Copyright © 2025 The Author(s)
Didaktika: Jurnal Kependidikan Vol. 14 No. 3 Agustus 2025

Project Based Game Learning Effectiveness In 21st Century Classrooms: A Literature Review

Angel Ardila Suci Q A[1], Ketut Agustini[2], I Kadek Suartama[3]
[1,2,3] Universitas Pendidikan Ganesha, Indonesia

[1]angelardila31@gmail.com

Abstract

21st century education demands a learning model that can foster critical thinking, creativity, collaboration and communication skills. One of the emerging models to answer this challenge is Project Based Game Learning (PjGBL), which integrates a project based approach with elements of educational games. This study aims to examine the application of PjGBL through the Systematic Literature Review (SLR) method on 13 selected articles in the range of 2020-2024. Articles were analyzed based on research subjects, education levels, subjects, learner characteristics, focus of learning outcomes, and approaches used. The review results show that PjGBL is most commonly applied at the higher education level (S1), especially in Mathematics and Science subjects, and is dominantly applied to students with visual kinesthetic characteristics. The focus of the most frequently developed outcomes are critical thinking (7 articles), collaboration and creativity (5 articles). In terms of approach, constructivism is the most dominant approach because it is aligned with the principles of active and participatory learning. This model is also most effective in middle grades with between 30 and 60 students. This study illustrates that PjGBL is a potential innovative learning model in supporting the development of 21st century competencies holistically.
Keywords: 21st Century Skills, Constructivism, Project Based Game Learning

Introduction

According to Law No. 20/2003 on the National Education System, education is defined as a conscious and planned effort to create an environment and learning process that enables students to actively develop their potential. This includes aspects of spiritual strength, self-recognition, personality formation, intelligence development, good morals, and mastery of skills that are useful for themselves, society, nation and state. The purpose of education is to create individuals who are qualified and moral, have broad insight into the future to achieve the expected goals, and can adapt quickly and appropriately in various environments. In accordance with Law No. 14 of 2005 concerning teachers and lecturers, it is stated that a teacher must have pedagogical competence. This means that teachers must have the ability to master the learning process, including mastery of learning strategies and the ability to create innovative learning media according to the needs in the process of learning activities (Dalyono, 2016) .

To make a qualified education, it is important to have a quality learning process. Quality learning is one that successfully achieves learning objectives and brings changes in student behavior with various innovative approaches that have been developed, one of which is Project Based Learning (PjBL). PjBL is an approach that trains students in designing and completing projects related to learning materials (Alhayat et al., 2023) . In this method, learning begins with real problems that must be solved through projects designed by students (Hidayat et al., 2023) . This approach allows students to explore the material more meaningfull while developing critical and innovative thinking skills (Puspitasari & Wahyuni, 2023) . In addition, PjBL can be

combined with other methods, such as Problem Based Learning (PBL), in the development of digital games to help students understand the complexity of business and industrial demands in the digital era (Lemes et al., 2024) .

One of the main advantages of PjBL is its ability to increase students' creativity and independence in learning. (Taliak et al., 2024) states that this method has proven effective in encouraging students' active involvement through real projects that are relevant to their lives. This is in line with research (Kusmiati, 2022) which shows that PjBL contributes to increased learning creativity by placing students at the center of learning process, while the teacher acts as a facilitator (Noorhalida et al., 2023). Although Project Based Learning (PjBL) has many advantages in improving 21st century skills, its implementation is not free from various challenges. One of the main disadvantages is the need for longer time compared to conventional methods, because students must go through the stages of planning, implementing, and evaluating projects thoroughly (Wardhani et al., 2023) .

In addition, PjBL often requires certain facilities and resources, such as laboratories or specialized equipment, which are not always available in all schools (Khasanah & Darsinah, 2022) . Teachers also face difficulties in managing projects, especially in terms of guiding students individually and in groups, and in assessing learning outcomes that are complex and subjective (Dewi, 2022) . Evaluation in PjBL not only assesses the final product, but also the work process and individual contribution, which requires a clear and objective assessment rubric (Khasanah & Darsinah, 2022) . In addition, not all students have good time management and cooperation skills, so projects can run ineffectively if group members are not equally active (Wardhani et al., 2023) .

As a solution to this challenge, Game Based Learning (GBL) can be an alternative to increase active participation and understanding of mathematical concepts. This approach integrates game elements into learning, making it more interesting and fun for students, both for those who love math and those who are less interested in the subject. According to (Bado, 2022), GBL increases learning flexibility and encourages a competitive spirit among students. In addition, research by (Smiderle et al., 2020) shows that gamification elements, such as rankings, points and badges, have varying effects depending on students' personality characteristics. With these elements, students' learning motivation can increase, so that they are more active in completing the assigned tasks.

In this context, the literature review aims to further examine the role of the Project-Based Game Learning model in supporting the 21st century learning model. This encourages researchers to conduct a literature review on the application of learning models that integrate a project-based approach with elements of educational games. The results of this study are expected to be a strong foundation for researchers to explore the potential of Project-Based Game Learning at various levels of education in various subjects.

Method

This research uses the systematic literature review method. Systematic literature review is a research method that identifies, interprets, and evaluates findings on a research topic to answer questions that have been previously set. The research procedure consists of three main steps referring to (Kitchenham & Charters, 2007) , including three stages namely planning, conducting, and reporting.

Copyright © 2025 The Author(s)

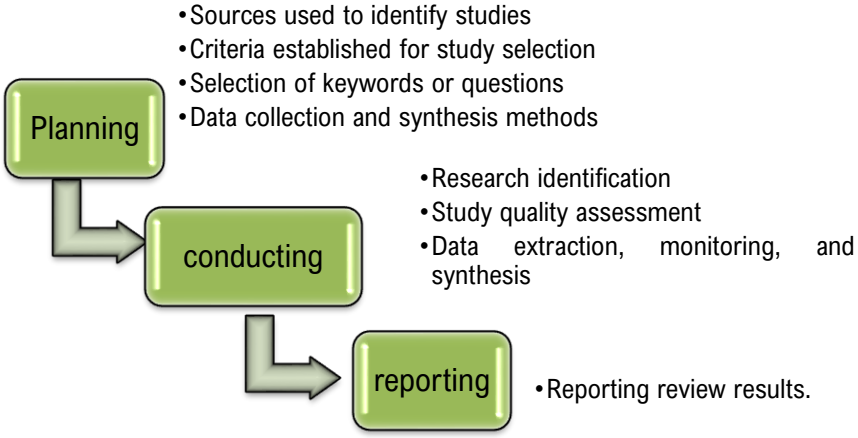


Figure 1. The systematic literature review method

Planning

This stage includes the preparation of a systematic literature review protocol. At this stage, the researcher determines the research topic, namely supporting interactive learning in the 21st century. Next, determine the article search criteria. The article search criteria are based on Scopus or Google Scholar sources from the last 5 years, namely 2020-2024, totaling 63 journals, with the criteria of 50 exclusion journals and 13 inclusion journals. The keywords used were "project based game learning" and "project based gamefication". Articles that are determined by inclusion include: articles that have research subjects, education levels, student characteristics, focus on achievements, and there is an approach used.

Conducting

This stage is the implementation of the systematic literature review. This stage begins with searching for articles based on the criteria set at the planning stage. The article search was carried out with the help of the Publish or Perish application. Next is the selection of articles. The articles selected are articles that are in accordance with the research topic. Based on the results of the article search, 5 international articles and 8 national articles were selected. After selecting articles, the next step is to synthesize data with the aim of analyzing and evaluating various research results from various literatures. The data synthesis carried out in this study is in the form of a narrative.

Reporting

The reporting stage is the last stage in systematic literature review research. This stage includes writing the results of the systematic literature review in written form according to the predetermined format.

Results

As part of the ongoing *Systematic Literature Review*, mapping the focus of the learning outcomes of each article reviewed is crucial. This aspect of learning outcomes not only provides an overview of the direction and trend of research related to project and game based learning models, but can also be the basis for making pedagogical recommendations and developing learning designs that are relevant to the needs of students.

Table 1. Learning Outcome Focus Results

Author and Year	Journal	Outcome Focus
(Journal et al., 2025)	JUDIKA (Unsika Education Journal)	Collaboration, communication, critical thinking, creativity (4C)
(Awaliyah et al., 2024)	International Journal of Elementary Education	Critical thinking skills
(J. Ibrahim & F. Rahmawati, 2023)	Journal of Mathematics and Natural Science Education	Mathematical reasoning ability and motivation
(Huda et al., 2024)	ICRECE	Social skills
(Ferdiani & Marsitin, 2023)	ICOMET	Creative thinking and problem solving
(Wibowo & Ahmad, 2023)	JIPF (Journal of Physics Education)	Critical thinking and concept understanding
(Siregar et al., 2024)	Journal of Informatics Media (JUMIN)	Learning creativity
(Malgazhdarova et al., 2024)	Novitas ROYAL (Research on Youth and Language)	Improved grammar and confidence
(Lopez-Gazpio, 2022)	IEEE Access	Critical thinking, collaboration, concept understanding, independence
(Putri & Sujana, 2020)	Scientific Journal of Elementary School	Collaboration skills
(Sanova et al., 2023)	Zarah's Journal	Concept understanding, motivation, concentration, problem solving skills
(Pratiwi et al., 2021)	Journal of Tourism Education	Critical thinking, collaboration, creativity, concept understanding, problem solving
(Ayu & Priyudahari, 2024)	Rajawali Media Utama Journal	Creative thinking, critical thinking, collaboration, and problem solving

Results of the 13 articles analyzed, critical thinking was covered in 7 articles, while collaboration and creativity appeared in 5 articles each. These three outcomes are considered dominant because they are in line with the demands of 21st century skills that emphasize higher order thinking, teamwork, and innovation. Learning models such as PjGBL naturally encourage students to analyze problems, work in groups, and create creative solutions, so these outcomes are the main focus of various learning research. The emphasis on critical thinking, collaboration, and creativity as dominant outcomes of PjGBLbased research reflects a broader trend in modern pedagogy, which prioritizes equipping students with competencies that extend beyond rote memorization. Critical thinking enables learners to approach problems with analytical rigor, while collaboration fosters interpersonal skills essential for teamwork in academic and professional contexts.

Creativity, on the other hand, encourages innovative solutions and adaptability in rapidly changing environments. These skills are particularly relevant in the 21st century, where

Copyright © 2025 The Author(s)

technological advancements and global interconnectedness demand flexibility and problem solving abilities. Moreover, the fact that PjGBL supports these competencies suggests that it serves as an effective framework for integrating cognitive, social, and emotional learning dimensions. The diverse range of journals and research contexts cited in the analysis indicates that interest in PjGBL spans multiple disciplines, from science education to language learning and tourism studies. This multidisciplinary relevance further underlines PjGBL's adaptability to different content areas and learner needs. Therefore, future educational strategies could benefit from incorporating PjGBL as a core instructional approach, supported by empirical evidence of its impact on fostering higher-order thinking, collaborative abilities, and creative problem solving among students at various educational levels.

Study by Education Level

The level of education affects the cognitive, social and emotional characteristics of learners, so learning approaches such as Project Based Game Learning (PjGBL) can have different impacts at each level. The purpose of mapping education levels is to identify the education levels that most frequently apply a particular learning model and to see the extent to which the model is spread and applied across different education levels.

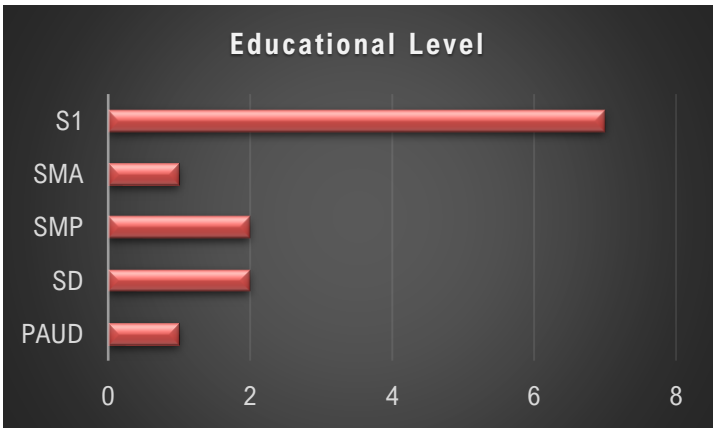


Figure 2. Study by education level

From Figure 2, we can see that research on project game based learning models is more researched at the undergraduate level because students have more mature critical thinking, independence, and collaboration skills so that the application of project based learning models can be optimized. And research at the PAUD to SMA level is rarely researched due to the limited ability of students to design and complete complex projects independently, as well as curriculum factors that are more structured and limited for the application of project based learning models widely. The dominance of studies at the undergraduate level may also be linked to the availability of institutional resources, access to technology, and the readiness of lecturers to implement innovative teaching models such as Project Game Based Learning (PjGBL).

At this level, students are generally required to engage in research-based assignments, internships, or capstone projects, all of which align well with the principles of PjGBL. In contrast, at the PAUD, elementary, and junior high school levels, limitations in infrastructure, teacher training, and curriculum flexibility may hinder the integration of game based elements into project-based tasks. Moreover, the complexity of PjGBL activities often demands higher-order thinking skills, which are still in the developmental stage for younger learners. Therefore, future research could explore simplified PjGBL frameworks tailored to younger age groups, ensuring that game mechanics and project scopes are age appropriate. By expanding the application of PjGBL to a broader range of educational stages, educators can potentially foster 21st century

skills earlier, making students more prepared for the demands of higher education and the professional world.

Studies Based on Research Materials

Details of the distribution of studies based on research materials related to the project game based learning model are presented in Figure 3.

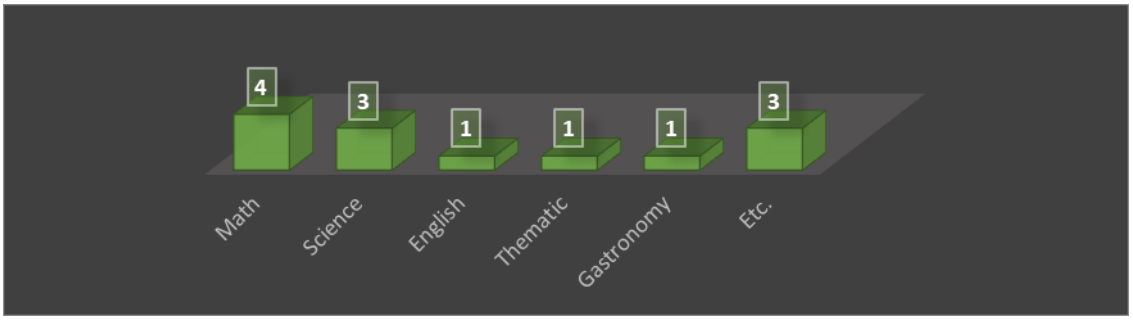


Figure 3. Study based on research material

Based on Figure 3, In addition to the concentration of studies in Mathematics and Science, several research works have explored the application of Project Based Game Learning (PjGBL) in other subject areas, including English, thematic studies, gastronomy, and interdisciplinary projects. Although these fields are less represented in the literature, they provide valuable insights into the adaptability of PjGBL across diverse educational contexts. For example, in English language learning, PjGBL can facilitate vocabulary acquisition, enhance communication skills, and encourage collaborative storytelling through gamified project activities. In thematic and gastronomy related projects, the approach allows students to integrate knowledge from various disciplines while engaging in hands on, real world tasks.

This not only supports content mastery but also nurtures creativity, problem-solving abilities, and cultural awareness. The relatively smaller number of studies in these subjects may reflect the novelty of applying PjGBL beyond traditionally challenging areas like Mathematics and Science. However, the positive results reported suggest significant potential for broader adoption. Expanding research into these underrepresented subjects could uncover innovative ways to apply PjGBL, tailoring game based elements to suit specific learning goals and student needs. This diversification would help educators maximize the strengths of PjGBL, making learning more engaging, relevant, and inclusive across a wider spectrum of academic disciplines. It can be concluded that the application of the project game based learning model is mostly done in Mathematics and Science subjects. This is because these two subjects tend to be considered difficult and challenging by students, so a learning model that can increase motivation, active involvement, and help understand abstract concepts in a fun and interactive way through educational games is needed.

Study Based on Student Characteristics

In education, the success of a learning model or approach is strongly influenced by the suitability of the strategy used and the characteristics of the learners. One important aspect of learner characteristics is learning style, which is generally classified into three main types: auditory, visual and kinesthetic. These learning styles play a major role in determining how students absorb, process and remember the information they receive. Details of the distribution of studies based on student characteristics related to the project game based learning model are presented in Figure 4.

Copyright © 2025 The Author(s)

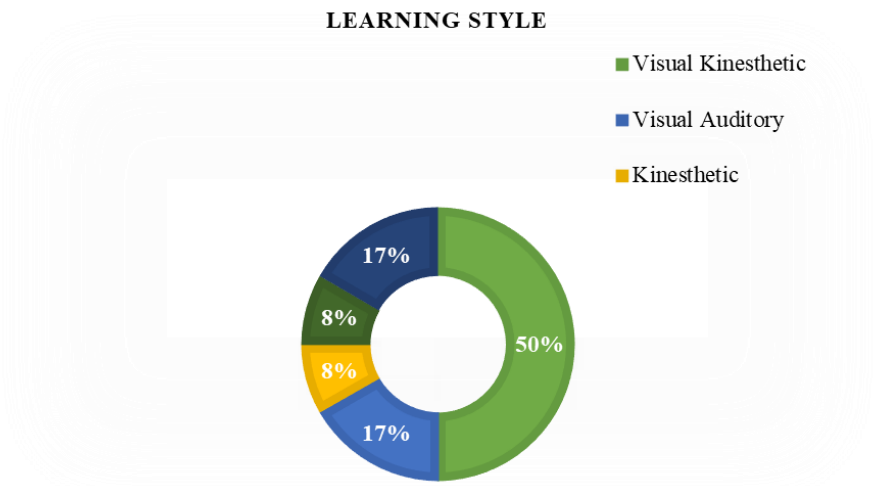


Figure 4: Study based on student characteristics

Based on the figure number 4, it can be concluded that the most dominant learning style is Visual Kinesthetic at 50%, followed by Visual Auditory and Visual Auditory Kinesthetic at 17% each. This shows that most participants learn more effectively through visual displays and hands on activities, so the Project Game Based Learning model is considered suitable for implementation because it is able to facilitate these learning styles optimally. Furthermore, these findings align with previous research emphasizing the importance of tailoring instructional strategies to students' preferred learning styles. Visual kinesthetic learners, who form the largest proportion in this study, benefit greatly from methods that combine visual representation with active, hands on experiences. Project Game Based Learning (PjGBL) naturally supports these needs by offering visual elements such as graphics, diagrams, and interactive interfaces, along with kinesthetic components like problem solving tasks, physical manipulation of materials, or simulated scenarios. When designed appropriately, these game elements can encourage sustained participation, help students persist through challenging tasks, and foster deeper understanding of complex concepts. Additionally, the adaptability of PjGBL makes it possible to address the needs of students with mixed learning styles, such as visual auditory or kinesthetic auditory learners, ensuring inclusivity and effectiveness. Thus, combining project based learning with gamification not only aligns with cognitive and learning style theories but also offers a practical approach to optimizing student involvement and performance in diverse classroom settings.

Studies Based on Research Subject

In educational research, the selection and number of research subjects play a crucial role in determining the effectiveness and applicability of a learning model or approach. The characteristics of the research subjects, including their number, age group, and learning environment, influence how the intervention is designed and implemented. Understanding these factors helps researchers tailor learning strategies to fit the needs of specific groups, ensuring better engagement and outcomes. The distribution of studies based on the number of research subjects involved in project game-based learning models is summarized in the following section in Figure 5,

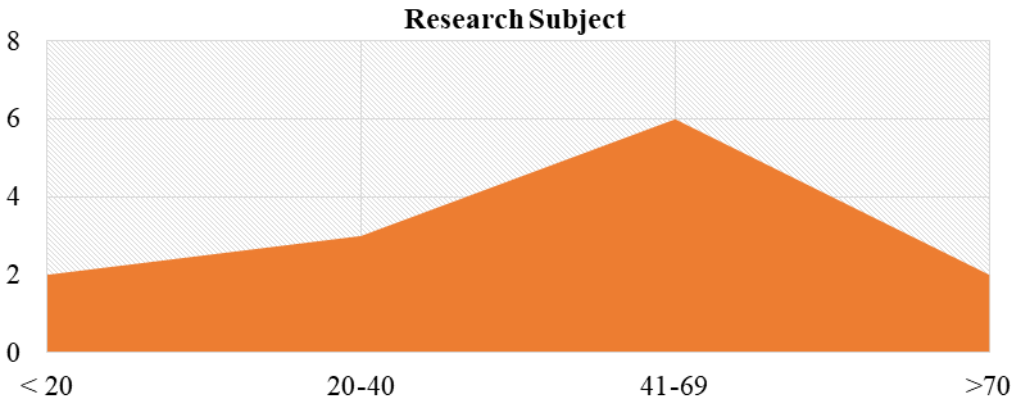


Figure 5. Study by Research Subject

Based on the data, the number of research subjects in the game-based learning project study varied from 8 to 75 respondents. The majority of the studies were in the range of 41 to 69 subjects, indicating that this model is generally used on a medium class scale (one or two classes at the elementary, middle or high school level). Project and game based learning models require active interaction between learners, small group collaboration, and participation in creative activities. Therefore, the ideal number of subjects for the implementation of project game based learning is in the range of 30-60 students. In this number, teachers can still facilitate group division, provide guidance, and manage project activities effectively without losing control of the learning process.

Studies with very small numbers of subjects, fewer than 20 students, are ideal for initial trials or development of learning media because they allow for close observation and detailed feedback. In such small groups, researchers or teachers can quickly identify issues, test new ideas, and make adjustments without the complexities of managing many participants. On the other hand, when the number of students reaches 70 or more, classroom management becomes more challenging due to the diversity of learners' needs and limited teacher attention. Large groups require more structured systems to ensure every student stays engaged and on track. Digital learning platforms or Learning Management Systems (LMS) help facilitate organization, track progress, and support communication, making them essential tools for managing such large-scale learning environments effectively.

Study by Approach Type

The type of learning approach used in a study greatly influences how students engage with the material and how learning is facilitated. Common approaches include behaviorism, humanism, collaborative learning, connectivism, and constructivism, each emphasizing different principles and strategies. Understanding which approaches are applied in project game-based learning helps clarify how the learning process is designed and supported. This section summarizes the distribution of studies based on the types of learning approaches used, highlighting the diversity of theories and methods applied to enhance student participation and understanding. This can be seen in Figure 6.

Copyright © 2025 The Author(s)

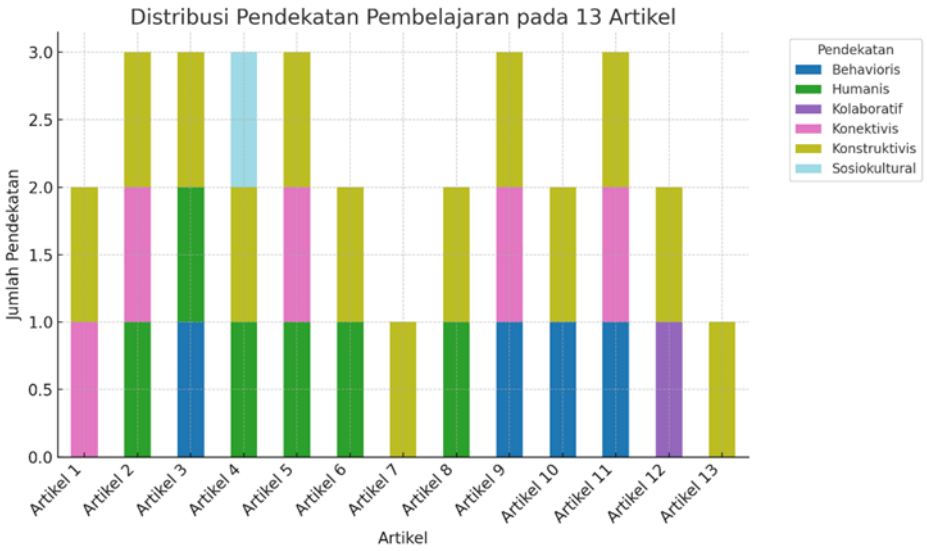


Figure 6. Study by approach type

Based on the distribution diagram of learning approaches from 13 articles, it can be concluded that the project game based learning (PjGBL) model is mostly done through constructivism approach. This approach appears in all articles, showing a very strong dominance compared to other approaches such as humanism, connectivism, behaviorism, sociocultural, and collaborative.

The main reason is because constructivism is very much in line with the character of PjGBL, which emphasizes active, participatory and contextual learning. In the constructivist approach, students learn through direct experience as they build their own understanding through exploration, group discussion, problem solving, as well as real projects and educational games. All these features focus on learning by doing. In other words, PjGBL brings the principles of constructivism to life in classroom practice, so it is no wonder that this approach has become the main foundation used by researchers in various levels and contexts of learning.

Discussion

The findings of the systematic literature review of 13 articles reveal that Project Based Game Learning (PjGBL) consistently supports the development of 21st century competencies, particularly critical thinking, collaboration, creativity, and communication. Gamification has been shown to can enhance student engagement, learning motivation, and academic achievement by integrating game elements such as points, badges, and leaderboards. (Smiderle et al., 2020) highlight that the effective use of gamification strategies can encourage students to participate more actively and improve learning outcomes. Similarly, (Hidayat et al., 2023) explains that project based learning enables students to develop critical thinking, collaboration, and problem solving skills through involvement in real world projects, fostering independent learning and responsibility for both the process and the result.The fact that critical thinking appeared in 7 of the 13 articles indicates that frequently associated with improved outcomesin encouraging students to engage in deeper thinking, analyze problems logically, and make data driven decisions. Likewise, the frequent presence of collaboration and creativity outcomes suggests that PjGBL successfully fosters teamwork and the exploration of innovative ideas.

The dominance of higher education (undergraduate level) as the primary context for PjGBL implementation can be explained by the more mature cognitive and social development of university students. At this level, learners typically possess abstract reasoning skills, the

ability to work independently, and sufficient social competencies to engage in collaborative group work. In contrast, the limited application of PjGBL at early childhood to secondary school levels reflects challenges in adapting the complexity of project based tasks to younger learners, as well as the constraints posed by more rigid and structured curricula.

In terms of subject matter, PjGBL is the most frequent applied in Mathematics and Science. These subjects are often perceived as difficult and abstract, which creates a need for engaging and interactive instructional models. By integrating game elements, PjGBL offers a more enjoyable and concrete learning experience that can enhance student motivation and conceptual understanding.

The finding that the most dominant learner characteristic is the visual kinesthetic learning style emphasizes the importance of aligning instructional strategies with students' learning preferences. PjGBL effectively supports this style by combining visual elements (graphics, animations, visualizations) with physical activities (games, projects, hands on exploration), which is particularly beneficial for students who learn best through concrete, hands-on experiences.

The ideal number of participants in PjGBL studies, typically between 30 and 60 students, suggests that medium sized class settings allow for meaningful group collaboration while remaining manageable for teachers to facilitate and monitor project activities. Smaller class sizes (<20) may limit group dynamics and diversity of ideas, whereas larger classes ($\geq$70) demand more complex classroom management strategies or well-structured digital platforms such as Learning Management Systems (LMS).

Lastly, the fact that all reviewed studies adopted a constructivist approach underscores the pedagogical alignment between PjGBL and student-centered, active learning theories. Constructivism emphasizes learning through direct experience, reflection, social interaction, and contextual engagement. By design, PjGBL operationalizes these principles through meaningful projects and educational games, offering students opportunities to construct knowledge in authentic and participatory settings. The strong presence of constructivism across the studies serves as theoretical validation for the effectiveness of PjGBL in fostering higher order thinking and collaborative learning.

In conclusion, this discussion confirms that PjGBL is not only an innovative model but also an adaptable approach across various educational contexts, learner characteristics, and pedagogical frameworks. The main remaining challenge lies in how to adapt PjGBL effectively for younger students and how to develop robust assessment systems suited to project and game based learning environments. For practitioners, this review suggests incorporating game elements into project-based tasks to optimize engagement, especially for students with visual kinesthetic learning styles

Conclusion

Based on the results of a systematic literature review of 13 articles, it can be concluded that the Project-Game Based Learning (PjGBL) model is a relevant approach to support 21st century learning. PjGBL is most widely applied at the higher education level (S1) because students have more mature critical thinking and collaboration skills. The application of this model is also dominant in Mathematics and Science subjects, which require interactive understanding of complex concepts.

In terms of learner characteristics, PjGBL is most suitable for students with visual kinesthetic learning styles, who more easily understand material through visual displays and hands-on activities. The largest number of research subjects was in the range of 30-60 students,

Copyright © 2025 The Author(s)

which is ideal for the implementation of collaborative projects on a middle class scale. The most widely used approach in the implementation of PjGBL is constructivism, as it is in line with the principles of active and contextual learning. This approach encourages direct student involvement in building knowledge through real projects and educational games. The findings suggest that PjGBL is a potential innovative learning model to improve students' competencies in critical thinking, collaboration and creativity.

References

Alhayat, A., Mukhidin, M., Utami, T., & Yustikarini, R. (2023). The relevance of the Project-Based Learning (PjBL) learning model with "Kurikulum Merdeka Belajar." *DWIJA CENDEKIA: Jurnal Riset Pedagogik*, 7(1), 105–116.

Awaliyah, N. P., Hastuti, W. S., Wibowo, S. E., & Hidayat, P. (2024). The effect of Problem Based Learning model on students' critical thinking ability. *MIMBAR PGSD Undiksha*, 12(1), 101–107. https://doi.org/10.23887/jjpgsd.v12i1.62280

Ayu, B., & Priyudahari, P. (2024). Implementasi pembelajaran Project Based Learning pada matakuliah game edukasi. *Jurnal Teknologi Informasi dan Komputer*, 3, (tanpa halaman).

Bado, B. (2022). *Model pendekatan kualitatif: Telaah dalam metode penelitian ilmiah*. Tahta Media Grup.

Dalyono, B. (2016). Strategi pembelajaran inovatif untuk mencapai kompetensi pembelajaran. *Prosiding Temu Ilmiah Nasional Guru (TING) VIII Strategi, UPBJJ-UT Semarang*, November, 29–41.

Dewi, M. R. (2022). Kelebihan dan kekurangan Project-based Learning untuk penguatan Profil Pelajar Pancasila Kurikulum Merdeka. *Inovasi Kurikulum*, 19(2), 213–226. https://doi.org/10.17509/jik.v19i2.44226

Ferdiani, R. D., & Marsitin, R. (2023). Adventure math game based on STEM Project-Based Learning to improve students' creative thinking. *Prosiding Seminar Nasional*, 375, 370–375.

Hastuti, D., & Malihah, N. (2024). Systematic literature review (SLR): Implementation of the Project-Based Learning (PjBL) approach to improve students' speaking skills. *Proceeding of International Interdisciplinary Conference and Research Expo*, 1(1), 88–107. https://conferences.uinsalatiga.ac.id/index.php/iicare/article/view/634/361

Hidayat, R. K., Novianti, B. A., & Subki, S. (2023). Meningkatkan kemampuan berpikir kreatif fisika peserta didik berbasis Kurikulum Merdeka. *Jurnal Ilmiah Profesi Pendidikan*, 8(2), 1143–1151.

Huda, K., Hartati, S., & Utami, A. D. (2024). Development of a Project-Based Learning model using science games to enhance social skills in early childhood. *Proceeding Seminar Nasional Pendidikan*, 2023, (tanpa halaman).

Ibrahim, J., & Rahmawati, F. (2023). Efektivitas model pembelajaran Project Based Learning berbasis gamifikasi terhadap kemampuan penalaran matematis siswa. *Jurnal Pendidikan dan Pembelajaran Matematika Indonesia,* 12(1), 84–95. https://doi.org/10.23887/jppmi.v12i1.2394

Jurnal, J., Unsika, P., Jambi, J., Bulian, M., & Jambi, M. (2025). Penerapan Project Based Learning berbasis gamifikasi menggunakan aplikasi Quizizz dalam meningkatkan universitas Jambi. *Judika: Jurnal Pendidikan Unsika*, 13, 15–24. https://doi.org/10.35706/judika.v13i1.2

Khasanah, S. U., & Darsinah. (2022). Implementasi pembelajaran berbasis proyek dalam perkembangan psikomotorik peserta didik usia sekolah dasar. *Jurnal Pendidikan Dasar Flobamorata*, 3(1), 281–287. https://doi.org/10.51494/jpdf.v3i1.666

Kusmiati, K. (2022). Pengaruh model pembelajaran Project Based Learning terhadap kreativitas siswa sekolah dasar. *Educator: Jurnal Inovasi Tenaga Pendidik dan Kependidikan*, 2(2), 206–211.

Lemes, D. D. O., França, E., Romanek, E., Valente, F., & Fujimoto, C. (2024). Análise e modelagem de jogos digitais: relato de uma experiência educacional utilizando metodologias ativas em um grupo multidisciplinar. *Revista Educação & Tecnologia*, 2024, (tanpa halaman).

Lopez-Gazpio, I. (2022). Gaining student engagement through Project-Based Learning: A competitive 2D game construction case study. *IEEE Access*, 10, 1881–1892. https://doi.org/10.1109/ACCESS.2021.3139764

Malgazhdarova, D. A., Kenzhetayeva, G. K., & Mırıcı, İ. H. (2024). Application of communicative game-based learning project "Aengime" for teaching grammar EFL classrooms. *Novitas-ROYAL*, 18(2), 131–145. https://doi.org/10.5281/zenodo.13338632

Noorhalida, N., Yuliani, H., & Santiani, S. (2023). Studi literatur: Pengaruh Project Based Learning pada pembelajaran fisika. *ORBITA: Jurnal Pendidikan dan Ilmu Fisika*, 9(2), 200–212.

Pratiwi, I. I., Suwandi, A., Khaerani, R., & Fauzan, H. A. (2021). Gastronomy game board project based learning in higher education. *Journal of Tourism Education*, 1(1), 1–14. https://doi.org/10.17509/jote.v1i1.37058

Puspitasari, V., & Wahyuni, A. (2023). Analisis penerapan Project Based Learning (PjBL) pada pembelajaran IPAS siswa kelas 4 dengan Kurikulum Merdeka. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 8(2), 2517–2530.

Putri, A. A. S. P. A., & Sujana, I. W. (2020). Traditional game "Bakiak" assisted Project-Based Learning model influences students' social skills. *Jurnal Ilmiah Sekolah Dasar*, 4(3), 463. https://doi.org/10.23887/jisd.v4i3.25360

Sanova, A., Asmiyunda, A., & Ekaputra, F. (2023). Pengembangan platform berorientasi case study dan Project Based Learning berbantuan tools gamifikasi untuk menghindari learning loss. *Jurnal Zarah*, 11(1), 31–40. https://doi.org/10.31629/zarah.v11i1.5120

Sekarwangi, P. A., Cahyaningtyas, M. S., Sofiyani, Fakhriyah, F., & Ismaya, E. A. (2024). Systematic literature review (SLR): Model pembelajaran Problem Based Learning (PBL) terhadap minat belajar. *Jurnal Ilmiah Profesi Guru (JIPG)*, 5(1), 60–66. https://doi.org/10.30738/jipg.vol5.no1.a15563

Siregar, D. R., Ulfah, F., Ekonomi, P., & Jambi, U. (2024). Efektivitas model Project Based Learning (PjBL) menggunakan game (Educaplay) untuk meningkatkan kreativitas belajar mahasiswa*. Jurnal Media Informatika (JUMIN)*, 6(2), 478–483.

Smiderle, R., Rigo, S. J., Marques, L. B., Peçanha de Miranda Coelho, J. A., & Jaques, P. A. (2020). The impact of gamification on students' learning, engagement and behavior based on their personality traits. *Smart Learning Environments*, 7(1). https://doi.org/10.1186/s40561-019-0098-x

Kitchenham, B., & Charters, S. M. (2007). Guidelines for performing systematic literature reviews in software engineering (Version 2.3). *EBSE Technical Report*. https://doi.org/10.13140/RG.2.1.5015.0886

Taliak, J., Al Farisi, T., Sinta, R. A., Aziz, A., & Fauziyah, N. L. (2024). Evaluasi efektivitas metode pembelajaran berbasis proyek dalam mengembangkan kreativitas siswa. *Journal of Education Research*, 5(1), 583–589. https://doi.org/10.37985/jer.v5i1.876

Copyright © 2025 The Author(s)

Wardhani, A. I., Rukayah, R., & Kurniawan, S. B. (2023). Analisis kesulitan guru dalam mengimplementasikan model pembelajaran Project Based Learning (PjBL) pada Kurikulum Merdeka materi membangun masyarakat yang beradab. *Jurnal Pendidikan Dasar*, 11(2), 141. https://doi.org/10.20961/jpd.v11i2.79476

Wibowo, F. C., & Ahmad, N. J. (2023). Enhancing creative thinking skills through Project-Based Learning assisted game open online physics instructional. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, 8(3), 278. https://doi.org/10.26737/jipf.v8i3.3868

--- This page is intentionally left blank---