Increasing Engagement with the Library via Gamification

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Abstract

One of the main challenges faced by providers of interactive information access systems is to engage users in the use of their systems. The library sector in particular can benefit significantly from increased user engagement. In this short paper, we present a preliminary analysis of a university library system that aims to trigger users' extrinsic motivation to increase their interaction with the system. Results suggest that different user groups react in different ways to such "gamified" systems.

1 Introduction

Many libraries currently suffer from a decreasing number of customers, threatening their main purpose to serve as a provider of knowledge for mankind. Apart from the rise of the Internet as a challenging source of information, an important factor that hinders users from actively using their library is the lack of user-friendly graphical user interfaces. As shown in other domains where information access systems are deployed, engaging graphical user interfaces play a key role in motivating users to engage with the content maintained by these systems.

Kazai et al. [9] argue that a promising technique to address this challenge is to adopt gamification. Gamification refers to the "use of game design elements in non-game contexts" [5]. In fact, various studies have been performed that showcase the benefit of gamification, e.g., in the field of document annotation [19, 17], relevance assessment [11] or item recommendation [10, 1]. Nicholson [14] argues that if users have

a positive and meaningful game-based experience that is closely connected to the underlying non-game setting (the library) then it will result in longer-term and deeper engagement between participants, non-game activities & supporting organisations.

We argue that it is important to incorporate users' context when providing gamified information systems. In order to study this further, we present a preliminary analysis of users' engagement with the LibraryTree system [13], a gamified web application that aims to increase engagement with library users by harnessing gaming techniques to reward elements of library behaviour and make interactions with the library more fun. LibraryTree is operated by the library of a larger British university. The system was deployed over 12 months ago and is actively advertised on the library website, as well as on posters and flyers that are displayed in the main library.

The paper is structured as follows. In Section 2, we discuss related work. Section 3 briefly introduces the LibraryTree system. Preliminary results of a transaction log analysis covering six months of user interaction is presented in Section 4. Section 5 concludes the paper and provides an outline of future work.

2 Related Work

This work touches upon two main research topics, namely the us of gamification to improve user experience and the impact of context on users' behaviour while interacting with information access systems. In the remainder of this section, we first provide an overview of gamification and then present related work in the field of context-based retrieval and recommendation.

2.1 Gamification for Improving User Experience

Deterding et al. [5] suggest that "gamification is an informal umbrella term for the use of video game elements in non-gaming systems to improve user expe-

rience (UX) and user engagement", while Kapp [8] defines gamification as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" while it is "not the superficial addition of points, rewards, and badges to learning experiences." The LibraryTree system described here aims to avoid such superficial adornments, with rewards tied instead to meaningful engagement with the library's services, and particular attention paid to highlighting under-utilised or little understood aspects of the library's function. Kapp also points out that many, if not all, of the ideas now associated with gamification have been used successfully in some form or another in classrooms before they were ever assembled under this umbrella. We, and other proponents of gamification, would argue that the tried-and-tested nature of these techniques actually demonstrates their utility - it is merely the context in which they are being applied that is novel.

A concern that is often overlooked when designing gamified systems is that of user preference and personality, and the context in which the player interacts with the system. Bartle [2], for example, famously identified four types of personality, each with different motivations for playing the Multi-User Dungeon (MUD) games which Bartle pioneered. For a game to appeal to all four player types (Killers, Explorers, Socialisers and Achievers), it must offer features that satisfy each of these various motivations. A game which appeals only to Killer type players is unlikely to appeal to players of the Socialiser type, for example.

There is also evidence to suggest that different genres of game appeal to different player personality types. For example, Peever et al. [16] found strong relationships between game genre preference and personality types, as measured by the five-factor model of personality. While Park et al. [15] found no such correlation between personality type and game genre preference, they noted that players' different motivations for playing correlated with the personality traits associated with the five-factor model.

Games, and by extension, gamified systems, are therefore likely to engage different users in different ways, and to varying degrees.

2.2 Users and Context

In recent years, various studies have been published that indicate that users' context play an important role in the way users interact with an information access system. The definition of context, however, differs based on the research questions or hypotheses that are studied in literature. In this section, we focus on the main contextual factors that are most important in the context of library systems, namely access to domain-specific content, and the level of expertise of users.

Bhavani et al. [3] report that different search strategies are required when retrieving domain-specific content. Similarly, Meij et al. [12] study different language models to improve domain-specific retrieval. Focusing on recommender systems, Zhang et al. [21] perform community topic mining to improve domain-specific recommendation. All studies are based on the assumption that the domain to which documents or items belong to is an important contextual factor that needs to incorporated when building an information access system.

Focusing on users' expertise in using search engines as contextual factor, Halvey et al. [6] observed that this context plays an important role in a retrieval task. A similar study is performed by Scott et al. [18]. Both studies indicate that users' expertise needs to be considered when developing graphical user interfaces to support their information seeking task. This observation is also considered in the field of human-computer interaction where a specific focus is set on the difference between novice and expert users. For a detailed survey, we refer to Cockburn et al. [4].

Concluding from these studies, it is evident that users' context, e.g., their expertise or the domain they are interested in, directly influences their search behaviour, thus indicating the need for context specific information access systems (e.g., [7]). Consequently, treating gamification as a novel method to enhance user interfaces of information access systems, we argue that further research is required to study the importance of context for the development of a successfully gamified system.

3 LibraryTree

In order to study the role of context for gamified systems further, we introduce the LibraryTree system. The system allows students to gain points & badges (referred to as stamps) for entering the library building, borrowing & returning books, accessing an e-resource or sharing a review of an item they have read with friends and classmates. Users can share this information with their friends via a web interface or a mobile app. Figure 1 depicts the graphical user interface, the home page, of LibraryTree.

While LibraryTree is available to all students, players must opt in to play the game. Registering to play the game is a simple process that utilises the university's existing user authentication system, making it as straightforward as possible for students to register and subsequently log in. The registration process is kept as brief as possible, but students are required to configure a range of privacy options that dictate the visibility of their library interactions and LibraryTree progress.
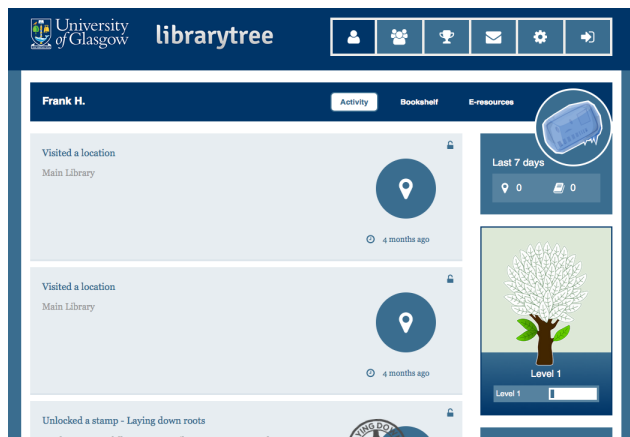
Figure 1: The LibraryTree Graphical User Interface.

Information relating to books and other items, library visits and LibraryTree stamps acquired may be made viewable by all players, or may be restricted to the players' friends or to the player only. Once registered, players' interactions with the library are automatically tracked by the LibraryTree system, requiring no further action on the part of the player. The balance struck between ease of use and granularity of privacy control has, thus far, proved satisfactory.

A key component of LibraryTree is the progression visualisation, displayed in the form of a tree - inspired by that depicted in the university's coat of arms - on the right hand side of the interface. As the player gains points, the tree on their profile page is seen to grow. Moreover, leaderboards show how the different colleges rank against each other. They show the overall points scored as well as weekly high scorers.

In order to trigger users' extrinsic motivation to interact with the system, LibraryTree allows users to collect stamps and displays them on their profile page. Example stamps are depicted in Figure 2. The system supports a total of 107 stamps covering general activities such as adding friends, rating books, or visiting the library building, but also more topic-specific badges such as borrowing books associated with individual subjects.
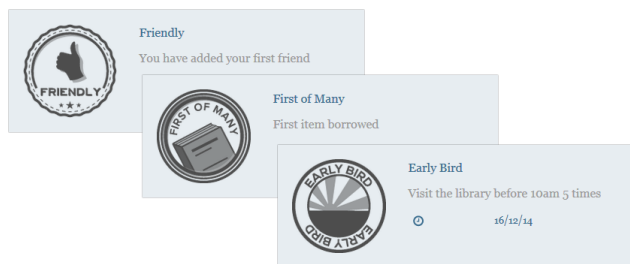

Figure 2: Examples of stamps awarded in LibraryTree.

Where a stamp is awarded based on a series of interactions - for example, borrowing five items of a certain type - progress towards this goal is clearly indicated on the visual representation of the stamp, as shown in Figure 3. Each stamp is associated with an appropriate number of points. For example, a player adding their first friend is awarded five points, while recommending ten items grants the player 25 points.

Figure 3: Progression towards stamp achievement.

4   System Usage

During the first six months of operation, 1751 players registered to use LibraryTree. During this period, 10072 stamps were awarded, the most commonly awarded of which were related to physically visiting the library building, or borrowing and returning items. For example, 1323 players earned the "First of Many" badge for borrowing their first item, while 1118 players were awarded the "Let's have lunch" badge for visiting the library building five times during lunch hours.

Engagement with LibraryTree (and, by corollary, the library management system) varied significantly by college, as illustrated by the points awarded to players from each of the four colleges (Arts, Science and Engineering, Social Science, and Medical, Veterinary and Life Sciences). A snapshot of activities is depicted in Figure 4. The mean number of points awarded to students across all four colleges in this period was 173, with a median value of 60. Students based in the College of Arts and College of Social Science, on average, scored significantly higher, with means of 268 and 235 points, respectively. The mean points awarded to students in the College of Science and Engineering and the College of Medical, Veterinary and Life Sciences were almost identical, at around 109.

This disparity in apparent engagement with the LibraryTree system can, in part, be explained by the nature of the subjects taught in each of the four colleges. The study of the Arts and Humanities and the Social Sciences tends to rely more heavily on a broad range of textbooks and monographs, while the various Sciences are, perhaps, more concerned with lab work and online resources that do not require physical access to the library. These differences exemplify the effects of user context, of which the player's College or discipline is an important aspect.

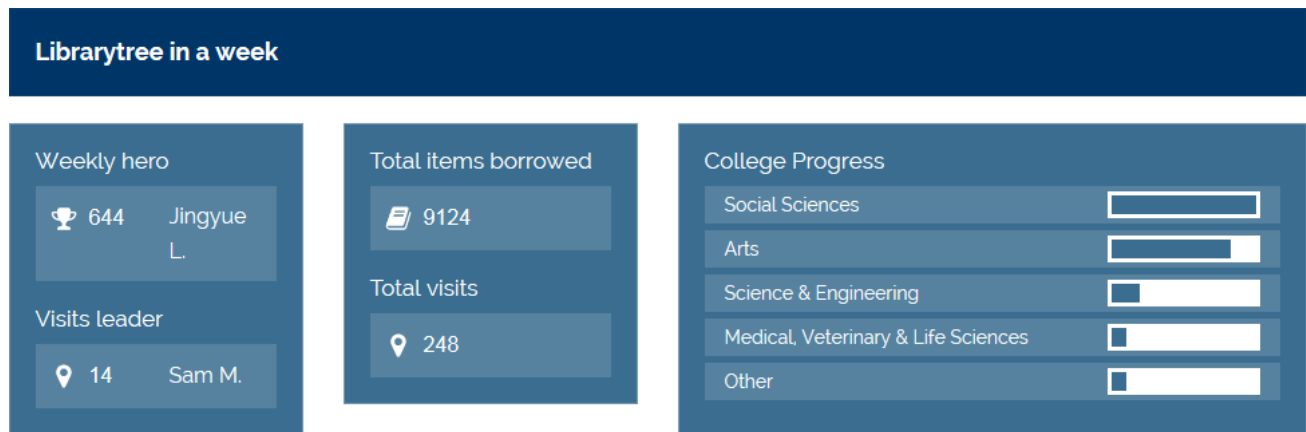The nature of individuals' engagement with the Li-

Figure 4: Weekly leaderboard and high scorers in LibraryTree.

braryTree game is also variable, leading to speculation that users of the system may be aligned with one or more of the player types associated with traditional video games, such as those identified by Bartle [2] and Yee [20]. In terms of Bartle player types, for example, one might classify those players with the highest scores as Achievers and those with the broadest range of stamps as Explorers. Socialisers would be expected to have the greatest number of friends in the game, and to have obtained a higher proportion of stamps associated with friend interaction. The identification of Bartle's Killers, however, may be more problematic in a gamified system such as this, which limits the scope for 'griefing' and other killer-like behaviour. In this regard, Yee's motivations for play may provide a more readily applicable scheme for classifying Library-Tree players. Yee's components of motivation eschew 'killer' type behaviour almost entirely, and subcomponents of motivation for play that fall under the larger 'Achievement' component (e.g. competition) may better explain the motivations at work in LibraryTree.

5 Conclusion

In this short paper, we presented a preliminary analysis on the role of user context of a gamified library system. We analysed the transaction logfiles over a period of six months to determine typical user behaviour patterns, as well as to analyse acceptance of the system by their users. The results suggest that while the system has been broadly welcomed by the student body, there is significant variation in the manner in which players interact with LibraryTree, in much the same way as players' motivations to play traditional video games varies.

In particular, we observed significant differences between different students from different colleges of the university. We argue that this indicates that users' context, e.g., the subject they are studying, influences the way they use a gamified system.

As future work, we will perform an in-depth analysis of the users' behaviour when interacting with the system. In particular, we aim to identify different contextual factors that influence user behaviour such as age and sex of the students or requirements to use the library system to further their study. The primary means by which these factors will be explored is an online questionnaire, aimed at collecting data from as large a number of LibraryTree players as possible. The main motivation of our research is to study whether different player types, e.g., as introduced by Bartle [2] and Yee [20] can be derived from their interaction.

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