Breaking the Campus Bubble: Informed, Engaged, Connected

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ABSTRACT

This paper introduces UniVote, a system supporting mobile phone-based interaction with public displays. The case study carried out at Lancaster University indicates that the campus "bubble" in which students live can lead to feelings of isolation within an insular community cut off from the outside world. UniVote makes use of a voting system to help elicit user involvement, keep users informed of campus- and world-wide events and news and create a sense of community. Findings of this preliminary study suggest that the campus "bubble" can indeed be broken, and the voting component of the system particularly fosters interaction and human connectedness.

Keywords

Interacting with public displays, mobile phones, expressing opinions, human connectedness, voting.

1. INTRODUCTION

Across the Lancaster campus there is an ongoing deployment of public displays designed to enable pervasive interaction as well as broadcast more traditional multimedia content. This infrastructure offers an opportunity to explore ways in which technology can improve student quality of life on university campuses.

Our work is driven by the ever-increasing levels of stress and work experienced by university students, with students' anxiety levels being particularly high during their first year at university [6]. Students therefore have very little time to explore new things [10] and often have a general lack of interest in anything that is not directly related to student life.

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This often produces insular and self-centred behaviour which can easily develop into a feeling of isolation, particularly on the Lancaster campus which is physically isolated from the city itself. This lends itself to the notion of students living in a "bubble", with students becoming more and more detached from the world outside of the university campus. Students at the university are aware of this problem, as the following quote suggests:

"*Campus is a place cut-off from the rest of the world… Students are disinterested and often blatantly unaware of what's going on around them.*"

It is this issue of student isolation from the outside world and each other that we would like to address by developing the UniVote system, through understanding campus life and exploring ways in which technology can assist in making the campus more responsive to student needs. Two concepts are particularly relevant here: *user engagement* and *human connectedness*, which are considered throughout the entire design process.

People in general have a desire to be involved in meaningful social relationships, a topic which has been explored in relation to technology by Agamanolis during his development of nine *human connectedness* principles [1]. These principles explore how such essential relationships are built, maintained or enhanced by technology [2], and as such can assist in designing effective public displays that encourage acceptance and entice interaction through building and maintaining a *relationship* with the user. To build this relationship a public display must *engage* its users and encourage interaction. A phenomenon coined as the *honey pot effect* was observed by Brignull and Rogers [5], which describes the *social buzz* produced by an increasing number of people gathering in the proximity of a public display, attracted by its interaction potential and the social payoff of congregating. Such displays would only need to attract the critical mass of people before the social facilitation of the display would maintain a high level of users' engagement and interaction with the display. However, there are no accounts of how such phenomena would evolve over time, particularly once the novelty of the display wears off.

Through the study of ambient displays Mankoff and Dey [8] identified that the information source is a crucial factor in user adoption and acceptance of a display. Since interaction with public displays is usually short (even for users interested in its content) the display has to ensure a transition from the users periphery to the focus of their attention. It is hoped that by providing information of interest to students (broadening their awareness of the outside world) and asking them to provide their input, the display will be woven into the fabric of students' interests and needs and will help to increase both acceptance and interaction. In addition an aesthetically pleasing front end will help to entice interaction in situations where the content on the display does not speak directly to the interests of students.

We hope to reduce the feeling of isolation on campus by keeping students better informed of campus- and world-wide events and allowing them to voice their own opinions on such matter through a voting procedure. Given that interaction with public displays often encounters resistance from a public audience [5], we feel that a voting system will help to elicit audience involvement as it has proven to do so in radio and TV. This research is particularly relevant given that there has been little work exploiting voting as an activity that can successfully promote interaction with public displays [13][12]. Opinionizer [5] includes similar voting capabilities to UniVote based on open-ended questions, however a serious limitation is that it does not provide anonymity to voters and cannot allow for simultaneous interaction by multiple users due to its use of a keyboard for input. The mobile phone interaction of UniVote will overcome these limitations and will consist of closed multiple-choice questions to ensure that the threshold to participation is perceived as low, so that the benefits of interacting outweigh the perceived costs [5].

Our work focuses on the use of mobile phones to act as a display and input for larger public displays to leverage on the strengths of both components: the personal control and market saturation of mobile phones (particularly in a predominantly student-centred environment); and the larger presentation space, and greater computational power and bandwidth of public displays [12]. It is hoped that the combination of the rich media potential of public displays and the communications possibilities of mobile phones, will produce a truly interactive system to entice user interaction and try to build a sense of community on Lancaster campus.

2. THE UNIVOTE SYSTEM

The UniVote system and further screenshots can be downloaded from *www.univote.co.uk*. The system has been developed and tested on a Nokia 6230 and Mac OS 10.4.

2.1 Needs Analysis

Our needs analysis involved both questionnaire and observation of students on campus. The questionnaire was administered to 31 students and captured factual data including: access to television, radio and Internet; level of interest in campus, local, national and international news; news categories of interest; level of knowledge about current affairs; and level of interest for a campus news system. The findings suggested that campus residents used the Internet as their main source of information (partly due to inadequate TV and radio signal on campus) and as a result residents were insufficiently informed about current news and events – supported by an overall poor level of knowledge in factual questions. Off-campus students preferred national news, politics and sport, whereas campus-based students were more interested in information about social events on a campus level. Both on- and off-campus students have a strong interest for knowledge of these areas, despite being uninformed, and responded enthusiastically to the proposed system. Naturalistic observation found that while there were many paper-based notices and advertisements along common campus routes, people rarely stopped to read them. Focussing on observing the natural patters of peoples' movement throughout campus will inform the decision of where the UniVote displays should be located.

2.2 System Architecture

UniVote is based on a client-server model (Figure 1) and has been designed with multiple campus installations in mind.

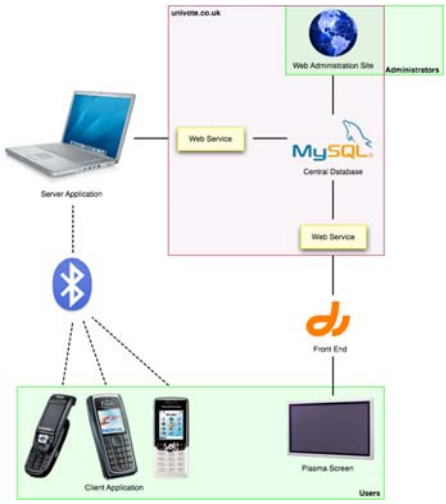

Figure 1. System Architecture

Each UniVote display will require its own Mac running the server application and front end. The components of the system are described below.

2.2.1 Client Application

The client application was designed to run on any J2ME and Bluetooth enabled mobile phone and is distributable over the air using a WAP connection. It uses the standard J2ME API to ensure it inherits the look-and-feel of the host mobiles' operating system, and operates in a step-by-step linear manner to ensure maximum usability (Figure 2). Users must have this application running on their phone before they can cast a vote. Users are connected to the server application nearest to their location (as determined by the Bluetooth protocol) which is highly likely to be the UniVote public display they are intending to interact with. On the development phone (Nokia 6230) it takes on average 16 seconds to cast a vote (including starting the application).

2.2.2 Server Application

The server application coordinates communication between client devices and the central database. It accepts incoming connections, retrieves the questions from the database (applicable to the display the user is interacting with) and sends them to the user's mobile phone. It also sends users' votes to the central database where they are saved.

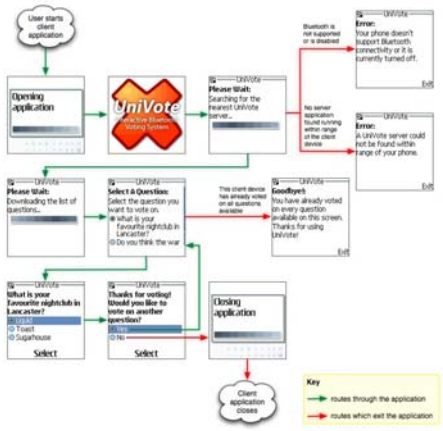

Figure 2. Client Application

2.2.3 Front End

The front end application (Figure 3) running on the public displays shows a scrolling news headlines feed and two-minute headline summary; cycles through the questions, inviting users to cast a vote and displaying a voting outcome; displays information on how users can cast a vote; and provides immediate feedback of new incoming votes by means of an animated bar chart. The front end application was implemented using Director, a common choice for delivering content on large public displays [5][13].

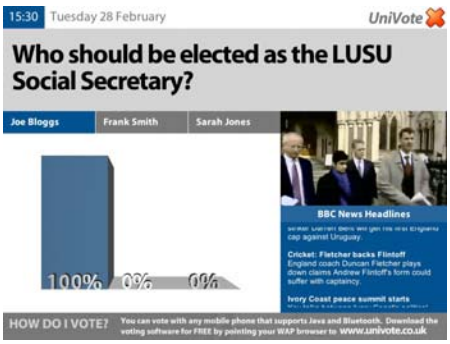

Figure 3. Front End Application

2.2.4 Central Database & Web Service

A central MySQL database and PHP-based web service are remotely hosted at *univote.co.uk* to allow screens to be deployed around campus wherever an Internet connection is available. The central database contains the questions, screen configuration settings and votes, and the web service provides a compatibility layer for passing data to the Director front end.

2.2.5 Web Administration Site

The web administration site allows university staff to manage the UniVote system. A central bank of questions is available to which staff can add, edit or delete questions. Questions comprise of a single question statement and three fixed answers and can be assigned start and expiry dates/times. Questions from this central bank are then assigned to *question groups*. Each screen around campus has a unique name and is assigned specific *question groups* to show: only questions from the central bank which belong to those groups will be shown on this screen. Screens have three configuration options: colour scheme (red, green, blue, black); question change interval (10, 20 or 30 seconds; 1-5 minutes); and voting information interval (1-10 questions) which controls how frequently the front end shows more detailed and eye-catching instructions on how to cast a vote. Voting statistics (for any screen around campus) can be viewed remotely by university staff as well as a timeline to show how voting is spread throughout any given 24-hour period. There is also a simulator for university staff to test a screen configuration before physically deploying it to an on-campus display.

2.3 Information Sources

There are two sources of information used in UniVote: *news* (displayed on the front end) and *questions* (on which users vote). The BBC was chosen as the source of news data because they provide an XML and two-minute RealVideo feed of the latest news headlines. The XML feed (parsed by the web service, and presented as a vertical scrolling marquee) and the two-minute video summary are embedded into the front end.

At this stage of the development it was decided that the questions would be added to UniVote by university staff and not by students directly, partly due to the proof-of-concept nature of this work. However, giving students the capability to manipulate campus displays in real-time could have negative consequences for the campus community through the posting of offensive or nonsensical questions (cf. "Error prevention and user control" [8]).

This notion of control also ensures that the questions posted on UniVote are neither highly controversial nor have right or wrong answers, so people do not feel defensive or inhibited in expressing their opinions. Public expression of opinions or attitudes for which people hold strong beliefs is often problematic [3][4][9] and can lead to the "spiral of silence" effect [11] in which those who hold minority opinions will choose to remain silent because of fear of isolation from the majority [14]. Given we are trying to increase the feeling of community and diminish the sense of isolation, this is certainly something we wish to avoid – if people perceive support for their opinions from a social network, they are more willing to express them [7].

3. EVALUATION

UniVote was evaluated by means of a lab-based evaluation session comprising of 23 first year undergraduate Computer Science students – 21 male, 2 female, with an average age of 20. Only 21% of participants had prior experience of public display systems such as UniVote. The front end of the system was projected at the front of the room.

Participants were given a brief presentation as an introduction to the system and the context in which it would be used in a real-world situation. Participants were asked to complete two tasks and were given an incentive for their participation.

The first task required participants to use the web administration site for posting their own questions, as a means of gaining familiarity with how the system works. Qualitative and quantitative data was collected from participants through a worksheet. The second task required participants with Java- and Bluetooth-enabled mobile phones to download the client application and cast a vote, and complete another worksheet based on their interaction experience with the voting functionality of UniVote.

Initial reactions to the system after the first task were positive, with 87% of participants reporting they would use such a system if it was deployed around the university campus. All participants found it easy to use. Over two thirds thought it suitable for deployment around campus, with one student particularly liking the idea of anonymous voting, and another suggesting that their real-world usage would very much depend on the types of questions available on it. As previous discussed this is crucial to the success of the system – participants

suggested topics including campus-related topics (where to build more parking spaces, new bus routes); student topics (student elections particularly); current events; or just anything fun or useful. Two usability issues were identified during this phase. A few students pointed out that the scrolling news feed would be difficult to read on smaller screens, suggesting the need for different "themes" of the front end which are optimised for certain screen resolutions. While the immediate feedback of the animated bar chart was thought advantageous, one student noted that the bar chart would be continually animating during periods with high voting levels. This suggests the need for scheduling of screen updates, for which further research would have to be conducted to find the optimal trade-off between immediacy of feedback and system capacity.

Despite the positive initial reaction, only 39% of participants were able to complete the second task (despite 70% having compatible phones). This was due to two factors. There were major problems downloading the client application: although 91% of participants had WAP-enabled mobile phones only 4% had experience using it. This suggests that WAP is not the ideal distribution method for such applications and a more convenient method such as SMS should be considered. Secondly, implementations of the J2ME API do vary between mobile phone manufacturers which caused runtime errors for some participants: further testing is required here.

Aside from these usability and technical problems, the general consensus of the system was highly positive and the majority of students would use such a system if deployed around campus.

4. DISCUSSION & CONCLUSION

Despite its prevalence, the lab-based evaluation session has limitations that need to be acknowledged. Ethnographic studies on future versions of UniVote running "in the wild" for a long period of time will undoubtedly capture aspects of the system's success that we cannot foresee at this stage. While the evaluation session showed a positive reaction to the system, a longer-term evaluation would be required to measure the system's success in terms of both human connectedness, and whether the system would outlast the novelty effect and recreate the *honey pot effect* to ensure continued interaction.

There are two features that we feel are very important to include in the next version of UniVote (given the evaluation findings) to help encourage interaction. Firstly, the system should handle questions with more than three answer options. This would be essential for using UniVote in student elections – a key usage area identified by the study participants and during the needs analysis. Secondly, a "points system" could be used to reward frequent voters with gifts and vouchers from the student union, who would be identified by the unique Bluetooth address of their mobile phone.

The outcomes of this study highlight that interaction with shared displays has a lot to offer through encouraging users to express opinions by casting votes on topics of interest, and our preliminary findings suggest that the campus "bubble" can indeed be broken. A series of real-world testing and evaluations would have to be conducted to confirm this with respect to human connectedness principles. Unsurprisingly we replicated the general finding that a strong well-founded rationale for developing an interactive system is the best predictor for its success, particularly when this is matched with users' greatest interests and needs.

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