificial Intelligence in EFL Learning from a Digital Literacy Perspective, <https://doi.org/10.24256/ideas.v13i2.8331>
- Prasetyo, B. (2018). Media video untuk pembelajaran olahraga di SMA. *Jurnal Pendidikan*, 6(2), 50–59.
- Putra, A., & Pratama, D. (2021). Efektivitas media digital pada pembelajaran olahraga. *Jurnal Penelitian Pendidikan*, 6(1), 33–40.
- Rahmawati, S. (2019). Pengaruh multimedia terhadap keterampilan gerak siswa. *Jurnal Pendidikan Olahraga Indonesia*, 7(1), 33–41.
- Rusman. (2020). *Model-model Pembelajaran: Mengembangkan Profesionalisme Guru*. Jakarta: Rajawali Pers.
- Sam Hermansyah, Buhari, Ibrahim Manda, Andi Sadapotto, Muhammad Hanafi, Andi Asrifan, ... Muliani. (2024). Reflection on Learning in Teacher Professional Education (PPG) Strategies to Enhance the Competence of Novice Teachers at Universitas Muhammadiyah Sidenreng Rappang. *INTERACTION: Jurnal Pendidikan Bahasa*, 11(2), 727–734.
<https://doi.org/10.36232/interactionjournal.v11i2.628>
- Sari, L. (2022). Inovasi pembelajaran gerak menggunakan media digital. *Jurnal Pendidikan Jasmani Indonesia*, 9(2), 101–110.
- Setiawan, R., & Haryanto, E. (2020). Pembelajaran berbasis digital untuk motivasi belajar siswa. *Jurnal Pendidikan Teknologi*, 3(2), 15–24.
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Susanto, M. (2017). Strategi pembelajaran gerak untuk siswa SMA. *Jurnal Pendidikan Jasmani*, 5(1), 45–54.
- Tafonao, R. (2018). Pengaruh penggunaan media digital terhadap motivasi belajar siswa. *Jurnal Pendidikan Teknologi*, 5(1), 23–31.
- Uno, H. B. (2019). *Model Pembelajaran: Konsep dan Aplikasi*. Jakarta: Bumi Aksara.
- Wahyuddin, N. R., Yanti, N. E., Arnas, R., & Hermansyah, S. (2024). Digital Literacy Integrated with Blended Learning in Improving EFL Students' English Language Skills: A Lesson Learned from the Independent Campus Program. *Journal of Language and Literature Studies*, 4(4), 744–757.
<https://doi.org/10.36312/jolls.v4i4.2351>
- Wicaksono, A. (2019). Penggunaan animasi digital untuk pembelajaran olahraga. *Jurnal Pendidikan Olahraga*, 6(2), 40–49.
- Yulianto, T., & Kurniati, S. (2021). Media interaktif berbasis digital dalam pendidikan jasmani. *Jurnal Pendidikan dan Pembelajaran*, 9(1), 20–30.