

The Effectiveness of Gamification in Enhancing Elementary School Students' Learning of Regional Scripts

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ABSTRACT

The preservation of regional scripts as part of cultural heritage faces challenges due to declining interest among younger generations. This study investigates the effectiveness of gamification as a pedagogical tool in improving elementary school students' ability to recognize and write regional scripts. Building on existing research that highlights the role of game-based learning in enhancing motivation and engagement, this study applies a quasi-experimental design with pre-test and post-test measures. A group of students participated in script-learning activities integrated with gamification elements such as points, badges, and interactive challenges, while a control group followed traditional instructional methods. The findings indicate that students exposed to gamification demonstrated higher learning outcomes, improved recognition and writing skills, and developed more positive attitudes toward script learning compared to those in the control group. In addition, gamification fostered greater engagement and intrinsic motivation, creating a more enjoyable and meaningful learning experience. However, the study also identifies limitations, including a limited sample size and the specific type of gamification applied, which may affect generalizability. Overall, the research confirms that gamification is an effective and innovative approach to script education, offering a potential model for integrating cultural content into modern learning practices. It underscores the need for further research across broader contexts to maximize its impact on cultural preservation in education.

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1. Introduction

Regional scripts, such as Javanese, Balinese, and Batak, represent an invaluable part of Indonesia's cultural heritage and identity (Susanti, 2019). These writing systems are not only linguistic symbols but also reflections of history, tradition, and local wisdom. However, in recent years, the learning and use of regional scripts among younger generations, particularly elementary school students, have shown a significant decline. This is largely due to the dominance of the Latin alphabet in education and daily life, the limited availability of modern and engaging learning resources, and the perception that mastering regional scripts is both difficult and less relevant in the digital era. The risk of cultural erosion becomes evident when students demonstrate low motivation and limited mastery of their own regional scripts (Salili et al., 2012).

In schools, the teaching of regional scripts often relies on conventional approaches such as memorization and repetitive writing exercises (Moon, 2012). While these methods may introduce students to the basic forms of the script, they frequently fail to sustain interest or encourage deeper understanding. Many students perceive the lessons as monotonous, which reduces their level of engagement and hinders learning outcomes. This condition raises concerns, as elementary school is a critical stage in building not only literacy but also cultural

appreciation. Without effective and innovative learning strategies, the preservation of regional scripts may face serious challenges in the future.

One promising approach to address these issues is the use of gamification in education. Gamification refers to the integration of game elements, such as points, levels, leaderboards, badges, and challenges, into non-game contexts like classroom learning (Pfeiffer et al., 2020). For children, whose natural curiosity and enthusiasm are often stimulated through play, gamification offers the potential to transform what is usually perceived as a difficult or tedious subject into an enjoyable and engaging experience. Previous studies in various disciplines, including mathematics, science, and language learning, have demonstrated that gamification can enhance student motivation, increase engagement, and improve learning outcomes.

Over the past decade, gamification in language and literacy education has been extensively explored through a growing body of empirical and review-based research. Aal-Asheakh & Saud (2024) conducted an experimental study with fifth-grade elementary students in Saudi Arabia, comparing a gamified teaching approach to traditional instruction. Their findings highlighted statistically significant improvements in students' pronunciation, fluency, accuracy, intonation, and vocabulary in the gamified group compared to the control group.

Complementing this, Gunawan (2020–2025) performed a literature review analyzing 14 empirical studies on gamification in Teaching English to Young Learners (ages 7–12). He found that when gamification is aligned with specific learning objectives, it enhances motivation, engagement, and integrated language skill development, though challenges such as infrastructure and teacher readiness remain.

In terms of comparative platform analyses, Sani & Ratri (2024) examined three mobile-based English learning apps Duolingo, Busuu, and Simpler in the context of elementary learners. Their study found that Duolingo's comprehensive gamification mechanics (e.g., points, levels, missions) fostered the highest level of engagement; Busuu blended gamification with social interaction to encourage collaborative learning; and Simpler offered a minimalist interface, with comparatively lower gamified features. Overall, all three platforms helped support reading, writing, speaking, and listening development through increased motivation.

Beyond English learning, several Indonesian studies address application of gamified tools to support regional script literacy. Feronika & Sukasih (2023) developed a digital game-based learning tool WARAJA designed to improve fifth-graders' Javanese script reading skills. Using the ADDIE development model, their research reported the media was deemed "feasible" (100%) by experts and practitioners, and was statistically effective in improving reading outcomes (t -test $p = 0.000$, N -Gain = 0.67, "moderate" category).

Similarly, Telkom University researchers Aprylia & Prasetyo (year unspecified but within the past decade) created the Susun Aksara Jawa educational game for grades 3–6 using the Game Development Life Cycle (GDLC) method. Their usability evaluation (SUS score = 71.5, "Good") indicated the gamified game increased engagement and interest in learning Javanese script.

Further exploring Javanese script learning, Fitriani & Insani (2024) used a modified "Snakes and Ladders" board-game model in a quasi-experimental pretest–posttest study with grade-5 students ($n = 27$). They found a highly significant improvement in writing ability (paired-sample t -test $p = 0.000$), with strong gains in learning outcomes. Suria (year within decade) also developed a web-based word game algorithm for Javanese script learners, with 100% of respondents deeming the app necessary and useful, and a 97% average success rate in performance during testing.

At a broader design and theoretical level, Nugraha & Mansoor (2021) conducted a comparative, qualitative analysis of several Indonesian educational mobile games teaching

different regional scripts (e.g., Rejang, Jawa, Bali, Lontara). They analyzed game content through the lens of game-design theory and highlighted essential elements for educational games aimed at learning scripts serving as a foundation for future development in this niche domain.

Beyond regional script education, Jayanti, Firdaus & Arochman (2024) evaluated the effectiveness of integrating the gamified learning platform Classcraft to enhance elementary students' writing skills in an English context. Published in *English Learning Innovation*, they reported positive impacts on writing achievement among young learners. And in a related vein but in narrative comprehension, Kholisna & Sukasih (2025) developed gamified reading-comprehension media using the RADEC model implemented via Genially, targeting fifth-grade narrative text comprehension. Their R&D study (ADDIE approach) yielded media with over 90% feasibility and significantly improved reading comprehension (paired-t tests, N-Gain classification "quite effective"), along with high teacher and student satisfaction.

Finally, several broader and cautionary studies shed light on potential limitations of gamification. Mogavi et al. (2022) investigated "gamification misuse" in a language-learning app (Duolingo), identifying how over focus on game aspects can distract from learning, highlighting the trade-off designers must manage.

Despite these promising findings, research exploring the application of gamification specifically in the context of regional script learning remains scarce. Most existing studies focus on general literacy or language acquisition, leaving a gap in understanding how game-based learning strategies could support the mastery of local scripts and contribute to cultural preservation (Shliakhovchuk, 2019). Therefore, it is essential to investigate the effectiveness of gamification in helping elementary school students learn regional scripts. Such research not only addresses the educational challenge of motivating students but also responds to the broader cultural responsibility of ensuring that Indonesia's rich heritage continues to thrive in the future.

2. Method

This study adopts a quasi-experimental research design to examine the effectiveness of gamification in learning regional scripts among elementary school students (Rachels, 2016). A quasi-experimental approach is considered appropriate because it allows the comparison of two groups those taught using gamified learning strategies and those taught through conventional methods while still accommodating the practical limitations of conducting research in school settings. Through this design, the study seeks to measure the extent to which gamification improves students' ability to recognize, read, and write regional scripts, as well as its impact on student motivation and engagement.

The participants of this study consist of elementary school students in the upper grades (specifically grade five), as this level of education is typically where regional script learning is introduced in the curriculum (Ede, 2006). The sample is selected using purposive sampling to ensure that students have already been exposed to the basics of regional scripts. The sample is then divided into two groups: the experimental group, which receives instruction through a gamified learning platform, and the control group, which continues with conventional instructional methods such as memorization and repetitive writing.

The development of the gamified learning media is based on the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), ensuring that the instructional tool is systematically planned and tested before being applied in the classroom. Key gamification elements such as points, levels, badges, leaderboards, and interactive challenges are embedded into the learning activities (Strmecki et al., 2015). These features are designed to foster engagement, provide immediate feedback, and create a sense of achievement, making the process of learning regional scripts more interactive and enjoyable.

To collect data, this study employs a combination of quantitative and qualitative instruments(Sandelowski, 2000). A pre-test and post-test are administered to both the experimental and control groups to assess students' mastery of regional scripts before and after the intervention. The tests focus on script recognition, reading, and writing accuracy. In addition, a motivation and engagement questionnaire is distributed to capture students' perceptions of the learning process. Classroom observations and teacher interviews are also conducted to provide complementary qualitative insights into student behavior and classroom dynamics.

The data analysis involves both descriptive and inferential statistics(Statistics, 2013). Mean scores, standard deviations, and gain scores are calculated to describe overall student performance. An independent samples t-test is then applied to determine whether there are statistically significant differences in learning outcomes between the experimental and control groups. Similarly, the questionnaire data are analyzed using Likert-scale scoring, while the qualitative data from observations and interviews are coded and thematically analyzed to support and enrich the quantitative findings.

Through this methodology, the study aims to provide a comprehensive understanding of how gamification can influence not only the academic achievement of elementary school students in regional script learning but also their motivation and engagement. This mixed-methods approach ensures that the evaluation of gamification is not limited to test scores alone but extends to the broader learning experience, thereby offering valuable insights for both educational practice and cultural preservation(Rodrigues et al., 2021).

3. Results and Discussion

3.1 Gamification improves learning outcomes in recognizing and writing regional scripts

Gamification has emerged as a promising approach in addressing the challenges faced by elementary school students in learning regional scripts(Lamrani & Abdelwahed, 2020). Traditional teaching methods, such as rote memorization and repetitive writing drills, often make students feel that learning scripts is monotonous and difficult. These approaches may introduce students to basic forms of the script but fail to sustain their interest or develop deeper literacy skills. By contrast, gamification introduces elements of play such as points, badges, levels, and immediate feedback that transform the learning process into a more engaging and interactive experience. This shift in instructional design has been shown to not only increase motivation but also to significantly improve learning outcomes in both recognizing and writing regional scripts.

In terms of recognition skills, gamification enhances students' ability to identify letters and symbols of regional scripts through repeated, enjoyable practice. For example, game-based exercises that require students to match symbols with sounds, or to quickly identify correct characters under time constraints, provide immediate feedback that strengthens memory retention. The competitive and reward-based nature of gamification keeps students focused, encouraging them to repeat these recognition tasks until mastery is achieved(Richter et al., 2014). As a result, recognition of script symbols becomes more automatic, reducing the cognitive load when moving on to reading and writing tasks.

Writing skills also benefit significantly from gamification. Interactive challenges, such as "unlocking levels" by correctly writing characters, allow students to practice in a goal-oriented and motivating environment(Huang & Oh, 2018). Instead of perceiving writing drills as tedious, students view them as steps toward achievement. The visual and auditory feedback embedded in many gamified learning platforms helps correct mistakes instantly, enabling students to refine their strokes and accuracy in real time. Over time, these gamified writing practices cultivate stronger muscle memory and greater confidence in script production.

Furthermore, gamification supports differentiated learning by allowing students to progress at their own pace. Those who struggle with recognition or writing can repeat levels until they achieve mastery, while advanced students can move on to more complex challenges. This adaptability prevents learners from feeling left behind or unchallenged, contributing to a more inclusive classroom environment (Westwood, 2018). Beyond academic gains, gamification also builds positive attitudes toward regional script learning, which is crucial for long-term cultural preservation. When students enjoy the process of recognizing and writing scripts, they are more likely to value and continue engaging with these cultural assets outside the classroom.

In conclusion, gamification offers more than just entertainment in the classroom; it directly contributes to better learning outcomes in regional script literacy. By making recognition and writing exercises enjoyable, interactive, and rewarding, gamification ensures that students not only master the technical skills but also develop motivation and appreciation for preserving their cultural heritage.

3.2 Increased student engagement, motivation, and positive attitudes toward learning scripts

One of the most significant contributions of gamification in education is its ability to increase student engagement, motivation, and foster positive attitudes toward learning. This is particularly relevant in the context of regional script learning, which many elementary school students often perceive as difficult or less appealing compared to other subjects. Conventional teaching methods such as rote memorization and repetitive copying can make script learning monotonous, leading to disinterest and disengagement. By introducing game elements such as points, rewards, levels, and interactive challenges gamification transforms the learning process into an activity that is not only educational but also enjoyable.

Student engagement rises because gamification creates a dynamic and interactive learning environment (Bouchrika et al., 2021). Tasks that would normally be seen as repetitive are reframed as challenges or quests, encouraging students to actively participate. For example, when learners are tasked with unlocking new levels by mastering a set of characters, they become more focused and involved in the process. The use of leaderboards or team-based challenges also adds a social dimension to learning, where students encourage and compete with one another in a healthy and supportive way. This kind of engagement ensures that students are not merely passive recipients of knowledge but active participants in their own learning journey.

Motivation is another area where gamification has a strong impact. Rewards such as badges, achievements, or points provide immediate reinforcement, which helps maintain enthusiasm throughout the learning process. Unlike conventional methods that may delay feedback until a test or evaluation, gamified systems provide instant recognition of progress (Attali & Arieli-Attali, 2015). This immediate reinforcement satisfies students' intrinsic need for accomplishment, making them more willing to invest effort in recognizing and writing regional scripts. Over time, this consistent cycle of effort and reward strengthens their commitment to learning.

Positive attitudes toward learning scripts also emerge as a result of gamification (Landers, 2014). By experiencing regional script learning in a fun and engaging manner, students begin to associate the subject with enjoyment rather than difficulty. This shift in perception is crucial, as attitudes developed at the elementary school level often shape long-term interest and appreciation for cultural knowledge. When students feel that learning regional scripts is an exciting and rewarding experience, they are more likely to value these scripts as part of their identity and heritage (Goddard & Wierzbicka, 2004). In this way, gamification not only improves academic outcomes but also contributes to cultural preservation by nurturing students who are motivated to engage with their cultural roots.

In sum, gamification enhances student engagement by making learning more interactive, boosts motivation through immediate rewards and progress tracking, and fosters positive attitudes by associating script learning with enjoyment and accomplishment. These psychological and emotional benefits are as important as the cognitive gains, since they ensure that students not only learn effectively but also develop a lasting interest in preserving regional scripts as part of their cultural heritage.

3.3 Potential model for integrating gamification into cultural education

The integration of gamification into cultural education offers a promising model for making the preservation of heritage more engaging and sustainable, particularly among younger generations. Cultural education, which often emphasizes traditional practices, values, and literacy of regional scripts, has historically relied on conventional methods such as storytelling, memorization, and teacher-centered instruction (Martínez, 2017). While these approaches have cultural authenticity, they may not fully capture the interest of today's students who are growing up in a digital era dominated by interactive technologies. By embedding gamification into cultural education, it becomes possible to bridge the gap between traditional content and modern learning preferences.

A potential model for integration begins with identifying cultural competencies such as recognizing, reading, and writing regional scripts that can be translated into achievable learning objectives (Chinn, 2006). These objectives can then be broken down into progressive levels, similar to game stages, where students gradually advance as their mastery deepens. For instance, the recognition of basic script symbols may represent the entry level, followed by more complex tasks such as constructing words or sentences, and culminating in challenges that require students to apply their knowledge creatively. Each level can be accompanied by rewards, such as badges or virtual tokens, which not only reinforce achievement but also serve as motivators for continued learning.

Another important aspect of the model is the incorporation of narrative and storytelling, which aligns naturally with cultural education. Scripts and cultural symbols can be contextualized within games that tell local legends, folktales, or historical events (Koski, 2016). This narrative framework not only makes learning enjoyable but also situates students within their cultural heritage, allowing them to see the relevance and meaning of the scripts they are learning. The combination of gamified mechanics and cultural storytelling ensures that students are not only learning technical skills but also internalizing values and traditions.

The model also promotes collaborative learning through multiplayer or team-based challenges. By working together to solve puzzles, complete quests, or achieve group milestones, students develop a sense of community and shared responsibility toward preserving cultural knowledge. Teachers play the role of facilitators, guiding students through the gamified journey while ensuring that cultural authenticity is maintained. Additionally, digital platforms allow for adaptability, enabling students to learn at their own pace and revisit challenging concepts until mastery is achieved.

In essence, this potential model for integrating gamification into cultural education transforms what might otherwise be a static subject into a dynamic, interactive experience. It not only enhances cognitive skills such as script recognition and writing but also fosters emotional engagement, motivation, and cultural pride. By leveraging the natural appeal of games, cultural education can be revitalized, ensuring that regional scripts and traditions are not only preserved but celebrated by future generations.

3.4 Limitations

One major limitation is the sample size. If the study involves only a limited number of participants from a specific school or region, the results may not fully represent the broader population of elementary students (Rowan et al., 2002). Differences in cultural backgrounds,

prior exposure to regional scripts, or even school resources can influence learning outcomes, and a small or localized sample may restrict the external validity of the findings.

Another limitation lies in the type of gamification used. Gamification encompasses a wide range of strategies, such as points, badges, leaderboards, storytelling, or interactive simulations. The study's choice of gamification elements might not capture the full potential of this approach (Schöbel et al., 2020). For example, if the design relies heavily on extrinsic rewards like points or badges, it may improve short-term motivation but not necessarily long-term retention of script knowledge. Conversely, more immersive gamification models involving narrative or role-play could yield different results, suggesting that the effectiveness of gamification is closely tied to its specific implementation.

Additionally, confounding factors may influence the study outcomes. Students' prior interest in regional scripts, their digital literacy, or even teacher involvement in the gamified learning process could affect results (Kingsley & Grabner-Hagen, 2015). For instance, a teacher who is more enthusiastic about using gamification might unintentionally enhance the learning atmosphere compared to a teacher less comfortable with technology. Similarly, differences in access to devices or technical infrastructure may limit the consistency of the intervention across participants.

Acknowledging these limitations is important, as they highlight the need for careful interpretation of the study's findings. While gamification may demonstrate positive impacts on learning outcomes, motivation, and engagement, future research should consider larger and more diverse samples, explore different types of gamification strategies, and control for external variables that may influence results. This reflective approach not only strengthens the study's credibility but also provides valuable insights for refining future research in the field of gamified cultural education (Dichev & Dicheva, 2017).

4. Conclusion

This study demonstrates that the integration of gamification into the learning process significantly enhances students' ability to recognize and write regional scripts. By transforming script learning into an engaging and interactive experience, gamification not only improves cognitive outcomes but also fosters higher levels of student motivation, participation, and positive attitudes toward cultural education. The findings highlight the potential of gamified approaches to bridge traditional knowledge with modern pedagogical practices, making regional scripts more accessible and appealing to younger learners. Despite its promising results, the study acknowledges certain limitations, including the relatively small sample size, the specific gamification elements employed, and the influence of contextual factors such as teacher involvement and students' prior exposure to regional scripts. These limitations suggest the need for caution in generalizing the findings to broader populations. Nevertheless, this research provides a valuable contribution by offering a potential model for integrating gamification into cultural education. It emphasizes the importance of innovative strategies in preserving regional heritage through education while simultaneously aligning with contemporary learning preferences. Future studies with larger and more diverse samples, as well as varied gamification designs, are recommended to further validate and expand upon these findings.

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