

Towards Customizing Gameful Systems by Gameful Design Elements

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Abstract. Recently, several researchers have suggested that personalized gameful systems can be more effective than generic approaches. However, there is still scarce empirical evidence that the suggested factors for personalization, such as gender, age, user types, and personality traits, will be effective in improving user engagement and performance for personalized gameful systems. In this work-in-progress, we present a research plan for empirical evaluation of a customizable gameful system. Upon completion of this study, we expect to provide empirical evidence that the participants' selection of gameful design elements in a practical application will correspond to the theorized relationships suggested by prior survey-based research, and that the system can suggest the gameful design elements that users are more likely to enjoy. The results of this research will provide an actionable path for gamification designers to implement personalized gameful systems and for researchers to develop recommendation algorithms for gamification.

Keywords: Gamification, Gameful Design, Personalization, Customization.

1 Introduction

Gamification, the use of game design elements in non-game contexts [1], can be employed as a toolset to increase user engagement, activity, and enjoyment of digital interactive systems. It can also be used to create applications aimed at promoting behaviour change in domains such as health, wellness, education, training, online communities, customer loyalty, and marketing [2–5], thus representing a form of persuasive technology (PT). Recently, a topic that has gained attention is understanding how to personalize gameful systems to each user [6–8]. This is important because personalized interactive systems can be more effective than generic systems [8, 9]. Gameful systems are effective when they help users achieve their goals, which often involve educating them about certain topics, supporting them in attitude or behaviour change, or engaging them in specific topics [6]. However, publications on personalized gamification so far have been mostly theoretical, for example, focusing on identifying different personality traits [10, 11] or preferences for personalization [9, 12].

In work-in-progress this paper, we present a research plan for empirical evaluation of a customizable gameful system. Our design approach includes understanding the different user preferences based on the Hexad framework [13], then allowing users to

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select the gameful design elements [14] that might be most appealing to them. Moreover, a gameful system might try to identify the user's preferences and suggest which elements they are more likely to enjoy [15], akin to what recommender systems (RS) [16] do in application domains such as online commerce. Therefore, this research aims to investigate empirically if this kind of tailored gameful system is more engaging to users than generic implementations.

2 Related Work

2.1 Gamification User Types

Research on gameplay motivations has shown that players have diverse personal preferences regarding how and what they play [17–19]. Researchers have developed player type models [17, 20, 21] or gamer motivation scales [18, 22] to capture the diverse styles of play exhibited by different players. This information has been increasingly used in gamification to model user behaviour and design more engaging gameful systems. Nevertheless, none of these models have studied elements used specifically in gameful design. Therefore, their applicability in gamification has not been supported by empirical evidence yet.

To address this problem, Marczewski [23] developed the Gamification User Types Hexad framework, based on research on human motivation, player types, and practical design experience. He also suggested different game design elements that may support different user types [24]. The six Hexad user types are [13, 23]:

- **Philanthropists** are motivated by *purpose*. They are altruistic and willing to give without expecting a reward.
- **Socialisers** are motivated by *relatedness*. They want to interact with others and create social connections.
- **Achievers** are motivated by *competence*. They seek to progress within a system by completing tasks or prove themselves by tackling difficult challenges.
- **Free Spirits** are motivated by *autonomy*, meaning freedom to express themselves and act without external control. They like to create and explore within a system.
- **Players** are motivated by *extrinsic rewards*. They will do whatever to earn a reward within a system, independently of the type of the activity.
- **Disruptors** are motivated by the triggering of *change*. They tend to disrupt the system either directly or through others to force negative or positive changes.

Moreover, Tondello et al. proposed a validated survey measure [13] for scoring individuals across these user types. They also suggested that the Hexad can be used as a model to personalize user experience (UX) in gameful systems, by showing that there are significant correlations between the Hexad user types and user preferences for 32 design elements commonly employed in gameful design [13]. Orji et al. [25] further supported this suggestion by also showing significant relationships between the Hexad user types and the persuasiveness of different strategies commonly employed in persuasive technologies.

2.2 Personalized Gamification

Regarding models of user preferences, Ferro et al. [10] studied several models of personality and player types, aiming to find the similarities between them as well as to relate them to different game design elements. Their work grouped personality traits, player types, and game elements in five player categories: ‘Dominant’, ‘Objectivist’, ‘Humanist’, ‘Inquisitive’, and ‘Creative’. Jia et al. [11] studied the relation between the five-factor model (FFM) personality traits [26] and individual gamification elements and found several significant correlations. Orji et al. [9] studied the relation between the FFM personality traits and several persuasive strategies used in gamification and found significant correlations.

Gamification also draws from research in persuasive technologies to further encourage adoption of behaviours. Theoretical and empirical studies have suggested different factors for persuasive technology personalization [27, 28], such as personality types [29–31], age [32], gender [32, 33], player types [34, 35], culture or nationality [36, 37], and individual susceptibility to persuasive attempts [38, 39].

Considering the topic of gameful design elements, Tondello et al. [14] proposed a new conceptual framework for classifying them based on participants’ self-reported preferences, with the goal of understanding user behaviour in gamification. Their work classified gameful design elements in eight groups [14]:

- **Socialization**: elements corresponding to some form of social interaction, including both collaborative, competitive, and entirely social interactions.
- **Assistance**: elements corresponding to the user receiving some sort of aid for their progression, either from the system or from other users.
- **Immersion**: elements related to immersion and curiosity, including elements related with a narrative or story or with exploration and unpredictability.
- **Risk/Reward**: elements related to challenges, gambling, and the rewards that come from winning.
- **Customization**: elements related to three different ways of customizing one’s own experience: (1) customizing the user’s avatar or experience, (2) automatic personalization, or (3) redeeming freely chosen goods with virtual currency or points.
- **Progression**: elements related to progression and meaning, representing the will to be involved in meaningful goals and feeling a progression towards achieving them.
- **Altruism**. elements corresponding to diverse ways of making a useful contribution, either to the system or to other users, including sharing knowledge or goods, contributing to improve the system, and collaborating with other users.
- **Incentive**. elements corresponding to incentives or rewards that the user might receive, such as badges, achievements, collectible items, and rewards.

It is also noteworthy that despite the existing literature on user preferences in gamification and games, most gameful design methods do not take user preference in consideration as part of their process [40, 41]. Nonetheless, Ferro [42] has recently developed *Gamicards*, a methodology that helps designers create gameful experiences by selecting game elements and mechanics tailored to the users and context of the application.

On the topic of customizing or personalizing the activities and gameful design elements available for the user, three promising approaches have been recently presented. Khoshkangini et al. [43] described and conducted an initial evaluation of an automated challenge generator, which is able to dynamically generate personalized challenges from templates, by tailoring the goals, difficulty, and rewards according to the user's preferences and skills. Altmeyer et al. [44] and Lessel et al. [45] also described and conducted an initial evaluation of a "bottom-up" gamification approach, in each users are given choices of available gameful elements, which they can customize by selecting their preferred elements and adjusting some parameters (such as the amount of points rewarded by an activity). Furthermore, Tondello et al. [15] suggested developing recommendation algorithms to suggest gameful activities, gameful elements, and persuasive strategies that each user is more likely to enjoy in a gameful system.

Finally, Böckle et al. [7] have recently presented a systematic literature review of the existing approaches on adaptive gamification.

3 Research Plan

Based on the related work on personalized gamification, we have reason to expect that a customized system will be more engaging for its users and might be better able to help the user achieve higher performance in the tasks carried out within the system. For example, Altmeyer et al. [44] and Lessel et al. [45] provided initial evidence that letting users customize their experience—by letting them select the game elements for their experience—can lead to better engagement and performance. However, if a gameful system is built with enough activities and gameful design elements to be appealing to all types of users, a problem of information overload may occur. The user might find so many different ways of interacting with the system that it might become difficult to choose their preferred style among them [15]. One of the existing solutions for this problem is the use of recommender systems (RS) [16], which are software tools and techniques that provide suggestions for particular items to a user. A RS can help the user find items that would probably match their preferences among the increasing amount of available information and products. Additionally, a RS relies on people making choices based on what other people recommend.

Although recommender systems can be a solution to tailor gameful systems to each user, the topic has been scarcely investigated until now. As an initial development of this idea, Tondello et al. [15] proposed a general framework that describes the possible inputs for this type of RS (items, users, transactions, and contextual information), the possible approaches to choose a recommendation algorithm, and the process output (the predicted ratings for each gameful activity per user). Nonetheless, the currently available knowledge on personalized gamification limits the current framework. Particularly, we still have scarce empirical evidence that the suggested models for personalization, such as user types and taxonomies of gameful design elements, will be effective to help users select their preferred activities within gameful systems.

To overcome this shortcomings in the literature, we will conduct an experimental study aimed at answering the following research questions:

- RQ1.** If allowed to choose the gameful design elements they prefer, do user choices correspond to the theoretical relationships with user types, personality, gender, and age reported in previous survey-based studies [13, 14]?
- RQ2.** Do user engagement and performance improve if the application helps them customize their gameful experience by suggesting the gameful design elements they are more likely to enjoy (based on the answer to RQ1)?

3.1 Study Design

We will build an online crowdsourcing platform in which participants will be asked to complete classification and brainstorming microtasks. Each task will consist in listing all the classification tags that the participant can think of for a stock image. Participants will create an account and will be encouraged to complete as many microtasks as they wish during the study period. The use of classification microtasks was already reported on previous studies of customizable gamification [44, 45]; therefore, this is an interesting type of task to allow for comparisons with previous results. Moreover, brainstorming tasks have also been used in previous empirical studies of gamification [46] because they were found to be good types of tasks to investigate task performance in relation to goal setting. Hence, we will be able to implement gameful design elements that motivate participants in two levels: (1) to complete more microtasks and (2) to perform better in each task by listing a higher number of tags.

The crowdsourcing platform will include gameful elements to motivate and encourage participants to complete more microtasks and to perform better in each task. To allow users to customize their gameful experience, we will include two elements from each one of the eight groups from our previous classification [14]. This will give users a broad range of experiences to select from. From the 16 available gameful design elements, each participant will be allowed to select up to four elements to customize their experience. This limitation is added to ensure that users will have to spend some time selecting the elements that they prefer. The 16 gameful design elements currently planned for the system design are:

- **Socialization:** leaderboards and social competition
- **Assistance:** glowing choice and beginner's luck
- **Immersion:** Easter eggs and theme
- **Risk/Reward:** lotteries and challenges
- **Customization:** avatars and points
- **Progression:** levels and progress feedback
- **Altruism:** knowledge sharing and gifting
- **Incentive:** badges and rewards

The study will be divided in two phases:

First Phase. The goal of the first phase is to answer RQ1. Therefore, all participants will be allowed to choose any gameful design element from the list, without any suggestion from the platform. By doing this, we will be able to verify if participants'

choices will correspond to the theorized preferences by user types, personality traits, gender, and age reported by the previous studies.

Second Phase. The goal of the second phase is to answer RQ2. Therefore, we want to test if it is useful for the platform to suggest the gameful design elements that each user is more likely to enjoy aiding them in their customization. For this purpose, we will split participants into three conditions:

- C1:** Tailored: in this condition, the application will suggest the four gameful elements that the user will be more likely to enjoy based on their profile.
- C2:** Contra-tailored: this is the opposite of C1; thus, the application will suggest the four elements that the user is less likely to enjoy.
- C3:** Control: in this condition, participants will not receive any suggestion from the platform regarding their selection of gameful design elements.

Measurements. During the first phase, we will record each participant's choice of gameful design elements. Therefore, we will analyze if the independent variables (gender, age, user type, and personality traits) can predict the participants' choices for the gameful design elements and if the relationships between them correspond to the theorized relationships from previous works [13, 14]. In the second phase, we will measure participants' engagement (with measures such as the number of completed tasks) and performance (average number of tags identified for each microtask completed). Moreover, to better understand the user experience with the customization of their gameful system, we will also include a few additional free-text questions, which will focus on their impressions about the activity of selecting gameful design elements and their general enjoyment of the platform.

4 Conclusion

In this work-in-progress paper, we have described our research plan for an experimental study aimed at demonstrating the viability of design customizable gameful interactive systems according to user preferences. Upon completion of this study, we will be able to provide two main contributions to the extant literature on personalized gameful systems. First, we expect to provide empirical evidence that the participants' selection of gameful design elements in a practical application will correspond to the theorized relationships suggested by prior survey-based research [13, 14]. Second, we expect to provide empirical evidence that it is possible to implement a simple system to help users overcome the information overload problem, by suggesting the gameful design elements that they are more likely to enjoy based on their user types and demographic information. The results of this research will provide an actionable path for gamification designers to implement personalized gameful systems. Furthermore, the empirical evidence that will be collected as part of this research will represent a valuable model, which in the future could be used to implement recommendation algorithms for gameful systems [15].

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