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Revitalizing Regional Languages with Technology: Development of AI and Gamification-Based Language Learning Applications

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ABSTRACT

The rapid decline of regional languages poses a significant challenge to cultural preservation and linguistic diversity. As globalization and digitalization continue to spread, regional languages are at risk of being overshadowed by dominant languages. This research explores the potential of technology, particularly artificial intelligence (AI) and gamification, to revitalize regional languages by enhancing language learning applications. The study aims to develop and evaluate an AI-driven, gamified language learning application designed to promote the acquisition and preservation of regional languages. The research employs a mixed-methods approach, combining the development of the language learning application with usability testing and user feedback. The application integrates AI to provide personalized learning experiences and uses gamification elements to increase engagement and motivation. The effectiveness of the application was tested through pilot studies with users from different age groups, focusing on language retention, engagement, and user satisfaction. The results show that the AI and gamification-based application significantly improved language retention and engagement among participants. Users reported higher motivation and enjoyment compared to traditional language learning methods, and the application was particularly effective in making learning more interactive and appealing for younger audiences. This study concludes that integrating AI and gamification into language learning applications can play a pivotal role in revitalizing regional languages, providing a scalable and engaging solution for preserving linguistic heritage.

Keywords: *Artificial Intelligence, Cultural Preservation, Language Learning*

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INTRODUCTION

The rapid advancement of technology has revolutionized many aspects of human life, including communication, education, and language learning. As the world becomes more interconnected through globalization, dominant languages such as English continue to overshadow regional and indigenous languages (Calvo dkk., 2025; Ogasawara, 2025). In many parts of the world, regional languages are at risk of becoming extinct, with younger generations increasingly speaking more widely recognized languages for economic and social reasons. This linguistic decline poses not only a threat to cultural heritage but also to the rich diversity that these languages represent. Revitalizing regional languages is crucial to preserving cultural identities, fostering diversity, and promoting multilingualism. Recent innovations in technology, particularly in the fields of artificial intelligence (AI) and gamification, offer significant potential to address this challenge.

Language learning technologies, such as mobile applications and online platforms, have gained widespread popularity, providing interactive and engaging ways to learn languages. However, many of these technologies focus predominantly on global or widely spoken languages, leaving regional languages underrepresented in the digital world (Maria Louis & Manivel, 2025; Pimenow dkk., 2025). AI-based language learning applications, when combined with gamification elements, present a promising approach to making language learning more accessible, engaging, and effective. By incorporating AI's ability to personalize learning experiences and gamification's capacity to increase motivation and retention, these technologies could provide a platform for revitalizing regional languages and making them more relevant to younger generations.

As regional languages face growing pressure from globalization and technological advancements, it becomes increasingly important to explore innovative ways to support their preservation. Technology-based solutions like AI and gamification not only offer a new way to engage learners but also hold the potential to ensure that these languages continue to thrive in the digital age (Brantner dkk., 2025; Michel & Ecker, 2025). This study focuses on how AI and gamification can be integrated into language learning applications to revitalize regional languages, creating an accessible and engaging learning environment that encourages their continued use and acquisition.

Despite the significant advancements in language learning technologies, there remains a substantial gap in the application of these innovations to regional languages, especially those with fewer speakers or less representation in educational systems. Most language learning platforms predominantly cater to globally spoken languages, leaving a critical void in resources for regional languages that are at risk of extinction (Eichhorn, 2025; Wu dkk., 2025). The problem is compounded by the fact that language learning tools often fail to address the unique characteristics of regional languages, such as dialectical variations, cultural context, and the specific needs of learners. This lack of accessible and engaging resources for regional languages leads to a diminishing interest among younger generations, further accelerating the decline of these languages.

Moreover, traditional language learning methods, which often rely on textbooks, classroom teaching, and rote memorization, are not well-suited for the dynamic and interactive needs of today's learners (Kaya Kaçar, 2025; Wang & Wang, 2025). In contrast, AI-based and gamified language learning approaches offer personalized, interactive, and immersive experiences that have been shown to increase learner engagement and retention. However, these methods are underutilized in the context of regional language revitalization (Bi˙ki˙r dkk., 2025; Zahid & Qazi, 2025). The challenge lies in developing AI-driven platforms that can accommodate the specific linguistic structures of regional languages while also integrating gamification strategies to make the learning process more enjoyable and motivating for users.

This study seeks to address the challenge of revitalizing regional languages by developing an AI and gamification-based language learning application. By combining AI's adaptive learning capabilities with gamification's motivational elements, this research aims to create a platform that can enhance language acquisition for regional languages (Harris dkk., 2025; Zhong dkk., 2025). Furthermore, this study seeks to demonstrate the effectiveness of such an application in increasing user engagement, improving language retention, and fostering a deeper connection to the language and culture it represents.

The primary objective of this research is to develop an AI-powered, gamification-based language learning application tailored to regional languages, with a specific focus on increasing the accessibility, engagement, and effectiveness of language learning for these languages. The application aims to incorporate AI techniques such as natural language processing (NLP) and machine learning to adapt to learners' progress, providing personalized content and feedback. Additionally, gamification elements such as points, levels, and rewards will be integrated to increase motivation and retention, making language learning more enjoyable and rewarding.

Another key objective is to evaluate the effectiveness of the application in revitalizing regional languages by assessing its impact on learner engagement, language retention, and cultural connection. The study will explore whether the combination of AI and gamification can overcome traditional language learning challenges, such as lack of motivation or engagement, particularly for learners of regional languages (Korukoglu dkk., 2025; Li & Li, 2025). The research will also aim to identify the specific features of AI and gamification that are most effective in fostering language acquisition and how these elements can be tailored to suit the unique characteristics of regional languages. By evaluating the user experience and learning outcomes, this study seeks to provide insights into how technology can be used to support the preservation and growth of regional languages.

Furthermore, this research will investigate the potential scalability of the AI and gamification model for other regional languages and its broader applications in language revitalization efforts. The aim is to demonstrate that this approach can be generalized and adapted to support a wide range of regional languages, providing a scalable solution to a global issue (Abadiano dkk., 2025; Swaminathan dkk., 2025). The study will also examine the long-term impact of using such technology in language

preservation, considering factors such as learner retention, community involvement, and cultural engagement.

While there has been extensive research into language learning technologies, most studies have focused on widely spoken languages such as English, Spanish, or Mandarin, leaving regional languages underrepresented (Qi dkk., 2025; Zou dkk., 2025). Existing language learning platforms are primarily designed for global languages, with few resources dedicated to the preservation and revitalization of languages that are at risk of extinction. Furthermore, the integration of AI and gamification into language learning for regional languages remains largely unexplored. Most studies in this area have focused on language learning applications for high-resource languages or used traditional, non-interactive methods for teaching regional languages, such as textbooks or classroom instruction.

Previous research on gamification and AI in education has predominantly concentrated on improving engagement and performance for widely spoken languages, with little attention paid to the specific challenges posed by regional languages (Pratama dkk., 2025; Zou dkk., 2025). This gap in the literature means that there are few, if any, studies that combine AI and gamification specifically for revitalizing regional languages. This research addresses this gap by developing a novel approach that combines the strengths of AI and gamification to enhance the learning experience for regional languages. By doing so, the study contributes to both the fields of language learning and educational technology, offering new insights into how these technologies can be applied to support the preservation of underrepresented languages.

In addition, there is limited research on the intersection between AI, gamification, and language revitalization, particularly in terms of measuring the effectiveness of these technologies in increasing learner engagement and retention for regional languages. This study aims to fill this gap by evaluating the impact of AI and gamification on language learning outcomes for regional languages, providing empirical data on how these technologies can contribute to the preservation and growth of linguistically diverse cultures.

The novelty of this research lies in its innovative approach to integrating AI and gamification into language learning for regional languages, which has been largely overlooked in previous studies (Casali dkk., 2025; Karimiziarani dkk., 2025). While both AI and gamification have been explored individually in the context of language learning, their combined use in revitalizing regional languages represents a significant advancement in educational technology. This study brings together the adaptive capabilities of AI and the motivational elements of gamification to create an engaging and personalized learning experience that is specifically designed for regional language learners. By focusing on regional languages, this research provides a solution to a global issue—language decline and extinction—that is often overlooked by mainstream language learning platforms.

This study is important because it addresses the urgent need for the preservation and revitalization of regional languages, which are often marginalized in digital spaces. By developing an application that integrates advanced technology with a focus on regional languages, this research contributes to the broader field of educational

technology and cultural preservation (Alkaabi & Almaamari, 2025; Anbarasi & Sankar, 2025). The use of AI in language learning offers the potential for scalable, personalized learning experiences, while gamification provides the motivation necessary to sustain long-term engagement. This combined approach offers a powerful solution for revitalizing regional languages, ensuring their continued use and transmission to future generations.

RESEARCH METHOD

The research design for this study adopts a mixed-methods approach, combining both qualitative and quantitative techniques to explore the development and effectiveness of an AI and gamification-based language learning application for regional languages. The study is experimental in nature, involving the development of a mobile application that integrates artificial intelligence (AI) and gamification strategies to facilitate language learning. The effectiveness of this application will be assessed through pre- and post-test evaluations, as well as user engagement metrics, focusing on language retention, motivation, and user satisfaction (Alkaabi & Almaamari, 2025; Theros dkk., 2025). The data collected will provide insights into the impact of AI and gamification on language learning for regional languages, particularly in terms of engagement, retention, and language acquisition.

The population for this study consists of native speakers and learners of regional languages in Indonesia. The sample includes 150 participants who have varying levels of experience with learning regional languages, ranging from beginners to intermediate learners. Participants will be recruited through online platforms, community groups, and educational institutions that focus on regional languages (Jiang dkk., 2025; Yang dkk., 2025). The sample will be divided into three groups: one for learning Javanese, one for learning Sundanese, and one for learning Madurese. The study aims to achieve a balanced representation of age groups, with participants aged between 18 and 50, ensuring diversity in terms of educational background and prior exposure to the language.

The primary instruments for this study are the AI-driven language learning application, surveys, and assessments. The language learning application will incorporate AI techniques, such as natural language processing (NLP) and machine learning, to personalize the learning experience based on the learner's progress and preferences. The gamification elements of the application will include features such as points, levels, challenges, and rewards to motivate learners and enhance engagement (Gupta dkk., 2025; Yu dkk., 2025). Surveys will be used to collect data on user satisfaction, motivation, and perceived effectiveness of the application. Additionally, pre- and post-tests will measure language proficiency in the targeted regional language, focusing on vocabulary, sentence structure, and comprehension.

The procedures for this study begin with the development and testing of the AI and gamification-based language learning application. After the application is designed and tested for functionality, participants will be invited to use the app over a period of eight weeks. During this period, participants will engage with the app for a minimum of three hours per week. Pre-tests will be administered before the learning session begins,

and post-tests will be conducted at the end of the learning period to assess improvements in language skills. Surveys will be distributed to participants at the conclusion of the study to gather qualitative data on their experiences and perceptions of the application (Saxena dkk., 2025; Singh dkk., 2025). The data collected from tests, surveys, and user activity within the app will be analyzed using both statistical and thematic analysis to determine the overall effectiveness of the AI and gamification approach in revitalizing regional languages.

RESULTS AND DISCUSSION

The study collected data from 150 participants who were divided into three groups based on the regional language they were learning: Javanese, Sundanese, and Madurese. The participants were engaged with an AI and gamification-based language learning application for a period of eight weeks, with each participant spending an average of three hours per week on the app. The total amount of engagement data for all groups combined amounted to approximately 4,500 hours of interaction with the language learning application. The data was divided into pre-test, in-app activity, and post-test performance. Pre-test scores across the three language groups were relatively similar, with average scores of 45%, 46%, and 47% for Javanese, Sundanese, and Madurese, respectively. Post-test scores showed significant improvement, with average scores increasing to 75%, 77%, and 73% for each group.

Table 1. The key data points for each language group in terms of pre-test and post-test performance:

Language	**Pre-test Score (%)**	**Post-test Score (%)**	**Average Learning Time (Hours)**	**User Satisfaction Rating (1-5)**
Javanese	45	75	24	4.3
Sundanese	46	77	22	4.5
Madurese	47	73	23	4.0

The improvement in post-test scores for all groups indicates that the AI and gamification-based language learning application was effective in enhancing language proficiency for regional languages. The increase in scores suggests that the combination of AI's personalized learning features and gamification elements, such as levels, rewards, and challenges, contributed significantly to the participants' engagement and motivation. The highest satisfaction ratings were observed in the Sundanese group, where the user satisfaction rating averaged 4.5 out of 5, indicating that learners found the application highly engaging and enjoyable. In contrast, the Madurese group had a slightly lower satisfaction rating, suggesting that there may have been unique challenges in learning Madurese through the app, which could be explored in future studies.

The data also highlights differences in average learning time, with the Javanese group spending the most time on the application. The relationship between learning time and post-test performance indicates a positive correlation, where more time spent on the app resulted in greater improvements in language proficiency. However, the differences in learning time across the groups also suggest that certain languages may require more intensive engagement to achieve similar learning outcomes. This could reflect the varying complexities and challenges inherent in each language and the way

learners interacted with the content. Future research should examine how language-specific factors affect engagement and learning time, especially in relation to less widely spoken regional languages.

The descriptive data collected from the surveys indicated that participants felt more motivated to continue learning due to the gamification aspects of the application. Many users reported that the points and reward systems were key motivators for continued engagement. A significant percentage (78%) of participants across all groups indicated that the integration of game-like features, such as earning rewards after completing levels, improved their overall experience and kept them engaged in the learning process. Additionally, 65% of participants noted that the personalized feedback provided by the AI helped them understand their mistakes and guided them towards more effective learning strategies.

On the other hand, some participants (around 22%) mentioned challenges in understanding the linguistic nuances of the regional languages, particularly in relation to pronunciation and grammar. These difficulties were more prominent in the Madurese group, which may have contributed to the slightly lower post-test scores and satisfaction ratings. The feedback suggests that while the AI and gamification features were effective for vocabulary and sentence structure, further enhancement in the pronunciation and contextual usage of words is necessary. This feedback highlights the need for future iterations of the application to incorporate additional features that address these gaps, such as voice recognition and more immersive language exercises that focus on practical conversation.

Inferential analysis conducted on the pre- and post-test scores revealed statistically significant improvements in language proficiency across all groups, with a p-value of less than 0.01. A paired sample t-test indicated that the post-test scores for Javanese, Sundanese, and Madurese were significantly higher than their respective pre-test scores, confirming that the AI and gamification-based approach positively impacted language learning. The analysis also revealed that the Sundanese group exhibited the most significant improvement in both test scores and satisfaction ratings, with the difference in pre- and post-test scores showing a p-value of 0.003, which is considered highly significant.

Regression analysis showed that the amount of time spent on the application was a significant predictor of post-test performance, with a regression coefficient of 0.45 ($p < 0.05$). This suggests that participants who dedicated more time to using the app were more likely to show greater improvements in language proficiency. The results further suggest that the effectiveness of the application may be influenced by the level of user engagement, which is often higher when gamification elements are included. This reinforces the importance of designing language learning applications that not only provide educational content but also motivate users to engage consistently through interactive features.

Relational data analysis revealed that participants who spent more time engaging with the application tended to have higher post-test scores, with a strong positive correlation between learning time and language proficiency improvement ($r = 0.78$, $p < 0.01$). However, the analysis also highlighted that increased learning time did not

always correlate with higher satisfaction scores. For example, the Madurese group spent similar amounts of time on the application as the Javanese and Sundanese groups, but they reported lower satisfaction and less improvement in post-test scores. This suggests that while time spent on the app contributed to improved language learning outcomes, the quality of engagement and the appropriateness of content for each language played a significant role in overall satisfaction and learning success.

The study also found that participants in the Javanese and Sundanese groups, who spent more time interacting with both text-based and voice-based components, exhibited higher language retention and more positive attitudes towards the application. This suggests that incorporating a variety of content types, such as visual aids, voice interaction, and sentence construction challenges, may be more effective for certain languages. This relationship between engagement type and language learning outcomes emphasizes the need for a personalized and adaptable learning approach that takes into account both the language being learned and the individual learner's preferences and needs.

A case study of a participant learning Javanese highlighted the effectiveness of the AI-driven feedback and gamification in improving language retention. The participant, who initially struggled with the sentence structure and vocabulary, reported that the personalized feedback provided by the AI helped them understand their mistakes and motivated them to engage more with the language content. The participant also expressed that the gamified elements, such as the point system and levels, made the learning process more enjoyable and encouraged them to spend more time on the application. This case study illustrates how the combination of AI and gamification can significantly enhance engagement and language retention, particularly for users who may find traditional language learning methods less motivating.

Conversely, a case study involving a participant learning Madurese revealed challenges in understanding complex grammatical structures and vocabulary that were not adequately addressed by the application. The participant struggled with certain syntax and cultural nuances that were important for fluent language use, and while the gamified elements kept them engaged, they expressed frustration with the lack of in-depth support for pronunciation and real-world application. This case study highlights the need for future improvements, such as incorporating more context-specific scenarios and interactive speaking exercises to address the specific challenges posed by learning regional languages with complex grammar and vocabulary.

Explanatory analysis of the data suggests that while the AI and gamification-based language learning application significantly improved language retention and engagement, certain elements of the application need to be refined to address specific language learning challenges. The combination of personalized feedback, gamification, and diverse learning methods was particularly effective in motivating users and enhancing their language skills. However, the challenges faced by learners of Madurese highlight the need for additional resources, such as voice recognition features and more detailed grammatical exercises, to support the acquisition of regional languages with intricate syntax and less accessible resources.

The data also suggest that the success of language learning applications in revitalizing regional languages depends on a combination of effective content delivery and user engagement. While gamification was effective in maintaining user interest, the quality of language instruction, particularly for pronunciation and context-specific usage, remains a critical factor in ensuring that learners can progress in mastering a regional language. Future iterations of the application should incorporate additional features that address these aspects, such as more interactive speaking tasks and real-world scenario-based learning. These improvements would help maximize the application's potential in revitalizing regional languages and make language learning more immersive and practical.

In conclusion, the study shows that AI and gamification-based language learning applications are effective tools for revitalizing regional languages, with improvements in language retention and user engagement. While the application performed well in motivating learners and improving language proficiency, challenges such as language complexity and the need for more context-specific learning strategies must be addressed in future iterations. The findings highlight the importance of personalized and multimodal approaches to language learning, particularly in the context of regional languages, and provide valuable insights for designing more effective language learning applications. Further research should focus on refining these technologies to improve pronunciation, grammar, and cultural context, ensuring that regional languages continue to thrive in the digital age.

This study explored the effectiveness of an AI and gamification-based language learning application designed to revitalize regional languages. The results demonstrated significant improvements in language retention and learner engagement across all target languages: Javanese, Sundanese, and Madurese. Participants showed an average increase of 30% in their post-test scores compared to their pre-test performance, with the Sundanese group showing the highest improvement in both language retention and user satisfaction. The gamification features, such as rewards, levels, and progress tracking, were particularly effective in maintaining motivation, while AI-driven personalized feedback helped learners better understand their mistakes and improve their language skills. Despite these positive outcomes, some challenges were noted in the application's ability to fully address the complexity of regional languages, particularly in areas such as grammar and pronunciation.

The findings of this study align with existing research that has highlighted the positive effects of gamification in language learning (Reinders & Wattana, 2014). Gamification has been shown to improve motivation and engagement, leading to higher learning outcomes in language education. Similarly, the role of AI in personalized learning is consistent with studies by Heffernan and Heffernan (2014), which suggest that AI can significantly enhance the learning experience by providing adaptive feedback and support. However, this study extends previous research by focusing specifically on regional languages, which have been largely underrepresented in the field of language learning technology. While previous studies have primarily focused on mainstream languages like English or Spanish, this research demonstrates that AI and

gamification can also effectively support the learning of regional languages, offering a novel contribution to the field of educational technology and language preservation.

The results signify that technology, specifically AI and gamification, can play a pivotal role in revitalizing regional languages, offering a scalable and engaging solution to the challenges of language preservation. By using AI to tailor learning experiences and gamification to sustain motivation, these technologies address key barriers to learning regional languages, such as lack of resources and learner disengagement. The positive impact on engagement and retention suggests that combining these two technologies creates an environment where learners are not only motivated but also receive the personalized support they need to succeed. The study underscores the potential for technology to empower learners and promote the survival of regional languages, which are often marginalized in the digital space.

The implications of these findings are profound for both language education and regional language preservation. As more learners engage with regional languages through AI and gamified applications, there is potential for greater cultural awareness and linguistic diversity. This approach could pave the way for the widespread adoption of regional language learning tools, ensuring that these languages are passed down to future generations. The findings also suggest that AI and gamification can be effectively integrated into language learning applications, making them not only more interactive but also more inclusive. These technologies offer a means to bridge the gap between traditional learning methods and modern educational needs, potentially transforming the way language education is approached in both formal and informal settings.

The results reflect the growing need for innovative language learning methods, particularly for underrepresented languages. Regional languages are often neglected in mainstream educational systems, and traditional language teaching methods fail to capture the interest of younger learners. The combination of AI and gamification addresses this by providing a more personalized, engaging, and adaptive learning experience. AI-driven applications can tailor lessons to individual learners, providing immediate feedback and adjusting difficulty levels to match their progress, while gamification motivates learners by incorporating elements of fun and reward. The effectiveness of these technologies in revitalizing regional languages highlights their potential to engage and retain learners in ways that traditional methods cannot, offering a modern solution to an age-old problem of language preservation.

Future research should explore ways to refine the AI and gamification models used in this study to further enhance their effectiveness in regional language learning. For instance, incorporating voice recognition and advanced grammar correction systems could address some of the limitations observed in this study, particularly in areas like pronunciation and complex sentence structures. Expanding the study to include a larger and more diverse set of regional languages would also provide deeper insights into the broader applicability of AI and gamification in language revitalization. Moreover, research could focus on the long-term impact of these technologies on language retention and use in real-world settings. Future studies should also examine how these technologies can be integrated into formal education systems and community-based initiatives to ensure the sustainability and scalability of regional language revitalization

efforts. By enhancing and expanding these technologies, they could become a critical tool in preserving and promoting linguistic diversity around the world.

CONCLUSION

The most significant finding of this research is the successful integration of AI and gamification in the development of a language learning application that effectively engages users and enhances their learning of regional languages. The study demonstrated that the combination of AI-driven personalized feedback and gamification elements, such as rewards and progress tracking, significantly increased user motivation and retention of language skills. The application resulted in measurable improvements in language proficiency among participants, particularly for underrepresented regional languages like Javanese, Sundanese, and Madurese. These results underscore the potential of AI and gamification as powerful tools in revitalizing regional languages, making learning more accessible, engaging, and tailored to individual needs.

This research contributes to the field of educational technology by introducing an innovative approach to language learning through the combination of AI and gamification. The application of AI to personalize learning experiences based on user performance, alongside the integration of game mechanics to boost engagement, represents a novel approach in language education. While gamification has been widely used in education, its application in the context of regional language learning, especially with AI-driven customization, offers a unique contribution. This study not only explores how these technologies can be applied to regional languages but also provides evidence of their effectiveness in overcoming traditional barriers to language learning, such as lack of engagement and insufficient resources.

A limitation of this study is the relatively small sample size and the short duration of the study. Although the findings indicate that the AI and gamification-based application had a positive impact on learning outcomes, further research is needed to assess the long-term effects of using these technologies for regional language revitalization. Additionally, the study focused on a limited number of regional languages, and the results may not be fully generalizable to all regional languages, especially those with even fewer resources or less digital content available. Future research should expand the sample size and explore a wider range of regional languages to determine the scalability of the approach and to refine the learning application for broader applicability.

Future research should also explore the integration of additional features, such as voice recognition for pronunciation practice, to enhance the application's capabilities. Although the study showed positive results for vocabulary and sentence structure, pronunciation and natural language use were identified as areas for improvement. Additionally, investigating the potential for integrating this AI and gamification-based application into formal educational curricula, community programs, and offline settings could help ensure its sustainability and broader reach. As regional languages vary significantly in terms of linguistic structure, it would also be beneficial to customize the application further to suit specific linguistic features, providing even more tailored learning experiences for diverse learners.

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