Orientation Passport: Using gamification to engage university students

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ABSTRACT

Adding game elements to an application to motivate use and enhance the user experience is a growing trend known as *gamification*. This study explores the use of game achievements when applied to a mobile application designed to help new students at university. This paper describes the foundations of a design framework used to integrate game elements to *Orientation Passport*, a personalised orientation event application for smart phones. Orientation Passport utilises game achievements to present orientation information in an engaging way and to encourage use of the application. The system is explained in terms of the design framework, and the findings of a pilot study involving 26 new students are presented. This study contributes the foundations of a design framework for general gamified achievement design. It also suggests that added game elements can be enjoyable but can potentially encourage undesirable use by some, and aren't as enjoyable if not enforced properly by the technology. Consideration is also needed when enforcing stricter game rules as usability can be affected.

Author Keywords
Gamification, achievements, user experience, mobile devices, university.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Recently there has been a growing interest in using elements of video games in non-game applications as a means to enhance the engagement with products. Coined as *gamification*, this trend potentially opens up ways to create more engaging user experiences with a wide range of applications. This paper explores the design of an achievement system added to engage university students with a mobile orientation application. The aim of this particular study was to test the first iteration of the application, exploring the design and initial response from participants in regards to the overall experience.

RELATED WORK

Gamification
Gamification has been defined as the "use of game design elements in non-game contexts" (Deterding et al., 2011).

The term is primarily being used to explain the intent to enhance engagement with a product, and motivate particular user behaviour, through the use of game elements. The use of computer game elements to enhance the enjoyment of non-game applications dates back to research as early as the 1980s (Malone, 1982). With recent developments in pervasive and mobile computing technologies, commodity technologies such as smart phones allow game elements to be layered over the top of everyday interactions, using contextual information provided by sensors to enforce game rules.

There has been an increase in research in various domains where the combination of pervasive technology and game design has been explored as a means to motivate people in different aspects of their life. The Playful Bottle (Chiu et al., 2009) uses mobile phone sensors and a virtual pet game to encourage healthy water drinking habits. Movipill (de Oliveira, 2010) uses points and a leaderboard with a pillbox augmented with sensors to encourage medication being taken on time. Up until now, research has primarily been interested in whether the introduced technology changes the user behaviour in a positive way or not. Although this is a focus of our research, we are also interested in contributing to the design of gamified applications and exploring how different game elements affect the user experience. For this particular study we are interested in the use of achievement systems.

Achievement Systems
The video game achievement system is a concept that has evolved over the last decade to become a very popular way to add extra challenges and play time to video games with little expense. Video game achievements are task-reward systems that usually reward the player with points, unlock bonus in-game material or simply exist as status symbols. Achievement systems have started to appear more and more as a means to make applications more engaging, providing goals, instruction, reputation, status and affirmation, and group identification (Antin & Churchill, 2011). It was found that the addition of an achievement system to a geo-tagged photo sharing service, although interesting, did not convince all users of the added value, with a number raising concerns about the achievements promoting undesirable usage patterns (Montola et al., 2009). Apart from this study there have been few other investigations into the use of achievement systems in non-game applications. As more and more non-game applications continue to use achievement systems there is a need for further research into their design, use and effects. In this study we apply them to an information application for students at university.

CASE STUDY

The study explores the addition of an achievement system for a mobile event application, built to help students at university orientation. For new students, university orientation is the key event that aids in the transition from a school to a university environment, introducing new students to the university campus, people and services. A study of the past two student orientation surveys and a focus group with university engagement staff revealed that new students often feel lost, have trouble meeting new friends and finding what services and events are available on campus. It was decided that a mobile application could help address some of these problems, providing an opportunity to explore the addition of game elements to engage students further with the application. The design of the system went through a number of iterations that employed paper and digital prototypes. Usability tests were also conducted with six individuals before the pilot study was undertaken. Achievement design received input from student engagement staff and from a focus group with orientation staff.

DESIGN FRAMEWORK

Orientation Passport is a prototype smart phone application that serves to support activities a student undertakes while at university orientation. For the application we used a design framework to aid in the construction of game elements that are connected to the goals of the application by means of a context layer.
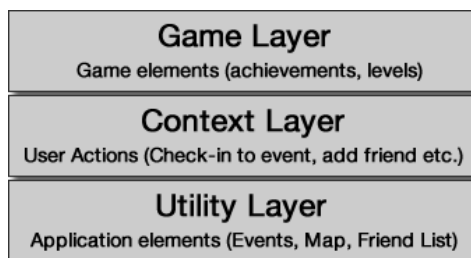

Figure 1. Initial design framework utilised for the system.

The *utility* layer provides the foundation of the application, describing the functions implemented that support the underlying goals that are to be addressed. The *context* layer identifies specific user interactions with the utility layer and technology that can be used as input for the game layer. The *game* layer provides the game elements and rules, driven by the context layer and supporting the utility layer, and goals, of the application. These three layers provide a useful framework for designing and describing gamified application design.

Utility

Orientation passport is primarily a digital orientation *schedule* that provides a customised list of events for the student depending on their enrolled degree. The schedule is accompanied by a number of helpful additions including an interactive *campus map*, which lists building names and shows the student's current location; an *information page* which provides information about university services such as IT helpdesk and security phone numbers, a *friend page* where new contacts students make on campus can be added and a *profile page* where the user can edit their personal information that they share with contacts such as email and faculty.

Context

The context layer provides the means for recording and verifying specific user actions that can be used as input for the game layer. In order to verify that the user has completed the goals required, user interactions with the software can be recorded or context information can be gathered using multimodal inputs on the phone. The context layer in Orientation Passport records four types of user actions as input for the game layer; answering a question using the touch screen, finding a university location or object and scanning it using a barcode or Quick Response (QR) code, checking in to an event using GPS and time, or adding a friend by bumping phones together using the third party Bump API (http://bu.mp).

Game

The game layer uses these recorded actions to drive game elements and enforce game rules for specific interactions relating to the use of the application. The game layer of Orientation Passport uses primarily one game element, an *achievement system*.

Achievement System

Twenty achievements were created that used the user actions above to reward students for application use (e.g. checking in to events, adding friends) and to make static university service information interactive (e.g. finding campus buildings, answering service related questions). Achievements were created by picking a utility, combining it with an available user action and creating an achievement that would introduce the students to that utility or information through a game-like interface.

Utility	User Actions	Example Achievements
Event list	Checked in to an event	Check in to 1 event Check in to 2 events
Contact list	Added people to the contact list	Add 1 friend Add 2 friends
University location information	Scanned a QR code or barcode	Find the orientation tent. Find the bookshop.
University service information	Answered questions relating to university services	Enter the campus bus route number. Enter how many floors the library has.

Table 1. Examples of creating achievements using contexts available from utilities

A number of different achievement systems (Steam, Xbox Live, PlayStation Trophies), games (Portal, Team Fortress 2, World of Warcraft) and gamified applications (Foursquare, GiantBomb) currently on the market were surveyed to influence the system design, language and anatomy. Each achievement had a title and clue, accompanied by an image and text that were revealed when the achievement was completed.
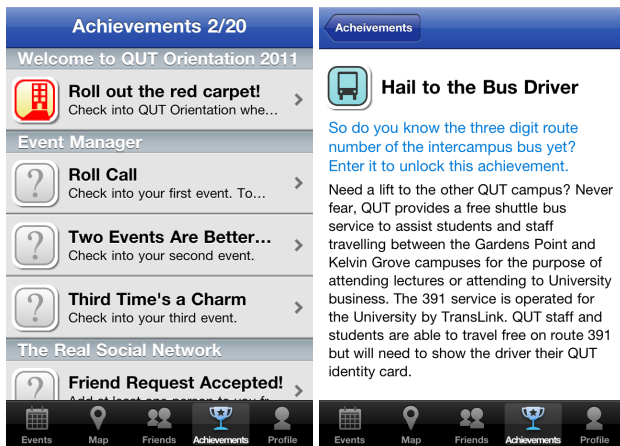
Figure 2. Achievements and achievement detail

Previous work in to what makes games engaging and enjoyable (Malone, 1982; Sweetser & Wyeth, 2005) was used to influence the overall design of the game elements. For example, players were taught to play the game through introductory achievements that were made easy to complete. When an achievement was unlocked then immediate feedback was provided via a pop-up message. To make it challenging achievements became progressively harder to complete either by requiring more interactions, e.g. Adding your *third* contact, or by having cryptic titles and clues, e.g. Title: 025.344 15. Clue: *???* (The title being a catalog code – requiring the student to scan a book in the library).

ORIENTATION STUDY

Participants
Twenty-six first year university students were recruited (male = 17, female = 9) to trial the gamified application during orientation week at university. Students were recruited via a news article posted on the university's orientation website. In order to create a realistic setting participants (1) were first year students and (2) owned and used a smart phone or similar device (iPhone or iPod touch in this case) on which to test the application, potentially removing the novelty factor of the smart phone. Participants received two free movie tickets for their participation after they completed the study and a questionnaire.

Participant Overview
The ages of the participants ranged from 17 to 45 years old with an average age of 20 years. All the students were new to university and entering their first year in one of six different university faculties. The majority of participants (84.6%) reported that they spent on average ten or more minutes using smart phone applications each day with twelve of the twenty-six participants (46.1%) spending one or more hours each day. Fourteen of the twenty-six participants (53.8%) had used an achievement system before on a mobile, video or computer game and of these participants all stated that they enjoyed using the system.

Study Method
When the participants arrived at orientation we met with them individually, provided them with a link to download the application onto their mobile device, set up their customised event list and provided an overview of the application. Participants used the application while at orientation, returning at the end of the day to provide feedback on their experience. Usage data was captured on the device and sent to the researcher, who recorded achievements completed by the student, events checked in to and friends added. A questionnaire was completed on completion which contained 5-point Likert scaled questions and a number of open-ended questions with five sections; Participant Information, Orientation Application Usage and Feedback, Game Aspects and Achievement System Feedback, Improvements and Future Uses and Additional Comments and Notes. Twenty-six questionnaires were completed however only twenty-two sets of data were successfully captured from participants' phones due to technical issues.

FINDINGS

Utility
Overall the majority of the participants reported that the application and its functions were useful for university orientation. All the participants found the interactive map of the university to be useful, with fourteen of the twenty-six reporting it to be the most useful part of the application. The event list provided students with the ability to view their upcoming events and to check in to those they attended. All but one reported that the event list and information was useful. Although nineteen of the twenty-six found the event check-in function to be useful, the majority (82%) checked in to only three or less events, even though all participants had at least six events to attend. Similarly with the friend list, twenty of the twenty-six participants found it a useful function however the majority (68%) only added one or less friends.

Context
Input for the achievements was provided through user interactions with the application. Overall participants generally preferred game activities that required some kind of contextual input (e.g. location, time, event) to complete than those that simply required answering a question. Out of the five different types of user actions – check in to a location, check in to an event, add a friend, scan a QR code and answer a question – half of the students picked *scanning a QR code* as their favourite type of action to complete. On the other hand, participants reported that for achievements that required numerical input (eg. finding how many levels a building had or entering the university bus number) they could simply "guess the answer through trial and error" and another said that instead of exploring the building for the answer they instead "didn't check it out and find the answer, what I did was guess". This ability to guess the answer meant that a number of students thought this activity was "useful but not fun".

Achievements
It was found that all of the participants completed at least four or more achievements with the majority of participants (81.8%) completing ten or more of the twenty achievements. All but one participant (96.1%) agreed that *the achievement system added value to their orientation experience* and that *the achievement system was fun to*

use. Participants reported that the achievements were "such a fantastic twist" and "were genuinely fun", "great for killing time productively", "very fun" and "unlocking the achievements made it [the application] interesting". Participants also reported that they liked the integration of achievements with orientation activities "because it was simple and part of existing activities" and because they were "based on existing activities" at orientation. All but one participant (96.1%) agreed that the achievement system motivated them to explore the campus. A large number of long responses reported that these achievements "made me want to find where things are", "led me to places I enjoyed and that I otherwise wouldn't have seen", "were the most motivating part of the application, it caused me to walk all around the university."

DISCUSSION

The results show that the game elements were generally well received by the students as a welcome addition to the application. However there were some observations made from the data that raises potential conflicts that should be considered when designing achievements as a means to engage people with non-game activities.

Using achievements to encourage use

There were three achievements awarded to participants who checked into one, two and three events respectively. Although this function of checking-in to events was reported as useful, the findings show once these achievements had been unlocked that the majority of participants stopped using this check-in feature. This indicates that some participants only used the check-in feature because it had game elements attached to it. Otherwise it could potentially mean that awarding an achievement for attending a maximum of three events might have been interpreted as the maximum number of events a student needs to attend. There is a need to make sure the goals of the game elements align with the goals of the achievements. Although when we initially designed this achievement it was simply to introduce students to the event list and to encourage checking in, it could in fact have a detrimental effect if it's encouraging students to attend only three events. A potential solution would be to provide an achievement for attending all the events.

Usability vs. Enjoyment

For those achievements that relied on numerical input to complete, it was found that participants enjoyed these less because for some they could simply answer using trial and error, thus providing little challenge. Those achievements that required some kind of contextual information to complete, like finding a location or checking in to an event, were found to be more enjoyable and challenging. Therefore utilising user context via sensors provides us with a way to record actions and enforce game rules layered on top of non-game activities, making sure that players can't cheat to complete achievements. However there could potentially be issues when balancing usability and enjoyment to make sure some users don't cheat. For example rather than allowing the addition of friends manually by entering text details the application enforced that the participant had to connect phones with another person in order to add their details and unlock the friend themed achievement. With this setup the user can't add a friend who isn't using the application, reducing the functionality of the phone. However, if the user could just add any person to their contact list to fulfill the achievement requirements would they find this enjoyable? This balance between usability and enjoyment needs to be considered further. However the aim of the achievements is to support the goals of the application, therefore we suggest enforcing game elements shouldn't remove functionality from the application.

CONCLUSIONS AND FUTURE WORK

This pilot study describes the design of a gamified application for a university orientation event that uses an initial gamification design framework, and reports on the response from a trial study. Results indicate value when adding game elements to utility applications however there are potential conflicting issues that arise when using game elements that should be considered. How the addition of game elements affect and drive use is important to consider and how balancing the usability and enjoyment of the application is important. Future work will entail testing the system using a control group, for a longer period of time at the next orientation event.

REFERENCES

Antin, J., & Churchill, E. Badges in social media: A social psychological perspective. In Proc. CHI 2011, ACM Press (2011).

Chiu, M., Chang, S., Chang, Y., Chu, H., Chen, C. C., Hsiao, F., & Ko, J. Playful bottle. In Proc. Ubicomp 2009. ACM Press (2009), 185-194.

Deterding, S., Khaled, R., Nacke, L., & Dixon, D. Gamification: Toward a definition. In Proc. CHI 2011, ACM Press (2011).

Malone, T. W. Heuristics for designing enjoyable user interfaces. In Proc. CHI 1982. ACM Press (1982), 63-68.

Montola, M., Nummenmaa, T., Lucero, A., Boberg, M., & Korhonen, H. Applying game achievement systems to enhance user experience in a photo sharing service. In Proc. MindTrek 2009. ACM Press (2009), 94-97.

de Oliveira, R., Cherubini, M., & Oliver, N. MoviPill: Improving medication compliance for elders using a mobile persuasive social game. In Proc. Ubicomp 2010. ACM Press (2010), 251–260.

Sweetser, P., & Wyeth, P. GameFlow: A model for evaluating player enjoyment in games. Computers in Entertainment 3, 3 (2005).