



A Gamified Mobile Application for Engaging New Students at University Orientation

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ABSTRACT

The term *gamification* describes the addition of game elements to non-game contexts as a means to motivate and engage users. This study investigates the design, delivery and pilot evaluation of a gamified, smartphone application built to introduce new students to the campus, services and people at university during their first few weeks. This paper describes changes to the application made after an initial field study was undertaken and provides an evaluation of the impact of the redesign. Survey responses were collected from thirteen students and usage data was captured from 105 students. Results indicate three levels of user engagement and suggest that there is value in adding game elements to the experience in this way. A number of issues are identified and discussed based on game challenges, input, and facilitating game elements in an event setting such as university orientation.

Author Keywords

Gamification, serious game, user experience, mobile devices, smartphone, university, orientation.

ACM Classification Keywords

K.3.0 Computers and education: General.

INTRODUCTION

During the first few weeks of university it is important to familiarise new students with the campus, make them feel supported by the university, and encourage the creation of social groups. Academic, social and personal support for students from the university will encourage students to remain at university (Reason et al., 2006) and challenging students and giving them the support they require to succeed is vital. For new students, university orientation is the key event that aids in the transition from a school to a university environment while also introducing them to the university campus, people and services. However it was found that encouraging some students to participate in the event can be difficult (Fitz-Walter et al., 2011).

This research explores the use of a gamified mobile application, designed for new students, to address a number of specific issues related to orientation. It uses game elements, integrated with an orientation mobile application, to make the orientation process more engaging and fun. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

OZCHI'12, November 26–30, 2012, Melbourne, Victoria, Australia.
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application, to encourage students to explore the campus and find out about important university services. The application was updated and added to the university's official iOS application as part of semester two orientation at Queensland University of Technology in 2012. This paper reports on the initial deployment and results gathered from a survey and usage data.

RELATED WORK

Recently there has been a growing interest in using video game elements in non-game applications as a means to enhance engagement and motivation. Known as *gamification*, the term is defined as the "use of game design elements in non-game contexts" (Deterding et al., 2011). Gamification focuses on the addition of game elements to non-game contexts, rather than creating fully-fledged games. Generally the game elements aren't central to the system but provide extra incentive and external goals that are meant to engage users. The use of computer game elements to enhance the enjoyment of non-game applications dates back to as early as the 1980s (Malone, 1982). Recently more research has explored how game elements and mobile technology can be used to motivate users in everyday contexts such as drinking water (Chiu et al., 2009) or taking medication (de Oliveira, 2010).

Although research in the area of gamification is growing, there is still a need to explore the effectiveness of game elements used in this way. University orientation provides an excellent domain to explore the use of gamification to potentially enhance engagement of new students. Mobile games have been explored at university as a means of delivering scavenger hunts (e.g., Schwabe and Göth, 2005) but little has been explored in terms of gamification.

CASE STUDY

A review of past orientation surveys, interviews and a focus group with university engagement staff revealed that during the first few weeks of university new students can often feel lost, have trouble meeting new friends and know what services and events are available on campus (Fitz-Walter et al., 2011). To address these issues a mobile application prototype was built that offered a number of useful functions for new students attending university orientation. As students might find some of the orientation activities boring or tedious, game elements were introduced to the application in order to make the experience more fun and motivating. The application was designed using a three-layered framework that connected

goals to game elements through various *sensing* methods available from the smart phone technology being used.



Figure 1. Design framework used for the application

The *goals* identified were to encourage exploration of the campus and services, encourage participation in the events and encourage socialising. Functions built to support these included an *event scheduler* to show students current and future events on campus, a *contacts page* for adding new friends students make, and a location aware *map* that showed campus buildings. *University information* about the campus and services was also provided. Interactions made with the application functions could be recorded with sensor data and used as input for game elements. These recorded contexts included entering a number, scanning an object with a barcode, attending an event, adding a friend or being present at a particular location.

A number of game-like *challenges* were then added to the prototype using the context triggers to support the goals identified. These were based around tasks such as exploring the campus and important buildings (e.g., Library, IT Helpdesk), collecting important university items (e.g., Student Card, Semester Planner) and learning about important services (e.g., Security phone number, Health services). Tasks also included introducing students to functions available in the application, such as using the event list and adding new contacts to the contacts page to engage them with these tasks. The challenges and their design were based on achievement systems that can be found in many video games and other gamified systems (Antin & Churchill, 2011). The challenges borrowed design elements from these systems including titles, clues and badges.

Initial prototype and redesign

The prototype was tested in a field trial that ran during semester one orientation week in 2011 (Fitz-Walter et al., 2011), which revealed positive reactions from the students in regards to both the function and game elements of the prototype. Based on the feedback in the evaluation the prototype was redesigned and then added to the university's official iOS application. New students attending orientation with an iOS device in semester two 2012 could access and use the module during the first few weeks of university. There were few changes made to the functions available in the application, however a number of changes were made to the context and game layers of the application based on the feedback from the field trial.

Context changes

It was found in the prototype that students could cheat when it came to entering numerical data so basic numerical challenges were updated to also include text entry challenges, for more diversity and challenge. It was found that students could also cheat for event check-in challenges and that students didn't find the check-in function very useful. Therefore, only one challenge was included for checking in to an event as a way to introduce students to the event scheduler feature. In the prototype students had to add a friend to their contact list by bumping phones together using the third party Bump API (<http://bu.mp>). This stopped cheating through manual input but also stopped students adding friends who didn't have the application. This was updated to allow students to manually add new friends, however any contact-list challenges could only be unlocked when bump was used.

Previously students reported they primarily enjoyed the QR code input for challenges, therefore more of these challenges were added to the updated design. The physical QR code design was revised to include a custom trophy graphic and explanation text, in order to set the QR code apart from other QR codes used elsewhere and to link promote the application. The QR codes were also laminated to protect them from wet weather.

Game changes

A number of additions and changes were made to the game elements based on feedback from the field study. Challenges were extended to run over the first three weeks of university as well orientation week, with new challenges being released weekly. Challenges were grouped into *sets* with common themes. New sets could be added and released on various days to coincide with important orientation milestones (such as orientation week, lectures starting in week one and tutorials starting in week two). These sets could be retired once each milestone was over. The difficulty of each challenge (easy, medium or hard) was displayed in the challenge description. This provided the user with more information about the challenges they were chose to undertake, and some feedback on how difficult each one may be.

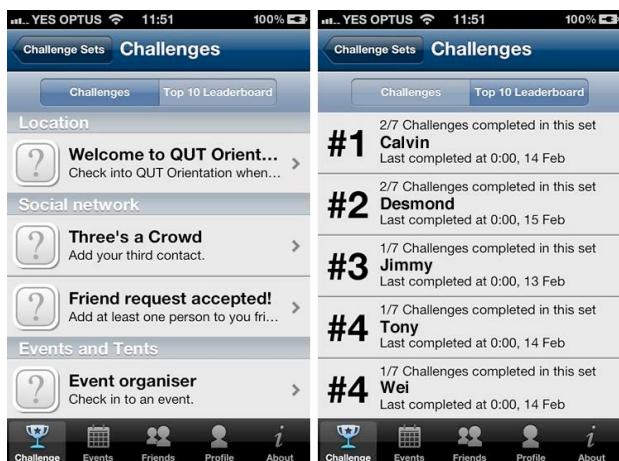


Figure 2. The redesigned challenge and leaderboard screens

In the previous version students could gain levels depending on how many challenges they had completed,

however this feature was removed, as students reported it was not that motivating. Instead a *leaderboard* was added for each set of challenges in order to encourage friendly competition between students and motivate them further. The ability to enter the draw for *rewards* was also added to each set. Once complete this feature was unlocked and students could enter the draw for prizes such as an iPad 2 and gift vouchers, provided by the orientation team. To facilitate these changes to the game layer a server was setup to allow organisers add and manage challenges and sets available in the application. The server also supported the leaderboards. Challenges could be updated and changed in the application on the fly using a Content Management System built in HTML and Java.

SETUP AND ORIENTATION STUDY

The redesigned application was integrated into the university's official iOS application. A usability study and playtest was conducted with six student volunteers by orientation staff. Following the test, minor adjustments were made based on feedback and then the updated application was made available to new students at the beginning of orientation week in second semester, 2012. Setup involved placing QR codes for some of the challenges at particular physical locations, including on buildings and at orientation information tents, before the orientation event started. The QR codes were checked a number of times during the week to make sure they hadn't been removed or tampered with. The applications was advertised to new students through a number of channels including the orientation website and social networking websites.

A total of forty challenges were created, sorted into nine sets based on theme, and released over four weeks. Twenty-three challenges were released in orientation week, seven in the first week of lectures, five in the second week and five more in the third week. Of these challenges sixteen required the student to scan a QR code, nine required text entry, five required checking-in to a location, five required number entry, three required a barcode to be scanned, one required the user to check in to an event and one required the user to add a friend to the contact list. Different sets were added and retired at the end of each week. At the end of week four the remaining sets of challenges were retired, however students could still use their contact list and view upcoming events.

Study Method

Data gathered during this time included survey responses from thirteen students, and usage data from 121 students. The survey was posted for the period the application was available and for two weeks after. Respondents were recruited using in-person and online methods, including visiting academic classrooms, via emails and official university social networks. Unlike the last field study, where respondents were recruited and provided with an introduction to the application, respondents this time were first year students who had found and tried the application as part of their orientation experience. Consent was provided by respondents at the start of the

survey and as an incentive participants could enter the draw for an iTunes gift voucher.

Participant Overview

Thirteen students who used the redesigned application completed the survey successfully (male = 8, female = 5). Their ages ranged from 18 to 28 years old with an average age of 22 years. All the students were new to university and entering their first year in one of four different faculties. The majority of students (84.6%) reported that they spent on average two or more hours using their smart phones each day, with seven of the thirteen students (53.8%) spending five or more hours each day. Eleven of the thirteen students (84.6%) had used an achievement system before in a mobile, video, or computer game, and of these participants all stated that they found it to be a positive addition to the game.

FINDINGS

Few questions in the survey asked students about the utility of the application, as this was relatively unchanged from the previous field study. When asked about the overall effect of the application eleven of the thirteen students (84.6%) either agreed or strongly agreed that the application was *easy to use* (none disagreed). Nine of the thirteen (69.2%) agreed or strongly agreed the application was *fun to use* (none disagreed). A number of students (nine of the thirteen, or 69.2%) agreed that *using the application meant they spent more time exploring the campus than they had otherwise planned to* (three disagreed).

Context

Similar to the previous field study a number of students reported that the QR codes were enjoyable. Students reported that location challenges "*promotes actually visiting and familiarising yourself with a location*" and from that they "*enjoyed exploring the campus*". A number of students mentioned that they thought the application could be improved by having more location-based challenges. However, it was reported in the survey responses that some of the QR codes at the tents could not be found and when asked by students, tent organisers were unsure of where to find the QR codes.

Although text input provided more diversity in terms of input for answers, a few students reported that they ran into issues with text input where they couldn't provide the correct answer. This was most likely due to the fact that case sensitivity was enforced by the application, which was also reported as an issue from a few students in the short answer feedback. Some students also reported that the text answers weren't as challenging as the QR code challenges, saying things like "*I was able to do most by using google rather than having to explore the uni*".

Game

A set of achievements had on average four challenges, and on average two were released and two were retired each week. Based on this it was inferred that if students completed two or more sets (eight or more challenges) then they engaged with the challenges (and were not just

trying them out). From the survey respondents six of the thirteen students (46.2%) reported that they completed one to four challenges, four reported (30.8%) that they completed five to eight challenges and two (15.4%) reported they completed nine or more.

This varied compared to the usage data captured from all the users on the server. Over the four weeks that challenges were available to users, 121 individual students completed a total of 560 challenges. Of these students 73.5% completed 1 to 4 challenges total, 9.1% completed 5 to 8 challenges and 17.4% completed 9 or more. These results indicate three types of users: those who *tried the application*, those who *engaged for at least one week* of challenges and those who chose to engage with the application for *longer than a week*. The most challenges a student completed was thirty-three, which took over four weeks to complete and required travel between two campuses. When asked *what were the motivating aspects of completing the challenges in the application* students reported in the survey that primarily they found *learning about the university* (ten of thirteen, or 76.9%), followed closely by *being eligible for prizes* (69.2%) and then *completing all the challenges* (61.5%).

DISCUSSION

Survey results suggest that the game elements were generally well received by the students as a welcome addition to the application, supporting results from the previous field study. Further investigation should explore why the game elements do not engage those who tried the application. It was also found that supporting the dynamic nature of an event can often lead to issues in setup and deployment. These findings are discussed further below.

Game elements

Although not all users engaged with the game beyond completing one to four challenges, survey results suggest that the game elements were generally a positive addition to the application, with a number of students reporting that they motivated them to learn about the university and explore the campus. The strength of the challenges seems to lie in the use of QR codes for location-based challenges, as supported by evidence from the survey results and the field study last year. Some students reported that keyboard input challenges weren't that interesting even though the support for text-based answers was added. Students reported that they simply weren't challenging enough in the sense that they could find the answer without much effort involved, especially when compared to the location-based challenges. This indicates that the text-input questions need to be made harder, or they could be removed altogether. A large number of users were recorded as trying only one to four of the challenges. Although difficult to determine based off these results, further investigation could explore if any design changes could be made to improve these numbers.

Running the experience

The results indicate a number of issues that occurred while running the application. More coordination was needed for setting up and maintaining the markers used in

the game, more regular checking is required to make sure they aren't taken down. It may be worthwhile utilising multiple QR codes for one challenge in case something happens to one of them (e.g., Taken down early). It may also be worthwhile providing support for students who require help with some of the challenge issues. This person could also make regular checks while the challenges are running to make sure all physical inputs, like QR codes, are working and in the right position.

CONCLUSIONS AND FUTURE WORK

Overall results suggest that the game elements complement the orientation application and experience, encouraging some students to explore the campus more. A number of issues were raised that should be addressed in future releases including reviewing the game elements and providing further support for the application during its use. The study will be undertaken again in semester one 2013, when the intake of new students is much larger than semester two orientation.

ACKNOWLEDGMENTS

This research was carried out as part of the activities of, and funded by, the Smart Services Cooperative Research Centre (CRC) through the Australian Government's CRC Programme (Department of Innovation, Industry, Science and Research). The authors wish to thank the QUT Student Engagement Team for their input and support, in particular Peter Gatbonton and Duyen Nguyen.

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