

Development of Educational Game-Based Learning Media and Problem-Based Learning Strategies in the New Normal Era

Puspita Wulan^{1*}

¹ Universitas Persatuan Guru Republik Indonesia Yogyakarta, Yogyakarta, Indonesia

Abstract

Article history:

Received: January 3, 2022
Revised: February 25, 2022
Accepted: April 27, 2022
Published: June 30, 2022

Keywords:

Educational Game,
Instructional Media,
Interactive Learning,
New Normal,
Problem-Based Learning.

Identifier:

Nawala
Page: 1-16
<https://nawala.io/index.php/ijei>

The post-pandemic new normal era has significantly transformed the education system, demanding the integration of technology with innovative and adaptive learning strategies. One promising solution to address these emerging challenges is the development of instructional media based on educational games integrated with the Problem-Based Learning (PBL) approach. This study aims to examine how the combination of game-based instructional media and PBL can enhance learning effectiveness during the transition toward digital education. Using a literature review method, this paper analyzes research findings that explore the impact of interactive digital media on learning outcomes. The findings reveal that the integration of educational games and PBL not only improves student motivation but also strengthens critical thinking and problem-solving skills. The development of such media requires a systematic instructional design process supported by appropriate educational technology that aligns with learners' characteristics and the demands of 21st-century learning environments.

*Corresponding author:
puspitawulan541@gmail.com (Puspita Wulan)

1. Introduction

The COVID-19 pandemic has caused significant disruptions in the education sector worldwide, including Indonesia. This global health crisis suddenly forced all levels of education to halt face-to-face activities as the primary mode of learning. Instead, the teaching and learning process had to shift to a fully online distance learning system. This situation presented a serious challenge as infrastructure, the readiness of educators, and students' skills in accessing digital learning were highly varied. However, beyond these challenges, the situation also presented a great opportunity to accelerate the integration of technology into the national education system. This transformation of learning is not just about moving from physical classrooms to digital spaces, but demands a paradigm shift in the learning approach (Rodney, 2020). Innovative learning strategies are needed to bridge the limitations of physical interaction and provide a learning experience that remains interactive, contextual, and meaningful. In this context, learning media that can facilitate active student participation and encourage emotional and cognitive engagement become crucial.

One learning approach that has gained increasing attention is Problem-Based Learning (PBL). This learning model emphasizes providing real-world problems as a learning stimulus that encourages students to think critically, collaborate in groups, and find logical solutions to these problems. PBL is specifically designed to stimulate 21st-century skills such as problem-solving, collaboration, communication, and self-reflection. In PBL, students are not just recipients of information, but active participants in the process of constructing knowledge based on their own learning

experiences. Along with the development of the PBL approach, the instructional media used in the process have also evolved. One form of media that has shown high effectiveness is educational games. Educational games are a form of interactive, game-based media consciously designed for educational purposes. This medium can create a fun, challenging, and competitive learning environment, thereby encouraging holistic student engagement. Xu et al. (2021) state that the integration of game elements such as challenges, rewards, immediate feedback, and engaging scenarios in educational games can significantly increase student motivation.

The combination of the Problem-Based Learning approach and educational game media is believed to create an active, collaborative, and meaningful learning atmosphere. By presenting problems in the form of game simulations, students are invited not only to understand the material but also to develop problem-solving strategies, think analytically, and make decisions independently or in groups. This is highly important in the context of modern learning, which emphasizes the process, not just the outcome. In the new normal era, the need for adaptive and interactive instructional media has become even more urgent (Bozkurt & Sharma, 2020). The post-pandemic situation has forced educational institutions to implement full online learning models or hybrid (a combination of online and offline) learning. Digital learning media are no longer just complementary to learning activities but have become primary instruments determining the success of the educational process. However, the reality in the field shows that not all parties have the same readiness. Challenges such as teacher readiness in using technology, limited internet access,

availability of digital devices, and lack of suitable learning content are real obstacles in the implementation of online learning.

Therefore, the development of educational game-based instructional media that integrates Problem-Based Learning strategies is essential to address these challenges. This approach can bridge the gap in the online learning process by providing flexible, engaging media that aligns with active learning principles. Moreover, this model can also increase student participation, provide deeper learning opportunities, and help teachers deliver material in a more creative way. This research aims to delve deeper into how the development of educational game-based instructional media integrated with the PBL strategy can address educational challenges in the new normal era. This study uses a literature review approach by analyzing various previous research findings, covering basic theories, media design, implementation, and its impact on student learning processes and outcomes. Furthermore, this article will also identify opportunities and obstacles faced in implementing this learning model in schools.

2. Literature Review

2.1. Concept of Educational Game-Based Instructional Media

Educational game-based instructional media is a form of innovation in education that functions as a learning aid specifically designed using game-based learning principles to deliver lesson material more effectively and enjoyably. This media not only displays educational content but also combines elements of entertainment, challenge, and interaction to create a fun, motivating, and engaging

learning atmosphere for students (Giannakos et al., 2017). In its development in the digital era, this instructional media is often developed in the form of Android-based applications or PC software, allowing flexibility in its use both in class and at home. Educational game media can be adaptively designed to suit learning objectives, curriculum needs, and student characteristics such as age, learning style, and their level of understanding of specific material. Research by Chizary and Farhangi (2017) shows that the application of educational games in mathematics learning at the elementary school level has a significant positive impact. The use of this media was able to increase active student participation and strengthen memory of learned mathematical concepts. This is in line with the findings of Chen et al. (2021), who concluded that the use of computer-based game media resulted in better learning outcomes compared to traditional lecture methods. The main advantage of this media lies in its ability to present interactive visualizations and simulations that resemble real learning experiences.

2.2. Problem-Based Learning (PBL) Strategy

Problem-Based Learning (PBL) strategy is a constructivist-based learning approach that places real-world problem-solving as the main foundation in the learning process. This model encourages students to be active subjects in learning through exploration, group discussion, investigation, and reflection on problems designed contextually by the teacher. This process provides a more meaningful learning experience because students do not just passively receive information but construct knowledge through interaction with problems and their learning environment. PBL is designed to develop not only cognitive aspects such as

reasoning and analysis but also affective aspects such as responsibility, cooperation, and open-mindedness, as well as psychomotor aspects through concrete actions in problem-solving.

Research by Ismail et al. (2018) shows that the application of the PBL strategy significantly increases students' critical thinking and creativity in completing learning tasks. This is because PBL provides space for students to explore various alternative solutions. Similar results were reported by Suryawati and Osman (2017), who concluded that this approach is effective in improving the deep understanding of lesson concepts because students are actively and directly involved in the context of real problems. The integration between PBL and educational game media is a very potential and innovative combination. Educational games can simulate complex problems in an engaging and enjoyable way, making the learning process more flexible, immersive, and not limited to delivering material in textbooks alone.

2.3. Learning in the New Normal Era

The COVID-19 pandemic has drastically changed how the world conducts learning activities, at primary, secondary, and higher education levels. Online learning became the only main option during social restrictions, which then evolved into a hybrid learning model combining limited face-to-face and online learning. The use of digital platforms such as Learning Management System (LMS) became a necessity in supporting this new learning system. However, these changes were not without various challenges, especially concerning active student engagement and the effectiveness of material delivery, which was previously more optimal directly in class. Research by Cole et al. (2021) specifically highlights that in online learning,

students are at risk of boredom if the material is delivered monotonously and non-interactively.

To overcome this obstacle, learning media that can attract attention and maintain student focus is needed. One proven effective solution is the use of educational games, which can increase participation and enthusiasm for learning. Meanwhile, research by Manuba et al. (2022) concluded that the integration of digital technology in learning combined with the Problem-Based Learning (PBL) approach positively contributes to maintaining the quality of learning during the pandemic. This approach not only supports student engagement but also helps maintain the quality of the learning process. In the context of the new normal era, learning is demanded to be more adaptive, flexible, and responsive to the needs of students. The main focus remains on developing 21st-century competencies, so the use of innovative instructional media and appropriate learning strategies becomes very crucial and cannot be ignored.

3. Methods

This study uses a literature review approach with a descriptive qualitative method, aiming to gather in-depth information from various relevant academic sources. This method was chosen because it allows researchers to review various previous research findings related to the development of educational game-based instructional media integrated with the Problem-Based Learning (PBL) strategy, especially in the context of learning in the new normal era. With this method, researchers can construct a comprehensive overview of the concepts, designs, and

implementation practices of the intended learning strategy, based on findings that have been tested in various educational contexts.

The literature sources analyzed in this study come from national and international scientific journals indexed in Google Scholar and are open access to be widely accessible to the academic community. In the literature screening process, researchers used several inclusion criteria that selected articles had to meet. First, articles must be to ensure that the information used remains relevant to current technological and pedagogical developments. Second, the literature used must specifically discuss the development of instructional media based on games or other digital technologies. Third, the article must contain discussions on the Problem-Based Learning strategy in the context of formal education. Fourth, the article must present data or analysis related to the effectiveness or results of the implementation of the media or strategy under review.

In the data collection process, researchers used several keywords such as “educational games,” “interactive learning media,” “Problem-Based Learning,” and “new normal learning” to obtain appropriate and comprehensive results. These keywords were used to search for articles relevant to the research focus. After all articles were collected, the next stage was to conduct an in-depth content review to assess their suitability and contribution to the focus of the study. Data analysis was carried out qualitatively with a thematic approach, organizing information into specific categories such as media design, effectiveness of PBL strategies, impact on student learning outcomes, and the relationship between media and strategies with learning dynamics in the new normal era. From the results of this analysis, the

researchers then synthesized to form a conceptual framework supporting the discussion in this article.

4. Results

The results of the literature study show that the integration between educational game-based instructional media and the Problem-Based Learning (PBL) strategy has a very significant impact on the quality of learning, especially in the context of education in the new normal era. This combination has proven not only to create a more engaging and challenging learning environment but also to enhance various important aspects of the learning process. The main findings from the various studies analyzed include increased student learning motivation, increased active student involvement during the learning process, and the strengthening of higher-order thinking skills such as critical thinking, analysis, evaluation, and complex problem-solving. Firstly, from an instructional design perspective, many studies emphasize the importance of thorough planning in the development process of educational game media. Good design is key to creating effective learning media, as it aims not only to transfer learning material into digital form but also to provide contextual and personalized learning experiences (Bernacki et al., 2021).

Pedagogically designed educational game media can facilitate the transfer of information and skills through enjoyable, simulated, and exploration- and active participation-oriented learning activities. In a study by Lestari and Chen et al. (2021), it was stated that the use of Android-based interactive game media significantly improved student learning outcomes, especially in mathematics. This happened

because students were more interested, less easily bored, and felt more challenged to complete various tasks packaged in game form. The presence of typical game features, such as challenging level systems, point collection, immediate feedback, and leaderboards, greatly contributed to the increase in students' intrinsic motivation. They were encouraged to keep trying, repeating, and correcting mistakes in a way that did not create pressure like in conventional learning.

Secondly, the Problem-Based Learning (PBL) approach is a very effective strategy in directing the use of educational game media into the context of real-world problem-solving relevant to students' lives. PBL emphasizes active learning through the introduction of complex, open-ended problems, requiring students to independently or collaboratively search for and evaluate information. A study by Suryawati and Osman (2017) confirms that when students are presented with scenarios or case studies through game-based learning media, they show a much higher level of engagement. This occurs because they feel challenged to identify problems, search for relevant data, and formulate creative and appropriate solutions. In the context of project-based learning, which is increasingly applied during the pandemic and the new normal era, this approach proves relevant and applicable. Students are no longer merely knowledge consumers but develop into individuals capable of generating solutions, making decisions, and creating innovations through a deep understanding of the subject matter.

Furthermore, the combined application of educational games and PBL strategies during the COVID-19 pandemic which marked the transition to the new normal era is also considered capable of addressing one of the biggest challenges in

online learning, namely limited social interaction and low student engagement. Cole et al. (2021) noted that during online learning, many students experienced feelings of isolation, loss of motivation, and difficulty building relationships with friends and teachers. In these conditions, educational games designed with collaborative features, such as multiplayer modes or cooperative systems for completing missions, can provide a space for virtual communication and social interaction. These features allow students to continue working in teams, discussing, and supporting each other in completing challenges given in the game, thereby fostering a sense of togetherness and connection even though they are not in the same physical space.

Other study results obtained from Manuba et al. (2022) also support the importance of integrating digital technology into learning strategies such as PBL. The research showed that the development of educational game-based learning media integrated with the PBL strategy was able to maintain students' enthusiasm and spirit in participating in online learning during the pandemic. In this study, two groups were compared: one group of students participated in online learning with a conventional approach, while the other group used educational game media designed to raise real-world issues and problems. The results showed that the group learning using problem-based educational games experienced a significant increase in their formative assessment scores, and were more active in online discussions and other collaborative activities.

However, the implementation of this learning model is not without various challenges that still need to be overcome. One of the main challenges lies in teachers' competence in designing or implementing interactive and effective digital learning

media. Many teachers at various educational levels do not yet have the skills or experience in using software to create educational games such as Construct, Genially, Scratch, or other platforms. The lack of professional training and time constraints also hinder the development of game-based media. Therefore, teacher training is a very important aspect in the process of developing and implementing innovative instructional media. This is in line with Cuhadar's (2018) findings, which state that the success of technology integration in learning highly depends on the readiness and competence of educators as the main implementers in the learning process.

In addition to human resource challenges, technical challenges cannot be ignored. Many schools, especially those in remote areas or areas with minimal infrastructure, still face obstacles in the form of limited digital devices such as computers, tablets, or smartphones, as well as unstable or even unavailable internet connections. This hinders the optimal implementation of digital-based media, including educational games. To overcome this challenge, several solutions have been offered in various literature, such as the development of games that can be used offline, the utilization of lightweight applications that do not require high internet connections, and the integration of learning media with platforms already familiar to teachers and students, such as Moodle, Google Classroom, or other local applications.

Developed an e-LKPD (electronic Student Worksheet) based on educational games using the Gamilab platform to support mathematics learning. In this study, the learning media was designed to align with PBL principles and encourage student

engagement in problem-solving. The advantage of this model lies in its flexibility, allowing adjustments to subject matter and ease of integration with problem-based learning approaches. In practice, students are asked to solve a problem through a provided game simulation, then compile their work reports through a digital LKPD. This mechanism not only helps students understand the material better but also allows teachers to evaluate students' thought processes more systematically and structured.

In general, the integration between educational game-based instructional media and the PBL strategy results in a more adaptive, inclusive, enjoyable, and challenging learning ecosystem. In the context of education in the new normal era, this approach is capable of responding to various limitations of online and hybrid learning, while providing immersive, interactive content oriented towards the development of key 21st-century competencies. These competencies include critical thinking, collaboration, creativity, digital literacy, effective communication, and data- and information-based decision-making. With the right media and strategies, students not only experience a meaningful learning process but also build readiness to face the dynamic and complex real world.

Going forward, the development of learning models integrating educational games and PBL strategies needs to be directed towards several important aspects. These include strengthening process-based assessment systems, not just outcome-oriented ones. Such assessment allows teachers to assess the development of students' thinking skills during the learning process. In addition, it is also important to encourage collaboration among schools, educators, and between schools and

media development institutions in designing and implementing learning content that aligns with local needs and student characteristics. Equally important is the integration of this learning model into the national technology-based education system, so that it can reach a wider audience and be implemented sustainably. Thus, PBL-based educational games not only function as a mere learning tool but also serve as a vehicle for character building, increased learning independence, and strengthening future competencies. In a constantly evolving digital era, such an approach is a visionary and solution-oriented form of educational adaptation to the challenges of the times.

5. Conclusion

This literature study confirms that the development of educational game-based instructional media combined with the Problem-Based Learning (PBL) strategy is an effective approach to improve the quality of learning, especially in the new normal era. This approach is capable of addressing post-pandemic educational challenges that require flexible, interactive, and student-centered learning models. Educational game media provides a fun, competitive, and challenging learning environment, while the PBL strategy emphasizes active learning based on contextual problems. The combination of both encourages the development of critical thinking, problem-solving, collaboration, and high learning motivation skills. The implementation of this model also provides solutions to the constraints of student engagement in online learning by presenting interactive media and facilitating virtual social interaction. However, the successful implementation of this approach requires

support from various parties, especially in aspects of teacher training, technology infrastructure, and the preparation of curriculum-aligned content. This research also recommends strengthening collaboration among teachers, media developers, and educational institutions in creating an adaptive and innovative digital learning ecosystem. By optimally utilizing technology and applying appropriate pedagogical strategies, Indonesian education can provide meaningful learning experiences relevant to future needs.

References

- Bernacki, M. L., Greene, M. J., & Lobczowski, N. G. (2021). A systematic review of research on personalized learning: Personalized by whom, to what, how, and for what purpose (s)? *Educational Psychology Review*, 33(4), 1675-1715.
- Bozkurt, A., & Sharma, R. C. (2020). Education in normal, new normal, and next normal: Observations from the past, insights from the present and projections for the future. *Asian Journal of Distance Education*, 15(2), 1-10.
- Chen, Y. C., Lu, Y. L., & Lien, C. J. (2021). Learning environments with different levels of technological engagement: a comparison of game-based, video-based, and traditional instruction on students' learning. *Interactive Learning Environments*, 29(8), 1363-1379.
- Chizary, F., & Farhangi, A. (2017). Efficiency of educational games on mathematics learning of students at second grade of primary school. *Journal of History Culture and Art Research*, 6(1), 232-240.

- Cole, A. W., Lennon, L., & Weber, N. L. (2021). Student perceptions of online active learning practices and online learning climate predict online course engagement. *Interactive Learning Environments*, 29(5), 866-880.
- Cuhadar, C. (2018). Investigation of pre-service teachers' levels of readiness to technology integration in education. *Contemporary Educational Technology*, 9(1), 61-75.
- Giannakos, M. N., Divitini, M., & Iversen, O. S. (2017). Entertainment, engagement, and education: Foundations and developments in digital and physical spaces to support learning through making. *Entertainment computing*, 21, 77-81.
- Ismail, N. S., Harun, J., Zakaria, M. A. Z. M., & Salleh, S. M. (2018). The effect of Mobile problem-based learning application DicScience PBL on students' critical thinking. *Thinking Skills and Creativity*, 28, 177-195.
- Rodney, B. D. (2020). Understanding the paradigm shift in education in the twenty-first century: The role of technology and the Internet of Things. *Worldwide Hospitality and Tourism Themes*, 12(1), 35-47.
- Suryawati, E., & Osman, K. (2017). Contextual learning: Innovative approach towards the development of students' scientific attitude and natural science performance. *Eurasia Journal of mathematics, science and technology education*, 14(1), 61-76.
- Xu, J., Lio, A., Dhaliwal, H., Andrei, S., Balakrishnan, S., Nagani, U., & Samadder, S. (2021). Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review. *Journal of affective disorders*, 293, 444-465.