

"Enhancing Physical Education: The Impact of Digital Media on Student Fitness and Engagement"

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Abstract

This study investigates the impact of digital, visual, and interactive learning media on the motor skills, participation in physical activities, and motivation of primary school students in physical education classes. Utilizing a Randomized Control Trial (RCT) design, 100 students aged 9 to 12 years from grades 4 to 6 were randomly assigned to either an experimental group, which received digital and visual learning interventions, or a control group, which followed traditional teaching methods. Data were collected through pretest and posttest assessments of motor skills, physical activity participation, and motivation surveys. The results indicated that the use of digital and visual learning media significantly improved students' motor skills, with the experimental group showing a 15% increase compared to only 5% in the control group. Additionally, the experimental group demonstrated a 20% increase in participation in physical activities, significantly higher than the 7% increase observed in the control group. Furthermore, students in the experimental group reported higher levels of motivation to engage in physical activities both inside and outside the school environment. These findings suggest that integrating digital and visual learning media into physical education can effectively enhance students' physical abilities, engagement, and motivation. The study highlights the potential of these innovative teaching tools to foster better learning outcomes and promote healthier, more active lifestyles among primary school students. Future research should explore the long-term effects of such interventions and best practices for their implementation in diverse educational settings.

Keywords: Digital learning media, Physical education, Motor skills, Student motivation, Interactive learning

Research Background

Physical education has an important role in the primary education curriculum as it directly affects students' physical, mental and social development. At the primary school level, physical education is not just about teaching sports, but also includes the development of basic motor skills, the inculcation of sportsmanship values, and the formation of healthy living habits. One of the main objectives of physical education is to improve students' physical fitness, which is a crucial aspect in supporting their long-term health and quality of life.

However, in practice, there are various challenges that hinder the achievement of this goal. One of the main challenges is how to get students actively engaged in physical activities in the classroom. This is where learning media plays an important role. Effective learning media can stimulate students' interest, increase their participation, and ultimately, improve learning outcomes, including in the context of physical fitness.

The Importance of Physical Fitness for Primary School Students, physical fitness in children has a much wider impact than just physical health. Numerous studies have shown that children who are physically fit tend to have better concentration, sharper cognitive abilities and better academic outcomes compared to children who are less

physically active. In addition, physical fitness also plays a role in character building, such as self-discipline, teamwork and mental resilience.

In today's digital age, the challenges faced in maintaining students' physical fitness are even greater. Children are increasingly exposed to technologies that provide passive entertainment, such as television, video games and social media, which contribute to the rise of sedentary lifestyles. This has a negative impact on their physical health, including an increased risk of obesity and other related diseases. Physical education in primary schools is therefore becoming increasingly important as a tool to counter this trend, and the use of innovative learning media can be a solution to increase students' engagement in physical activity.

The Role of Learning Media in Physical Education, Learning media in physical education can be visual aids, instructional videos, digital apps, and technology-based games designed to teach sports concepts and skills in an engaging and fun way. The use of these media not only helps teachers to deliver material more effectively, but can also increase students' interest and motivation to actively participate in physical activities.

The use of appropriate learning media can change students' perceptions of physical activities that were previously considered boring or difficult into something interesting and fun. For example, through the use of videos that demonstrate correct exercise techniques, students can more easily understand and replicate the movements, so they are more confident and motivated to try. In addition, interactive physical game applications can make students more excited to move, compete and learn at the same time.

Challenges and Opportunities in the Use of Learning Media

Although the potential of using learning media in increasing students' physical activity is huge, there are some challenges to overcome. Firstly, the availability of technology infrastructure in schools, especially in remote areas, is still an obstacle. Many schools are not equipped with adequate facilities to support the use of technology-based learning media. Secondly, the readiness and ability of teachers to integrate this learning media into the physical education curriculum is also a determining factor for success. Teachers need to be equipped with sufficient knowledge and skills to be able to utilise learning media effectively.

However, behind these challenges, there are great opportunities to improve the quality of physical education through learning media innovation. For example, the development of mobile applications specifically designed for physical education can be easily accessed by students, both at school and at home. In addition, continuous training for teachers in the use of learning media can ensure that they are able to implement more modern and effective learning methods.

Research urgency, research on the effect of learning media on physical fitness activities of primary school students is highly relevant in this context. With the increasing awareness of the importance of physical education and physical fitness, there is a need for empirical evidence that shows how learning media can be optimised to improve physical education outcomes. This study aims to fill the existing knowledge gap by identifying and analysing the extent to which learning media can influence students' physical activity and fitness.

This research is expected to make a significant contribution to the development of more effective learning strategies in the field of physical education, which in turn can help students achieve optimal physical fitness and develop healthy habits that they will carry into adulthood.

H1: The use of learning media has a significant effect on increasing physical fitness activities of primary school students.

H2: The use of interactive learning media will increase student participation in physical activity in physical education classes.

H3: Visual learning media such as instructional videos will improve students' motor skills in performing specific physical activities.

H4: The use of digital learning media will increase students' motivation to engage in physical activity both inside and outside the school environment.

Literature Review

H1: The use of learning media has a significant effect on increasing physical fitness activities of primary school students.

The use of learning media, especially in physical education (PE), has been shown to significantly enhance the active learning time and physical fitness of primary school students. Research indicates that implementing various forms of PE learning media can increase students' active participation and physical fitness levels. For instance, the use of physical education learning media has been proven effective in increasing the active learning time of students, which directly contributes to better physical fitness outcomes (Andiyanto et al., 2020; Suddee, 2019; Sutarjo & Hadiwinarto, 2022). Additionally, studies have shown that the use of digital and web-based technologies in physical education can lead to a significant increase in physical activity levels among students, transitioning them from light to moderate-to-vigorous physical activity (Botagariyev et al., 2024; Sofias & Pierrakeas, 2023). The use of learning media in PE significantly enhances the physical fitness activities of primary school students by increasing their active participation and physical activity levels.

H2: The use of interactive learning media will increase student participation in physical activity in physical education classes.

Interactive learning media, such as digital tools and gamified activities, have been found to increase student participation in physical activities during PE classes. Studies reveal that incorporating digital media in PE can create engaging and interactive environments, which significantly boost student involvement. For example, the use of tablets and apps like iMovie in PE classes has been shown to empower students and foster new roles, increasing their engagement in physical activities (Greve et al., 2022; Varga & Révész, 2023). Moreover, web-based technologies and digital interventions have been associated with higher levels of motivation and participation in physical activities during school hours (Botagariyev et al., 2023). Interactive learning media significantly increase student participation in physical activities during PE classes by making the learning experience more engaging and motivating.

H3: Visual learning media such as instructional videos will improve students' motor skills in performing specific physical activities.

Visual learning media, including instructional videos, are effective in enhancing students' motor skills in specific physical activities. Research indicates that when students are exposed to visual aids such as instructional videos, they can better understand and perform the required motor skills. A study on the use of digital media in PE found that students who engaged with video content demonstrated improved motor performance and were more adept at executing specific physical tasks (Greve et al., 2022; H'mida et al., 2020). Additionally, other studies have shown that integrating visual media into PE lessons helps in the development of motor skills and physical literacy, which are crucial for executing specific physical activities (Sortwell et al., 2022). The use of visual learning media, such as instructional videos, effectively improves students' motor skills in performing specific physical activities.

H4: The use of digital learning media will increase students' motivation to engage in physical activity both inside and outside the school environment.

Digital learning media play a significant role in enhancing students' motivation to engage in physical activities both within and beyond the school environment. Research has shown that digital interventions, such as the use of accelerometers and social media platforms in PE, not only increase students' physical activity levels during classes but also motivate them to be more active outside of school (Botagariyev et al., 2024; Vlahu-Gjorgievska et al., 2023). Additionally, motivational instruction using digital media has been found to significantly boost students' confidence and drive to participate in physical activities, fostering lifelong habits of engaging in physical exercise (Luo et al., 2022). The use of digital learning media significantly increases students' motivation to engage in physical activity both inside and outside the school environment.

Research methodology

This study used a pure experimental method with a Randomised Control Trial (RCT) design to evaluate the effects of digital and visual learning media on students' motor skills and participation in physical activity. The

sample consisted of 100 students in grades 4 to 6 at an elementary school in Jakarta, who were randomly divided into two groups: 50 students in the experimental group who received digital and visual media intervention, and 50 students in the control group who received traditional learning. The research procedure began with a pretest that measured motor skills and level of participation in physical activity using standardised tests and questionnaires. For 8 weeks, the experimental group participated in physical education learning with digital and visual media, while the control group underwent conventional learning. After the intervention, a posttest was conducted to measure changes in students' motor skills and participation. Data were analysed using t-test to compare the pretest and posttest results between the two groups. This analysis aimed to determine whether the use of digital and visual learning media significantly improved motor skills and participation in physical activity compared to traditional methods. This study is expected to provide empirical evidence on the effectiveness of learning media in physical education in primary schools.

Results and Discussion

Table.1 Characteristic Respondent

Characteristic	Details
Age Range	9 to 12 years
Grade Levels	Grades 4 to 6
Gender Distribution	50% Male (50 students) 50% Female (50 students)
Socioeconomic Background	Diverse, representing various socioeconomic statuses

Data Source: Processed 2024

The purpose of this study was to examine the effects of digital and visual learning media on the motor skills and physical activity participation of primary school students. The study utilized a Randomized Control Trial (RCT) design involving 100 students, divided equally into an experimental group, which received digital and visual learning interventions, and a control group, which followed traditional teaching methods. The analysis of pretest and posttest data provides valuable insights into the effectiveness of these interventions in enhancing physical education outcomes.

Results

Motor Skills Improvement:

The pretest results indicated that both the experimental and control groups had similar baseline motor skills. After the 8-week intervention, the experimental group showed significant improvements in motor skills compared to the control group. Specifically, students in the experimental group demonstrated enhanced performance in activities such as sprinting, long jumping, and balance tests. The mean improvement in the motor skills score for the experimental group was 15%, compared to only 5% in the control group.

This result aligns with previous studies that have shown the effectiveness of visual learning tools in improving motor skills. For instance, (Greve et al., 2022) found that the use of instructional videos in physical education significantly improved students' ability to perform specific physical tasks, particularly those requiring coordination and timing (Greve et al., 2022). These findings suggest that visual learning media can provide students with clearer demonstrations of movements, leading to better comprehension and execution.

Physical Activity Participation:

The analysis of physical activity participation revealed that students in the experimental group were more engaged in physical activities both during and outside of school hours. The data from the kuesioner (questionnaire) indicated a 20% increase in reported participation in physical activities among students in the experimental group, compared to a 7% increase in the control group. This enhanced participation can be attributed to the engaging nature of the digital learning media used during the intervention.

These findings are consistent with the research conducted by Botagariyev et al., (2024), which highlighted that the integration of digital technologies in physical education, such as the use of accelerometers and social media

platforms, significantly increased student motivation and engagement in physical activities (Botagariyev et al., 2024). The interactive nature of these technologies may help students to perceive physical activities as more enjoyable and less of a chore, thereby increasing their willingness to participate.

Student Motivation:

The intervention also had a positive effect on student motivation to engage in physical activity. The posttest surveys indicated that students in the experimental group reported higher levels of motivation to participate in physical activities compared to those in the control group. This was particularly evident in their responses to questions about their enjoyment of PE classes and their intentions to engage in physical activities outside of school.

Luo et al., (2022) found that motivational instructional strategies, particularly those involving digital media, significantly enhanced students' self-confidence and motivation to engage in physical activities (Luo et al., 2022). This supports the idea that digital learning media not only improve physical performance but also foster a more positive attitude toward physical education.

H1: The use of learning media has a significant effect on increasing physical fitness activities of primary school students.

The use of learning media in physical education significantly increases physical fitness activities of primary school students. The results showed that students exposed to digital and visual learning media, such as interactive apps and instructional videos, showed a significant increase in participation and physical activity compared to those who received traditional learning. These media help to clarify the physical concepts being taught, so that students better understand and actively engage in physical activities. In addition, it also provides variety and innovation in the delivery of the material, which makes students more motivated and interested in participating in physical activity more intensively. aligned with the Corbin et al., (2014); Kahn et al., (2002) the use of learning media not only improves students' understanding of the material, but also encourages an increase in their physical activity, which contributes directly to the improvement of overall physical fitness .

H2: The use of interactive learning media will increase student participation in physical activity in physical education classes.

Interactive learning media was shown to be effective in increasing student participation in physical activity during physical education lessons. Students who participated in classes that used interactive media, such as digital games and activity tracking apps, showed a significant increase in participation compared to students who followed conventional learning methods. These interactive media provide a more engaging learning experience and involve students actively in the learning process, so they are more motivated to participate in physical activity. In addition, it allows students to get immediate feedback and be involved in decision-making regarding their physical activity, which increases their engagement and motivation. Therefore, the use of interactive learning media not only increases students' participation but also encourages deeper engagement in physical activity during physical education lessons Supported by research Fernandez-Rio et al., (2020); Nagovitsyn et al., (2020); Papastergiou & Mastrogiannis, (2021).

H3: Visual learning media such as instructional videos will improve students' motor skills in performing specific physical activities.

Visual learning media, such as instructional videos, effectively improve students' motor skills in performing specific physical activities. Research shows that students who learn through visual media show significant improvement in their ability to perform specific physical movements, such as jumping, running and balance. Instructional videos provide a clear visual demonstration of the correct technique, allowing students to more easily understand and replicate the movements shown. By seeing visualisations of correct movements, students can correct their mistakes and improve overall motor skills. This use of visual media is particularly beneficial in teaching complex motor skills, where verbal explanations alone may not be sufficient. Thus, instructional videos are a very effective tool for improving students' motor skills in physical education Supported by research (Daum et al., 2021); Dewi & Verawati, (2022); H'mida et al., (2020).

H4: The use of digital learning media will increase students' motivation to engage in physical activity both inside and outside the school environment.

The use of digital learning media significantly increases students' motivation to engage in physical activity both inside and outside the school environment. Students who engaged in learning through digital media, such as fitness apps and activity tracking programmes, showed increased motivation to participate in physical activity. These digital media provide tools that allow students to monitor their progress, set goals and receive real-time feedback, all of which contribute to increased motivation. In addition, it makes physical activity more engaging and fun, which encourages students to continue being active even outside of school hours. Thus, digital learning media not only increases students' engagement in physical education but also instils sustainable healthy habits that can be applied outside the school environment.

Discussion

The findings from this study clearly demonstrate the benefits of integrating digital and visual learning media into physical education. The significant improvement in motor skills observed in the experimental group highlights the effectiveness of visual learning tools in teaching complex physical movements. By providing students with clear, visual examples of the correct techniques, these tools can help overcome the challenges associated with traditional verbal or textual instructions.

Moreover, the increased participation in physical activities among students in the experimental group suggests that digital learning media can play a crucial role in enhancing engagement in physical education. The interactive elements of these tools, such as gamified learning experiences and immediate feedback, likely contribute to this increased engagement. This is particularly important in the context of contemporary education, where traditional PE methods may not always resonate with digitally-native students.

The increase in motivation reported by students further underscores the potential of digital learning media to transform physical education. As research by Invernizzi et al., (2019) suggests, the teaching styles and tools used in PE significantly influence students' experiences and attitudes toward physical activity (Invernizzi et al., 2019). When students perceive PE as enjoyable and rewarding, they are more likely to develop positive lifelong habits of physical activity.

However, it is important to note that the successful implementation of digital learning media in PE requires careful consideration of several factors. First, the quality of the digital tools and resources must be ensured. Poor-quality media can lead to confusion and frustration, ultimately reducing the effectiveness of the intervention. Therefore, it is essential that educators are provided with high-quality, user-friendly tools that are specifically designed for educational purposes.

Second, the role of the teacher remains critical in the effective use of digital learning media. While these tools can enhance learning, they cannot replace the guidance and support provided by a skilled educator. Teachers must be adequately trained not only in the use of these tools but also in how to integrate them effectively into their teaching strategies. This aligns with the findings of Botagariyev et al., (2024), who emphasized the importance of teacher support in the successful implementation of digital technologies in PE (Botagariyev et al., 2024).

Finally, while the study provides strong evidence for the benefits of digital learning media in PE, it is also important to acknowledge the limitations of this approach. For instance, the reliance on technology may lead to reduced opportunities for face-to-face interactions and traditional play, which are also valuable components of physical education. As such, it is essential to strike a balance between the use of digital tools and traditional methods to ensure that students receive a well-rounded physical education.

In conclusion, the results of this study highlight the significant potential of digital and visual learning media to enhance motor skills, increase participation, and boost motivation in physical education. These findings contribute to a growing body of evidence supporting the integration of technology into education, particularly in areas where traditional methods may fall short. Future research should continue to explore the long-term impacts of these interventions and identify best practices for their implementation in diverse educational settings.

Conclusion

of this study shows that the use of digital, visual and interactive learning media in physical education has a significant positive impact on primary school students' motor skills, participation in physical activities and motivation to participate in physical activities, both inside and outside the school environment. Specifically, this study found that, The use of digital and visual learning media significantly improved students' motor skills. These media provided clear and detailed demonstrations of correct physical techniques, which helped students understand and replicate the movements better, thus improving their motor skills. Interactive learning media proved effective in increasing students' participation in physical activity during physical education lessons. Students who engage in learning through interactive media are more motivated and actively involved in the learning process, which results in a significant increase in their participation. Digital learning media also increases students' motivation to engage in physical activity outside of school hours. Features such as progress tracking and goal setting in fitness apps encourage students to continue being physically active even after the lesson is over. Overall, the results of this study support the use of innovative learning media as an effective tool to improve learning outcomes in physical education, with benefits that extend not only to physical skills, but also to students' participation and motivation in physical activity. The implementation of these media in the physical education curriculum may contribute to the development of sustainable healthy living habits among students.

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