A Resource Base for Human-Computer Interaction Educational Material

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1 Introduction

The paper describes the outcome of earlier stages of a long-term project to advance the teaching of human-computer interaction (HCI). The project runs under the auspices of the IFIP Working Group 13.1 (HCI Education and Curricula).

An HCI Education Workshop (Cox, Oestreicher, Quinn, Rauterberg, and Stolze, 1999) was held in 1999 during the INTERACT ’99 Conference in Edinburgh. Among the topics that were discussed was the relative lack of good textbooks in the area. Most of the existing textbooks being used turned out to be too wide, too unspecific, or not suitable for a complete course in HCI. The workshop also emphasised the need for material that supported the forming of an HCI mindset with the student, something that the traditional textbooks don't do. Furthermore there was a suggestion to construct an example database with good or useful examples of teaching materials that would allow people to avoid to reinvent the wheel in their teaching. (See http://www.dis.uu.se/~larsoe/eduworkshop/ for a report on this workshop).

A follow-up workshop on the development of educational material for HCI (Oestreicher and Kotzé, 2000) was held in 2000 at the Royal Institute of Technology in Stockholm, Sweden, coinciding with the NordiCHI 2000 conference. The rationale of this workshop was to investigate alternative possibilities to provide the HCI community with a qualitative resource of educational material, which is useful, accessible, and affordable, where the focus is on topics that are not exactly textbook topics, but which in many cases can be used to augment the available textbooks. The first part of the workshop focussed on a discussion of suitable types of materials to be published in this way, while the second part of the workshop focussed on criteria to be placed on the material, essentially creating a template for contributions to this database. (See http://www.dis.uu.se/~larsoe/eduworkshop/ for a draft report on this workshop.)

The main purpose of this paper is to consolidate the results from these two workshops and illustrate the proposed framework by means of examples and diagrams.

2 What is the problem with existing resources

The first question that should be addressed relates to the problems and shortcomings of current HCI textbooks and other resources.
Most of the workshop participants used one of the three main alternatives textbooks for HCI: *Human-Computer Interaction* (Preece, Rogers, Sharp, Benyon, Holland, and Carey, 1994), *Human-Computer Interaction* (Dix, Finlay, Abowd, and Beale, 1998), or *Designing the User Interface* (Shneiderman, 1997).

Some of the general comments made about the currently used HCI textbooks included the following:

1. Most of the existing books are Anglo-American oriented. Most of the examples and associated material refer to either the British or American environment, largely neglecting the rest of the world.
2. There is little or no coverage of deep cultural issues. Multi-cultural issues are often limited to a short discussion on multilingual aspects.
3. Most of the books are direct manipulation-centred or imply the use of graphical interfaces.
4. Although most of the books cover some issue relating to human resources (perception, cognition, and physiology), they all lack a prevailing interdisciplinary perspective.
5. Many of the books focus on essential topics but miss out on lateral thinking - providing a link between the theory and application of the issues in the wider world.
6. Issues relating to physical ergonomics are mostly not covered. If it is, it’s done in a very superfluous way.
7. Most books lack good advice on where to get further and up to date information.
8. Printed books rapidly fall behind as far as technological development is concerned.
9. Illustrative material is limited to text, graphics, and pictures. Video, sound, multimedia, and animations cannot be accommodated.
10. Ineffective connections are made between theory and practice (students cannot talk about a ship in a stormy at sea, without having seen or experienced the sea before).

Specific comments were made about the most commonly used textbooks, including:

1. Preece et al: The book starts off well, but the run out of steam, most probably because it tries to cover too much (almost every aspect mentioned in the ACM Curriculum). It lacks practical exercises and examples, as well as real-world connections. It also does not cover the SDLC and how to incorporate HCI issues in systems development.
2. Dix et al.: The book is generally seen as a good overview book, although not inspiring and thought provoking. The sections on formal methods and examples are generally seen as too difficult for non-technical students, and very limited.
3. Shneiderman: The book has lots of examples, but it is difficult to map issues to chapters themes. One generally gets the feeling that there is something missing when reading the book. This may relate to insufficient depth.

Note that these comments were not primarily aimed at criticising any single book as being especially good or bad for teaching but rather at isolating features that were missing or not especially well treated in the books.

3 Scope and Purpose of the Project

The first workshop agreed that HCI as a field of study requires education not only on theoretical aspects of HCI, but also on practical experience. The presentation styles of most HCI textbooks are too traditional and aimed mostly at a more theoretical education perspective. Students often want knowledge that is directly applicable, and which leads quickly to the desired goals. The focus in this case is centred on how to make students experience HCI, rather than learning practical applications of HCI.

As output the workshop participants produced a complementing methodology that could be followed in order to make the teaching of HCI more practical whilst still providing for a motivated theoretical underpinning. This consisted of the following six steps (named the *Six Golden Rules to Shake the Student’s Mind* by the workshop participants):

1. Read thought-provoking literature.
2. Observe real users using real tools.
3. Analyse the findings in the observation.
4. Mix the results from the analysis with theory.
5. Redesign the artefact.
6. Iterate the observation phase.

The mixing of theory and practice requires a good knowledge source, where the knowledge in the
theory is suited for the integration with the practical experiences.

The second workshop identified resources to complement existing HCI literature as the main concept to be pursued. Issues to be considered include:

1. The identification of resources to enable both educators and learners.
2. How to make these resources accessible to educators around the world.
3. The topics to be covered, and the evaluation and validation of resources.

The general consensus was that the material to be collected, developed, and recorded should focus on topics that are not exactly textbook topics, and should try not to duplicate the material generally found in textbooks. The material should rather support the theory provided in the textbooks. Each example should be explained and linked to associated theoretical issues. In cases where the theory is incomplete or absent from available textbooks, the associated theoretical background should be provided as explanatory text, or appropriate references to assessable sources should be provided.

### 4 Preliminary recommendations and Resolutions

To initiate the discussions on the needed sources, four main questions were raised and from these questions a number of recommendations were made and a number resolutions drafted. The questions are:

1. What resources are required to enable educators and learners?
2. What is required to make these resources useful? How would one use the resources to teach HCI?
3. Which topics need to be covered?
4. How to evaluate or validate resources or topics?

It was recommended that the resources needed should as far as possible be directed towards a distributed teaching context, that is, they should not require the support of an HCI network.

The following were identified in order to facilitate the resource.

1. Guidelines for the development of a (virtual) HCI laboratory.
2. Setting up national/international HCI laboratory networks.
3. Material for these laboratories, focussing on examples, exercises, assignments, projects, and examination support.
4. Collaborative links and resources.

Several types of material were identified and envisaged as typical material that would be both valuable and useful to all parties concerned. This material should focus on actual content and should not be confused with an HCI bibliography.

1. Both low-tech and high-tech solutions to problems.
2. Cartoons focussing on interactive issues - commercial or self-made (see Figure 1 for an example).
3. Annotated ‘war stories’ and ‘urban legends’ (link to theory or experience).
4. Material related to the evolution of interfaces.
5. Material focussing on cultural issues (problems/features/advantages): globalisation (internationalisation) as well as specified for each country.
6. ‘Interface Hall of Shame’ or ‘Fame’ type of examples, annotated with links to the

![Figure 1: An example of a cartoon](image)
relevant theoretical issues involved as well as indicators as how to correct the problems illustrated.
7. Sets of annotated standards, guidelines, and patterns.

5. Supplementary material (could be WWW links).
6. Resource level (basic, elementary, or advanced).
7. Type of experience or learner encounter

A framework was also identified which could be used to record and organise these sources, including examples, exercises, assignments, examination support, posters, cartoons, text book chapters, and specialised lectures. Each item will be recorded with the following parameters (see Figure 2 for a prototype example):
1. Resource (the item itself) and its description.
2. Procedure for use of resource.
3. Intention of resource (why is the item there).
4. Related / associated theory.
5. Supplementary material (could be WWW links).
6. Resource level (basic, elementary, or advanced).
7. Type of experience or learner encounter

Collaboration on all levels was identified as a major issue. Collaboration should include support in the form of:
1. Sponsorship and industry participation.
2. Guest lecture program (plus stored recorded guest lectures).
3. Cross-institutional examination support.
4. Cross-institutional lecturing (video-conferencing, for example).
5. A research topic index, and titles, themes, and sources.

5 Future work

Two questions remained unanswered or require further work. These will be the topic of the next
meeting of the working group in Japan during July 2001:

1. Which HCI topics need to be covered?
2. How to evaluate / validate resources / topics?

Quality control and the structures for enforcing such control is important. Without such control the material would be just another useless source of information.

6 Conclusion

HCI is a relatively new subject in the Computer Science and Information Systems curricula in Southern Africa. In many cases the subject is still not taught, or only superficially.

The additional purpose of this paper is to sow the seeds for the establishment of a national (Southern African) resource base for HCI material and courseware. The idea is to add examples and experiences unique to the region and its infrastructure. This resource base could act as not only a database from which material for the teaching of HCI can be drawn, but can in future be used to compile a HCI curriculum specific to Southern Africa.

References

