



The Use of Game Based Learning as a Skill Optimization for 4C in Elementary / MI

Dyah Afifah Andari*¹, Aenullael Mukarromah²
^{1,2}Institut Agama Islam Qamarul Huda

Abstract

21st century education requires students to have the main competencies in the form of 4C skills (Critical Thinking, Communication, Collaboration, and Creativity). The Independent Curriculum at the elementary/middle school level encourages the application of innovative learning models that are able to grow these four skills. One effective approach is *Game Based Learning* (GBL), which is game-based learning that prioritizes interaction, challenge, and collaboration. This study uses the Systematic Literature Study method on scientific articles and journals published in the period 2020–2025. Data sources are drawn from accredited national journals and reputable international journals that discuss GBL and 4C skill development at the primary school level. The results showed that GBL made a significant contribution to the improvement of the four 4C skills. Game elements such as challenges, rules, quick feedback, and social interaction have been proven to encourage students' critical thinking skills, increase creativity in solving problems, strengthen communication between students, and form teamwork. In addition, GBL also increases students' motivation and active participation during the learning process. These findings show that GBL is a relevant and effective approach to be applied in the Independent Curriculum, especially in the development of essential skills for the 21st century at the elementary/secondary school level

Keywords: Game Based Learning; 4C; SD/MI

Abstrak

Pendidikan abad ke-21 menuntut siswa untuk memiliki kompetensi utama berupa keterampilan 4C (Critical Thinking, Communication, Collaboration, dan Creativity). Kurikulum Merdeka di tingkat SD/MI mendorong penerapan model pembelajaran inovatif yang mampu menumbuhkan keempat keterampilan tersebut. Salah satu pendekatan yang efektif adalah *Game Based Learning* (GBL), yaitu pembelajaran berbasis permainan yang mengedepankan interaksi, tantangan, dan kolaborasi. Penelitian ini menggunakan metode Studi Literatur Sistematis terhadap artikel dan jurnal ilmiah yang dipublikasikan dalam rentang waktu 2020–2025. Sumber data diambil dari jurnal nasional terakreditasi dan jurnal internasional bereputasi yang membahas GBL dan pengembangan keterampilan 4C di tingkat sekolah dasar. Hasil penelitian menunjukkan bahwa GBL memberikan kontribusi signifikan terhadap peningkatan keempat keterampilan 4C. Elemen permainan seperti tantangan, aturan, umpan balik cepat, dan interaksi sosial terbukti mampu mendorong kemampuan berpikir kritis siswa, meningkatkan kreativitas dalam memecahkan masalah, memperkuat komunikasi antar siswa, serta membentuk kerja sama dalam tim. Selain itu, GBL juga meningkatkan motivasi dan partisipasi aktif siswa selama proses pembelajaran. Temuan ini menunjukkan bahwa GBL merupakan pendekatan yang relevan dan efektif untuk diterapkan dalam Kurikulum Merdeka, khususnya dalam pengembangan keterampilan esensial abad ke-21 di jenjang SD/MI

Kata Kunci : Game Based Learning; 4C; SD/MI

Introduction

21st century education demands that students not only master academic knowledge, but also develop essential skills such as critical thinking (*critical thinking*), communication

*Corresponding author: Dyah Afifah Andari, email: dyahafifahandari@gmail.com
Institut Agama Islam Qamarul Huda

(*communication*), collaboration (*collaboration*), and creativity (*creativity*), which is known as the 4C. These skills are considered essential to prepare the younger generation for global challenges and the ever-changing world of work (Ackerman, 2010). Therefore, an innovative and active learning approach is needed so that students are able to build these competencies from an early age. The complexity of the situation faced in the era of society 5.0 includes various aspects of activities, which are carried out for students to be able to have the power to adaptively adapt to the times (Vinika et al., 2019).

The changes that occur have the integration related to technology with human resources related to knowledge to see the various qualities of human resources, education, and employment (Syasmita, 2019). The use of technology also provides a change in various social investigations that explain that society 5.0 encompasses all aspects of data and automation (Al Maidah et al., 2017). The implementation of learning in the society 5.0 era emphasizes more on the mastery of each individual, to be able to develop their abilities, supported by all aspects applied using technology, then the latest curriculum called the Independent Curriculum was published.

The implementation of the independent curriculum as the latest curriculum has been carried out in several schools, especially at the elementary school level. The independent curriculum aims to be an innovation for the education system. In the independent curriculum, there are also new ideas aimed at developing students' personalities and cognition, namely the Pancasila student profile (Regina, 2023). The thing that underlies the profile of Pancasila students is the development of the times and there has been a socio-cultural shift, especially one that has an impact on education (Kahfi, 2022). Therefore, the formation of Pancasila student profiles can be a reference in the world of education as a character development and competencies that exist in students (Nur et al., 2023). The profile of Pancasila students consists of 6 dimensions, namely faith and fear of God Almighty and noble character, global diversity, cooperation, independence, critical reasoning, and creativity. Through this dimension, it is hoped that it can be an orientation in development for individuals or students of Pancasila in accordance with the values of Pancasila and put themselves in an opportunity to know themselves (Najati et al., 2023). This dimension needs further development to strengthen each student so that it becomes a habit

Problems faced in the implementation of learning in SD/MI to realize the Pancasila Student Profile in the Independent Curriculum, among others. The students' concentration level is low, students only follow the lesson well for only 15 minutes, then then play. Then in terms of the level of student understanding in reading, there are some students who do not read the reading text seriously, teachers have not used innovations in learning, so students are passive and do not understand the material during learning which causes low learning outcomes

One of the learning innovations that has developed in the last decade is *Game based learning* (GBL), which is an approach that integrates game elements into learning activities. This model is designed to increase students' motivation and involvement in the learning process, while strengthening mastery of the material in a fun and meaningful way. The results of the research conducted by (Lestari Rahayu, 2022) shows that the application of

GBL in learning Indonesian can improve reading comprehension skills and strengthen the critical thinking skills of elementary school students significantly. In addition, a study conducted by (Cinta et al., 2021) shows that the use of MI digital-based educational games encourages active participation and improves the quality of learning interactions between students and teachers. The research emphasizes that GBL is not only a learning aid, but also a strategy that is able to build a collaborative and fun learning atmosphere, especially in listening and writing learning. However, the use of GBL at the elementary/secondary level is still not widely adopted. Many teachers do not have the understanding and skills to design and implement educational games that are in accordance with learning outcomes. Therefore, further research is needed to assess the effectiveness of use *Game based learning* in improving student motivation and learning outcomes, especially in elementary / MI. This research is expected to contribute to the development of innovative learning strategies that are relevant to the needs of today's generation of learners.

Several researchers have made innovations in the Independent Curriculum to apply game systems or *games* in carrying out learning, in the midst of the incessant 5.0 era by using *game-based learning* with quiz-based applications, namely *Quizizz* and *Kahoot* which are easily accessible to students. *Games* are media that can be applied in learning, with the aim of providing skills to students to utilize their thinking skills to solve problems that exist during games, then adjusted contextually with the integration of fictitious sides. So that it makes the game interesting to implement.

Game based learning is a learning method based on the use of games to support teaching materials with the use of technology, to show some of the learning objectives achieved through *Game* with the completion of the quiz. *Game based learning* by using a quiz application that has adapted the implementation to the integration of learning and games (Fatima et al., 2020)

In the context of the Independent Curriculum, teachers are given the flexibility to implement learning strategies that are student-centered, fun, and relevant to their needs (Kahfi, 2022) One approach that is in line with this spirit is *Game Based Learning* (GBL), which is a learning model that utilizes game elements to increase student participation and involvement in the learning process (Redy Winatha & Made Dedy Setiawan, 2020). GBL is believed to be able to create a contextual and collaborative learning experience, thereby supporting the simultaneous development of the four 4C skills.

Various studies show that GBL can improve critical thinking skills through problem-solving and decision-making (Qian & Clark, 2016), encouraging creativity through in-game exploration and innovation (Zainuddin et al., 2020), as well as building communication and collaboration through social interaction in play activities (Gamlo, 2022). At the primary education level, the implementation of GBL is considered effective in increasing student learning motivation and engagement, which in turn strengthens the development of 4C skills (Alfiah & Sholihah, 2025)

However, the use of GBL in elementary and secondary schools still faces various challenges, ranging from the limitations of learning media to the readiness of teachers to design game-based learning effectively. Therefore, this study aims to examine more deeply the potential of GBL in optimizing 4C skills at the elementary/middle school level, as well

as analyze the latest research results related to its implementation in the context of the Independent Curriculum.

Method

This study uses a **systematic literature study method** with a focus on scientific publications that discuss the application of *Game Based Learning* (GBL) in the development of 4C skills in elementary/MI students. Data was collected from various national and international journals published between 2020 to 2025 through databases such as *Google Scholar*, *Science Direct*, and campus journal portals.

Inclusion criteria include research that:

1. Explain the use of GBL in the context of basic education (SD/MI).
2. Examine the 4C skills explicitly.
3. Using quantitative, qualitative, or mixed methods.

Data analysis was carried out with a qualitative descriptive approach, which organized the main findings related to the effectiveness of GBL in developing 4C skills.

Results and Discussion

Results

Based on the literature review carried out, it was found that the use of *Game Based Learning* (GBL) significantly contributes to the optimization of 4C skills in elementary/middle school students. The following are the main results obtained: 1). Increase in Critical Thinking, namely Critical Thinking of students increases through problem-solving challenges contained in educational games. Games provide an authentic context for students to make repeated analyses, evaluations, and decision-making (Qian & Clark, 2016). 2). Creativity Development and GBL facilitates creativity by providing freedom of exploration and the creation of new solutions in various game scenarios (Zainuddin et al., 2020). According to Beghetto and (Vinika et al., 2019) Creativity develops optimally when students are given space to innovate in a supportive environment. 3). Increased Collaboration Interaction in multiplayer games and group assignments improves students' collaborative abilities through coordination, idea sharing, and responsibility sharing (Gamlo, 2022). Vygotsky dalam (Habsy et al., 2023) emphasizing the importance of social interaction in learning as a process of mutual construction. 4). Strengthening Communication, namely GBL in improving students' communication skills through dialogue in games and discussions after the play session (Cinta et al., 2021). The ability to convey ideas and actively listen becomes more trained in a fun social context. and 5). Motivation and Engagement, namely GBL, increases intrinsic motivation and active involvement of students in learning (Redy Winatha & Made Dedy Setiawan, 2020). Theory *Self-Determination* explains that motivation increases when the psychological needs for competence, autonomy, and connectedness are met, which can be facilitated through the mechanics of the game.

Discussion

The results of this study support the idea that *Game Based Learning* is an effective approach to develop 4C skills which are the core competencies of the Independent Curriculum (Nur et al., 2023). The theory of constructivism put forward by Piaget and Vygotsky in (Sulaswari et al., 2021) explains that learning is most effective when students actively build knowledge through social experiences and interactions. GBL provides an environment that allows for such processes in a structured and engaging manner.

Critical Thinking in GBL develops through layered problem solving and simulation of real situations (Qian & Clark, 2016) This strengthens the theory (Sulaswari et al., 2021) that critical thinking involves an in-depth evaluation of information that is easier to hone through contextual and repetitive practice, such as in games. Creativity develops when students are given the freedom to explore and innovate without fear of failure, in accordance with the concept of safe space in the theory of creativity development. GBL offers a variety of challenges, triggering students' innovation skills, which is crucial in an era of globalization and rapid change.

Social interaction in GBL strongly supports collaboration and communication, as Vygotsky explains in (Habsy et al., 2023) that the zone of proximal development is achieved with the help of peers. Multiplayer games and group assignments require students to communicate effectively, negotiate, and bring ideas together to achieve a common goal (Gamlo, 2022).

In terms of motivation, *Self-Determination Theory* explained that GBL can meet the basic psychological needs of students: competence through *feedback* instant and reward, autonomy through choice in *Game*, and connectivity through social interaction. This leads to an increase in intrinsic motivation, which has a positive effect on engagement and learning outcomes (Cinta et al., 2021). However, the implementation of GBL also requires teacher readiness and adequate infrastructure support. Theory *Diffusion of Innovation* by (Rahmatussyfa, 2024) affirming the importance of effective technology adoption through training and resource readiness. This obstacle is still a challenge in many elementary schools, especially in areas with limited access to technology.

Overall, the integration of GBL in the Merdeka Curriculum provides a learning approach that is not only fun but also in-depth, interactive, and empowers students to master essential 21st-century skills holistically. To implement learning in the Independent Curriculum with good goals, it is necessary to choose and use methods that have a function as a tool to achieve the goals to be developed in accordance with project-based learning on the basis of the development of Pancasila student profiles that are applied in each subject (Tambunan et al., 2023) (Najati et al., 2023). In addition, the selection of learning methods by paying attention to the skills that students have during the learning process, to obtain *experience* in learning to improve students' interests and skills. Teachers play a creative role to use new methods with different and appropriate variations to be alternatives in learning. The play method is applied to create a variety of learning so that students are interested and enthusiastic about learning Indonesian related to the reality in the student environment.

Game based learning is a direct learning method with a *learning by doing* pattern. The pattern that is carried out during the learning implementation process by uniting the context of problems in daily life with quizzes, if in the application students fail in the game, it will spur students to play again so as to find the correct answer, so that it can foster motivation and improve students' ability to use technology.

Several researchers have applied the effectiveness of learning using *game based learning*, in the application of the Quizizz application, and Kahoot showed results that students had increased activeness during learning, had high learning outcome values. In addition. The use of *game-based learning* provides a new experience for students to participate during learning, arouse students' motivation to be enthusiastic, because quizizz and kahoot applications are packaged interactively, there are pictures, motivational words and supporting voices for each quiz, teachers are easier to carry out learning evaluations, by looking at the results listed on the application, also analyzing the achievement of student competencies, so that *game-based learning* is feasible to be applied in elementary school,

The advantages of *game-based learning* in Indonesian language learning Independent Curriculum in SD/MI, among others. Fun, interesting, motivates students to continue learning, can measure the level of understanding students have an interest in reading, writing, and listening to problems, train memory, relax after learning by communicating with teachers, and trigger the spirit of learning. Then the weakness of *game-based learning* is that the implementation requires an internet network, so that students cannot take the quiz properly if the network slows down, and each student must have a gadget

The results of this study corroborate previous findings that *Game based learning* make a positive contribution to improving the quality of learning Indonesian using the Independent Curriculum at the elementary/middle school level. Significant increase in motivation and learning outcomes in line with research (Lestari Rahayu, 2022) Setiawan concluded that GBL is effective in building a fun learning experience and improving the ability of technology students in GBL not only makes learning more contextual, but also accommodates students' visual and kinesthetic learning styles.

However, challenges in the implementation of GBL still need to be considered. Teachers need special training to design games that align with basic competencies and learning outcomes. Time constraints in conventional learning are also obstacles that need to be overcome through more flexible planning and oriented towards meaningful learning. Thus, GBL is not only relevant as a strategy to increase learning motivation, but also has the potential as a learning approach that supports the formation of students' language competence in a holistic and fun manner.

Limitations

This literature study research has several advantages and limitations. Its main advantage lies in its ability to provide a comprehensive theoretical overview of Game Based Learning (GBL) and its relevance in developing the 4C skills, namely critical thinking, creativity, collaboration, and communication. Through a synthesis of various previous studies, this study provides broad insights into current learning trends, identifies supporting factors, and highlights the potential of GBL in modern learning. In addition, this research is efficient in

terms of time and cost, and can be a strong foundation for future empirical research. However, this study also has some weaknesses. This research is highly dependent on the quality and availability of existing literature, so it can limit the depth of analysis. Thus, the conclusions produced tend to be general and do not fully represent the specific conditions of each school, which have differences in terms of facilities, teacher readiness, and learning environment.

Conclusion

Based on the results of the literature review, the use of *Game Based Learning* (GBL) is an effective learning strategy in optimizing the 4C skills (Critical Thinking, Creativity, Collaboration, and Communication) in elementary/MI students. GBL provides a contextual, interactive, and fun learning experience that significantly increases student motivation and engagement. Through in-game challenges, students are trained to think critically and creatively, work together in groups, and communicate effectively. However, the success of the implementation of GBL is highly dependent on the readiness of teachers, the selection of the right game media, and the support of adequate technological facilities. Therefore, GBL deserves to be an integral part of the Independent Curriculum to support the development of 21st century competencies at the basic education level.

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