

## Development of Gamification-Based Wayground Learning Media on Geographical Conditions Material in Junior High School

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### Abstract

Geography instruction at the Junior High School (SMP) level often encounters obstacles regarding low student interest and comprehension due to material presentations that tend to be abstract and monotonous. This research aims to develop and test the effectiveness of "Wayground" gamification-based learning media in enhancing student interest and learning outcomes on the topic of Geographical Conditions and Interactions with Foreign Nations. The study employs the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation) with a One-Group Pretest-Posttest experimental design. The research subjects consisted of 40 eighth-grade students at SMP Negeri 9 South Tangerang. The feasibility of the media was confirmed through expert validation (material and media experts), achieving a combined average score of 89.95%, categorized as "Very Feasible". Data analysis using a paired sample t-test indicated a significant improvement (Sig. 0.000) in student scores. The average score increased by 9.80 points, rising from 71.70 in the pretest to 81.50 in the posttest. These findings demonstrate that the use of Wayground media is effective in creating an interactive learning environment and tangibly increasing student interest and understanding of geography material.

**Keywords:** Learning Media; Wayground; Gamification; Learning Interest; Geography

### 1. Introduction

Education plays a fundamental role in shaping human resources that are capable, competitive, and highly adaptive to the rapid changes of the 21st century (Budiaman et al., 2021; Ginanjar et al., 2025; Zhang et al., 2024). In this digital era, the educational process must go beyond the mere transmission of theoretical knowledge; it must cultivate critical skills necessary to navigate complex global dynamics (Arita Marini et al., 2022; Sarifah et al., 2022). The integration of technology has become a primary driver in this transformation (Ibrahim et al., 2025). In many developed nations, technology has been seamlessly embedded into learning ecosystems to enhance both pedagogical processes and student outcomes (Binti Man & Bin Abd Majid, 2025). However, the landscape in

Indonesia presents a unique set of challenges. Despite the fact that internet penetration in Indonesia reached 79.5% in 2024, connecting over 221 million individuals, the utilization of this infrastructure for educational purposes remains uneven (Aminudin et al., 2025; Fointuna et al., 2025). The 2022 PISA (Programme for International Student Assessment) results highlight this urgency, revealing that Indonesian students' scores in reading, mathematics, and science have seen a decline compared to 2018, with creative thinking proficiency remaining significantly below the OECD average (Achmad Zukhruf Alfaruqi & Nurwahidah Nurwahidah, 2025; Putri et al., 2025; Solihin et al., 2024). These statistics suggest that while access to technology is high, its effective integration into classroom learning to foster deep understanding and critical thinking faces substantial hurdles, including limited digital pedagogy capability among teachers and a lack of innovative, technology-based learning models.

In the context of Social Studies (IPS), specifically within the field of Geography at the Junior High School (SMP) level, these challenges are particularly acute (Kurniawan et al., 2025; Nur Hidayah et al., 2025). Geography requires students to possess strong spatial intelligence to understand abstract concepts such as earth surface forms, climate dynamics, and inter-spatial relationships (Lestariningsih et al., 2023). However, conventional teaching methods, which are often teacher-centered and rely heavily on memorization, fail to bridge the gap between these abstract concepts and the students' reality. Research indicates that students often struggle to grasp material related to the lithosphere and spatial data because it is perceived as disconnected from their daily lives (Aulia, 2025; Soekanto, 2021; Teixeira & Vasconcelos, 2024). Consequently, students show low enthusiasm and engagement during lessons, leading to suboptimal learning outcomes. This "engagement gap" necessitates a renewal in learning strategies, shifting towards approaches that are more contextual, visual, and interactive to reignite student interest.

One promising innovation to address these issues is the application of digital games and game-based learning (GBL) approaches. Gamification, the application of game-design elements in non-game contexts has emerged as a powerful strategy to enhance educational resilience (Buckley & Doyle, 2016; Rahman et al., 2021; Sujarwo & Safitri, 2025). Recent meta-analyses from 2021–2025 indicate that gamification positively affects knowledge retention and student engagement by fulfilling the psychological needs for competence, autonomy, and social relatedness (Faradina et al., 2025; Handoko et al., 2021; Janković et al., 2024; Magadán-Díaz & Rivas-García, 2022; Mislia et al., 2025; Rayan & Watted, 2024; Safitri et al., 2025; Sujarwo et al., 2024). Educational digital games have been proven to foster intrinsic motivation through features such as instant feedback, leaderboards, and interactive challenges.

A potential medium specifically suited for this purpose is "Wayground," an interactive technology-based learning platform (formerly known as and evolving from the mechanics of Quizizz). This platform allows students to engage with material through quizzes, interactive presentations, and AI-integrated evaluations (Dorssom, 2025). By incorporating elements like avatars, memes, and live rankings, the platform creates a fun and competitive atmosphere that reduces the anxiety often associated with difficult subjects (Le & Tran, 2024; Rokhaniyah et al., 2025). Previous studies have consistently indicated that digital game-based learning enhances effectiveness due to its collaborative and participatory nature. Through these activities, students are expected to develop a more concrete and visual understanding of complex geographical concepts. However, while the efficacy of platforms like Quizizz has been studied broadly, specific research regarding the effectiveness of Wayground in the specific context of Geography learning at the SMP level in Indonesia remains very limited. Most existing research focuses on language learning or general science, leaving a gap in understanding how such tools specifically aid spatial thinking in geography. Against this background, this research aims to

analyze the effectiveness of using Wayground learning media in increasing the interest and learning outcomes of SMP students regarding the material on the geographical conditions of the Indonesian region.

## 2. Research Methods

This study utilizes an experimental design with a One-Group Pretest-Posttest model to measure the effectiveness of Wayground learning media on student outcomes and interest. In the initial stage, SMP students were given a pretest to measure their initial level of interest and understanding of the material "Geographical Conditions and Interaction with Foreign Nations" before using the Wayground media. Subsequently, students participated in learning using Wayground as an interactive tool to explore Geography material. After the learning process was completed, students were given a posttest to measure changes in interest and improvements in learning outcomes following the application of the media.

The population in this study was all students of SMP Negeri 9 South Tangerang. The research sample was taken randomly from grade VIII students, totaling 40 respondents. The research instruments included: (1) a pretest to measure initial ability and interest; (2) Wayground learning media as an intervention tool; (3) a questionnaire to assess perception and media effectiveness; and (4) a posttest to measure changes after implementation. Data analysis was performed using the Kolmogorov-Smirnov normality test and Levene's homogeneity test. Hypothesis testing used a paired t-test with a significance level of 0.05. The null hypothesis ( $H_0$ ) is rejected if the significance value is less than 0.05, indicating a significant difference between pretest and posttest results.

## 3. Results and Discussion

### Results

This research utilized the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation) to produce and test the effectiveness of the Wayground learning media. Analysis Phase: The initial stage involved a needs analysis to identify the fundamental problems in the geography learning process at SMP Negeri 9 South Tangerang, specifically regarding the material "Geographical Conditions and Interaction with Foreign Nations" for Grade VIII. Interviews with Social Studies (IPS) teachers revealed that students struggled to grasp spatial concepts because the material presentation was conventional and lacked visual interaction. Teachers indicated that student enthusiasm increased when learning activities utilized interesting, technology-based media. Consequently, the analysis concluded that an interactive media solution was required to actively engage students in the learning process.

Design Phase: Based on the analysis, the media was designed using the Wayground platform (formerly known as Quizizz), which supports AI-based evaluations and gamification. The design focused on enhancing engagement through interactive visuals, instant feedback, and competitive elements. The content was adapted from the Grade VIII Geography textbook, transforming static text into quiz questions, map visualizations, and interactive illustrations relevant to the topic. The design also prioritized mobile compatibility to ensure accessibility inside and outside the classroom.

In the development phase, interactive content was created, integrating game mechanics such as points, leaderboards, and ranking systems. Each session comprised 10–15 questions accompanied by narratives to reinforce context. Before implementation, the product underwent validation by material experts and media experts to assess its feasibility. Assessed content quality, accuracy, and language. The

results are presented in Table 1. Assessed visual design, usability, and interactivity. The results are presented in Table 2.

The combined average validation score was 89.95%, categorizing the media as "Very Feasible". Revisions were made based on expert feedback, including adding contextual narratives to case studies and increasing the font size of maps for mobile clarity. Implementation Phase: The validated media was implemented with 40 Grade VIII students at SMP Negeri 9 South Tangerang using a One-Group Pretest-Posttest Design. Students first completed a pretest to measure initial understanding. During the intervention, students used Wayground to solve interactive challenges and quizzes guided by the teacher. Students were actively involved in answering questions and competing for scores, receiving immediate feedback on their performance. Evaluation Phase: The final phase evaluated the effectiveness of the media by comparing pretest and posttest results using statistical analysis. The descriptive statistics of the student scores are shown in Table 3.

The data shows an increase in the mean score from 71.70 to 81.50, a gain of 9.80 points. The standard deviation decreased from 8.36 to 7.52, indicating a more even distribution of understanding among students after the intervention. To test the significance of this improvement, a Paired Samples Test was conducted (Table 4). Table 4 indicates a very strong correlation (0.92) between the scores. Finally, to test the significance of the improvement, a t-test was conducted (Table 5). As shown in Table 5, the significance value (Sig.) is 0.000 (< 0.05) and the t-count is 18.02. This confirms that H0 is rejected, meaning there is a significant difference between the pretest and posttest scores.

**Table 1.** Material Expert Validation Results

No	Assessment Aspect	Average	(%)	Category
1	Material Suitability with Curriculum	4,6	92	Very Feasible
2	Accuracy of Geography Concepts	4,5	90	Very Feasible
3	Language and Readability	4,2	84	Very Feasible
	<b>Overall</b>	<b>4,43</b>	<b>88,6</b>	<b>Very Feasible</b>

**Table 2.** Media Expert Validation Results

No	Assessment Aspect	Average	(%)	Category
1	Visual Design and UI	4,8	96	Very Feasible
2	Ease of Operation	4,5	90	Very Feasible
3	Interactivity and Button Function	4,4	88	Very Feasible
	<b>Overall</b>	<b>4,56</b>	<b>91,3</b>	<b>Very Feasible</b>

**Table 3.** Paired Samples Statistics

Pair 1	Mean	N	Std. deviation	Std. Error Mean
<i>Pretest</i>	71.70	40	8.36	1.32
<i>Posttest</i>	81.50	40	7.52	1.18

**Table 4.** Independent Samples Test (Paired Differences)

	N	Correlation	Sig.
<i>Pretest and posttest</i>	40	0.92	0.00

**Table 5.** Paired Samples Test Results

Pair 1	Mean Diff.	Std. Dev	Std. Error Mean	95% Lower	CI Upper	t	df	Sig. (2-tailed)
<i>Pretest-Posttest</i>	9.80	3.41	0.54	8.75	10.85	18.02	39	0.0

## Discussion

The implementation of Wayground as a mobile-based gamification tool has proven to have a significant and positive impact on student learning interest and outcomes at SMP Negeri 9 South Tangerang. This finding is empirically supported by the statistical analysis of the One-Group Pretest-Posttest design, which revealed a substantial increase in the average student score by 9.80 points (from 71.70 to 81.50). The significance of this improvement was confirmed by the paired samples t-test ( $t = 18.02$ ,  $p < 0.05$ ), rejecting the null hypothesis and affirming that the intervention was not merely coincidental but a direct result of the media application. These results align with previous meta-analyses stating that digital game-based learning interventions significantly enhance cognitive outcomes and motivation in school settings.

A critical finding in this research is the narrowing of the performance gap among students. The data showed a decrease in standard deviation from 8.36 in the pretest to 7.52 in the posttest. In the context of classroom dynamics, this reduction indicates that Wayground promoted more equitable learning mastery; the variance in student understanding became smaller, suggesting that the media effectively supported students with lower initial capabilities to catch up with their peers. This supports the argument that technology integration can assist in standardizing the quality of concept reception across diverse learner abilities.

Furthermore, the analysis revealed a very strong correlation ( $r = 0.92$ ) between pretest and posttest scores. This high correlation coefficient suggests a consistent stability in the media's effectiveness; students experienced improvement relative to their starting points regardless of their initial interest levels. Unlike conventional methods where low-interest students might detach further, the interactive nature of Wayground ensured that engagement was maintained across the spectrum of student engagement levels. From a psychological perspective, the mobile-based approach successfully reduced the abstraction of geographical concepts—a common hurdle in social studies education. By transforming static textbook material into interactive quizzes, map visualizations, and immediate challenges, Wayground helped students visualize spatial data more concretely. This process simplifies cognitive load, allowing students to focus on analysis rather than rote memorization, thereby fostering higher-order thinking skills.

The specific gamification elements embedded in Wayground, such as live leaderboards, points, and instant feedback, created a competitive yet constructive environment. The immediate feedback mechanism allowed students to self-correct and reflect on their understanding in real-time, a feature often absent in traditional lecture-based methods. This interactive loop addressed the initial problem

identified in the analysis phase regarding student boredom and passivity. Consequently, the learning atmosphere shifted from monotonous to dynamic, where students were not just passive recipients of information but active participants in their own learning journey.

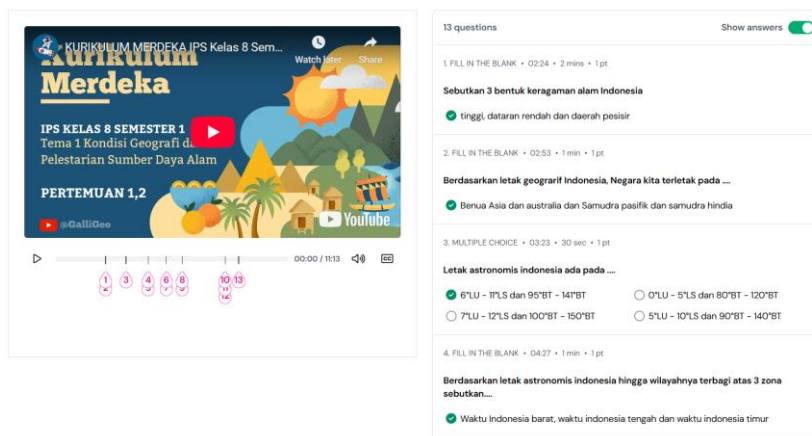


Figure 1. Matters Display in Wayground



Figure 2. Students Leaderboards in Wayground

## 4. Conclusion

The development and implementation of Wayground learning media followed the ADDIE model and proved to be highly effective for Grade VIII Geography students. The media was validated as "Very Feasible" by experts and empirically demonstrated its value through a significant increase in student learning outcomes, with an average score improvement of 9.80 points (Sig. 0.000). The use of gamification not only improved academic scores but also fostered a more engaging, interactive, and participatory learning environment. These findings suggest that integrating mobile-based digital games is a viable solution for overcoming low student interest in abstract social studies concepts.

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