

Gameful interaction: How principles of game design can be applied to enhance user experiences in non-game applications

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Abstract. In the era of digital transformation, the integration of game design and interaction design has become an important trend, and its scope of application has gone beyond purely entertaining applications. This thesis investigates the principles of gamified interaction with a focus on how game design elements can be utilized to enhance the user experience in non-game applications. The research objective of this thesis is to investigate the effectiveness and limitations of gamification design in a variety of contexts when incorporating it into educational, business, health, and other types of applications. The study employs a mixed research methodology, which includes analysis and comparison of the literature, as well as a specific case study of the Chinese fitness app "Keep" to demonstrate real-world applications. The data for this study came from existing academic papers, app analysis, user feedback and design evaluation. This thesis finds that gamified interactions have a significant impact on user engagement and motivation, providing valuable insights for designers to create more engaging digital environments.

Keywords: Gameful Design, Gamification, User Experience, Interaction Design, Productivity Apps

1. Introduction

The digital age has brought about a major convergence between interaction design and game design, two traditionally separate fields that are increasingly recognized as overlapping. Interaction design focuses on creating meaningful relationships between people and the products they use, while game design centers on creating engaging and immersive experiences for players. This study investigates "gamified interaction," which is a subset of "gamification". "Gamification" is a term coined by Deterding et al. to describe the use of game design elements in non-game environments [1]. Nowadays, despite progress in understanding gamification, there is still a gap in fully understanding its impact, especially in non-game applications. This study aims to fill this gap by investigating the effectiveness, limitations, and potential ethical issues of gamified interactions in non-game applications.

The motivation for this research stems from the integration of digital environments in people's daily lives and the consequent need to optimize the user experience. With the increasing popularity of digital interfaces, it is crucial to understand how to improve user engagement and satisfaction. This study will explore the core principles of game design, the application of these principles to non-game environments, the effectiveness of gamified interactions in increasing user engagement and satisfaction, and potential

ethical considerations. The results of this research will potentially revolutionize the design of digital interfaces in a variety of applications, contributing to the improvement of user experience in the digital age. By providing a comprehensive understanding of the impact of gamified interactions on non-gaming applications, this study will provide valuable insights to designers and developers in the technology industry, enabling them to create more engaging and user-friendly digital environments. Ultimately, this research will contribute to the broader goal of optimizing digital environments to better serve users, with potential applications in education, healthcare, business, and more.

2. Literature review

According to Hamari, Koivisto, and Sarsa, gamification can increase user engagement, motivation, and overall satisfaction [2]. These advantages are particularly important in today's digital environment where user attention is fragmented and engagement is more important than ever. However, some of the literature also highlights some of the challenges and criticisms associated with gamification design. For example, Caponetto, Earp, Ott, and Passarelli conducted a literature review of empirical studies on gamification and found mixed results [3]. This is mainly reflected in the fact that some studies show that gamification has a positive impact on user engagement and satisfaction, while others show that gamification does not have a significant impact, or even has a negative impact. These mixed results emphasize that it is not enough to simply apply game design elements to an application and expect positive results. Instead, designers must carefully consider the context in which the application will be used, the specific needs and preferences of the target audience, and the potential unintended consequences of gamification.

3. Gameful design

3.1. Principles of gameful design

Gamification design aims to make everyday tasks and applications more engaging, rewarding, and enjoyable. Its key principles include engagement, motivation, progression, feedback, and narrative.

Engagement is crucial for apps as they must capture and maintain the user's attention, encouraging them to interact with the app on a deeper level. The design should provide challenges that are balanced with the user's skill level, creating a state of "flow."

When it comes to motivation, Rigby and Ryan outline several key motivators for effective game design, including autonomy, competence, and relevance [4]. Autonomy refers to feelings of control and choice, competence refers to feelings of mastery and effectiveness, and relevance refers to feelings of connection to others.

Progression in game design means that a well-designed progression system will guide the user through increasingly difficult challenges while providing appropriate rewards and feedback. This creates a sense of accomplishment for the user and encourages continued use.

For feedback, Effective feedback should be timely, clear, and meaningful, helping users understand the impact of their behavior and guiding them to more desirable moves.

The role of narrative in gameful designs can't be overlooked. Engaging narratives can make apps more engaging and memorable. This doesn't necessarily mean "story" in the traditional sense, but rather a coherent theme or purpose that ties the user's actions together.

Incorporating these principles into non-gaming applications can greatly enhance the user experience, making it more engaging, valuable, and meaningful. For example, a health application that incorporates elements of progress and feedback can encourage users to complete tasks more efficiently. Similarly, an educational application that incorporates narrative and motivational elements can make learning more fun and effective.

3.2. *Application in non-game environments*

Gamification design principles are not limited to video games or game applications. These principles are being applied to a variety of non-game contexts, including education, health, business, and productivity, to make these applications more engaging, motivating, and effective.

3.2.1. Education. Education is one of the most important application areas for gamification. Caponetto, Earp, Ott, and Passarelli conducted a literature review on gamification in education and found that gamification has a positive impact on motivation, engagement, and learning outcomes [3]. Gamified learning involves the application of gamified design principles such as points, badges, leaderboards, challenges, and narratives in educational settings. This approach makes learning more engaging, enjoyable, and effective by tapping into students' intrinsic motivation. For example, a classroom management application might include a point system where students can earn points for good behavior, completing assignments, or participating in classroom activities. These points can then be exchanged for rewards, such as small prizes, special privileges, or recognition. This approach can motivate students to participate more actively in the classroom and promote positive behavior. In addition, incorporating narrative elements such as tasks or challenges can make the learning experience more engaging and meaningful.

However, the authors note that the effectiveness of gamified learning may vary depending on the setting, the design elements used, and the target audience. This means that this approach to learning may work well for one group of students (e.g., high school students learning math through a task-based learning platform), but may not work as well for another group of students (e.g., adult learners taking an online language course through a badge and leaderboard system). Similarly, narrative-driven learning experiences that immerse college students in historical simulations may not resonate with lower elementary school students, who may prefer more direct rewards or visual feedback.

3.2.2. Health. The use of gamified design is also increasing in the field of health. Health apps and fitness trackers often incorporate gaming elements to motivate users to exercise more, eat healthy, or get enough sleep. Some apps also incorporate narrative elements such as challenges or quests to make the experience more engaging.

However, it is important to carefully design these apps to ensure they are effective and do not lead to unintended consequences. For example, overly competitive leaderboards or rewards may encourage excessive exercise or unhealthy competition. Therefore, it is important to balance the game elements with the well-being of the user and the purpose of the application.

3.2.3. Business. In the business world, gamification design can be applied to a variety of areas such as employee onboarding, training, and performance appraisals. For example, new employees may complete a series of challenges or tasks during the onboarding process. This approach can make the onboarding process more engaging and fun, helping new employees understand the company and their role more effectively.

Similarly, performance metrics can be gamified to encourage employees to achieve goals and improve performance. For example, a sales team could set up a leaderboard that tracks each team member's sales and rewards the best performers. This approach creates an atmosphere of motivated competition and incentivizes team members to improve their performance. However, it is important to design these systems carefully to ensure that they promote healthy competition and do not lead to stress or burnout.

3.2.4. Productivity. Productivity apps are another area where gamification design principles are widely used. For example, apps such as Forest, Keep and Duolingo incorporate various gamification design elements to make them more engaging and effective. The Forest app encourages users to stay focused by planting a virtual tree that grows as long as the user is not using the phone. keep is a Chinese health app that incorporates challenges, rewards and social elements to motivate users to stay organized and

complete tasks. Duolingo, a language learning app, uses points, levels, and winning streaks to encourage users to engage in daily practice. These design elements capitalize on users' intrinsic motivation, encouraging them to stay engaged and achieve their goals.

3.3. Case study: deep dive into a productivity app

Keep is a popular fitness app in China that helps people revolutionize their fitness and health routines by using it. Launched in 2015, the app provides users with a comprehensive platform to help them with home workouts, outdoor activities and healthy eating habits. It features a rich library of workout videos, personalized fitness plans, and social features that encourage users to share their progress and motivate each other. Most importantly, it innovatively utilizes game-like interactions to motivate users and provide them with an overall fitness experience that is easy to use, engaging and rewarding.

3.3.1. Gameful design elements in Keep. In Keep, the Challenge element is a significant motivator for users. One of its primary offerings is Personalized Fitness Challenges. For instance, if a user wants to focus on core strength, the app might suggest a "30-day core strengthening routine". Conversely, for those keen on improving cardiovascular health, there could be a "2-week cardio blast challenge". These challenges are meticulously crafted, and tailored to individual fitness goals, aiming to push users out of their comfort zones and motivate them to hit new fitness milestones. Another critical component in this mix is Streak Challenges. The underlying philosophy is that consistency is paramount to fitness success. It's all about habit formation, urging users to engage with the app or indulge in daily exercises. The mere challenge of maintaining an unbroken streak can often be the catalyst, ensuring users stay committed even on days when motivation might be on the lower side.

In the realm of Points within Keep, Workout Points play a significant role. After completing workouts, users earn points. The more intensive or longer the workout, the more points they can accumulate. This system incentivizes users to push themselves harder in their exercises.

In addition to these, there are Engagement Points. Actions like logging in daily, sharing a workout, or engaging with the community might also grant points, encouraging overall app engagement. Points can be used to unlock features or rewards, earn badges or levels, or even redeem for swag like pins and necklaces.

Delving into Badges and Stickers, Achievement Badges emerge as a cornerstone of user motivation. As users reach certain milestones, whether it's completing a specific number of workouts, burning a set amount of calories, or trying a new type of exercise, they're rewarded with badges. These serve as virtual trophies, showcasing their hard work and dedication. Even allowing users to spend money to buy physical badge medals has received a stronger sense of honor. In tandem, Stickers are awarded after specific activities or events. After certain activities or for participation in events, users might receive stickers. These can be shared or displayed, adding a fun, visual element to their achievements.

Turning the attention to Leaderboards, Keep offers two distinct types. Friend Leaderboards allow users to compete with their friends by comparing points, badges earned, or challenge progress. This friendly competition can be a strong motivational tool, pushing users to stay active and consistent.

On a larger scale, community Leaderboards rank users based on specific metrics, achievements, or points, allowing them to see where they stand in comparison to others within the broader community of the app. It enhances participants' motivation to compete, improves engagement and retention, and is more widely recognized and socially justified.

3.3.2. Encouraging user engagement. Personalized Fitness Plans: Keep provides personalized fitness plans based on the user's fitness level, goals, and preferences. These plans break down the user's long-term goals into smaller, more manageable daily and weekly targets. Achieving these smaller targets contributes to maintaining streaks and meeting overall fitness goals.

Notifications and Reminders: The app sends regular notifications and reminders to users to complete their daily exercises or activities.

Rewards System: Users earn rewards, such as points, badges, or certificates, for completing exercises, challenges, and maintaining streaks. These rewards serve as a tangible acknowledgment of the user's efforts and encourage them to stay committed to their fitness journey.

Social Features: The app includes features that allow users to share their progress, challenges, and achievements with their friends or the Keep community.

Progress Tracking: The app provides visual progress tracking features, such as charts, graphs, and calendars, that allow users to see their progress over time. Seeing their progress and how far they have come can be a powerful motivator for users to maintain their streaks and meet their fitness goals.

3.3.3. Gameful interactions in Keep: enhancing non-game user experience. In terms of data-driven insights, Keep leverages analytics to provide a perspective on user performance, activities, and preferences. For instance, the app might analyze a user's workout history to suggest new challenges or personalized fitness plans. This use of data helps in creating a more engaging and personalized user experience.

Emphasizing usability, a crucial aspect of gameful interaction is the application's user-friendly nature. Keep has an intuitive interface that makes it easy for users to navigate through the app, access their fitness plans, track their progress, and interact with other features of the app. This ease of use is vital in ensuring that users regularly engage with the app and remain committed to their fitness goals.

Delving into the gamified elements, Keep incorporates features such as rewards, challenges, and social interactions. These elements are designed to not only motivate the users but also to make the fitness journey more enjoyable and less tedious. For example, earning a badge for completing a 30-day challenge or receiving positive feedback from the community can make the process more rewarding and fun.

4. Challenges and limitations

Over Gamification is one of the main pitfalls, which refers to the excessive use of game elements that can overwhelm users or distract them from the main purpose of the app. With Context Sensitivity, the effectiveness of a gameplay design element can vary widely depending on the context in which it is applied. What works well in a fitness app like Keep might not work as well in other contexts, like a productivity app for professionals. From the lens of Ethical considerations, as discussed in Anderson, C. A. and Dill, K. E, the use of game design requires ethical considerations [5]. For example, game elements that encourage competition may lead to unhealthy comparisons or stress among users.

Highlighting Accessibility, it's crucial to ensure game elements are accessible to all users, regardless of their physical or cognitive abilities. This requires careful consideration of design elements to ensure they are inclusive and do not create barriers for any user group.

5. Conclusion

This study focuses on the principles of gamification design and its application to non-game contexts, with a particular focus on its potential to enhance user engagement and experience in a variety of applications, including education, health, business, and productivity applications. The study concludes that while gamified interaction design offers a promising approach to enhancing user engagement and experience, its effectiveness is highly context-dependent and limited by a variety of challenges, including the risk of over-gamification, motivational mismatches, ethical considerations, and accessibility challenges. Despite the comprehensive analysis of this topic in this thesis, there is still room for improvement in understanding the long-term impact of gamified design on user behavior and thought. Future research could focus on developing a standardized framework for implementing gamification design in a variety of non-game contexts, as well as investigating the potential negative impacts of gamification design on users and developing strategies to mitigate these impacts.

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