



ARTIFICIAL INTELLIGENCE AND GAMIFICATION IN ENHANCING LANGUAGE LEARNING OUTCOMES

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ABSTRACT

AI and gamification have become a game-changer in language education, by providing personalized, adaptive and captivating learning experiences. Through questioning the theoretical frameworks that underpin these tools (self-determination theory, cognitive load theory) and examining how platforms like Duolingo, Quizlet, Babbel and Memrise use AI and gamification, this article explores these issues. Using case studies and an in-depth discussion on the aims and effects of these technologies, this article further looks at challenges and path forward including trying to build immersive technologies such as virtual reality (VR) and natural language processing (NLP).

Introduction

Learning a language is usually thought of as memorizing vocabulary, drilling grammar and doing the same or similar things over and over again. But the digital age has ushered in new tools for learners to interact with language, and using those tools can make a big difference in how much they get out of the study time. Two of the leading innovations in this revolution are artificial intelligence and gamification, changing the world of language learning. AI provide personalized, real-time adaptive learning paths and gamification incorporates game mechanics to non-game contexts also enhancing motivation and engagement (Kulik & Fletcher, 2019). This article we will be examining the relationship between AI and gamification in platforms such as Duolingo, Quizlet, Babbel and Memrise.

The Role of Gamification and AI in Learning Language

Gamification has been appreciated as an approach that enhances the engagement of learners by meeting basic psychological needs competence, autonomy, and relatedness (Ryan & Deci, 2000). This approach is absent in traditional language learning, contributing to dropout because the drills and grammar exercises are Boring AF. Gamification changes this dynamic by adding game-like fun features like points, badges, and leaderboards. They appeal to intrinsic motivation, making learning less intimidating and more rewarding (Seaborn & Fels, 2015).

AI reinforces the sound of gamification with personal and adaptive exercises, this is what each learner has to be challenged at their appropriate level. AI adapts task difficulty to

live data about learner performance, adjusting content so it's neither too challenging nor too simple (Deterding et al., 2011). This aids in avoiding cognitive overload, which can lead to learning when learners are overloaded by complex tasks (cognitive load theory) (Sweller, 1994).

Language learning platforms that use AI: Duolingo, Quizlet, Babbel and Memrise

Many AI-based platforms have effectively added gamification. Language learning has been similarly transformed with machine learning algorithms and spaced repetition (Loewen et al., 2019) enabling platforms such as Duolingo to constantly modulate the difficulty of lessons, reinforcing learning at supposedly optimal intervals. This way, students are always engaged and have just the right amount of challenge.

Likewise, through AI-driven personalized quizzes, Quizlet allows for dynamic team play to enhance vocabulary retention (Wang & Tahir, 2020). Babbel's emphasis on spaced repetition – powered by AI that determines the best time for learners to review vocabulary means one does not just memorize; they remember and recall information at the right point for maximum impact. Memrise takes this idea a step further by employing artificial intelligence to bring in words and phrases as if learners were hearing them in the experiences of living language, thus naturally learning the language (Miangah & Nezarat, 2021).

Case Studies Demonstrating Impact

There are a number of case studies that highlight the success of AI-powered gamification in language learning. Indeed, studies conducted on Duolingo revealed that 34 hours of online study with this platform correspond to a university level language course (Vesselinov & Grego, 2020). This result indicates the effectiveness of the system for higher quality educational delivery in limited time.

Learning effects have also been revealed by research on Quizlet's AI-assisted gamified quizzes on vocabulary retention (Wang & Tahir, 2020). Meanwhile, Memrise has also been found to be an effective vehicle for contextual learning when the learners' vocabulary retention and practical use have enhanced with AI (artificial intelligence)-enabled context-based learning (Miangah & Nezarat, 2021).

AI-based gamification is rooted in established psychological and pedagogical theories. According to the self-determination theory (SDT), learners will feel more motivated when they perceive competence, autonomy, and relatedness (Ryan & Deci, 2000). Gamification utilizes these desires by providing rewards (competence), handing over control of learning to students (autonomy), and promoting social interactions via leaderboards, multiplayer modes, etc.

Cognitive load theory (Paas & Sweller, 2012) supports SDT by stressing the need to optimise cognitive resources. When exposed to an instructional environment where they receive information at the instruction level that is complicated and difficult, learning load may increase more than their cognitive resources can sustain, causing the learning result to be declined (Sweller, 1994). And by making it possible for AI to adapt the complexity of tasks, learners are less likely to be frustrated and will learn in a more productive way.

Also constractive learning theory is essential for efficacy of AI gamification. It assumes that learners create their own knowledge through experience and interaction (Vygotsky,

1978). AI-based gamified platforms fit into this theory by promoting interactive and hands-on learning, but not passive learning.

However, despite the great promise of AI and gamification applications in language learning, various problems still persist. Access and equity problems remain especially in marginalized areas where such required technology is not readily available. Digital inequality problems have been preventing many students to take advantage of such advanced educational resources (Nouri, 2020). Societal responses to this challenge include the promotion of open educational resources (OERs) with premium content being available for free and the establishment of platforms capable of working in low bandwidth settings (UNESCO, 2021).

The training of teachers is also a challenge because many are not aware of how AI driven gamification works. So with no guidance, the power of such tools is not fully exploited (Mayer & Fiorella, 2021). Professional growth courses that are designed to help teachers develop the skills that they need to be able to implement AI, as well as gamification into their teaching can help address this issue.

Another issue is content alignment. AI-based systems are also often at cross-purposes with formal curricula, creating a time lag between what students are taught in school and what they learn on platforms like IV from Kapp(2019) The challenge is that practitioners may not consider these factors when developing AI-based infrastructures intended to support robust educational environments. Hybrid teaching models, where AI-generated work is supplemented with teacher-led instruction, PCs and other classroom materials can be used to make sure the AI tools are integrated with what students learn in class.

Future prospects are also promising for the AI-led gamification in language learning. Virtual Reality (VR) and Augmented Reality (AR) are becoming robust instruments to produce complete immersion language learning settings in (Aziz et al., 2020). Such technology enables learners to practice language skills in virtual environments that simulate the real-world usage, providing a better opportunity for context-based learning.

Another AI subfield that has the potential to transform language learning is natural language processing (NLP). Through carrying out advanced analysis on learner's responses, NLP can also offer in-depth insights to grammar rules/pragmatic/usages (Wang & Liu). And as AI advances, language learners are in line to gain even more personalized, responsive and immersive learning experiences.

Conclusion

The blend of AI and gamification in language learning Create a total package for enhanced learner engagement and results. They do so through personalized, adaptive and immersive experiences, enabling learners to stay inspired and supported as they navigate their learning path. Although there are still issues to be overcome, including the issue of access to technology and teacher training as well as content-relevance, solutions exist that will help move these technologies to scale. The future of AI-powered language learning looks promising, with VR, AR and NLP developments ensuring the latest innovations will continue to deliver a more immersive and efficient learning experience.

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