Identifying Challenges within HCI Education

Anne Roudaut
University of Bristol
Bristol, UK
roudauta@gmail.com

Orit Shaer
Wellesley College
Wellesley, USA
oshaer@wellesley.edu

Audrey Girouard
Carleton University
Ottawa, ON, Canada
audrey.girouard@carleton.ca

Andrew L. Kun
University of New Hampshire
Durham, USA
Andrew.Kun@unh.edu

CHI 2018 workshop on Developing a Community of Practice to Support Global HCI Education.

Abstract
In this position paper, we argue that the first step toward unifying teaching in HCI is to identify the main challenges faced when teaching HCI at higher education levels. We explain how these challenges negatively impact the field itself and propose initial steps toward finding solutions to address these issues. We particularly discuss the idea of supporting an international HCI curriculum, of new forms of delivering content and of news ways to evaluate our teaching practices. We argue that moving in this direction can not only improve teaching practices but also enhance research methods in general.

Author Keywords
HCI; education; teaching practices;

ACM Classification Keywords
K.3.2 Computer and Information Science Education

Introduction
A future conceptual framework for HCI education has to address the challenges of teaching Human Computer Interaction (HCI). HCI is an established field with numerous dedicated courses taught on the topic in both undergraduate and graduate levels in many colleges and

universities. Still, instructors find the topic and the field to pose certain challenges. Here we have highlighted several challenges that come with teaching HCI more specifically.

Drawbacks of Being a Multidisciplinary Field
Although the multidisciplinary of the field has many advantages, it also comes with many drawbacks when it comes to teaching for two reasons: the first is that it is difficult to know what are the most important aspects to focus on, secondly to know where is the cut off, i.e. what is not necessary/critical to teach. In more details:

It is difficult to identify the important topics to teach. Ultimately HCI is a blend of design, computer science and experimental psychology but HCI researchers come in all flavors, e.g. some being more technical (e.g. hardware prototyping), some being more theoretical (e.g. information theory). It is expected that when we are creating the content of a teaching unit, we put more emphasis on the aspects that are related to the unit we teach in, our interests, or simply our own skills. For example, some teachers will focus on teaching quantitative evaluation methods while others will focus on qualitative ones. This creates disparity between what is taught according to different universities or countries.

It is difficult to know where to start each topic. It is relatively easy for instructors to fall prey to the "curse of knowledge" - a tendency to assume that our audience knows more than they actually do [2]. This is especially true for interdisciplinary courses, where students might come from different backgrounds. For example, if we need to present material on digital signal processing, students with a computer engineering background might need less of an introduction, than those with a CS background, and CS students might need less than psychologists. It is not always clear how the instructor should present this type of material such that students who have more preparation to understand it are not bored, and that those who need more support are not lost.

It is difficult to know where to cut off. Because HCI is based on multiple fields, there are potentially many skills to learn and it is sometimes difficult to know where to stop, what is the critical and necessary basis for HCI research to be. For example, one can choose to teach how to design a controlled experiment and how to analyze the results using statistical tools. The question of the students needing to learn about the entire fields of experimental psychology or alternatively statistics to do this is somewhat unclear. Certainly, we have all seen students with a very poor understanding of statistics using SPSS in all possible wrong ways, but surely there is no need to be a skilled mathematician to understand the basis of parametric and non-parametric testing.

Drawbacks of Being an Applied Field
Although the field of HCI has many theoretical aspects serving as pillars for design processed, it is essentially an applied and practical field, with the goal of producing interfaces and devices that fit human need. We see particularly three potential issues described below.

Certain HCI skills require manual savoir faire. We would argue that learning physical prototyping skills require practice. It is one thing to know the principle of sketching, basics of electronics or how fabrication machine works (e.g. laser cutter, 3D printer), but using them require a completely different set of applied skills that come with practice.

Figure 1. We asked 24 computer scientists to draw the C of HCI (computer). 15 draws a laptop or conventional computer; 4 computers without IO; 1 a phone; 1 abacus; 3 were humans. No wonder why we struggle to explain what is HCI.

Certain HCI skills require access to specific equipment such as prototyping machines (e.g. CNC machines) that are not available to the common end-users. This make it really difficult for example to provide online content.

Certain HCI skills require dedicated practice. One typical example, that we argue many of us have encountered, is the difficulty to teach students the principle of user-centred design (UCD) as it is natural, as a human, to believe that other people behave like is, a cognitive bias known as false-consensus effect. As a result, students overlook activities consisting in understanding users need such as critical incidents or contextual interviews. We would argue that experiencing with designing for specific users help students understanding this aspect.

Drawbacks of Being a Relatively Young Field

Compared to physical or biology fields, for instance, HCI is relatively new. We describe here some issues we believe have impacts on teaching and training.

It is unclear for others what HCI stand for. We surely all have experience of colleagues from other fields asking what HCI stand for and the thrill (or pain) to explain the different skills HCI researchers have. But even despite this, there are still some misconception. Recently, one of the authors of this paper asked to a crowd of 24 computer scientists what they thought the C (computer) stands for by asking them to draw computers (this was done during an internal departmental talk with academics). 79% drew a conventional desktop computer or a laptop. This demonstrates that in our field that computer means more than that, but this is not expressed outside of the field. Some similar effect can happen when we use the word "Design" who is often associated with "Art" and strengthen the misconception around our field. As a consequence, it could be sometimes hard to argue the need for more the need of teaching HCI at institutional level. In fact, this type of exercise ("draw me a computer") would be an interesting class exercise to do in the first and last class of a unit. This could help students reflect on what HCI means. It could also be interesting to run with multiple classes/ and backgrounds of students.

It is unclear for others if HCI is science or engineering. It is sometimes really hard to convince other researchers that HCI is a field, with theoretical and applied aspects, but that understanding and modeling the users is a fundamental aspect of our research, and thus must be taught (e.g. evaluations, design process) with the same care than other aspects such as programming user interfaces.

Action items to improve practices

In the light of these drawbacks, we propose three main steps to take as we define a conceptual framework of an HCI living curriculum:

- Define an international curriculum that would define what are the basic requirements to teach to become an HCI researcher.
- Define new form for delivering content that accommodates the practicality of teaching HCI.
- Define methods to evaluate our own teaching and spread good practices.
- Determine how to provide such new supports to HCI teachers in high education.

This workshop will be a good start to initiate discussion. Each of the authors has also implanted innovative teaching within their career and a few examples are described below. They are excited to communicate those ideas to a broader audience and discuss future plans.

Authors Short Bio

Anne Roudaut's research skills combine hardware prototyping expertise with a strong grounding in empirical user evaluation. She is a leader in the area of shape changing allow the students to manipulate theoretical concepts in real applications. She has a sound knowledge of teaching methods and innovation and has consistently investigated ways of improving students' understanding of material. With the ease of access to knowledge, she believes that the future of teaching is to provide highly interactive and hand-on units that are unique and truly highlight the need for higher education. She is directing two units at the University of Bristol and is also part of a Faculty Learning Community. The goal is to support the scholarship of teaching and learning, in particular bring together staff from different Schools in order to discuss ideas for innovation in teaching and learning, specific to Engineering. Within this context her project is to better bridge research and teaching activities.

Audrey Girouard is an associate professor in the School of Information Technology at Carleton University and the director of the Creative Interactions Lab. Specializing in next generation interactions, she explores the deformation of displays and objects for gaming, creativity input and disabled populations. She has taught an HCI undergraduate course in the Interactive Multimedia and Design program and a graduate class on emerging interaction techniques for a multi-disciplinary set of students. She was awarded the Carleton University New Faculty Excellence in Teaching Award in 2014. Dr. Girouard also leads the Collaborative Learning in Usability Experiences (CLUE) training program. With this program, she organizes and runs hand-on workshops and courses about HCI, usability and user experiences to bridge the skill set of graduate students from various backgrounds.

Orit Shaer is an associate professor of Computer Science and a director of the Media Arts and Sciences Program at Wellesley College. Her research focuses on the application of tangible and embodied interaction to scientific discovery, collaborative learning, and health informatics. She is a primary investigator on an NSF funded project "Making the Invisible Tangible: Reimagining Science Education in Kindergarten through Reality-Based Interfaces." Shaer teaches introductory and advanced undergraduate HCI courses as well as introduction to Media Arts and Sciences. She was awarded Wellesley College's Pinanski Prize for Excellent Teaching, and a Google App Engine Education Award.

Andrew L. Kun is an associate professor of electrical and computer engineering at the University of New Hampshire, and leads the UNH HCI Lab. His research interests include in-vehicle HCI, as well as exploring collaborative and learning activities for large groups of users in multi-device environments. He has taught courses in ubiquitous computing, with a significant focus on HCI-related topics. He edits the Training & Education department of the IEEE Pervasive Computing magazine.

Acknowledgement

This work was supported and funded by a Leverhulme Trust Early Career Fellowship and the National Sciences and Engineering Research Council of Canada (NSERC) through a Discovery grant (2017-06300).

References

1. https://www.khanacademy.org/exercisedashboard
2. Pinker, S. (2015). The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century!. Penguin Books. Chicago