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"Please turn ON your mobile phone" – First Impressions of Text-messaging in Lectures

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Abstract. Previous work by Draper and Brown [3] investigated the use of specialized handsets to increase interactivity in lecture settings. Inspired by their encouraging findings we have been exploring the use of conventional mobile phones and text-messaging to allow students to communicate with the lecturer as the class proceeds. In our pilot-study, students were able to respond to MCQs and send free-text comments and questions to the lecturer via SMS. Through observations and interviews with students and lecturers, we gained useful impressions of the value of such an approach. Students enjoyed the opportunity to be more actively involved but voiced concerns about costs.

1. Introduction

Anyone who has given a talk or lecture to a large audience will be well-acquainted with the uncomfortable silences, embarrassed glances and nervous shuffling that greet requests for audience participation. This anecdotal evidence is supported by survey findings presented by Draper & Brown [3] indicating that if a lecture class is asked for a verbal response, 0 to 3.7% of students is likely to respond; even for the less exposing, "hands-up" response style, the participation rate is also a low 0.5-7.8%.

Not all audiences are so shy, though. In the late-1990s the television gameshow, *"Who wants to be a millionaire?"*, attracted large viewing numbers throughout the world. As part of the game format, the contestant could "ask the audience", getting each member to answer the multi-choice question using a handset.

Draper and Brown have taken similar handsets out of the TV studio and into the classroom. In [3] and an earlier paper [2], they present pedagogic motivations for their work which we share and will not elaborate on here beyond noting the value of interactivity and engagement between the learners (students) and the learning-leader (lecturer).

In a long-term, extensive study – summarized in [3] – the personal response system they used for multiple-choice questions (MCQs) was seen as being of benefit: for example, 60% of 138 first-year computer students rated the system "extremely" or "very" useful; and, similar responses were seen in other disciplines as varied as medicine and philosophy. Handsets are also likely to increase the participation levels

– when asked whether they would work out an answer if asked to vote using the system, between 32-40% agreed.

Of course, specialized handsets have many advantages such as providing simple, direct ways for students to respond (they just press a button); however, there are some drawbacks including: large costs involved in providing handsets ubiquitously, for every student and every lecture; organizational-overheads (e.g. handing out and collecting handsets); and, the impoverished range of responses possible (a single selection for MCQ use).

Inspired by Draper and Brown's experiences we sought to address these sorts of drawbacks by using a technology that most developed-world students now carry with them to every lecture – the mobile telephone. We were interested in whether the pervasiveness and easy familiarity students have with this technology would allow it to serve as a replacement for the purpose-built handsets. Furthermore, we wanted to explore the possibilities beyond MCQs such as students sending free text questions or, perhaps suggestions and comments to the lecturer. Although other researchers have considered the use of mobile phones in a university setting (e.g., [1]), we believe this to be a novel application.

2. Example Scenario

While the specialized handset studies provided us with a very useful set of functional and non-functional possibilities, we decided to also run some sessions bringing together a group of eight experts in both human-computer interaction and education (all of which were also lecturers) to brainstorm requirements. In the process we developed scenarios such as this one:

Dr Monday begins her lecture on advanced linguistic analysis to 300 first year students. "Before we go any further, are there any questions about last week's topic? Send me a text now from your mobile phone to 444". After a minute, Dr Monday checks the computer display and sees there are 25 questions listed in the order they arrived; she can reorder the list alphabetically and by size of message as well. She selects one of the questions to answer.

Later in the lecture, Dr Monday wants to test the students' understanding of "focus". "Here's a quick quiz," she says. "If you think focus is related to the subject, text 1 to 444; if you think it is related to the topic, text 2; and if you think it is related to the verb, text 3 to 444". Moments later, Dr Monday can display a bar chart showing the students what the most popular choice was. "Most of you are wrong", she says, wryly, "the correct answer is 2 – the topic".

Several times in the lecture, Monday asks the students to text their current "happiness level": "send a text message to 444 now to show how well you understand the lecture so far," she says, "enter H followed by a number from 0 to 9 where 0 is the worst". She can view the changing level of "happiness" over time as a line graph.

After the lecture, Monday returns to her office and can access all the questions sent by students; she can also review the bar charts for each multiple choice question; and see the "worm" trace plotted over time. All this information helps her review the lecture content and plan for next week's session.

Such discussions clarified some of the additional forms of interactivity mobiles might provide over specialised handsets: allowing multiple responses to a MCQ – e.g., "choose 2 of the 5 features listed below"; parameterised responses – e.g. "text your answer (1-5) and how confident you are in your answer (0-100%)"; open-ended 'conversations' between the lecturer and audience; and, finally, as an active feedback device.

3. Pilot-study system

Before building a full-scale system, tailored specifically to the lecture-context, we decided to acquire a third-party, commercial text-polling system to first explore the issues and feasibility of our ideas. The software chosen was the *SMS PollCenter* by Code Segment[1]. The system runs on a PC (we ran it on a laptop in the field studies) and also requires a mobile phone to be connected to the computer via a serial cable so that sent text messages can be gathered. MCQ results can be displayed in a range of forms such as bar chart and a pie-chart. The "SMS Chat" facility displays incoming texts in a scrolling whiteboard format.

4. Field studies

We studied the system in use over six, one-hour sessions spread over a couple of months. Our aim was to gather impressions in a range of contexts so we chose situations with different characteristics and used the system in a variety of ways.

Three courses were involved: *A*- first year programming class run in New Zealand (NZ); *B*- first year programming class run in South Africa (SA); and, *C*- a 4th year human computer interaction class in South Africa. For courses *B* and *C* we carried several trials each separated by around a week. During each session, researchers set up and operated the system for the lecturer; they also observed the class interaction and were involved in interviewing students at its end. In class *A* and *C* the authors were the lecturers – we wanted to experience the system from the front, as it were; two other lecturers were involved in presenting class *B*.

[1] For information and a demonstration see: http://www.codesegment.com/

Session/ system use	Course	Question type	Response elicited	visibility	# people in class	#unique respondents (% of total)
1	A	factual	MCQ	full	155	35 (23%)
2.1	B	factual	MCQ	full	180	32 (18%)
2.2	B	personal	chat	full	180	16 (9%)
3.1	B	personal	MCQ	partial	150	17 (11%)
3.2	B	factual	MCQ	partial	150	10 (7%)
4.1	C	personal	MCQ	full	40	15 (38%)
4.2	C	personal	chat	full	40	3 (1%)
5.1	C	factual	MCQ	full	40	6 (15%)
5.2	C	personal	chat	hidden	40	3 (1%)
6.1	C	personal	MCQ	full	33	10 (30%)

Table 1. Summary of sessions and system use. In each session (e.g. 2) there was one or more use of the system (e.g. 2.1, 2.2). Questions were either factual (based on lecture content) or personal (eliciting subjective opinion). Text messages sent were either single selections relating to a MCQ or free text (chat style). Messages/poll results were either were fully visible (results shown during polling and dynamically updated), partially visible (final results shown at end of polling) or hidden (only the lecturer saw the messages).

A summary of each session and use of the system within them is shown in Table 1, along with data on the number of text messages received during each use. While this table gives some raw indications of interactivity, it is worth highlighting some of the specific behaviours and effects we noticed. First, 19% of all logged responses to MCQ style questions were in a form that were not recognized by our answer matching filters: for example, in Session 2.1, the students were asked to enter a single integer, but one sent *"Turn 72 degqees"* (*sic*). Second, on average, 10% of respondents sent more than one message in response to a question (either resending their initial response or changing their vote). Third, in SA, 6% of all messages were spam (e.g., *"Let the universe decide SMS "oracle" to 34009"*); no spam was received in NZ. Fourth, in most of the MCQ cases, as the lecturer discussed the results of the poll chart, additional messages would arrive – sometimes this was a mobile telephone network effect (5-10% of messages were delayed), but there was also evidence of a 'playfulness' as students attempted to 'disrupt' the lecturer by altering the results.

At the end of each session, we asked for volunteers to remain behind and give feedback on the system. Overall we spoke to around 50 people in this way. Views were consistent in that students liked the idea of the approach (it gave them more of a role in the lecture, changed the pace of the session *etc*); strongly preferred the MCQ style of interaction over the chat scheme (as texting a freeform question could take too long and the display of comments to the whole class could be distracting); but, they had concerns over the cost of sending messages (over and over again we were told – *"if sending a message was at a reduced rate, or free, I'd use it a lot more").*

We also discussed the experience with the class *B* lecturers. They were less enthusiastic and more cautious about the scheme than the students. Their main concerns were the potential negative impacts of the technology on the "natural" flow of the lecture and the need for more flexibility in the software to respond dynamically.

5. Discussions and future work

As this was a pilot-study, no strong conclusions can be drawn at this stage. However the results suggest that using the handsets to SMS responses to MCQs could improve the level of participation: we saw a response rate of 7%-38% (higher than that predicted by Draper and Brown for 'hands-up', and in the best cases near to that predicted for their specialized handsets). The system was most successful when the results were always on display to the students (from the start to the end of the poll): we discovered that students liked watching their messaging change the display dynamically. Even when the messaging rate was low, the technique appeared to have a positive impact on the lecture experience: the sessions became more participative with the lecturer engaging the students in a discussion of the poll results, for instance. In setting up software to process MCQ responses, the aim should be to accommodate the variety of answer messages likely to be sent (e.g. "1", "one", "the first choice").

While a novelty effect might well have been in play, the response rate seen in 6.1 (30%) compares favorably with that in 4.1 (38%), even though the second session took place approximately one month after the earlier one. Given Draper and Brown's experience, we predict the enthusiasm for the approach would grow, particularly if charging issues can be resolved (e.g., by providing free texting for students).

The 'chat' form of interaction was disappointingly received. However, we intend to explore this form further as its potential was undermined by the constraints of the pilot system (e.g. lack of filtering or censoring facilities for the lecturer). Another area for potential was discovered in the form of an interesting emergent 'community' behaviour when the chat screen was visible to all students: as well as communicating with the lecturer, students posed questions to *each other* and received replies from within the audience. While there is much exciting work on mobile communities for non-colocated people, this experience suggest there is some useful work to be done on supporting *immobile* mobile communities, such as crowds in football stadia.

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7. References

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