

'In it to win it – at it to get it': Low - tech Interactions for Motivation and Learning in HCI

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ABSTRACT

In this paper, we describe a motivational tool that was used in a large undergraduate HCI class; looking to design a more inspirational learning experience, we took inspiration from the 'H' and the 'I' in Human Computer Interaction to devise a low - tech system that engaged the students and provided us, as lecturers, with interesting knowledge about motivation and engagement. The use of the tool was evaluated over a twelve week course and the results showed that whilst engagement and motivation increased over the first few weeks, it tailed off towards the end. An interesting finding was that students were prepared to 'cheat' to win and this behaviour is examined in the paper and suggestions made as to how this might be implemented in a more high – tech interaction.

Keywords

Motivation, Engagement, Interactive lectures, Low - tech

1. INTRODUCTION

Following on from earlier studies by ourselves and others, this paper describes an experimental approach to lecture management that was intended to improve student engagement and motivation (Read, Kelly and Sim 2005), (Gregory and Read 2000). There is a perception by some students that in order to learn, all they need to do is attend classes and carry out the activities (Petty 2004). Within the institution that hosted this study, many of the classes are delivered in the form of lectures and their duration is typically one hour. However, it has been noted that undergraduates have only a typical attention span of around fifteen minutes (McCabe, Horowitz and Beakes 2004) and so, lecturers can become less effective unless they incorporate some interaction with the students to help them stay focussed. In several studies, lecturers overcome this problem by incorporating problem solving activities into the lectures (Rodger 1995), this is not always easy as in some circumstances there are physical constraints, for example the seating arrangement of learners, that limit the opportunities for peer interaction and for interaction with the teacher (Roth, McGinn, Woszcyzna and Boutonne 1999)

There are known 'tricks' to improve student engagement; one is the use of multimedia. It is common with teachers of HCI to use multimedia in the lectures to introduce concepts and technology. An example is in the discussion of ubiquitous computing where the technology will be difficult to demonstrate in the class and it might be expensive. This use of multimedia is supposed to provide engagement for the students and facilitate effective learning by catering for different learning styles (Alessi and Trollip 2001). However, despite the inclusion of multimedia, the students can still be passive recipients of information and not be engaged with the subject domain.

A different approach to engage students is to use interactivity. Currently one of the most widely adopted approaches to making lectures interactive, is the incorporation of mobile devices into the classroom (Draper and Brown 2004). This enables the students to exchange their role as a passive recipient of information into an active participant in the communication process. Typically the interaction that occurs is in the form of quizzes where students use a device to communicate their response to a question to the lecturer (Scheele, Seitz, Effelsberg and Wessels 2004). The lecturer can gain instant feedback from the students on their understanding of the concept and provide additional clarification if necessary. Through this interaction there is the expectation that students learning will be enhanced by being actively involved in the communication process. To use these devices it is often necessary to have a specially equipped lecturing space, and there is a time overhead involved in programming and maintaining the systems.

In the study described in this paper, the approach was to investigate how the use of low-tech, non-interactive tools might improve engagement and motivation. Multimedia had been tried, high – tech interactivity was not an option as the class could not use the lecture theatre with that facility built in.

In the rest of this paper the approach is described, some results and presented and discussion follows that suggests some ways forward for the idea.

3. IN IT TO WIN IT AND AT IT TO GET IT

The work that is described here took place in a “new university”, where 89 second year undergraduates attend a common year-long HCI course in the Department of Computing. The course is one sixth of their study for the year, and is taken by several different cohorts. The largest group taking HCI are enrolled on BSc Computer Games, other groups include BSc Computing, BSc Network Technology, BSc Multimedia Computing, BSc Business Information systems, BSc Database Systems, BSc Software Development and also students from the Department of Technology studying BSc Web and Multimedia, as well as handful of Combined Honours students from who knows where! The cohort includes several students that do not really see the ‘point’ in doing HCI and, as the module is compulsory, it is often done somewhat grudgingly.

The course is taught by two lecturers who take a team approach to the work. In the first semester, one does the lecturing and staffs practical sessions whilst the other does the associated marking and admin. The course is presented in two parts. In the twelve weeks to Christmas students are taught the core syllabus, basing the content on the HCI Textbook by (Dix, Finlay, Abowd and Beale 2004). In the second semester, students have a more varied experience, electing to attend a minimum of five seminars and working on their coursework. The work described here was carried out in semester one, during the core teaching.

3.1 The Plan

The plan was very simple, each week the lecture would include a quiz for the students. The quiz, once handed in would act as a register (thus encouraging participation) and the week following, one of the winners of the quiz would be drawn from a hat and given a HCI text book as a prize. The students had to be at the lecture to participate and had to attend the following week for the prize. If a student was drawn as a winner but was not present, another one was chosen. This would continue until a winner was found.

Central to the philosophy was that anyone could win, thus, it was not to be a quiz that measured ability but should be easy enough for everyone to complete, if they paid attention to the lecture.

3.2 Design of the Quiz sheets

The quiz sheets were created week by week by the lecturer that was not teaching the class. Based on the PowerPoint slides that accompanied the class, each quiz had ten questions. The question topics were balanced to cover the whole of the lecture time i.e. questions were set from the early, middle and latter parts of the lecture. The first question always asked what the aim of the lecture was, and the last question asked what topic was being covered in the next lecture. The questions were not designed to be particularly difficult, the aim was to encourage attention to be paid throughout the lecture time and promote active listening. Some example questions are given here:

Lecture topic	Example Question
Intro to HCI	Name one type of expert review
Evaluation Methods	Name a method of direct observation
Input technology	Name one of two ways of Classifying input
Output technologies	What are the two gulfs in Norman’s model
Dialog notations	What does HTA stand for
Design	What are some of the easy things to think about in design for all?

Table 1 - Examples of Questions

Humour was also used in some of the questions, for example, a question on state transition diagrams was followed by “How many states are there in the USA?” Again the rationale for this approach was that questions were not particularly intended to find out how hard the students were thinking – just that they were engaged and paying attention in the class.

3.3 The Method

The quiz sheets were handed out at the start of the class; student’s filled them in during the class and at the end of each lecture the quiz sheets were left on the front desk by the students. The sheets were not actively collected from them and therefore individual students were not compelled to submit a quiz sheet. The pile of completed quiz sheets were then gathered up by the lecturer and these were marked outside of class time. The sheets were then separated into three groups: (i) those that had only the name of the student on the sheet and therefore did not participate at all in the quiz, (ii) those that attempted questions but did not get them all right, and (iii) those that got all answers correct. The numbers were counted up for each category by week and data entered onto a spreadsheet. A number of simple statistics were then calculated and analysed.

3.4 The Results

At the beginning of the semester, the students took a rather haphazard approach to completing the quiz sheets, evidenced in Table 2 by the high proportion of students that got a lot of the questions wrong.

	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8
not attempted at all	5	10	5	2	3	7	5	3
attempted but not correct	42	19	8	16	10	14	14	16
all correct	21	38	41	42	35	25	22	25
Total class attendance	68	67	54	60	48	46	41	44
% of all correct vs. total class	30.9	56.7	75.9	70.0	72.9	54.3	53.7	56.8
% not correct (inc not attempted) vs. all correct	69.1	43.3	24.1	30.0	27.1	45.7	46.3	43.2
% of not attempted at all vs. whole class	3.4	6.7	2.7	1.2	1.44	3.22	2.05	1.32

Table 2 - Results from the quizzes

Over the following weeks, students became more concerned with getting the answers right, possibly motivated by the high quality (!) text books that were being seen to be given out to their peers. On two occasions, the course text book (Dix, Finlay et al. 2004), was given out as a prize but students were not told what the winning book would be, so this would not have influenced the hand ins. The graph in Figure 1 shows how the quizzes were answered. It can be seen that the

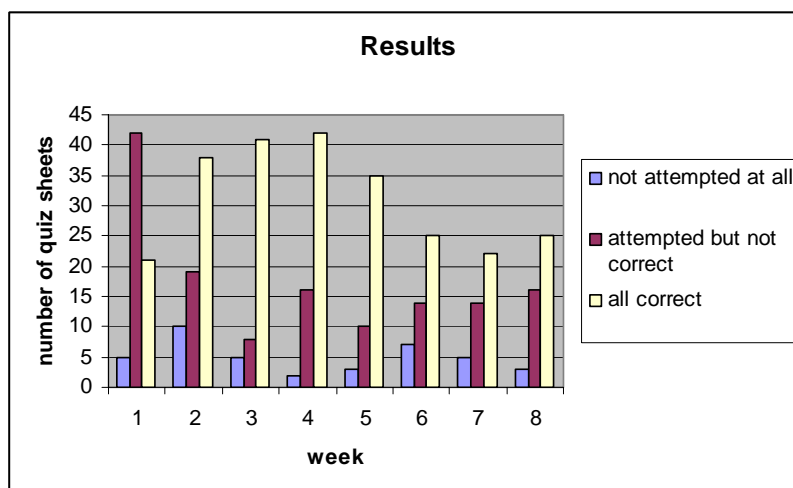


Figure 1 - Summary of results

In week one, the total number of quizzes submitted was 68. We would have expected this number to be the highest as most students attend the first week of term, however, as the total number of students registered on the module was 89, we were unsure whether these 21 missing students were incorrectly registered on the module or simply didn't engage at all with the process. It can be seen that the total number of submitted quizzes decreased as the semester went on, with 44 quizzes submitted in the final week.

The results show that in the first week almost 70% of students attempted the quiz but didn't answer all questions correctly. Around a third of students answered all questions correctly in week one. A very small percentage of students (5 students, 3.4%) didn't attempt to answer a question and simply put their name on the quiz sheet. In week two more students got all answers correct than didn't get all answers correct (38 vs. 19, 57% vs. 43%). This trend continued for the rest of the semester, peaking in weeks 3, 4 and 5 when 76%, 70% and 73% of students who attempted the quiz got all answers correct.

The number of students not attempting any questions increased to its highest rate in this second week (10 students, 6.7%). In later weeks the numbers of students attending the class fell, but students continued to be more likely to answer all questions correctly than not (circa 55% vs. 45%).

As the semester progressed some interesting strategies emerged. Several students embellished their quiz answer sheets with graffiti such as "pick me!!" in a bid to have their quiz sheets chosen as prize winners. Others, having seen how the completed sheets were folded before being picked, coloured in all the corners to make them stand out. Four students submitted multiple quiz sheets to increase their chances of winning (this was only uncovered during marking when the lecturer had a déjà vu moment!

4. DISCUSSION

There were several questions that interested the lecturing staff. The first was about attendance; did the quiz increase attendance? This was not easy to determine. Given the low chance of winning the book, it is possible that the quiz was not the tool for attendance, it was more likely the fact that the quiz became the register, that made people fill it in. Certainly, the large proportion of uncompleted quiz sheets seemed to indicate that students 'wanted a mark'.

As regards engagement, the quiz seemed to increase engagement for some of the students. Because over the weeks a subset of students became more concerned with getting the answers right, this might indicate engagement. Another hint of increased engagement was the disappointment when, with a guest lecture doing the class, several students became concerned that this might mean no quiz. Other signs of increased engagement included the personalisation of the quiz sheets with little messages being sent to the lecturers.

The success, or otherwise, of the scheme depends to some extent on the way that the individual students are motivated. There is an interesting conflict between intrinsic and extrinsic motivation (Reiss 2005), (Deci, Koestner and Ryan 1999).. Students that 'like' the free book may be more extrinsically motivated than intrinsically motivated.

Having run the scheme for the semester, the class resumed in the New Year for a different sort of class and there were cries of 'what no books!' and 'are there no quizzes?' so it seemed that for some students this was a fun experience that they wanted to stay with. That said, the results indicated a down turn in popularity and so we concluded that it was better to quit whilst ahead!

One of the features of this experiment was that the interaction was so low – tech, in the next cohort of students we intend to replicate this using digital pens and paper. In this way, we hope to retain the best part of the low tech interaction (the facility to cheat, to personalise, and to scribble) but enable a high – tech interchange of ideas. We will be interested to see how the students respond to this.

The low tech nature of the quiz sheet added a dimension that would be hard to replicate in a digital form. The students' personalisation of the sheets, we would argue added to their engagement in the process – the sheets became a mode of self expression for them. It could be argued of course that their doodles were a sign on lack of engagement, though talking to the students themselves would be the only way to ascertain this.

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