HCI Education in a Business School: Outside Their Box

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ABSTRACT

This paper describes some of the techniques used to teach HCI to final year Business School Students. The students are from a range of IT and non-IT disciplines, with a range of post-university destinations. An aim of the elective is to cause students to think deeply and differently about their interactions with technology, and to become aware of the range of experiences (individual differences) of other computer users. Student engagement is encouraged in both tutorials and assignments, increasing students' sense of fun when working on the unit. Tutorials use a range of demonstrations, that are interactive. Assignments require action that is outside of their prior experience, using both video and experimental techniques. The approach has benefits for students with dyslexia, so supporting access and inclusion. As a result the unit is highly rated by students, and recommendation levels are high. Dissemination through staff development supports replicability of the approaches.

Categories and Subject Descriptors

Human Factors

General Terms

Experimentation, Human Factors, dyslexia, assessment.

Keywords

Student engagement, learning community, tutorial demonstration, podcast, assessment.

1. INTRODUCTION

Within the Manchester Metropolitan University Business School (MMUBS) there is an elective designed to give future business managers an understanding of the significance of Human Computer Interaction (HCI). The intention is that MMUBS graduate will be able to make a case for including HCI factors in the future procurement of Information Technology based systems, or to provide resources for them during design stages. This is to help to overcome the problems with getting HCI taken seriously

when procurement *begins*, rather than when it is too late to be of real benefit [1]. Business School students vary considerable in both their motivation and their technical capability. Students taking this elective may be on one of a range of undergraduate courses: Business, Marketing, Business Information Technology and others.

Teaching and learning can both be chores if a unit is not well designed and executed. This contrasts with those units where the "work" can be fun for both teachers and learners. While this may happen by accident for a small group of particularly gifted, natural, teachers; for most of us it requires conscious and explicit design. This paper reports some of the practices adopted in the design and delivery of the Human Factors for Business Information Technology (HFBIS) final level elective. As such it does not present a rigorous analysis of the effectiveness of each technique, but an indication of the range of techniques adopted and the main effects of their application.

The elective runs over two terms, has two assignments, and is based on a standard lecture-and-tutorial scheduling and resourcing model. The numbers taking the elective varies from year to year, but is generally in the range of 70 to 100 students. One or two staff are involved with teaching and assessment. Over the years they have developed some familiarity with the material and ways of working with it. The content has been refined in the light of feedback from students, other staff, and in response to developments in technology.

2. [DE]MOTIVATING FACTORS

The literature on factors affecting student motivation is diverse. Apart from issues such obvious factors as hygiene factors and motivators [2], coming from the field of management, there is a wealth of literature from the educational sphere.

2.1 Work Load

For some students a high work load is an obvious de-motivator or hygiene factor. Anecdotally, this is one area where students make a lot of informal complaints. Complaints relate to the volume of work, the coincidence or proximity of deadlines, the loadings caused by working in groups. Chambers [3] calls for the obvious expedient of considering work load during course design. They also suggest that students reports of work loading need to be considered carefully- not taken at face value. There are a lot of factors to consider, and variations between the individual personal effectiveness of students and their external circumstances. Rhodes and Nevill [6] also report workload as an explicit concern

of students that is perceived as a likely cause of a student withdrawing from the course. In light of all this it may be considered expedient to make the student experience seem more like play than work. This potentially enables students to build work-play into their schedule without feeling that they also need to build in time for “pure” play. Key issues for this are going to be the linked concepts of engagement and enjoyment.

2.2 Theatre

Yang [4] describes how “theatre” was applied in primary teaching. The theatre is described in multi-media terms, rather a live stage with proscenium arch. However, the pupils were able to interact and role play within the system. This approach seems to encourage interaction between students, discussion and experimentation. With the pupil largely in control of the interaction and pacing this will seem less like a lesson where the pace is forced by the teacher. The role-play elements are more like “play” than “work”.

2.3 Reducing Alienation

Mann [5] whilst focusing on social structures in education, and linked issues of alienation, also touches on the concepts of creativity and play. Their absence is more likely to increase student alienation. From the perspective of the current paper there are a number of key issues taken from Mann [5]: creativity, play, the power relationship within the learning situation, and students' perceptions of their own power. With these factors in mind it seems appropriate to design some learning elements that alter the power relationship, for example, by negotiating assignments with students, or by using students to teach other students. This is a significant departure from the school situation where state exams are not up for negotiation, and where the teacher is required to be in control of the class-room situation. A shift in the power relationship can alter education from being something done *to* students to something they participate in, that is done *with* them.

2.4 Reviewing the Issues

Consideration of this literature has enabled the identification of a number of elements to be manipulated to improve student engagement, and increase the likelihood that the learning experience would be regarded as fun rather than tedious and to be avoided. The first factor, related to social power structures, leads to the softening the boundary between student and lecturer in relation to being a source of knowledge. Students could be empowered to develop knowledge rather than to learn and regurgitate. Consideration of theatre, in the current information revolution, is relatively straightforward. There is a boom in the availability of audio and video recording technologies for capture, distribution, and playback. Making “theatre” has never been easier. Finally, by changing attitudes to the discipline of the elective it may come to be seen as play with both intrinsic rewards of enjoyment, and extrinsic rewards from the marks gained. A discussion of the application of these factors follows.

3. PLAY IN PRACTICE

Playfulness has been introduced into three areas of teaching: lecturers, tutorials, and assignments. In each area the approach is different, as required by the scope and constraints of each situation.

3.1 Lectures

To engage students in a lecture situation can be difficult. Constraints are often imposed by physical issues, such as fixed seating, and uncomfortable lighting. In addition there are psychological factors relating to student expectations and prior experience (either from school, college, or university) [6]. In the HFBIS elective lectures a number of approaches are consciously used.

3.1.1 Connection with prior experience

Lectures are retained, and have a conventional lecturer-at-the-front physical organization. Presentation software is used to provide structure: introduction, beginning, middle, and end. However, some additional features are used to engage students: interaction and novelty. The introduction of these *within* a “conventional” framework allows students to retain some connection with prior experience, enabling students to have a reasonable understanding of what is expected of them.

3.1.2 Interaction

Interaction is supported in a number of ways. At some points in some lectures students are required to vote. The voting mechanism is explicitly technology-based – but “low-tech”. Voting takes place by displaying a five coloured menu, the colours used are replicated on voting books. These are A5 books of card with a spiral binding. The required colour is put to the front of the book, and the book held aloft. Students can then see the pattern of voting, and this can even be displayed on screen. From here the discussion can be modified to take account of the vote.

In addition, there is some interaction with students over the physical conditions within the lecture theatre: lighting and ventilation decisions are made with reference to the students.

3.1.3 Novelty and Provocation

This is added in two ways: through content and through multi-media. The content novelty is about requiring students to think about new things and in new ways (one of the prime requirements of a university). In the context of this unit students are required to think about the range of individual differences, and differences in working methods. As Business School students they have a tendency to think about office-based work. Introducing examples from diverse contexts, such as aviation and abattoirs, expands awareness of possibilities and situations not previously considered. They are encouraged to try perceiving the world through the eyes of others.

Novelty is also introduced through the use of multi-media. This may include songs about operating systems, video of sausage factories, imposition of a wide range of music. One specific lecture makes use of a partial change of clothes and an air-horn. These are incorporated into a garden-path lecture on the Total Customer Experience. In this situation an argument is presented that students are familiar with. The presentation is such that

students believe they have followed the argument and know what is coming next – up to the point the air-horn is used. The first part relates to usability factors in e-commerce sites, an analysis is presented that shows the importance of good web-site design. After the air-horn is used good interaction design is placed into the context of company logistics (prompt delivery), customer-company communication (e.g. late delivery follow-up), warehousing systems (stock levels), etc. The purposes of this approach is to demonstrate that good site design is not enough – the whole system must work and have appropriate interface features. The partial change of clothes is linked to the concept of first impressions (trait attribution), while the air-horn is used to underscore the point that a good site interface is not enough.

Novelty is also supported by making the published on-line notes different to those delivered in lectures. While the text may be (mostly) the same as the lecture presentation the lectures often have added multi-media content.

Finally, novelty is introduced through the lecturer's "attire". Most sessions are delivered in one of many combinations of bow-tie and waist-coat. This is outside the experience of most students. However, for some sessions the above "teaching costume" (as termed by one student) is replaced with a full set of motorcycle leathers. This reduces predictability, and also makes it difficult to pigeon-hole the lecturer, whilst still maintaining separation. Previously the lecturer had worn a more conventional jeans-and-sweatshirt attire, and received fewer expressions of thanks and less apparent respect.

The combination of these approaches serves to make lectures less predictable.

3.2 Tutorials

A number of demonstrations have been developed that are intended to both challenge existing thinking and to illustrate key issues in relation to individual differences.

3.2.1 Mental Models

Having previously discussed mental models (models that users have of systems) the existence of mental models that are flawed, despite adequate user performance. Students are asked if the cycle, or are able to cycle – most indicate that they can. They are then asked how steering works, for example, "Do you steer left to go left?" – they agree that this is the case. This is then clarified – "To go left the handlebars are turned to the left?" Students have problems with this because it seems a ridiculous question to ask. However, the truth of the situation is that the steer-left-to-go-left statement is only true at low speeds. At higher speeds cyclists need to turn the handlebars right in order to go left. This is because different forces apply at higher speeds, when the wheels act as gyroscopes and steering is less by friction and more by momentum.

During the discussion a bicycle wheel is produced. This has been fitted with handles on its axle, effectively extending the axle beyond the hub so that the wheel may be held and spun. When the wheel is not moving or moving very slowly the students feel comfortable with the wheel's behaviour – it can be moved about predictably. However, if the wheel is spun quickly it behaves differently. Movement on the handles causes the wheel to twist in the hands, the wheel no longer behaves as expected. A playful

example, that many students have real-life familiarity with, is used to illustrate academic points.

This is used as a springboard for discussions on user competence and performance, interviewing users as a method for requirements analysis, and the way that skills are acquired

3.2.2 Individual Differences

Two main demonstrations are used here, both relating to mobile phone use. In one case the examination is of age differences, in the other it is gender differences.

In considering age the students are asked to consider why older people are not such high level users of mobile phones. Typically students will respond that older people do not like technology – it's too difficult for them to learn, etc. After some discussion we use a simulation of infirmity and the problems of arthritis and deterioration of strength and sight. To simulate loss of strength in fingers students are required to work in pairs to tape up both joints on each finger and to immobilise their thumbs. Ordinary stationers sticky-tape is used to do this. This has the effect of reducing joint mobility and weakening grip. Once "disabled" the students are required to use their phones. Many fail at this stage, being unable to get their phones out of their pocket, some have trouble turning their phones on. Texting requires a completely different technique. It is harder work, slower, and more error prone.

Once un-disabled, students are required to use their phones again, but this time the screen is made less clear through the use of a crude plastic filter, or by using unsuitable spectacles.

These two techniques are entertaining to the students for a number of reasons. Firstly, they are not used to being told to get their phones out during a class. This is a novel experience for them. They also enjoy the taping up – it is a very physical process. They also appreciate the opportunity to think differently, the forced empathy the process brings about.

Individual differences are further explored in relation to gender and phone use. For this demonstration the students are asked to move about so that male and female students occupy different sides of the room. While not essential for the demonstration it does enhance the awareness of gender issues; the situation becomes "us and them". Again, students are asked to get their phones out. For this demonstration they are asked to count the lengths of their text messages. The number of words is counted: for example "c u l8tr" would be 3 words. In addition they have to put each count under a heading: male-to-male, male-to-female, female-to-male, and female-to-female (MM, MF, FM, and FF). After a fairly arbitrary period of time, say 5-10 minutes, the data is collected and presented on a white-board at the front of class. The data typically follows this pattern: the length of message is shortest in MM, next is MF, then FM, then FF. In addition, it is often the case with these student groups that most texting is within gender groups, so, mostly MM and FF. Students seem to like this demonstration because it i) uses their mobile phones, ii) reinforces their gender stereotypes, iii) is real-data collected from real people that shows, usually, an apparently significant difference between gender behaviours. The demonstration is discussed in relation to literature on gender and language, eg. [7] and demonstrates that questionnaires are not the only way to collect data.

In these cases the use of mobile phones is significant. Students don't see using mobile phones as "work" – it is a leisure activity. There show some delight in seeing that mobile phone use is a serious and suitable topic for research; and thus that research can be fun and relate to the real world of their own experience.

3.2.3 Interface evaluation

A significant part of our time is spent on interface evaluation. While evaluation techniques can be applied to many systems it is useful, particularly in a Business School context, to examine commercial websites. Within tutorials students are given practice in applying evaluation techniques on a range of websites. Some "standards" are used so that the whole group can explore the same base system and take part in its evaluation. In this way they practice and refine their skills. These skills are then applied to sites of their own choosing. This enables them to bring their own interests into the classroom. For example, fashion and football are often areas of interest, the evaluation task is less like work and more like play when these are explored in class.

4. ASSESSMENT

At the start of the elective students are told that if the assignments are dull this is entirely their own fault. There are two assignments. The first relates to data collection, the second to website evaluation. Students have reported that they enjoy these assignments.

4.1 Assignment 1: Data Collection

The first requires the collection of data by non-questionnaire or interview methods. Data has to be collected by direct measurement. Students are given considerable flexibility over the domain, though typically the key issues are around individual differences or usability measurement. The students are required to identify an area of interest. This could be sport, fashion, games consoles, politics, etc. from here they identify a use of technology that fits within that context (e.g. mobile phones, games consoles, video cameras...). Literature is found that helps with the design of an experiment. So, a student interested in gender differences in fashion marketing using mobile phones would be looking for literature on gender differences, and marketing. If the literature suggests that the linguistic patterns of males and females is different then collecting data from mobile phones that allows this to be tested (supported or refuted) would be appropriate. The student would then go on to collect text messages from a number of participants, analyse it in accordance with factors identified in the literature, then present their findings.

Other students might explore the interaction between handedness and controllers for games consoles, website colours and memorability of content, or common errors in using digital cameras.

4.2 Assignment 2: Evaluation

The second assignment has two options, both related to evaluation. In the context of this elective, and with the students in mind, the focus is on web-site evaluation. This fits with the student experience, and will be of practical use to both them and their future employers. Broader applications of evaluation *are* considered and discussed, but they are not the focus of activity.

The first option requires students to apply heuristic evaluation to a website of their choice. This again enables students to engage with their leisure activities in an academic setting. Students have applied their skills to football and cricket clubs, on-line gambling, fashion, shopping, the BBC, music, politics and others. In doing so they have discovered things about their favourite websites that they didn't previously know, and have developed analysis and evaluation skills in the process.

The second option for this assignment requires students to make a short video of five to ten minutes duration. This is to be used as an instructional podcast by subsequent cohorts. The subject of the video is a single evaluation heuristic that may be explained or demonstrated in any way – so long as it demonstrates understanding of the heuristic. The duration was arrived at based on past experience of the unit leader in academic presentations and students' abilities in communication. Examples of playfulness include: exploring the match between the real-world and on-line shopping by recording a trip around a supermarket (speeded up to take place in one minute) and an on-line shopping session; exploring aesthetics by comparing outfits of clothes (a work suit versus a mix of formal, leisure and night –wear worn simultaneously); the adequacy of help systems in on-line gambling sites. The choice of demonstration environments, and the methods of demonstration, show creativity and a sense of fun in the students, which is nice.

High production values are not a requirements of this assignment. The significant technical requirements are that what needs to be seen can be seen, and what needs to be heard can be heard and understood. There are a number of reasons for this approach. Firstly, the focus is intended to be on the conceptual / semantic content rather than on presentation. Secondly, this allows students to use whatever equipment they have to hand. Thus a submission of video taken using a mobile phone would be acceptable. Many students have access to a number of video recording devices, including: phones, digital still cameras, webcams, and video cameras. Thirdly, from the perspective of future cohorts using the video as a learning resource, the quality would be comparable to that frequently seen on YouTube – which seems to be very acceptable to the student body. In addition, the less than perfect production values seem to make the task more approachable, less daunting.

A positive side-effect of this approach has been to identify gains for students with dyslexia. In an early version of the video assignment students were required to submit a written rationale for their approach. This was to explain the structure of the video, and how it could be used to learn specific lessons when used by other students. In assessing both the written and video submissions of students it became clear that dyslexic students would gain higher marks if the whole assignment was in video format, ii) the value of the written component was negative – it diverted effort from the more useful video activity. A designation of dyslexia was based on formal statements of student special educational needs provided after professional diagnosis. However, the severity of the disability was obvious on inspection of the written work submitted by these students. Assessment by video enables these dyslexic students to demonstrate their understanding of concepts to a higher degree than would be possible in writing. In addition, they are able to complete the assessment without having to use the services of educational support staff.

5. EVALUATION OF THE APPROACH

It is possible to make a university elective unit enjoyable without meeting all necessary criteria. In this section the various checks and balances are described to ensure that student enjoyment is not at the cost of academic content.

Enjoyment is assessed for all Business School units towards the end of every academic year. Assessment is through a questionnaire available to all students, though completion of the questionnaire is not compulsory. Recent ratings for the unit have placed it at a sufficiently high level to gain official commendation from the Dean of School. The number of units getting such a commendation is low, and requires high levels of student approval. The other side of the enjoyment “coin” is that teaching the unit is also fun. There is flexibility in interactions with students during lectures and tutorial, and students take varying approaches students take. The latter of these points is significant when considering that assessment is the part of the academic job often seen as a chore.

The academic level of the elective has been confirmed by internal and external peer review. These reviews have been for the purposes of assessment moderation, internal course review, and external course review. External examiners have not found the need for criticism, and have positively commented on the use of video assessment.

The grade profiles for this unit are comparable with other units at this level: means and standard deviations are similar and not at the extremes of the range. In one sense this is comforting. When taken with the approval of the external examiners it indicates conformity with standards. However, if this playful approach results in increased engagement then one would expect greater student effort – and improved marks. On that basis the elective may be considered to under-perform. At this point it is possible to take a more positive view, which is that the elective’s reputation for being entertaining may attract less academic students, students who would not normally be high achievers. If this is the case then the results may be positive and encouraging. Additional data will need to be collected to explore this possibility more fully.

6. CONCLUSIONS

The unit has been running for a number of years, with approval ratings rising as new techniques have been added to lectures, tutorials and assessment. This has not been at the cost of the level of academic content, and also has the side-effect of improving the experience for the staff associated with the unit.

Students, with or without dyslexia, are supported by a video based approach that is both playful and not text based. This supports national and University policies on access and inclusion. With the evidence that this can be done without a reduction in academic standards, assessment by video seems to have more in its favour than against.

The unit lecturing team review the unit regularly. Planning for the next cohort typically begins two terms ahead. This enables informal feedback from students to be given consideration along with the end-of-year feedback recorded by the University. Making the unit “fun” makes for a win/win/win experience. The students enjoy the “work”, and become more motivated; the teaching is more fun as interaction with the student cohort improves and the monotony or assessment is reduced; the University gains, as students report an improved experience.

Finally, there is an issue of replicability. These techniques have much less value if they cannot be reproduced by a wide range of lecturers on the novice/experienced scale and in a range of subjects. The lecturers involved with this unit have many years experience between them. In making decisions about all aspects of the course it has been possible to draw on this experience. Less experienced and/or more introverted staff may lack the confidence to try some approaches. One way to resolve this is has been to engage the services of experienced lecturers to support more junior staff. In the context of the present work the author is engaged in the design and delivery of staff development sessions within the University. Feedback from those attending the sessions, but taken some time later, suggests that seeing “radical” methods demonstrated gives less experienced staff the confidence to apply these techniques successfully. The use of varied methods, increasing student engagement and developing a learning community, helps us to move away from a teaching and learning model where teaching is done to students using an industrial model, to a situation where teaching and learning is done with students.

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