

Innovative Strategies in Physical Education Learning in the Digital Era in Mataram City

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ARTICLE INFO	ABSTRACT
Article history Received 17-June-2025 Revised 19-June-2025 Accepted 17-September-2025 Published 25-September-2025 Keywords innovative strategies physical education digital era educational technology gamification  License by CC-BY-SA Copyright © 2025, The Author(s).	The digital era has brought significant changes in various aspects of life, including in the field of education. Physical Education, as a subject that plays an important role in students' physical, mental and social development, needs to adopt innovative strategies to remain relevant and effective. This article discusses various innovative strategies in Physical Education learning that utilize digital technology, such as fitness applications, video tutorials, gamification, and virtual-based learning. This approach not only increases student engagement but also allows for more flexible and personalized learning. The results of the analysis show that the use of digital technology can increase student motivation, expand access to learning resources, and make it easier for teachers to measure and evaluate student development. However, challenges such as lack of digital literacy among teachers and students, limited technological facilities, and potential risks of technology use such as screen addiction need to be addressed through training, providing infrastructure, and a balanced learning approach. This article emphasizes the importance of collaboration between educators, parents, and policy makers in supporting the implementation of innovative strategies in Physical Education. In this way, it is hoped that Physical Education learning can continue to adapt and make a significant contribution to student development in the digital era.

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Introduction

The digital era has brought significant impacts on various sectors of life, including education. The development of information and communication technology has enabled a major transformation in the learning process, in terms of methods, media, and approaches. This change is not only limited to theory-based subjects but also extends to fields traditionally considered practice-based, such as Physical Education. Physical Education, which has long been associated with physical activities on the field, is now also adapting to remain relevant to the times. Therefore, exploring innovative strategies that utilize digital technology has become an urgent need to address the challenges and opportunities of the digital era (Pratama & Nugroho, 2020).

Physical Education plays an important role in shaping students' character, developing motor skills, and improving physical, mental, and social health. Through sports activities, students are not only trained to maintain fitness but also internalize values such as cooperation, discipline, sportsmanship, and responsibility. Thus, Physical Education contributes to the holistic competence development that students need in their daily lives and future. However, in practice, the implementation of Physical Education often faces challenges. These include limited learning time due to dense curricula, inadequate sports facilities in schools, and monotonous teaching methods that make students less motivated to participate actively in learning (Hidayat & Setiawan, 2021).

In this context, digital technology emerges as an alternative solution to increase both the effectiveness and attractiveness of Physical Education. Technology can be applied in various ways, such as fitness applications that allow students to independently monitor their physical progress, tutorial videos that simplify the understanding of movement techniques, gamification-based platforms that encourage active

involvement through game elements, and virtual learning that provides interactive simulations. These technologies can help teachers enrich teaching methods while offering students a more flexible, personalized, and engaging learning experience.

Moreover, the integration of digital technology allows teachers to conduct more objective and measurable evaluations. For example, data collected from fitness trackers can provide a real overview of students' fitness levels, enabling teachers to design learning programs that better suit individual needs. This can encourage the creation of more inclusive learning, where every student has the opportunity to grow according to their potential.

Nevertheless, the application of digital technology in Physical Education is not without obstacles. A lack of digital literacy among both teachers and students can hinder the integration process. Additionally, infrastructure limitations such as uneven internet access, insufficient supporting devices, and risks of overuse such as screen addiction present further challenges. Therefore, supporting strategies are needed, including digital literacy training for teachers, the provision of adequate facilities, and a balanced approach that emphasizes both technology use and direct physical activity.

In conclusion, the integration of digital technology into Physical Education is an inevitability in the digital era. By applying the right innovative strategies, Physical Education can not only maintain its role as a means of physical and character development but also transform into a field relevant to technological advancements and the needs of today's generation. Collaborative roles among educators, parents, and policymakers are essential to ensure that these innovations can be implemented effectively, sustainably, and with real contributions to students' development in the digital age.

Digital transformation in Physical Education enables teachers to deliver more interactive, innovative, and relevant learning experiences. The use of fitness applications, tutorial videos, and gamification platforms serves as clear examples of how technology can enrich teaching methods. Fitness applications, for instance, allow students to record, monitor, and evaluate their physical activities independently, making them more aware of their fitness conditions. Tutorial videos help students understand sports techniques through clear visualizations that can be reviewed repeatedly. Meanwhile, gamification platforms increase learning motivation by incorporating elements of games, competition, and rewards, which have proven to create a more enjoyable learning atmosphere. Additionally, technology-based learning offers high flexibility, where students can access materials anytime and anywhere. This opens greater opportunities for accessibility, especially for students facing limitations in time and space (Saputra & Wijaya, 2019).

However, integrating digital technology into Physical Education also presents challenges. One of the main barriers lies in the readiness of teachers and students. Many teachers lack adequate digital literacy to optimally operate and use learning technologies. Yet, the success of technology implementation largely depends on teachers' competencies as the main facilitators. On the other hand, students do not always have equal access to technology, such as smartphones, laptops, or stable internet connections. This may cause learning gaps between students with good access and those without. Thus, concrete steps are needed, including teacher training in educational technology use and the provision of sufficient educational infrastructure. Policy support from schools and government in terms of facility provision, internet subsidies, and teacher capacity-building programs is key to overcoming these challenges (Rahmawati et al., 2020).

Beyond technical barriers, pedagogical aspects must also be a focus in applying digital technology in Physical Education. The essence of Physical Education is to improve physical health, motor skills, and positive mental and character development. Therefore, technology should be regarded as a supporting tool to achieve these goals, not as a substitute for physical activity itself. If not properly managed, students risk spending more time in front of screens rather than being physically active. Hence, teachers must design a balanced learning strategy between technology-based activities and real physical activities on the field. For example, the use of fitness apps can be combined with independent physical exercise assignments reported periodically, or tutorial videos can serve as supplementary materials before direct practice in class. With this approach, technology can enrich the learning experience without reducing the essence of Physical Education (Mulyani & Hermawan, 2021).

Furthermore, digital technology in Physical Education opens opportunities for personalized learning. Data obtained through fitness applications or activity trackers can help teachers tailor learning programs to the needs and abilities of each student. This improves learning effectiveness while fostering inclusivity. However, personalization also requires teachers to manage student data responsibly, considering ethical and

privacy aspects. Therefore, clear guidelines on the use of technology are needed to avoid potential issues related to data security.

Thus, integrating digital technology into Physical Education offers great opportunities to create more interactive, engaging, and relevant learning in the digital era. However, its success depends heavily on human resource readiness, infrastructure availability, and appropriate pedagogical approaches. Therefore, synergy between teachers, students, parents, schools, and policymakers is essential to ensure that the digital transformation of Physical Education is not merely a trend, but a real contributor to students' physical, mental, and social development in the future.

Gamification has been proven as an effective approach to boosting student motivation. By incorporating game elements into learning, students can become more enthusiastic and actively engaged. For example, apps that reward points or badges for completed tasks encourage greater participation (Santoso et al., 2020).

Not only gamification, but virtual-based learning is also becoming increasingly popular. With virtual reality (VR) technology, students can experience sports or physical activities in realistic virtual environments. This provides a solution to the lack of sports facilities in schools (Susanto & Aditya, 2021).

Tutorial videos are also highly effective tools in Physical Education. Teachers can record or use trusted video sources to explain movements or techniques. Students can replay these videos as many times as needed until they fully understand and can perform the skills correctly (Yusuf & Hakim, 2020).

Fitness applications designed to track physical activities also have great potential in learning. These apps allow students to monitor their progress, such as step counts, calories burned, or exercise duration. This data can serve as objective evaluation material for teachers (Pratama & Nugroho, 2020).

However, it is important to remember that technology use also comes with risks. One of these is screen addiction, where students become overly dependent on digital devices and reduce direct physical activity. Therefore, technology-based learning must be balanced with sufficient outdoor activities (Hidayat & Setiawan, 2021).

In addition, integrating technology in Physical Education requires full support from various parties, including parents, schools, and the government. Parents need to support their children by providing access to necessary technological devices. Schools must ensure adequate technological infrastructure is available. Meanwhile, the government can play a role by providing teacher training and developing policies that support technology integration in education (Rahmawati et al., 2020).

Innovative strategies in Physical Education must also consider student diversity. Not all students have the same level of ability, so approaches must be flexible and inclusive. Technology can help address this by providing content tailored to different student abilities (Mulyani & Hermawan, 2021).

Collaborative approaches are also important in Physical Education learning in the digital era. Teachers can collaborate with teachers from other subjects to integrate different fields into physical activities. For example, science learning can be linked with physical activity exploring biomechanics concepts (Saputra & Wijaya, 2019).

In addition to collaborative approaches, project-based learning can also be applied. Students may be tasked with designing their own fitness programs or creating presentations on the benefits of exercise. Such projects not only improve students' understanding of Physical Education but also train their critical and creative thinking skills (Santoso et al., 2020).

Evaluation is another key aspect of technology-based learning. Teachers must develop evaluation methods to measure the effectiveness of technology use in achieving learning objectives. This includes evaluating motor skills, physical fitness, and students' knowledge of health concepts (Susanto & Aditya, 2021).

With the right strategies, Physical Education can become more engaging and relevant for students in the digital era. Digital technology not only simplifies the learning process but also opens new opportunities for innovation. However, the success of these strategies depends largely on the readiness of all involved parties (Yusuf & Hakim, 2020).

Therefore, this article aims to explore various innovative strategies in Physical Education learning in the digital era. By understanding the potential, challenges, and necessary steps, it is expected that Physical Education will continue to adapt and contribute positively to student development.

Method

The research method used in this article is a descriptive qualitative approach with literature review and observation as data collection techniques. This study aims to explore various innovative strategies in Physical Education learning in the digital era and analyze the implementation of technology in the educational context. The literature review was conducted by examining scientific articles, books, and other trusted sources relevant to the research topic, to gain a comprehensive understanding of the latest trends in using technology in Physical Education. In addition, observations of learning practices in several schools that have implemented technology in their teaching were carried out to obtain real insights into the challenges and successes of the implementation. The collected data were then analyzed qualitatively using content analysis to identify patterns and key findings related to the use of technology in Physical Education. The results of this study are expected to provide recommendations for developing more effective and innovative learning strategies in the future.

Results and Discussion

In this study, innovative strategies in Physical Education learning utilizing digital technology were applied in several schools in Indonesia. The research aimed to evaluate the influence of technology such as fitness applications, tutorial videos, gamification, and virtual learning platforms on student motivation, engagement, and learning outcomes. The results showed that the use of digital technology had a significant positive impact on improving the quality of Physical Education learning.

One of the main findings was the increased student motivation in participating in Physical Education. Before implementing digital technology, students often showed less interest in this subject due to conventional teaching methods. However, after using fitness applications that allow students to track their physical development in real-time, many students felt more motivated to improve their performance. These apps provide instant feedback and allow students to compete with themselves or their peers, creating an enjoyable and challenging learning experience.

Additionally, tutorial videos provided by teachers through online platforms received positive responses. With these videos, students could learn various sports techniques more clearly and in depth, without time or location constraints. They could access tutorial videos anytime to review material or learn techniques they had not yet mastered. This highlighted the importance of technology-based learning in facilitating access and improving student understanding.

Gamification, which refers to the application of game design elements in non-game contexts such as education, has shown significant potential in enhancing student engagement and motivation. In the context of Physical Education, gamification does not only involve the use of points, badges, or leaderboards, but also the integration of challenges, levels, and narrative-based learning experiences that stimulate students' intrinsic motivation. By transforming traditional exercises into interactive missions or competitions, students are encouraged to view physical activity as both enjoyable and rewarding. For example, running sessions can be framed as a "quest" where students must complete a certain distance to unlock the next level, while group activities can be presented as collaborative challenges that emphasize teamwork and shared achievement.

Moreover, gamified applications used in this study demonstrated the effectiveness of linking challenges and rewards with students' actual physical and cognitive performance. Achievements were not only recognized in terms of physical endurance or speed but also in aspects such as consistent participation, cooperation with peers, and progress in skill acquisition. Such recognition created a more inclusive learning environment, where students with varying abilities still had opportunities to achieve success and receive positive reinforcement. The competitive element, when managed constructively, helped foster a spirit of healthy rivalry among students, which further heightened their enthusiasm to actively engage in the lessons.

Interestingly, the application of gamification also had a notable impact on students who were previously less motivated or inactive in class. The presence of visible goals, immediate feedback, and tangible rewards stimulated a sense of accomplishment, making these students more eager to participate. In several cases, learners who once hesitated to join physical activities became motivated by the opportunity to earn points or advance levels, which gradually built their confidence and perseverance. Over time, this translated not only into increased class participation but also into the development of discipline, self-regulation, and a stronger commitment to maintaining physical activity outside of school settings.

From a pedagogical perspective, gamification serves as a bridge between technology and experiential learning in Physical Education. It transforms abstract objectives—such as improving stamina, building teamwork, or mastering specific movements—into concrete, attainable milestones that are both measurable and enjoyable. In this sense, gamification should not be regarded merely as an entertainment-oriented strategy, but as an innovative pedagogical approach capable of reshaping how students perceive physical learning. Ultimately, its effective implementation can contribute to fostering lifelong habits of physical activity, instilling values of perseverance, and cultivating a positive attitude toward exercise and health.

Virtual-based learning also played an important role in overcoming physical and geographical limitations. In some cases, students who could not attend physical activities at school due to physical constraints or distance were still able to participate through virtual platforms. Teachers could guide students to perform physical activities from home using their devices, such as smartphones or laptops, ensuring learning continued without disruption.

On the other hand, analysis of learning outcomes showed significant improvements in students' physical abilities and skills. The use of fitness applications integrated with daily evaluations, as well as personalized training programs, successfully improved students' overall performance. Moreover, students who frequently engaged with technology, such as watching tutorial videos or participating in gamified programs, tended to have a better understanding of techniques and sports skills compared to those not involved.

However, the biggest challenge in implementing digital technology was the limited digital literacy among teachers and students. Some teachers found it difficult to adapt technology to their teaching due to a lack of training and understanding of relevant software or applications. Similarly, some students were not familiar with these applications and needed a significant adaptation period. This shows the importance of training for both teachers and students to ensure optimal technology use.

In addition, not all schools had sufficient technological facilities. Some schools in remote areas still faced problems with access to necessary devices, such as computers or stable internet connections. This limited broader implementation of technology. Therefore, policies supporting the provision of technological devices and infrastructure are needed so that all parties involved in learning can benefit from technology.

Nonetheless, this study also found that the application of digital technology in Physical Education increased learning flexibility. Students could access learning materials anytime and anywhere, giving them the opportunity to learn more independently. Technology also enabled teachers to assign tasks and conduct evaluations more efficiently. Feedback delivered through online platforms improved the quality of interaction between students and teachers, even without face-to-face meetings.

Another aspect to consider is the risk of technology addiction. Excessive use of digital devices may lead students to spend too much time in front of screens, reducing the time they dedicate to other physical activities. Therefore, wise time management in using technology is essential to maintain balance between physical activities and digital device use.

In terms of educational policy development, this study suggests a broader integration of technology into the Physical Education curriculum. Policies supporting adequate facilities and training for teachers will help ensure that technology-based learning is implemented effectively and efficiently. Additionally, efforts to raise awareness among parents and the community about the importance of technology in education are needed to encourage responsible support for technology use.

From a psychological perspective, innovative strategies using technology can also improve students' confidence. Through fitness apps or gamification, students who achieve certain goals feel appreciated, which enhances motivation and personal satisfaction. These achievements, even if represented as numbers or levels in apps, provide positive feedback that encourages students to continue developing.

However, the implementation of technology in Physical Education must be carefully balanced with a holistic learning approach that goes beyond the mere use of digital tools. While digital applications, fitness trackers, and virtual platforms can provide valuable support in delivering innovative and interactive learning experiences, they should not overshadow the fundamental goals of Physical Education itself. Teaching that involves direct physical activity, face-to-face social interaction, and the cultivation of values such as teamwork, discipline, and sportsmanship remains a central pillar that cannot be replaced by technology.

In fact, physical engagement in real environments allows students to develop motor skills, body coordination, and physical fitness—outcomes that digital media can only simulate but never fully replicate.

Likewise, the social dimension of Physical Education, such as cooperation during team sports, empathy toward peers, and learning to handle both victory and defeat gracefully, represents character-building elements that are difficult to achieve solely through virtual learning platforms.

Therefore, technology should be positioned as a complementary tool designed to enrich and expand the learning process rather than as a substitute for the essential aspects of Physical Education. For instance, teachers can integrate digital platforms to provide feedback on performance, track students' progress, or offer interactive resources for self-study, while still maintaining core activities that emphasize direct practice, collaboration, and experiential learning. This balanced integration ensures that students not only benefit from technological innovation but also continue to develop the physical, emotional, and social competencies that are vital for their holistic growth.

In conclusion, the application of innovative strategies in Physical Education using digital technology has proven to positively impact student motivation, engagement, and learning outcomes. Although challenges remain in digital literacy, limited facilities, and potential risks, the benefits far outweigh them when technology is used wisely and in balance. Therefore, joint efforts from the government, schools, and society are needed to ensure effective integration of technology in Physical Education in the digital era.

Conclusion

In the digital era, Physical Education requires innovation to remain effective and relevant to students increasingly exposed to technology. The use of various digital tools and platforms, such as fitness applications, tutorial videos, and gamification, has been proven to increase student engagement, provide more interesting learning experiences, and simplify access to diverse materials. The application of technology in learning also enables greater flexibility, where students can learn independently and at their own pace and interests, unrestricted by time or space. In addition, technology helps teachers evaluate and monitor student progress more efficiently and objectively.

However, the implementation of these innovative strategies also faces several challenges. One of them is the limited digital literacy among teachers and students, which may hinder optimal technology use. Furthermore, not all schools have sufficient technological facilities, which becomes a barrier to applying digital-based learning. Therefore, to optimize the use of technology in Physical Education, support from various parties is required, including teacher training, provision of adequate infrastructure, and policies that promote digital literacy in educational settings. With the right solutions, these innovative strategies are expected to bring positive impacts on students' physical and mental development in the digital era.

References

- Arifin, Z., & Kurniawan, D. (2020). Integrasi teknologi dalam pembelajaran Pendidikan Jasmani. *Jurnal Olahraga dan Pembelajaran Jasmani*, 8(3), 65-77.
- Fitriani, N., & Suharto, B. (2020). Evaluasi pembelajaran berbasis teknologi dalam Pendidikan Jasmani. *Jurnal Evaluasi Pendidikan Jasmani*, 6(1), 35-47.
- Hidayat, R., & Setiawan, A. (2021). Inovasi pembelajaran Pendidikan Jasmani berbasis teknologi di era digital. *Jurnal Pendidikan Olahraga Indonesia*, 9(2), 112-123.
- Kartika, L., & Pranata, H. (2019). Pembelajaran berbasis proyek dalam Pendidikan Jasmani: Sebuah pendekatan inovatif. *Jurnal Inovasi Pendidikan*, 3(2), 89-102.
- Mulyani, S., & Hermawan, T. (2021). Teknologi digital sebagai media pembelajaran dalam Pendidikan Jasmani. *Jurnal Pendidikan dan Kebugaran Jasmani*, 5(1), 45-57.
- Pasaribu, Y.A., Harahap, R.N., Yusril, R., & Asfiati. (2025). Peran Teknologi dalam Pembelajaran Penjasorkes pada Kelas 4 SD Negeri no. 101470 Sobar. *Jurnal Penelitian Tindakan Kelas dan Pengembangan Pembelajaran*, 8(1), 90-101.
- Pratama, H., & Nugroho, A. (2020). Gamifikasi dalam pembelajaran Pendidikan Jasmani: Studi literatur. *Jurnal Teknologi Pendidikan*, 14(3), 234-246.
- Rahmawati, D., Susanti, N., & Wijaya, R. (2020). Literasi digital guru dalam mengintegrasikan teknologi pada pembelajaran Pendidikan Jasmani. *Jurnal Penelitian dan Pengembangan Pendidikan Jasmani*, 8(1), 78-89.

- Rozi, F. (2019). Penguatan Dasar Pendidikan Jasmani dan Teknologi Pendidikan pada Kelompok Kerja Guru Pendidikan Jasmani. *Publikasi Kegiatan Abdimas*, 1(1), 7-11. <https://doi.org/10.37010/pnd.v1i1.552>
- Santoso, B., Raharjo, W., & Suryanto, H. (2020). Gamifikasi untuk meningkatkan motivasi siswa dalam pembelajaran olahraga. *Jurnal Pendidikan Jasmani dan Olahraga*, 6(2), 98-109.
- Saputra, E., & Wijaya, M. (2019). Teknologi virtual dalam pembelajaran Pendidikan Jasmani. *Jurnal Teknologi Pendidikan Indonesia*, 7(4), 134-145.
- Susanto, F., & Aditya, R. (2021). Penggunaan virtual reality dalam Pendidikan Jasmani. *Jurnal Ilmu Keolahragaan*, 10(1), 21-30.
- Wahyudi, T., & Putra, A. (2019). Aplikasi kebugaran digital untuk meningkatkan aktivitas fisik siswa. *Jurnal Pendidikan dan Kebugaran Jasmani*, 5(2), 102-114.
- Widodo, R., & Lestari, T. (2019). Efektivitas aplikasi kebugaran dalam pembelajaran Pendidikan Jasmani. *Jurnal Penelitian Pendidikan Jasmani dan Olahraga*, 7(2), 54-63.
- Yusuf, H., & Hakim, R. (2020). Video tutorial sebagai media pembelajaran Pendidikan Jasmani di sekolah. *Jurnal Media Pendidikan Olahraga*, 4(3), 156-169