

Transforming Gamification into User Experience Through Interaction Design: A Case Study of Duolingo

Zhuoxi Yang

Xi'an TieYi International Curriculum Center, Xi'an, China
yangbaoer2027@163.com

Abstract. The increasing adoption of digital learning platforms has highlighted the importance of user experience (UX) in promoting learner engagement, motivation, and long-term participation. While gamification has become a widely used strategy in educational applications through mechanisms such as points, rewards, streaks, and leaderboards, the effectiveness of these elements depends on how they are integrated into interaction design. This study aims to investigate how gamification mechanisms shape user experience through interaction design, using Duolingo as a case study. A qualitative case study methodology is adopted, combining theoretical analysis with platform observation to examine how interaction design strategies transform gamification features into meaningful user experiences. The analysis focuses on five key dimensions: progress visualization, feedback interaction, reward interaction, social interaction, and emotional interaction. The findings demonstrate that gamification mechanisms alone do not directly generate positive user experiences; rather, interaction design plays a central role in transforming motivational elements into meaningful interactions and shaping users' cognitive and emotional responses. Through interactive progress tracking, immediate feedback, reward systems, social engagement, and emotional micro-interactions, Duolingo enhances user motivation, satisfaction, and continuous learning engagement. Based on these findings, this study proposes a conceptual framework that explains the relationship between gamification mechanisms, interaction design strategies, and user experience outcomes. This framework extends existing understandings of gamification by emphasizing the importance of interaction processes in creating meaningful digital learning experiences. The study provides practical implications for educational technology designers by highlighting the need to integrate gamification with user-centered interaction design principles.

Keywords: Gamification, Interaction Design, User Experience, Digital Learning, Duolingo

1. Introduction

With the development of online courses and other platforms, many people have started to learn through these channels and have changed their way of studying. Therefore, the user experience (UX) of a system can affect how often and how well users use it [1]. To enhance the interest of students in digital learning, many educational applications have started to add game elements such as points, badges, progress tracking, challenges and social competition [2]. Gamification does not add only

game elements to educational products. In practice, the results of gamification depend on how well these mechanisms are combined with interaction design and what level of motivation they can motivate in users. Most of the previous research has focused on how gamification affects people's motivation and learning results, and less attention has been paid to the Design of interaction that creates a good experience for users through gamification.

Duolingo is a typical case of applying gamification and interaction design in digital education. Duolingo has introduced many features to make learning more enjoyable and engaging, such as learning streaks, experience points, achievement systems, leaderboards, instant feedback and character-based interactions, etc., to provide a fun learning experience [3]. Therefore, a study of Duolingo from the perspective of interaction design can provide some references for improving user experience through gamification.

Research is being conducted on the impact of gamification on user experience via interaction Design. Duolingo is a typical case, and the primary interaction design strategies in this paper are progress visualisation, feedback interaction, reward design, social interaction and emotional interaction. Based on the application of gamification and interaction Design principles, this paper introduces a system that can enhance user engagement and create an effective interactive learning environment for educational applications.

2. Theoretical foundation

2.1. User experience of digital learning applications

UX refers to the general sense, emotions and behaviour that users have after using a product or system [4]. UX in the context of digital learning environments also includes users' sense of being engaged, satisfied, happy, and willing to use the platform continuously. A good learning experience should help users achieve their goals of learning and inspire them with positive emotions to keep learning. Educational Applications need to motivate users to study persistently for extended periods, so they require higher engagement. Therefore, the design of interactive features in digital-learning platforms now aims to reduce cognitive load and offer rich feedback that can motivate students to learn actively. Therefore, UX can be used to explore how the design of something will affect people's emotions and behaviour [5].

2.2. Interaction design and user experience

Interaction Design (IxD) is the design of meaningful communication between users and digital systems to optimise how users interact with interfaces and perform tasks to create a good experience during interaction [6]. Interaction Design refers to not only the appearance of a product but also how people use a technological system; how information is displayed and operated; how the system responds to changes in user behaviour, etc. Finally, we hope to build interactions that are high-efficiency, easy-to-understand, interesting and emotionally resonant.

Interaction Design is based on some basic ideas from the theory side. Norman believes that a good user interface should be clearly visible, provide suitable feedback, have intuitive affordances, use natural mappings, and have reasonable constraints to help users understand what actions are available [7]. Interaction Design in Educational Technology also aims to motivate and engage learners by improving their experience. Interactive components of the system include real-time feedback, progress display, animations, adaptive prompts, badges and micro-interactions to continuously communicate with the learner. The design mechanism reduces uncertainty, reinforces

the successful behaviour, and makes people feel competent and successful. In addition, a good interaction sequence can support learner autonomy by providing choices for the learners and offering different degrees of difficulty through adaptation.

2.3. Gamification and its application in interaction design

Gamification is applying game elements in non-game environments to motivate people to participate more willingly. Typical gamification devices are points, badges, levels, challenges, rewards and leaderboards. Many of these mechanisms are used in the digital learning environment to promote participation, offer feedback and support continuous learning. Gamification is not inherently positive for the user. The Degree of gamification is determined by how these mechanisms are displayed and felt through interaction design. Points and rewards can motivate people better when shown in a clear progress display, given promptly and receiving emotional encouragement. Therefore, gamification should be regarded as a type of interactive Design rather than merely a set of game elements.

Based on the connection between UX, interaction design and gamification, this paper proposes a system of concepts(see figure 1). Gamification in this system aims to motivate users; interaction design determines how users experience this gamification; and UX is the resulting emotions and behaviours of the users.

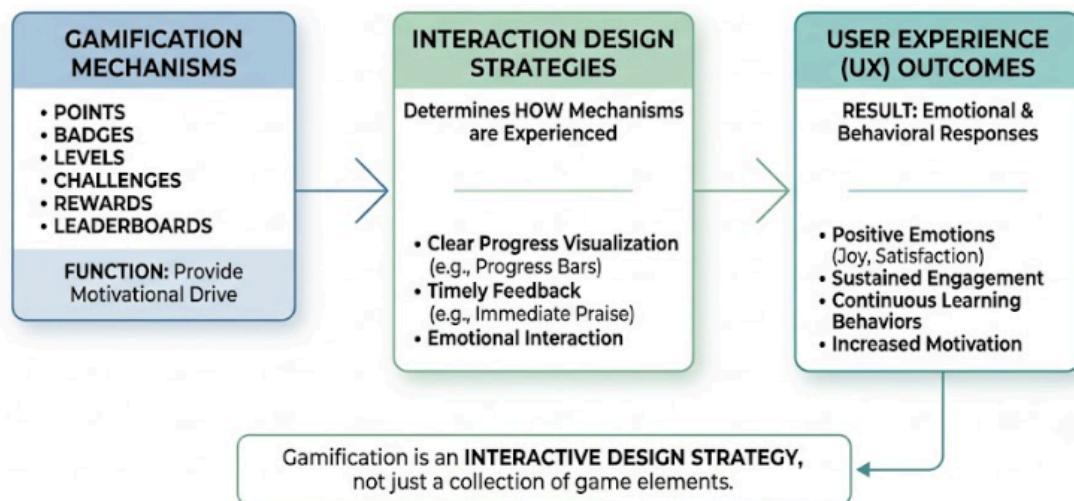


Figure 1. Conceptual framework

3. Case study: interaction design in Duolingo

Duolingo is a typical case of integrating gamification in digital learning through interaction design [3]. Duolingo is not externally motivated; instead, many game features have been integrated into the learning process, such as tasks, progress tracking, feedback displays and social functions. Through the above interactive methods, language learning on the platform can be made more interesting and emotionally rewarding for users [8]. The five aspects of Duolingo's interaction design in this paper are progress display, response-to-feedback, incentive construction, social sharing and emotional support.

3.1. Progress visualization design: supporting continuous engagement

Progress visualisation is a basic way that Duolingo uses interaction design to show users their learning progress in an accessible and understandable manner. In the old way of learning, students may not feel a gradual improvement in their grades because it takes a long time. Duolingo has added several types of gamification to its interface design, such as learning paths, experience points (XP), levels and streaks [8]. Duolingo's learning path is a series of organised tasks and progressive stages for the language course, for instance. Instead of a typical textbook-style learning path, the platform will present the learning process as interactive steps and achievements. Show users their current position, finished tasks and pending issues at a glance. This Design reduces the risk of the unknown and provides students with a clear learning path.

The XP system will also make the learning process more tangible through measurable results. Exercise completion will add XP to show how far you have gone [9]. XP does not have direct teaching benefits, but it can make users feel a sense of accomplishment and be more willing to continue using the system. A streak mechanism records consecutive learning days and shows users' consistency with a visual indicator. The Progress tracker is connected to a display, and users are motivated by a sense of achievement to keep studying. Duolingo's progress visualisation can be seen as an application of gamification principles to improve the user experience through interface Design. Award points to users and add an interactive progress system to help them feel more accomplished, be motivated to achieve goals, and participate more often.

3.2. Feedback system: improving learning experience through prompt response

A type of Interaction Design that offers ongoing guidance and evaluation for users during their learning in a digital environment is called feedback [10]. Duolingo has added real-time feedback to almost all the learning activities and can promptly inform users of any errors in their study. Complete the vocabulary, translation and pronunciation exercises in Duolingo, and then you will immediately be shown pictures and sounds. The correct answers are usually linked to positive cues, such as animations, sounds and encouraging words, and incorrect answers are followed by explanations or corrections to help users learn from their mistakes. Promptly respond to users' operations so that they know how the system will operate, and this way it can be used conveniently.

Duolingo also offers some emotions through Design in addition to functional feedback. The reactions of the Duo character, congratulatory animations and encouraging messages offer support to the user during their studies. These emotions will make the system more appealing to the users; otherwise, they may be bored or frustrated when facing errors and difficulties during the practice. Duolingo is a representative case of interaction design that uses feedback functions to convey information and, at the same time, can also affect users' emotions and motivations [10]. Add cognitive feedback and emotional rewards to help the user feel more accomplished and motivated to learn, thus improving their motivation for study.

3.3. Reward interaction design: converting achievement into user motivation

Among the most typical applications of gamification in Duolingo's interaction design are reward mechanisms. Many types of rewards are available in the system, such as experience points, gems, badges, daily quests and achievement milestones, etc., to motivate users to keep learning. The Effect of these rewards will also vary according to how they are presented in the user interface and other Design elements. For example, after completing a lesson, Duolingo will show that you have gained

some XP, and this will be accompanied by animations and other visual effects in the reward process. The interactive display is now an achievement of learning, not just a number.

Another typical case of a reward mechanism in user flow is the Daily Quest system. Set achievable goals and display how far they have gone to motivate learners to continue learning by doing small tasks. Instead of asking for long-term learning commitments, the system sets small, achievable interactive goals and is therefore easier to participate in. The Design of interaction includes rewarding users with experiences rather than granting them rewards directly. Duolingo presents visual feedback, uses timing, links to learning activities, and thus creates an external reward that is meaningful and motivates learners to keep learning.

3.4. Design of social interaction: creating engagement through competition and connection

Another kind of gamification in Duolingo is social functions. Although most people are aware that language learning can be done alone, Duolingo has also added some social functions to help students feel a sense of community and motivation, such as leaderboards, leagues and friend challenges. The Leaderboard System is a typical case. Based on the amount of XP a user has accumulated, they will be ranked among other users to see who is learning better [9]. Display the rank of learning behaviour and other indicators graphically to show students' achievements in society. This design of interaction encourages more users to participate and feels like a competition or recognition.

Duolingo also has some cooperative social features, such as friend quests and group challenges, besides competition. The above attributes can enable users to learn together in a social setting and be more accountable. Besides internal reasons, other external social connections within the platform are also motivations for staying on the platform. Duolingo's social features show that gamification can also expand the range of people who use the system for self-study. Add a social comparison, cooperation and community participation area in the interface to make users feel a sense of belonging and stay longer.

3.5. Emotional interaction design: creating user attachment through micro-interactions

In addition to the functions and motivations of use, emotion design is also applied to create an enjoyable and memorable user experience. Character design, animation, playful language and micro-interactions can all be employed to create an emotional bond between users and the learning system [11]. One of the most well-known applications of emotional design in Duolingo is the Duo character. Duo is a visual mascot that also appears in many places during the learning process to provide reminders, encouragement and humour. An anthropomorphic Design can give the platform a sense of humanity and help people feel that it is a good study buddy.

Duolingo also uses many micro-interactions to create moments of joy in the daily learning process, such as celebration animations after completing a lesson, expressive character reactions and playful interface responses. These small interactive functions can make the learning of Chinese less dull and more enjoyable for students. Interaction Design can evoke emotions in users and, thus, create positive feelings and stronger connections between users and the digital system to enhance the user experience. Duolingo shows that in order to build a good gamified learning experience, both motivation and rewards need to be provided, and the design of interactions should also arouse emotions carefully.

4. Discussion

A case study of Duolingo shows that a gamification mechanism alone is not enough to create a good user experience; therefore, Interaction Design should be used to build an attractive interactive environment for users. Points, streaks, rewards and leaderboards are effective because they have been included in good interactive processes, such as progress display, immediate feedback and emotional response. The above strategies will help Duolingo change the nature of language learning from task-oriented to interest-driven, thereby motivating students to study willingly and for a longer time.

Based on the Design of interaction, this study proposes that gamification should be viewed as a whole-system Design approach rather than just a set of game elements. Gamification and user experience refer to how much users feel and are motivated to participate in a gamified environment. The new framework is as follows: Gamification Mechanisms → Interaction Design Strategies → User Experience Outcomes; its aim is to create meaningful interactions in line with the goals of learning and cognition, as well as in the emotions of users.

5. Conclusion

Duolingo is a typical case used to explore how gamification mechanisms create a user experience through interaction design. According to the above results, the gamification features of points, win streaks, rewards, leaderboards and achievements do not automatically enhance user experience. They will be effective if they are included in the strategy for interaction design. Duolingo adds some basic gamification elements to create a more enjoyable and motivating study atmosphere via progress display, instant feedback, rewards for behaviour, social functions and emotional prompts. Interaction Design is required to connect gamification and user experience, and thus it can influence how users perceive, feel about, and behave in relation to both.

However, this study has some defects. First, this study employs a single case study method and focuses on Duolingo; therefore, the results may not be generalisable to other digital learning platforms or educational environments. Second, most of the analysis is based on theoretical explanations and platform observations rather than direct user data. Therefore, it cannot fully cover all the users' feelings, reasons or long-term behaviour changes. In addition, this paper will not explore how the new technologies will further change gamified learning in this study.

In the future, based on the above shortcomings, some researchers may select several digital learning platforms to conduct comparisons and integrate qualitative methods, such as user interviews and usability tests, with quantitative approaches, such as behaviour data analysis and experiments. In the future, AI, adaptive learning systems and personalised interaction design will also be used to explore how gamification affects the user experience. Based on the above exploration, it can be seen that new interactive technologies have gradually been introduced to improve the quality and effectiveness of online education.

References

- [1] Sutcliffe, A. (2016). Designing for user experience and engagement. In *Why engagement matters: Cross-disciplinary perspectives of user engagement in digital media* (pp. 105-126). Cham: Springer International Publishing.
- [2] Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in e-learning: A literature review. *Technology, Knowledge and Learning*, 27(1), 139-159.

- [3] Kherazi, A., & Bourray, M. (2024). Gamification and m-learning: An innovative approach to sustainable language learning. In *E3S Web of Conferences (Vol. 477)*, p. 00066. EDP Sciences.
- [4] Hartson, R., & Pyla, P. S. (2012). *The UX book: Process and guidelines for ensuring a quality user experience*. Elsevier.
- [5] Nasution, W. S. L., & Nusa, P. (2021). UI/UX design web-based learning application using design thinking method. *ARRUS Journal of Engineering and Technology*, 1(1), 18-27.
- [6] Stanney, K. M., Hughes, C., Nye, H., Cross, E., Boger, C. J., & Deming, S. (2024). Interaction design for augmented, virtual, and extended reality environments. In *Human-Computer Interaction* (pp. vol4-355). CRC Press.
- [7] Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic Books.
- [8] Shortt, M., Tilak, S., Kuznetcova, I., Martens, B., & Akinkuolie, B. (2023). Gamification in mobile-assisted language learning: A systematic review of Duolingo literature from public release of 2012 to early 2020. *Computer Assisted Language Learning*, 36(3), 517-554.
- [9] Topîrceanu, A. (2017). Gamified learning: A role-playing approach to increase student in-class motivation. *Procedia Computer Science*, 112, 41-50.
- [10] Qi, Y., & Xu, R. (2024). Research on user interface design and interaction experience: A case study from "Duolingo" platform. *EAI Endorsed Transactions on Scalable Information Systems*, 11(5), 61.
- [11] Dell'Aquila, E., Ponticorvo, M., & Limone, P. (2025). Psychological foundations for effective human-computer interaction in education. *Applied Sciences*, 15(6), 3194.