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Review Article

The Effectiveness of Game-Based Learning Interactive E-Modules in Enhancing Students Learning Concentration: A Systematic Literature Review

Arcita Rizara[1*], Dwi Kusumawardani[2], Mita Septiani[3]

[1-3] Jakarta State University, Indonesia
* Corresponding Author : e-mail: arcita.rizara@mhs.unj.ac.id

Abstract: This systematic literature review examines the effectiveness of game-based learning (GBL) interactive e-modules in improving students' learning concentration. The study synthesizes the findings from eight research articles published between 2012 and 2025. The analysis reveals that GBL-based e-modules significantly enhance learning motivation, with validity rates ranging from 90% to 99%. Additionally, the use of interactive platforms such as Wordwall, Gimkit, and other digital tools effectively supports various learning styles, particularly visual and kinesthetic learners. The review highlights that student engagement levels improve significantly, ranging from 67.42% to 87.12%. Furthermore, these e-modules positively impact learning outcomes, providing a more engaging and interactive approach to education. By integrating gamification elements, the e-modules create a dynamic and motivating learning environment that fosters better concentration and focus among students. The review concludes that GBL-based e-modules are an effective educational strategy, particularly in geography education at the high school level. These tools not only engage students in a fun and interactive manner but also improve their ability to focus, leading to enhanced learning experiences. As a result, incorporating GBL-based e-modules in educational practices can contribute to better learning concentration and overall academic performance.

Keywords: E-Module; Game-Based Learning; Geography Education; Interactive Media; Learning Concentration

1. Introduction

Twenty-first century education demands learning that focuses not only on knowledge transfer but also on developing critical thinking skills, creativity, collaboration, and communication. In the context of geography learning at Senior High School (SHS), students are expected to understand complex spatial concepts, analyze geographical phenomena, and apply knowledge in daily life. However, the main challenge faced is students' low learning concentration, which impacts their concept understanding and suboptimal learning outcomes.

Learning concentration is the ability of students to focus attention on learning materials for a certain period without being disturbed by external or internal stimuli. Research shows that good learning concentration positively correlates with academic achievement and problem-solving abilities (Lingin, 2012). However, in this digital era, students face various distractions that can disrupt concentration, such as gadgets, social media, and less conducive learning environments.

Along with the development of educational technology, game-based learning (GBL) interactive e-modules have emerged as an alternative solution to increase students' concentration and learning motivation. GBL integrates game elements such as points, levels, challenges, and rewards into the learning process, creating a more engaging learning experience (Oktavia, 2022). This approach has proven effective in increasing students' intrinsic motivation, active participation, and learning outcomes in various subjects.

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Various studies have demonstrated the effectiveness of GBL-based e-modules in different learning contexts. Jannah et al. (2020) found that GBL-based e-modules are valid and practical with validity levels reaching 95.48% to 99%. Misdawati (2023) reported that GBL-based interactive digital modules can significantly increase students' learning motivation. Fathiani (2025) proved that web-based GBL models (Gimkit) increased student learning activities from 67.42% to 87.12%. These findings indicate the great potential of GBL in optimizing learning.

Although there is much research on GBL, there has been no comprehensive study that specifically synthesizes the effectiveness of GBL-based interactive e-modules in enhancing students' learning concentration, particularly in the context of geography learning at SHS. Therefore, this systematic literature review aims to: (1) analyze the characteristics of GBL-based interactive e-modules that have been developed; (2) identify the effectiveness of GBL-based e-modules on students' concentration and learning outcomes; (3) formulate recommendations for developing GBL-based e-modules for geography learning at SHS.

2. Research Method

Research Design

This study uses a Systematic Literature Review (SLR) method to synthesize findings from various research related to the effectiveness of game-based learning interactive e-modules. SLR is a systematic, transparent, and replicable research method to identify, evaluate, and interpret all research relevant to specific research questions.

Data Sources and Inclusion Criteria

The main data sources for this study include journal articles, theses, and proceedings obtained from leading academic databases such as Google Scholar and national publication portals. The inclusion criteria for selecting publications are as follows: first, the publications must have been published between 2012 and 2025. Second, the research must discuss e-modules or learning media based on game-based learning. Third, the studies must focus on the secondary education level, specifically Junior High School, Senior High School, or Vocational Schools. Finally, the research should measure variables such as motivation, concentration, activity, or student learning outcomes.

Data Collection Technique

Literature search was conducted systematically using keyword combinations: (1) "E-Module" AND "Game Based Learning"; (2) "Interactive Learning Media" AND "Learning Motivation"; (3) "GBL" AND "Learning Concentration". The filtering process was carried out through screening of titles, abstracts, and full-text to ensure relevance to the research focus.

Data Analysis Technique

Data were analyzed using qualitative descriptive analysis techniques through the process of: (1) Data extraction from each selected article; (2) Categorization based on media type, research method, and main findings; (3) Critical synthesis to identify patterns, gaps, and contributions to the development of GBL-based e-modules for geography learning.

3. Results and Discussion

Literature Analysis Results

From the screening and quality evaluation process, 8 research articles that met the inclusion criteria were selected. These articles were published between 2012-2025, with the majority (75%) being Research and Development studies. Table 1 below presents a summary of the research characteristics examined.

Table 1. Summary of Research Characteristics

No	Researcher & Year	GBL Media Type	Dependent Variable	Research Method	Key Findings
1	Jannah et al. (2020)	Interactive e-module (picture guessing, crossword, snakes & ladders)	Character and learning motivation	R&D (Borg & Gall)	Valid (95.48%-99%), practical (92.21%-100%), fostering character
2	Misdawati (2023)	Interactive digital GBL module	Motivation and learning outcomes	R&D (ADDIE)	Valid, very positive student response, increased motivation
3	Ardianty et al. (2023)	Print GBL module with game activities	Learning outcomes and motivation	R&D (4D)	Valid (90-95.38%), practical (91.17-94%), moderate effectiveness (N-Gain=0.49)
4	Liyana (2023)	Wordwall-based GBL e-module	Website-based learning media	R&D (ADDIE)	Valid (93% material, 83% media), teacher response 94%, student 99%
5	Lingin (2012)	Computer-based interactive media	Geography learning outcomes	R&D (Borg & Gall)	Valid (>89%), significantly improved learning outcomes, 82.55% effectiveness
6	Arisandi et al. (2024)	Computer-based interactive media	Student motivation	R&D (Borg & Gall)	Valid (>89%), significantly increased motivation (F=5.19>1.95)
7	Fathiani (2025)	Web-based GBL model (Gimkit)	Student learning activities	Quasi Experiment	Activity increased from 67.42% to 87.12%
8	Oktavia (2022)	GBL model (Conceptual study)	Student learning effectiveness	Literature Review	GBL increases motivation, engagement, and learning achievement

Discussion

Characteristics of GBL-Based Interactive E-Modules

Analysis results show that GBL-based interactive e-modules developed have main characteristics in the form of gamification element integration (points, levels, badges, leaderboards), interactive multimedia content (videos, animations, simulations), and user-friendly digital platforms. Research by Jannah et al. (2020) developed e-modules with game activities such as picture guessing, crossword puzzles, and snakes and ladders integrated with learning materials. Misdawati (2023) used an interactive digital module approach accessible through mobile devices, facilitating students to learn anytime and anywhere.

The most widely used platforms are web-based applications such as Wordwall (Liyana, 2023), Gimkit (Fathiani, 2025), and Flash/computer-based interactive media (Lingin, 2012; Arisandi et al., 2024). The advantages of these platforms are ease of access, attractive displays, and interactive features that support active learning. The validity of developed products is in the very good range, with average validity of material experts 90-95%, media experts 83-93.64%, and language experts 95.38-96.03%.

Effectiveness on Motivation and Learning Concentration

GBL-based e-modules proved to be very effective in increasing students' learning motivation. Misdawati (2023) reported that student responses to interactive digital modules were very positive, with significant indicators of increased learning motivation. Arisandi et al. (2024) found that computer-based interactive learning media significantly increased students'

learning motivation compared to textbook learning (Fcount 5.19 > Ftable 1.95), with effectiveness reaching 82.55%.

Regarding learning concentration, although not all studies explicitly measured this variable, several indicators of engagement and student learning activities showed significant improvement. Fathiani (2025) proved that Gimkit-based GBL models increased student learning activities from 67.42% (moderately active) in cycle I to 87.12% (very active) in cycle II. This increase in activity indicates an improvement in students' concentration and focus in following learning.

Effectiveness on Learning Outcomes

Student learning outcomes experienced significant improvement after using GBL-based e-modules. Lingin (2012) found that geography learning outcomes of students using computer-based interactive learning media increased significantly compared to textbook learning, with media effectiveness reaching 82.55%. Ardianty et al. (2023) reported learning outcome effectiveness in the moderate category (N-Gain = 0.49), but still showed a positive trend.

Jannah et al. (2020) found that GBL-based e-modules not only improved cognitive learning outcomes but also fostered character traits of love for reading and appreciation of achievement. This shows that GBL has a holistic impact on student development, not only cognitive but also affective and psychomotor aspects.

Compatibility with Student Learning Styles

GBL-based interactive e-modules are very suitable for accommodating the diversity of student learning styles, especially visual and kinesthetic learning styles that are dominant in SHS students. Visual media such as videos, animations, and infographics are effective for visual students, while interactive elements and games support kinesthetic students who need activity-based learning (Oktavia, 2022).

Research by Liyana (2023) shows that teacher and student responses to Wordwall-based e-modules were very positive (teachers 94%, students 99%), indicating that this media can meet the learning preferences of Generation Z students who are familiar with digital technology. Platforms such as Gimkit, Wordwall, and other interactive media provide a gamified learning experience, making students feel more engaged and motivated.

Implications for Geography Learning at SHS

Geography learning at Senior High School (SHS) requires approaches that effectively integrate abstract concepts with real-life contexts. Game-Based Learning (GBL)-based interactive e-modules offer promising solutions by providing simulations, interactive case studies, and visualizations of complex geographical phenomena. Based on findings from various studies, the implementation of GBL-based e-modules in geography learning can be carried out using several strategies. These include developing geography content in the form of educational games with challenge elements, missions, and rewards; integrating interactive maps, virtual field trips, and simulations of geographical phenomena; utilizing digital platforms such as Wordwall, Gimkit, or similar applications for interactive quizzes and collaborative discussions; and designing learning activities that encourage students to think critically and creatively solve geographical problems. With these strategies, GBL-based e-modules are expected to be an effective solution for increasing students' learning concentration in geography subjects, which ultimately impacts the improvement of concept understanding and learning outcomes.

4. Conclusions

Based on the systematic literature review of eight research articles, it can be concluded that game-based learning (GBL) interactive e-modules have proven to be both valid and effective, with expert validity levels for materials, media, and language ranging from 83% to 99%. The use of GBL significantly increases students' learning motivation, as indicated by positive student responses, which reached 92% to 99%, along with enhanced learning engagement. Furthermore, student learning activities and concentration showed a significant improvement, moving from the moderately active category (67.42%) to the very active category (87.12%) after the implementation of GBL. Digital platforms such as Wordwall, Gimkit, and other computer-based interactive media were found to effectively accommodate visual and kinesthetic learning styles of students. Additionally, student learning outcomes saw a significant increase, with media effectiveness reaching 82.55% when compared to conventional learning methods. Finally, GBL-based e-modules were found to be highly

suitable for implementation in Senior High School geography learning, as they effectively visualize abstract concepts and enhance students' learning concentration.

Based on the findings of this review, several recommendations can be proposed. For geography teachers, it is suggested to utilize game-based learning (GBL) platforms such as Wordwall, Gimkit, or Quizizz to make geography learning more interactive and engaging. Teachers should also design learning activities that integrate game elements with geography materials to enhance student concentration and develop interactive e-modules that are adapted to student characteristics and learning styles. For schools and educational institutions, it is recommended to provide adequate technological infrastructure to support the implementation of GBL-based e-modules. Additionally, schools should offer training for teachers on the development and use of GBL-based learning media and encourage collaboration among teachers to share best practices in GBL implementation. For future researchers, conducting experimental research to empirically test the effectiveness of GBL-based e-modules on students' learning concentration in geography is recommended. Researchers should also consider developing integrative learning models that combine GBL with other learning approaches, such as project-based learning or problem-based learning, and analyze the long-term impact of GBL use on students' spatial literacy and geographical thinking abilities.

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