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Here Today – Where Tomorrow?

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ABSTRACT (150 words)

The evolution of HCI education does not take place in a vacuum, nor is it only controlled by the academics and practitioners close to its core. In this paper we reflect on the causes of change in the HCI curriculum and consider what has been lost and found during these changes.

Taking inspiration from both the theme of the workshop and the cultural richness of the workshop location we consider the value of change, and contrast the needs for preservation of valued artifacts with the need for artifacts that reflect the modern age; streamlined and efficient.

Our paper concludes with a manifesto for the modern HCI age.

Categories and Subject Descriptors

K.3.2 [**Computer and Information Science Education**]: Curriculum

General Terms

Education, HCI, Interaction Design, Reflection, Management of Change, Curriculum changes.

Keywords

HCI Education, Pedagogy

1. INTRODUCTION

This paper considers change as it pertains to the HCI curriculum and the discipline of HCI. Taking the theme of the workshop, the architecture of HCI, and embedding the discussion in and around the cultural heritage of the workshop location, the authors consider change as a necessity but reflect on what is lost and what is gained when change occurs.

It was Arnold Bennett who wrote '*Any change, even a change for the better is always accompanied by drawbacks and discomforts'*. Change is indeed inevitable and inevitably causes disruption, and the University sector is neither immune to this change nor immune to the effects of change. In this paper, we consider the way that the changes in Universities, in Computing, and in particular in HCI, have affected the stakeholder experience. We present a reason for some of the changes, based on an understanding of the UK curriculum, and from this reasoning suggest a manifesto for the future that takes account of the heritage of the past, provides scope for a leaner, more efficient future curriculum whilst also allowing for innovation and organic change.

2. CHANGES IN THE UK

Without apology, this section looks at how change has occurred in the UK system. Acknowledging that this narrows the discussion, the authors feel it provides a factual basis for the later discussion, which takes a broader approach.

2.1 Changes in the University Sector

The notion of a University, and the teaching associated with University has changed drastically over its existence. Initially, certainly in the UK, a place where scholars studied and gave the occasional public lecture, with little or no pre-planning and with a title plucked from their studies, the modern University relies on a coherent published curriculum and advertises 'programmes' with highly specified named degrees made up of well specified modules. In their early form in Germany (Clark 2007), Universities were open to all in the form of openly publicized seminars, therefore implying that education was for the masses, there was no requirement to join, and no path to follow. When education became business, these attendees became commodities and the under-graduate and post-graduate student became a reality.

In the UK, University life was relatively stable until the mid 60s when the government saw the need to expand higher education to satisfy the growing numbers of under-graduate students. Around this time, a number of academically orientated universities were created. Polytechnics were also created to focus on the more practical skills needed in professional and vocational courses. In 1992, the polytechnics were given permission to adopt the title of 'University'.

These stages, together with the increasing role of industry within the development of the curriculum, have impacted on the understanding of the term University. Academics now face pressure to behave as trainers and administer skills as outlined by national bodies including the QAA National Qualifications Framework (QAA 2000) as originated in the Dearing report (Dearing 1997)

With Universities becoming the main providers of higher education, it was inevitable that new subject areas would be introduced into the system. Computing is a prime example of a new subject area being created in response to professional needs

2.2 Changes in the Computing curriculum

Traditionally, Universities in the UK dealt largely in arts and science. This has not been massively challenged, engineering degrees have been introduced but by and large, subjects fall into one or other of the two main definitions.

Computing is generally considered to be a science but this is not very helpful when discussing the way the subject changes over time as the exactness and calculability of science is not always easily applied to computing. In 2001, Barnett proposed that computing might be considered to be a 'knowledge field' (Barnett, Parry et al. 2001). In this paper, he highlights how science-based fields are 'subject to a tacit responsiveness to extra mural interest' but talks of new topics emerging with knowledge fields. Barnett bemoans the lack of discussion and research in the area of understanding how curricula are changed and how this aligns to the nature of the subject area, and his definition of a knowledge field, as opposed to a science field, is intended to give us the flexibility to discuss this very dilemma.

The major single influence on the computing curriculum in the UK has been the British Computer Society (BCS). Prior to the first 'official' computing benchmark (QAA 2000) being written the BCS curriculum (BCS 1994) defined the requirements for Society Membership and thereby influenced the content of the curriculum within the majority of UK degree courses in computing. It is worth noting that the BCS HCI Educators forum was responsible for the addition of HCI into the BCS computing curriculum in 1996 (Kirby, Life et al. 1995), (Scown and McManus 1996) As a consequence of this, when the computing benchmark was written (QAA 2000) it defined a range of areas suitable to be taught within the discipline of computing and included in this list was HCI.

In acknowledgement of the changing environment in computing, The British Computer Society does not insist on 100% coverage from the Computing benchmark.

A recent change in funding for computing, which took away extra lab-based funding from Universities, overall funding for Computing has been reduced and this has impacted on the monies available for resources. To maintain staffing and cover associated costs, Higher Educational Institutions (HEIs) now must recruit more students and reduce the contact time with the students in order to maintain the status quo. This has impacted on the practical skills that the students develop. Whereas in the past they were taught the skills within the class contact time, now students are more likely to be sent away to learn the skills on their own. If they have not already received a good underpinning knowledge on programming and algorithmic data structures, their programming attempts may well be flawed. This in turn could lead to poor and in some cases fatal results (Casey 1998)

2.3 Changes in the HCI curriculum

Human Computer Interaction has been offered within HEIs for over 20 years. In the UK, the decision to teach HCI was as a direct result of work undertaken by a committee chaired by John Alvey whose report was accepted by the government in 1983. As a result of its production, HEIs were encouraged to develop the skills of the workforce in the areas of Artificial Intelligence (AI) and its associated subject Man-Machine Interaction (MMI), later known as HCI. With the growth of technology, HCI has come to include Multimedia in recognition of the mapping between multimedia/multimodal and human physiology and cognition. Interactivity is an essential part of the development phase with a move to its wider inclusion with HCI both as Interaction Design and Interactive Learning.

The new Computing benchmark (QAA 2007) defines Computing as including 'aspects that overlap with areas of interest to a number of adjacent subjects. Examples of such areas are: … philosophy and psychology (human computer interaction and aspects of artificial intelligence) …' The benchmark also states specifically that it is 'not intended to constrain the development of new courses, rather such initiatives, as well as innovative approaches to the design and development of new degrees, are to be encouraged within the basic principles of the framework that this statement describes.'

Within the US, the position of HCI as a computing topic within a range of 'computing' based areas has been analysed and reported on in Computing Curricula: (ACM and IEEE 2005).

Knowledge Area	CE		CS		IS		IT		SE	
	min	max	min	max	min	max	min	max	min	max
Programming Fundamentals	4	4	4	6	2	4	2	4	5	5
[illegible]	0	2	1	3	2	4			1	3
[illegible]										
atform technologies	[illegible]		[illegible]		1	[illegible]	[illegible]		3	3
Theory of Programming Languages	1	2	3	5	0	1	0	1	2	4
Human-Computer Interaction	2	5	2	4	2	5	4	5	3	5
Graphics and Visualization	1	3	1	5	1	1	0	1	1	3
[illegible]	1	3	2	5	1	1	0	0	0	0

Figure 1 - Table showing the minimum and maximum amount of HCI taught in different degree streams in the US

It does not however define the contents of the area of HCI, simply indicating (Figure 1) that HCI is taught with greater or less emphasis according to the specific degree area being considered and to differing levels of ability (Figure 2).

Area	Performance Capability	CE	CS	IS	IT	SE
Algorithms	Prove theoretical results	3	5	1	0	3
	Develop solutions to programming problems	3	5	1	1	3
	Develop proof-of-concept programs	3	5	3	1	3
	[illegible]					
	[illegible] computer peripherals					
	Design complex sensor systems	5	[illegible]			1
	Design a chip	5	1	0	0	1
	Program a chip	5	1	0	0	1
	Design a computer	5	1	0	0	1
Human-computer interface	Create a software user interface	3	4	4	5	4
	Produce graphics or game software	2	5	0	0	5
	Design a human-friendly device	4	2	0	1	3
Information systems	Define information system requirements	2	2	5	3	4
	Design information systems	2	3	5	3	3
	Implement information systems	3	3	4	3	5
	Train users to use information [illegible]	1	1	4	5	1
	Maintain [illegible]					

Figure 2 - HCI elements in the US Curriculum

2.4 Where Next for HCI?

It is interesting to note that the British HCI group recently changed its name to 'Interactions'. Not only was British considered a bad tag line, so was 'HCI'. HCI feels and sounds old and dull. Interaction Design feels and sounds more exciting! In a competitive education system, the aim is to fill seats, running specialized courses is costly and titles are great attracters. Changing HCI to Interaction Design might attract more students but then we are at risk of marketing the Coliseum as an outdoor market! The emphasis on design in HCI is both a blessing (as it allows for re-branding) but also a difficulty as design, unlike computing, is generally not a science course, is generally the enclave of designers, and is measured, assessed and understood in a very different way than most science based subjects.

Design is an interesting component of the HCI curriculum. Gaining importance over recent years, design as a concept has long been integrated within the computer curricula for example program design, database design, network design and

system analysis and design but in the context of HCI, design, whilst rigorous can sometimes be understood to be something more 'artistic'. It is this 'tendency to art' that makes for an uncomfortable relationship with traditional design faculty. It is fine for computing people to design programs and systems but as soon as they start to design 'things', 'tangible things', the designers get worried! This should not be the case, design should, and can, be perfectly well argued for computing. According to the etymological dictionary, design is defined as 'to note down' or 'to denote' so Interaction Design is deemed as the important aspect of documenting the method and importance of interaction.

The fact that design is important in computing is evidenced by the number of publications referencing design in the major computing libraries:

Digital Library	Design publications
ACM	164,930
Science Direct Computer Science	236,721
AACE	881
Ingenta	166,159

Table 1: Research publications incorporating design

Research referencing design includes areas such as social processes (Erickson and Kellogg 2000) and interface design and evaluation (John and Kieras 1996)

The emphasis on design in the HCI curriculum has not changed the way University courses are advertised. A search for 'Interaction Design' within the UCAS (UK Application System for Higher Education courses) website revealed only 63 courses: these included graphic design, interactive toy and games design, multimedia design and interactive design. It is worth noting, however, that there are only 4 'Human Computer Interaction' courses being offered in the UK, these being in very different Faculties including Art and Design and Science and Technology which clearly will have different underpinning ethos and values.

3. THE EFFECTS OF CHANGE

Changes affect multiple stakeholders. The three most affected are the managers of the organization, the academics, and the students.

As organizations are key catalysts of change, the effect of changes on them should be predicted. However, many organizations struggle to fully understand how there can be design in computing, how there might be programming in media and how there could be psychology in HCI. Because of this, organizations make ill-informed decisions. An example in one University was that 'design' was not allowed in a job title for a computing academic as that would imply that the job would be situated in a different faculty. Managers like there to be clean lines and obvious divisions but HCI is by its definition multidisciplinary and as it changes and offers new sub-disciplines, it becomes more and more confusing for managers to understand.

Academics are used to adapting to change but for the HCI academic, the misunderstandings that surround the subject area can cause difficulties. For instance, other academics may not understand the differences between user interface design and interaction design but for the HCI academic, this is 'obvious!' In addition to these difficulties, where the curriculum gets 'loaded' the academic has to make decisions about what to keep in and what to leave out, often resulting in a less than satisfactory teaching experience.

Students can see HCI as fragmented, wooly and irrelevant. This is compounded by a system that expects more 'stuff' in less 'time' and with reduced 'instruction'. The lack of a linear curriculum can leave students unsure about their knowledge and skills in the context of the whole.

4. A MANIFESTO FOR HCI

We believe HCI has to make some key changes to the way it is marketed, taught, and managed in the modern University. These are:

As a single subject HCI is now too big to be taught once only to students in an introductory course. User Interface Design, Interaction Design, Usability Engineering, HCI are all 'different' courses and steps should be taken to define these independently and also to discover what 'other' courses exist.

The HCI community needs to ensure that as new subjects and new subject areas are formed, a reasoned discussion takes place about which element of general HCI is most appropriate for those students.

To ensure practical exposure to general and specific HCI concepts, HCI academics should avoid theoretical presentations of work and ensure that students gain skills and master techniques in keeping with a knowledge science.

5. CONCLUSION

As HCI has developed and incorporated new subject areas within it, and the BCS HCI group has renamed itself, this is perhaps an opportune time for the HCI academic community to discuss the content of the HCI teaching curriculum and its context within the computing curriculum as a whole. As was highlighted in the ACM/IEEE analysis, HCI is currently taught at varying levels of detail and with differing foci dependent on the degree 'stream', yet its component parts are not specified. Surely HCI has now reached maturity and is ready for its rightful place in computing.

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