Teaching Design for HCI

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Background

I joined the Department of Computer Science and Information Systems at the then University of Port Elizabeth in 1997. During my time in the Department I completed an honours degree with the focus on delivering education using videoconferencing. My interest in HCI was sparked during this time, as I could see how the students were struggling with the various software interfaces as well as their own postgraduate development projects. I completed a Masters degree in Computer Science in 2002 with the title "Formal Usability Testing of Interactive Educational Software: A Case Study Approach" which entailed a methodology for usability testing of interactive education software. My current PhD studies is focused on developing a process model for interaction design of the Information Architecture of Web-based Learning Environments (expected date of completion April 2007).

I have always been interested in understanding the diversity of user experiences in South Africa. My work at the NMMU focuses on user interaction design and usability evaluation (I initiated the first Usability Engineering course in South Africa at the university). Not long thereafter, demand from local industry led me to develop a short course on user interface design and evaluation. Currently, I am in the process of developing curricula for industry-based short courses on interaction design. I have developed and taught the following courses:

- Postgraduate projects: a project-focused university course for postgraduate students that focuses on the design of interactive application interfaces with specific emphasis on User Interface Design, Evaluation, and Implementation in different domains varying from web design to mobile interfaces to GUI to touch screen technology.
- Computer Aided Learning Design - a university course for postgraduate students with the focus on the structure and design of Computer Aided Learning software. Students explore different CAL methods and design new interaction techniques for existing software.
- Human-Computer Interaction - a university course for postgraduate students that surveys research and issues from the whole range of HCI.
- User Interface Design and Evaluation - a university course for undergraduate and postgraduate students that focuses on the design of interactive application interfaces, with a course-long project and coverage of management/budget/cost justification issues.
- An Introduction to User Interfaces - a short course/tutorial that provides a high-level introduction to the material from the UI Design and Evaluation.

These courses were heavily influenced by books, syllabi, and curricula provided by others. In particular, the courses make use of books and talks by Ben Shneiderman, Deborah Mayhew, Jenny Preece, Alan Dix, Jeff Rubin, Carol Barnum and several others.

The rest of this position article reflects the use of some design exercises from the respective courses.

The teaching process

Teaching design of interactive systems in a developing country is a challenge. The design depends not only on the tasks...
challenging task. The design depends not only on the tasks undertaken and on the experience of the intended users, but as much on the context in which the tasks will be carried out (e.g., the work environment, other systems in use, and time pressures).

I make use of case studies to help students see a variety of examples of good and bad designs, and expect students to generalize from the cases. Students do struggle at times to generalize without substantial guidance. I also teach fundamental principles and good design heuristics. This is clearly a necessary component for students who are firstly computer programmers and who give little thought to design. It is extremely valuable to discuss human characteristics and limitations (e.g., human memory, colour perception) and to review and discuss some effective design heuristics ranging from the use of standard components to heuristics about layout and colour.

To ensure that the students understand their intended target audience when developing software, we follow the User Centered Design process in all its phases with a strong emphasis on the iterative process. This approach addresses design from the analysis of user requirements and the tasks they do, to identification of possible improvements through system development, prototyping and evaluation. It is an iterative process. Students learn quickly that they are expected to learn, use, and understand a design process that will lead to better interfaces and user satisfaction. To keep this process in focus requires several structural components in the course. Students always receive regular feedback at each step in the design process and are expected to prepare specific deliverables for the different phases of the development cycle.

One positive consequence of the course structure is the discipline it imposes upon the students. Many students commented (in course evaluations) that the rigid structure was the only thing that prevented them from putting off the design of the interface as they implemented it. The structure also seems to be an effective message to explain why the first part of an interactive interface project does not generate or require any code.

The most critical element of teaching design of interactive systems is giving students the opportunity to experience the design process. One of the benefits I find in teaching UI design courses is the opportunity to bring together students with different backgrounds (both academically and culturally) and expertise. This is critical to the success of interdisciplinary design and implementation teams for a multicultural user population as can be found in South Africa.

**An example of exercises used in courses**

**Exercises on analysis and design**

Objective: To determine the appropriateness of different kinds of conceptual models which were designed for similar kinds of physical and electronic artefacts.

Describe the conceptual model that underlie the design of a personal diary, a wall calendar and desk planner.

- What is the main kind of activity and object these are based on?
- How do these differ for each of the above?
- What metaphors have been used in the design of their physical interface?
- Do people know how to use these and do they match user needs?

Describe the conceptual model that underlies an electronic calendar as found in MS Outlook.

- How does this differ from the physical artefact?
- What new functionality has been provided?
- What interface metaphors have been used?
- Are the functions and interface metaphors well integrated?
> What are the problems that users have with the interactive calendars. Explain why.

**Design exercise**

Design the user interface for your system:

> Identify the users’ goals, context of use and requirements for the system.
> Construct a low-fidelity prototype for this system (conceptual model).
> Show this prototype to potential users and get some feedback (give a brief report on this).
> Use a software-based prototyping tool to develop a high-fidelity prototype for the system (physical model).

**Evaluation exercises**

Prepare a one-page report on the following:
www.nelsonmandelabaytourism.co.za

> What you like about the site and why?
> What you dislike about the site and why?
> What changes would you suggest should be made to the site?

Using Nielsen's list of heuristics, conduct a heuristic evaluation of the following site:
www.capegateway.gov.za

Each member of the team should conduct a separate evaluation. The team members should meet to discuss their results.

Each group has to create a HE report which must include the following components:

> HE checklist
> Each evaluator’s individual report
> A usability issue list together with severity ratings
> Recommendations for improvements

Working in your groups, create a paper prototype for the opening screen of an information kiosk to assist tourists who are planning on visiting the Western Cape. A representative from another group will act as the target user for your kiosk interface to test the paper prototype.

**Goals and Conclusion**

While I attempt to bring other disciplines into my courses, the focus is very much IT orientated. I expect to learn a great deal from the HCI teaching approaches that start from a different domain and build their processes from a different starting point.