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# Teaching HCI students to be researchers

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**Abstract**

Research skills are important, both for HCI professionals and for budding HCI professionals who attend workshops, courses and programs to improve their skill-base. However, the multidisciplinary nature of HCI can leave many students (perhaps especially those who were successful in undergraduate courses) at a loss as to what research methods to use and where to begin choosing and applying the methods in their own work. We describe here our efforts, both together and severally, in teaching our students to be excellent HCI researchers.

**Introduction**

This paper describes how three different universities address the need for grounding in HCI research skills.

Human-Computer Interaction (HCI) is naturally a diverse discipline. It grew from the founding disciplines of psychology and computer science, and rapidly expanded to encompass all areas of human endeavour where digital technologies can make a difference. Within current HCI, it is easy find the further influences of disciplines such as sociology, anthropology, graphic design, linguistics, product design, philosophy — and even fine arts and literary criticism. Researchers in HCI can legitimately draw on the theories or methodological

practices of any or all of these disciplines. But the disciplines have very different measures of value and validity: what might satisfy an ethnographer as a rich and valuable description of practices may fail to meet standards of causal attributions that an experimental psychologist would expect to see, and in turn the psychologist might be criticized by a computer scientist for their unreliable programming, and so on. Comparing results derived from different practices is not so much comparing apples and oranges, but more like comparing apples and Wednesdays. As a consequence HCI researchers are increasingly unable to recognize the value in each other's work leading to partitioning of the discipline and, unfortunately often, the rejection of potentially valuable, albeit diverse, contributions to the field (Thimbleby, 2004).

Additionally, the lack of standard or even commonly accepted research practices means that often researchers are applying methods with little formal training or experience. Even statistical methods, which might reasonably be said to be at the objective end of the research methods spectrum require considerable experience and craft skill to apply well. Unsurprisingly, then, the standard of statistical analysis in HCI is lamentable (Gray & Salzman, 1998; Cairns, 2007). It may therefore be surmised that other methods are similarly misapplied.

New students are faced with a bewildering array of potential research methods for them to use, and unfortunately not all published work attains the highest level of rigor in the methods employed. How then is a new researcher to develop the skills they need?

The approaches that underpin our method have been to give students resources to read, the opportunity to discuss things with us openly, and using writing as a formative tool for research.

### **Read**

To address the needs of these new researchers, Cairns and Cox (2008) was intended to be a first point of reference where new researchers could find out enough about a variety of research methods to firstly decide if that was the method they needed and secondly to provide enough information for them to find out a lot more about the different methods.

The book (Cairns & Cox, 2008) was therefore deliberately an edited volume so that each chapter on each research method could be written by a researcher who had first-hand experience of the method being described and discussed. Moreover, where appropriate, the work of the chapter authors could be used as the basis for discussion of the research method in question. This was to give the background and contextual knowledge to a piece of research that is usually entirely absent when the work is published.

Socrates, though, was against the written word, and with good reason (Plato, c370BC). The written word is a one-way street, which is neither able to engage with the particular needs of the reader nor defend itself when criticized. (Of course, the irony is that had Plato not written this down, none of us would ever have heard of Socrates let alone known what he thought.) Whilst a book preserves ideas and allows them to live beyond the lives of the authors, they are not as good as engaging with people directly.

## **Discuss**

Recognizing the need to enter into a dialog with students, we introduced research skills into the specialist HCI masters programmes at the universities where we teach. The following three paragraphs give a small overview of the ideas.

*At York*, research methods are explicitly represented in the program as three separate modules that cover each of qualitative, quantitative, and HCI-specific research methods. This separate approach also enables the same modules to be taken by direct Computer Science students, who might need to use human-oriented research methods in their studies, not just specialist HCI students.

*At UCL*, research methods are tightly integrated into the various modules and taught in HCI-specific contexts such as the modules *Applied Cognitive Science* and *User-Centred Evaluation Methods*. UCL also holds 2-day workshops as students begin their masters projects. The staff at the workshop provide a brief overview of various methods, often responding to questions raised in advance by the students, before working with the students to develop their research ideas.

*At Swansea*, a third approach is taken where most modules, though covering HCI, are not specifically about HCI *research* methods. There is a generic research skills module, and a specialist HCI module based on seminars where the students follow a speeded-up “mini research” agenda, on an HCI topic of their own choice, following the life-cycle of a real research project (such as a PhD), covering networking, posters, presentations, and finally writing a short paper in the format of an ACM CHI paper (or ACM UIST...).

As well as running workshops in our universities, to reach the wider HCI community, the authors of this paper have also held tutorials at the British HCI conference where authors of the chapters in Cairns and Cox were invited to give specific talks on their specialisms but in relation to the research interests of the tutorial attendees.

## **Discuss openly**

Learning through engagement is at odds with many powerful forces (Thimbleby, 2009). Student assessment is confidential. Plagiarism is anathema. Exams happen at the end of courses. Teachers know what the exam questions and answers are, but mustn't tell the students. Students (particularly poor ones) are un-calibrated and never know what good work is. Students become both passive learners and demanding consumers in lectures. None of this “undergraduate” culture is conducive to learning what research is; it is, in William Perry's words an attitude that is intellectually unsophisticated (Perry, 1998) and, worse, inhibits further progression of the student.

Against this, we have successfully required students to participate by giving presentations (not just powerpoint, but including acting and other techniques — one memorable presentation was when students interviewed Ted Nelson played by another student). When student work can be presented in class, everybody can see the quality of the work and enter into debate and feedback with everyone. Everybody gains by the process, and the open feedback is of benefit to everybody. At both UCL and Swansea, digital stories (Thimbleby, 2010; Benedyk & Furniss, 2011) are used — the early ones are not assessed but treated

as a skill acquisition process, and later ones are integral to the course content.

### **Write**

For students to understand research methods, they need to employ them for themselves. But as this usually means going out and conducting a study, often under the guidance of a supervisor, it is challenging to bring first-hand experience of research methods to the classroom. To overcome this, we place particular emphasis on the importance of writing as a fundamental research skill and also a tool to help articulate, refine and communicate research ideas *both* with someone else and with the writer themselves. We first require students to write a *research question* and a *fantasy abstract*:

A **research question** is characterized for the student as: one sentence long; in principle having a yes/no answer, though the answer almost certainly is “it depends”; and the question suggests how to answer the question.

A **fantasy abstract** is the abstract for a study that the student would like to do (or to have done) that answers the research question. A fantasy abstract needs to cover a brief motivation for the study and then outline what was done, what the results were and what they mean — just like a real abstract, except the work described is fantasy.

These writing tools have several advantages in our experience. First, they are short and therefore easy to iterate in the running of a short course. Secondly, they are easy to read and hence share with other class members and tutors. And of course, we have examples

of research questions and abstracts from actual research that we and others have conducted. Moreover, we can show students how abstracts have developed over the course of developing a paper, thus demonstrating the value of iteration and the contingent nature of the meaning of research.

The research questions and fantasy abstracts are a way of requiring students to explicitly commit to a potential study. In communicating that it is only trying to articulate precisely what the study is that they are able to scrutinize it in relation to the research methods that are needed to answer the research question.

The fantasy abstract is one example of our broader approach to research; writing is not just “writing up” but is, and should be, an active part of articulating the research process. It helps identify and triage the research activities, and the student progresses from fantasy, through scaffolding, to drafts, to final dissertations (or papers). Promoting writing emphasizes *deliberate practice* (Ericsson *et al*, 1993), and encourages the student to see that “writing” isn’t just a mechanism to gain credit but is part of a life-long process that can end up with good work presented in powerful documents that will influence people (Thimbleby, 2008).

### **Benefits for teaching HCI**

Not everyone would agree on the emphasis that we placed on research methods in HCI, nor on a proactive approach to writing. But given that there are many specialist masters programs and many PhD students in HCI, there is a clear need for students to have the appropriate skills to conduct HCI research to the highest standards of soundness and validity. We have

found that students who have engaged in reading, discussing and writing about their research methods then approach their research projects with a greater confidence in the feasibility of their projects as well as a critical eye to the value of their work, as well as having a much more mature approach to practice that “merely” builds their skills.

Furthermore, more often than not, the research they produce is conducted to a sufficiently high standard to merit publication (albeit in conjunction with other authors). In the current climate, at least in the UK, of limited research funding but increasing pressure for research excellence, getting the students we are required to teach to produce research to the highest standard is an epic win for all concerned. Our approach

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undermines two damaging trends in teaching and teaching research: where “teaching” has been over-emphasized to the point of making students incapable of engaging with the depths of a subject beyond learning the answers already written down in standard texts and notes; and where “research” is done and then written up. HCI is much more interesting, and deserves a teaching approach that both rises to it and draws the students into it throughout their learning process.

## Acknowledgements

Thanks to Richard Young for his insistence that Anna wrote regular fantasy abstracts during her graduate studies. It was difficult and frustrating but was invaluable, and now she tells everyone to write them!