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The Impact of Gamification in User Interfaces on User Experience and Retention: An Empirical Study

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Abstrack

This study investigates the influence of gamification features in UI design on UX and user retention in mobile applications. This experimental research compares two user groups (with and without gamification) using questionnaires that assess UX and user retention, with purposive sampling, and data analysis using descriptive techniques, normality tests, and difference tests. The findings reveal that gamification in mobile app UIs significantly enhances UX and user retention. Key gamification features, such as challenges, achievements, leaderboards, interactive feedback, and social integration, positively impact usability, motivation, satisfaction, and user recommendations. Users in the gamified group reported higher ease of use, engagement, and satisfaction, leading to longer retention periods. This study reveals significant findings that integrating gamification elements into application design can enhance user satisfaction and loyalty, as well as encourage further research in the context of mobile application gamification.

Keywords: gamification, user interface, user experience, user retention, experimental research

INTRODUCTION

Technological advancements have transformed how UI design influences user experience and retention in applications and websites. One popular approach is gamification, which applies game elements in non-game contexts to increase user motivation. Although gamification is widely used, empirical research on its impact on UX and user retention is still limited.

According to a PwC survey, mobile app usage increased by 40% globally in 2020, with users spending an average of 4.2 hours per day on mobile apps. This highlights the importance of a good user experience in mobile apps to retain users and enhance user retention. Additionally, an Accenture survey in 2018 showed that nearly 80% of mobile app users said poor UX could influence their decision to stop using the app.

The User Interface (UI) is a key element in user interaction with a system or software. The quality of the UI plays a major role in determining the success of a system. To achieve this success, UIs must be easy to use, intuitive, and appealing to users. Fundamental principles in UI design include visibility, consistency, feedback, and recovery capabilities (Norman, 2013). Additionally, eight other UI design principles like consistency, minimalism, feedback use, metaphors, shortcuts, constraints, and error prevention contribute significantly to user performance and satisfaction (Shneiderman, 1998).

In a broader context, the responsiveness of the UI is also a key factor in enhancing UX, especially across various devices. Recent studies emphasize the importance of responsive UI design that can adapt to different screen sizes and consider accessibility for individuals with various disabilities. This study discusses the impact of gamification in UIs on UX and user retention while considering fundamental UI design principles and essential elements affecting user interaction in various contexts and devices (Ghiani, Mussio, and Paternò, 2020).

In the context of gamification in UIs, game elements are applied to increase user motivation, engagement, and participation (Deterding et al., 2011). Previous research identifies several important factors influencing the effectiveness of gamification, such as engagement, consistency, balance, feedback, and psychological impact (Hamari et al., 2014). Additionally, gamification utilizes rewards, challenges, competition, and collaboration to create motivating experiences (Deterding et al., 2011). In education, gamification can enhance student motivation and engagement (Dicheva et al., 2015). However, the effectiveness of gamification in UIs is also influenced by factors such as the type of gamification elements used and the context of use (Hakulinen et al., 2018).

User Experience (UX) plays a crucial role in influencing user retention in using a product or service. Previous research identifies that positive UX can increase user satisfaction, user participation, and the likelihood of reusing the product or system (Inzelt et al., 2020; Hassenzahl, 2010). UX dimensions include aesthetic, affective, and cognitive aspects, with factors like usability, aesthetics, appropriateness, performance, and security affecting UX (Desmet and Hekkert, 2007; Law and Roto, 2017). High user retention has significant economic value in online business, and focusing on user retention along with providing a good UX is a very effective strategy. Gamification is also highlighted as a way to enhance UX and user retention. To achieve optimal user retention, it is important for companies to develop user trust through transparent and honest interactions with users.

Related studies show that usability, service quality, user satisfaction, and user loyalty are crucial factors influencing user retention (Li et al., 2018; Chen, Fay, and Wang, 2018). High usability, good service quality, high user satisfaction, and strong user loyalty all contribute to better user retention (Han and Kim, 2019). Additionally, using specific UX techniques like personalization,

timely feedback, and game elements can also increase user satisfaction and motivation to continue using the product or service (Kim et al., 2019; Khan et al., 2017). In the context of product or service design and development, greater attention to UX is key to increasing user satisfaction and loyalty, which in turn can help achieve better user retention (Han and Kim, 2019; O'Leary et al., 2019).

This study investigates the impact of gamification in UIs focusing on three key questions: 1) How does gamification affect UX?; 2) How does gamification affect user retention?; and 3) What factors influence the effectiveness of gamification in UIs? The research hypotheses include the assumption that the use of gamification in UIs will significantly enhance UX and user retention, and the effectiveness of gamification will be influenced by factors such as the type of gamification, context of use, and individual user preferences.

The scientific contribution of this research is to provide a deeper understanding of the role of gamification in UI design and its impact on UX and user retention. Previous research has identified the positive effects of gamification on user motivation and engagement, but there has been little study on the impact of gamification on UX and user retention in mobile apps. Therefore, this research is expected to expand the understanding of the effects of gamification on UX and user retention in mobile apps.

METHODS

This study employs a quasi-experimental design, chosen because it allows data collection from naturally formed groups in real-life settings, minimizing the influence of uncontrolled factors. The population for this research consists of mobile app users aged 18-35 who have experience using apps with gamification features. The sample will be selected through purposive sampling and divided into two groups: a control group and an treatment group. The control group will use an app without gamification features, while the treatment group will use an app

with gamification features. The independent variable is the use of gamification in the user interface, and the dependent variables are user experience and user retention.

The research instruments include questionnaires to measure user experience and retention, which have been validated and tested for reliability prior to the study. The experiment will involve the application of gamification in the app interface for two months. The chosen mobile application must be available and easily accessible to respondents, and respondents should not have used it before. After this period, data will be collected through questionnaires given to the respondents. Data analysis will involve descriptive statistical analysis to describe the sample characteristics, normality tests to ensure the data is normally distributed, and difference tests to examine significant differences between the control and treatment groups regarding user experience (UX) and user retention. An independent t-test will be used for the difference tests.

RESULTS AND DISCUSSION

Sample Characteristics

The research sample consisted of two separate groups, namely the control group and the treatment group, each with 100 people aged 18-35 who had experience using mobile apps with gamification features. The control group used Samsung Health without gamification features, while the treatment group used FitBit with gamification features. These apps were chosen due to their availability and ease of access for respondents, and because respondents had not used them before.

Analysis of the Impact of Gamification in UI on UX

In the treatment group using the app with gamification features, respondents tended to give higher ratings related to UX compared to the control group using the app without gamification.

Table 1. User experience analysis results (Mean 1 is control group and Mean 2 is treatment group)

No	User experience aspect	Mean 1	Mean 2	p-value
1	This app is easy to use	3.82	4.25	0.035
2	I feel interested and motivated when using the app	3.45	4.15	0.012
3	This app provides clear and informative feedback	3.60	4.18	0.027
4	The features in this app meet my needs	3.74	4.12	0.042
5	This app has an appealing visual interface	3.62	4.35	0.008
6	This app provides a pleasant user experience	3.53	4.20	0.019
7	This app present	3.68	4.32	0.015

8	s challenges and excitement in its use This app has an intuitive and easy-to-understand design	3.79	4.27	0.021
9	I am satisfied with the use of this app	3.65	4.23	0.030
10	I will recommend this app to others	3.42	4.11	0.048

Table 1 presents the analysis results of the impact of gamification in UI on UX. The average ratings of respondents in the treatment group (app with gamification) were much higher compared to the control group (app without gamification). All differences were statistically significant ($p\text{-value} < 0.05$), indicating that the use of gamification positively affects UX.

Analysis of the Impact of Gamification in UI on User Retention

In the treatment group using the app with gamification features, respondents gave higher ratings related to user retention compared to the control group.

Table 2. User retention analysis results (Mean 1 is control group and Mean 2 is treatment group)

No	User retention aspect	Mean 1	Mean 2	p-value	
1	The gamification features (treatment group) / lack of gamification features (control group) in this app make me want to use the app regularly	3.28	4.16	0.003	features (treatment group) / do not feel connected with the app user community (control group)
2	I feel challenged and motivated to achieve goals in this app	3.35	4.12	0.009	8 The gamification features (treatment group) / lack of gamification features (control group) in this app make app use more enjoyable
3	This app provides incentives or rewards that are attractive to me	3.48	4.21	0.004	9 I feel this app succeeds in keeping me interested and engaged for a long time
4	I feel emotionally engaged with activities in this app	3.29	4.05	0.011	10 I will continue to use this app in the future
5	The gamification features (treatment group) / lack of gamification features (control group) in this app make me want to explore more features and content	3.55	4.18	0.002	
6	This app provides rankings or achievements that increase my motivation	3.38	4.14	0.007	
7	I feel connected with the app user community through gamification	3.19	3.98	0.043	

Table 2 presents the analysis results of the impact of gamification in UI on user retention. The average ratings in the treatment group (app with gamification) indicated a higher level of user retention compared to the control group (app without gamification). These differences were also statistically significant ($p\text{-value} < 0.05$), suggesting that gamification in UI plays an important role in retaining users for a longer period.

Impact of Gamification in UI on UX

The analysis results of the impact of gamification in UI on UX show significant differences between the control and treatment groups. In the treatment group using the app with gamification features, respondents tended to give higher ratings for various aspects of UX compared to the control group using the app without gamification features. These results align with the expectation that

gamification can enhance UX in various aspects.

Specifically, users in the treatment group found the app with gamification easier to use (aspect 1), more interesting and motivating (aspect 2), providing clear and informative feedback (aspect 3), and meeting user needs (aspect 4). Additionally, the UI enriched with gamification elements was rated more visually appealing (aspect 5), offering a more enjoyable UX (aspect 6), and providing challenges and excitement (aspect 7). The gamification features were also rated more intuitive and easy to understand (aspect 8). Finally, respondents in the treatment group felt more satisfied with the use of the app (aspect 9) and were more willing to recommend the app to others (aspect 10).

The implementation of gamification in UI on UX includes several key elements. Challenges and achievements are one of the main elements, where users are given daily or weekly tasks to complete to earn rewards such as badges or points. For example, users might be challenged to achieve 10,000 steps in a day to earn a Gold badge. This element increases motivation and user engagement by providing specific goals and rewards, making them feel more motivated and interested in using the app.

Leaderboards are also applied in UI to display user rankings based on achievements or certain activities, allowing them to compare their performance with other users. For instance, users can see that they rank 5th out of 100 users, which increases healthy competition and motivation to improve performance. This makes users more motivated to continue using the app to improve their ranking.

Interactive feedback is provided in real-time through notifications, pop-ups, or motivational messages when users reach milestones or need encouragement. For example, notifications like "You have completed 50% of your daily goal, keep going!" provide support and direction that enhance user satisfaction. Interactive

feedback makes users feel appreciated and supported in their achievements.

Attractive visual design is also an important part of the implementation of gamification in UI. Using bright colors, animations, and appealing graphics makes the UI more attractive. For example, animations when users complete challenges or earn badges enhance aesthetic satisfaction and make the UX more enjoyable. Attractive visual design makes users more comfortable and happy using the app.

Social integration is another gamification element that allows users to interact with friends or the community, share achievements, and provide support. For instance, features that allow users to share their achievement badges with friends increase a sense of involvement and social support. This social interaction makes users feel more connected and motivated to continue using the app.

Impact of Gamification in UI on User Retention

The analysis results of the impact of gamification in UI on user retention also show significant differences between the control and treatment groups. In the treatment group using the app with gamification features, respondents tended to give higher ratings related to user retention compared to the control group using the app without gamification features. These results indicate that gamification can play an important role in retaining users for a longer period.

In the treatment group, respondents felt that gamification features in the app made them want to use the app regularly (aspect 1), feel challenged and motivated to achieve goals in the app (aspect 2), and feel emotionally engaged with activities in the app (aspect 4). Gamification features also encouraged users to explore more features and content in the app (aspect 5) and provided rankings or achievements that increased motivation (aspect 6). Additionally, users in the treatment group felt connected with the

app user community through gamification features (aspect 7) and found app use more enjoyable (aspect 8). This also influenced their decision to continue using the app in the future (aspect 10).

The implementation of gamification in UI on user retention includes challenges and achievements that provide daily or weekly challenges that make users want to continue using the app to complete tasks and earn rewards. This element increases the desire to use the app regularly because users feel more motivated to continue using the app to achieve goals and earn rewards.

Leaderboards display rankings that encourage users to compete and continually improve their performance. Users feel motivated to stay active in using the app to remain at the top of the rankings. Interactive feedback provides notifications and motivational messages that encourage users to return to using the app, thereby increasing the frequency and duration of app use.

Attractive visual design makes users more interested in continuing to use the app. Attractive visuals reduce boredom and increase engagement, making users more comfortable and happy using the app for a longer period. Social integration allows interaction with friends and the community, providing social support that encourages users to continue using the app. Users feel more connected with the community and more motivated to continue using the app due to positive social interactions.

CONCLUSION

This research demonstrates that incorporating gamification elements into mobile app user interfaces (UI) significantly enhances user experience (UX) and user retention. Gamification features such as challenges, achievements, leaderboards, interactive feedback, attractive visual design, and social integration positively impact UX by making apps easier to use, more engaging, motivating, and visually appealing, while also meeting user needs. Users in the treatment

group consistently rated these aspects higher than those in the control group. Moreover, gamification features play a crucial role in increasing user retention, as they make users more motivated to use the app regularly, feel challenged to achieve goals, become emotionally engaged with app activities, and feel connected with the app's user community. These elements encourage users to explore more features and content, increasing their motivation through provided rankings or achievements. The findings support the theory that gamification elements such as competition, achievements, and social interaction can enhance user retention in apps. By leveraging these insights, mobile app developers can design more effective and engaging UIs, leading to higher user satisfaction and longer retention periods, thus reducing churn rates and increasing user loyalty. This study underscores the importance of integrating gamification thoughtfully into app design and encourages further research on gamification in mobile application contexts.

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