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HCI Education in Sweden

Reports from a national workshop on HCI education

HCI is still a rather new subject for Scandinavian undergraduate level studies. Ten years ago only short courses at various computer science and system development educations were available. During the last two-three years HCI education has grown rather rapidly through the establishment of minor programs at the smaller universities and with specific profiles at the bigger universities. In 1998 the first Ph.D. in HCI graduated and now an HMI graduate school has been started in Linköping and Stockholm. HCI has also been well established as a research activity in Sweden and is now becoming

more and more regular departments at the major universities. Still, education in HCI is varied in content and direction, and this paper describes a first Swedish workshop aimed at reviewing the contents of HCI courses in Sweden.

Proposed Discussion Topics

The workshop was initiated through a session where everybody was asked about their expectation on the workshop in the forms of relevant questions to discuss. The initial questions and discussion topics were, in order of appearance:

1. How do you create a balance between redesigning existing artifacts and promoting new and creative solutions?
2. Exchange experiences concerning different pedagogical approaches to HCI
3. New ways of examining HCI

courses

4. What should a basic HCI course contain?
5. What should advanced HCI courses contain?
6. What basic knowledge should we require?
7. How can we introduce practical tasks into a HCI course? Without it taking too much of the time?
Using simple and realistic problems?
8. How do you create motivation for the students to take HCI as a secondary subject?
9. Practical issues
How do we teach innovation?
How do we teach creativity?
10. What can we learn from the game industry?

We did not go through the questions in detail but touched upon most of them in the discussion that followed.

Basic HCI Courses

Through a brainstorming session we attempted to condense a set of what we considered to be typical knowledge that a basic course on HCI should present.

We performed an informal survey in which the workshop participants were to choose the five most important subjects and the summary of the votes went as shown in Table 1. The course should comprise 5 points (where 1 point corresponds to approximately one week of work). The number of subjects turned out to be rather limited.

This informal survey indicates that cognitive psychology, design principles/processes, interaction techniques, usability, task analysis, evaluation methods, system development methods and prototyping could be regarded as the most important themes in a basic HCI course. In the discussions that followed, there was a general

agreement that it might be dangerous to go into too much of detail on each of the separate topics and that the education should rather be guided towards looking at IT solutions as a whole.

Table 1: The various subjects proposed for an introductory course on HCI

Subject	Vote
Design principles/process	10
Cognitive psychology	10
Interaction techniques	9
Usability	7
Task analysis	7
Evaluation methods	6
System development methods	6
Prototyping	5
Information visualization	3
New techniques	3
Interface stuff	2
CSCW	2
Method	2
HCI as a responsibility for programmers/developers	2
Web design	1
Design for all	1
Interdisciplinary	1
Emotion	1
Interaction principles	—
Hypertext	—
Linguistics	—
Real time systems	—
Graphical design	—
Complex systems	—
Social & organizational aspects	—
Ethics	—

Supplementary HCI Courses

We continued the session by looking at a set of potential supplementary courses which might be given to students (all based on 5 point course blocks). The idea was to find course topics that would be:

1. Sufficient to form courses on their own
2. Central enough to defend their roles

as separate courses

Although some of the suggested courses might be a bit too small or narrow in their focus, one conclusion of this informal survey is that there is a large set of possible and potentially interesting course topics for a devoted HCI student (or teacher).

- Method, Evaluation methods and usability
- Design
- Functional design
- Screen presentation
- Cognitive design?
- Graphical design
- Prototyping & user centered design
- Creativity & Innovation
- Multimedia and multi-modality
- Tools for UI design & Programming
- Social, moral and organizational aspects/effects of IT
- Documentation and supervision
- Pedagogical user interfaces
- "Theoretical views"
- Project administration, Co-operation

This list of possible topics has not been ordered in any way. Some of these topics are overlapping, e.g., graphic design and screen design. However, the discussions also showed that the participants of the workshop did not interpret some of the course titles in the same way. It is thus very likely that different teachers will give the topics slightly different focus, depending on personal preferences.

Course Literature

During the discussion on HCI courses, the issue of textbooks was raised. One initial observation is that the selection of central textbooks actually used on courses was relatively small (e.g., Preece et al. 1994, and Dix et al. 1998). Surprisingly, it seemed that the participants were not directly satisfied with the books. The lack of a good Swedish book was also mentioned.

The problem of selecting textbooks and reference literature seems to be a problem in many HCI educations. Also, whereas the basic books, as mentioned above, are at least potentially useful, there are very few books that can be applied on higher levels of education.

When asked for books that had been used in courses (at some point), the participants of the workshop collectively mentioned some 5 to 10 books, which were used for the basic education in HCI.

The general critique on the books was that they generally:

- are too shallow in the coverage of many topics
- impose a common structure on HCI, which is not necessarily the best from a pedagogical point of view
- try to cover too many topics within what is reasonable in 5 weeks

The general view was that if, for example, a more problem-oriented educational approach would be adopted on the course there is no really useful textbook on the market.

New Forms of Education

Since some of the issues mentioned new ways of teaching and examining HCI, a discussion grew in outbreak sessions about how new forms of HCI education could be developed. Since these discussions were spontaneous and unstructured, only a very small selection of the subjects covered is mentioned here.

One point that was made several times was the size of the educational groups (The participants reported experiences from 6-175 students). Generally a smaller number of students per group promotes better results, as well as a larger possibility to discuss interesting aspects of HCI. On the other hand, larger groups of students could be handled in project teams where comparative design solutions could be one way of developing the students' awareness of alternative design solutions.

It was also considered beneficial to develop new forms for examination. The problem is to examine the student in a more holistic way, not focussing on details. A starting point for the discussions was some experiments performed at Chalmers Institute of Technology in Gothenburg. The examination was performed as an oral examination on previously submitted mandatory tasks. By using this type of

examination the throughput and the frequency of examination in the organization increased substantially. In this case, it was also possible to let the students perform projects that lasted up to a year. One example assignment of this kind was to develop a system for handling medical records for gymnastic therapists.

As a related topic the use of problem based education in HCI was discussed in fairly large detail. This discussion also raised the question on lecturing versus supervising. Since HCI is an area, to a large extent, based on understanding rather than actually learning of details, it was considered interesting to increase the focus on supervising assignments, rather than using traditional lecturing in HCI education. This can probably not be used as a general assumption, but it can be applied at least partially in most classes.

A fairly intense debate on textbooks and their quality also promoted one suggestion concerning course literature, namely to let the students themselves find, analyze and use the various and often contradictory guidelines that can be found on the web as part of the course literature. The general idea in these discussions was to increase the students' awareness of that there are no simple solutions to HCI problems. One problem with textbooks is that the students tend to regard them as the "solution" to all their problems.

Freedom in the choice of mandatory tasks also made a difference in the student's motivation. The treatment of real or realistic problems is advantageous, such as computerization of bus stops or support for people with special needs, especially people with severe disabilities (à la Stephen Hawking).

Real user participation is also beneficiary. However, letting the students use real companies or users for their course assignments was by some of the participants considered a problem. However, at Chalmers the students were often asked to visit companies for their assignments and apparently they seemed to get a rather large number of supportive companies.

Industrial Requirements on HCI Education

One special concern in HCI education is the promotion of HCI in the industry. One of the participants has practiced HCI education for industry for several years. In this chapter his main points of view are summarized. HCI education is becoming increasingly important also from the companies' perspective. There is clearly a greater need for HCI experts than to promote usability increasing operations through methods and tools. Although this is also important as an expert evaluation of a user interface is always more worthwhile when it comes to time and resources. The industry is also pragmatic. One can never achieve a perfect result, one should rather strive to achieve as good as possible within the available time. What the industry needs is both pragmatic knowledge and hands-on advice and guidelines. Therefore it is often better to do little than to do much (and never get anything done).

An important thing for HCI education is to train peoples ability to be sensitive for judging good and bad design, an ability that partly is there by heart and partly can be trained. This could possibly be performed based on realistic problems and then applying HCI knowledge to be able to achieve better design. A practical design course could, for example, use Don Norman's book (The design of everyday things) and let the students apply the ideas in it to HCI.

HCI is best applied through "indoctrination" into projects, simply by showing that something works by applying it. "Learning on the job", to work with your skills and expertise is important in education. Working in projects is one of the best ways to learn. Extra credibility can for instance be achieved by inviting guest lecturers from companies that tell the "right" things. Usability should be a major goal in all development within a company, rather than being a goal to evaluate against in the end. Usability is not something that can be applied in the end.

Sunshine or disaster histories are useful in HCI education but difficult to acquire from the industry. There are many reasons for this:

- It can be difficult to actually tell whether a project has succeeded or failed.
- Evaluation is often performed by other than those who have done the work.
- The industry does not want to get an image of a company that failed or shared a winning concept.

The requirement specification is a central concept not only in software engineering/design but also in HCI design, and requirements gathering is thus a central part in HCI work. The responsibility for arriving at a solution should never be put on the user; it is up to the system developer to design a good product. Alternative solutions should be used to promote new ways of doing old tasks. It is unfortunately far too easy to be stuck in your old trails.

A good example of a small practical design task is to ask the students to design functional salt and pepper packages for airline passengers. You can arrive at several conceptual design solutions within 15 minutes and discussing the different design solutions is a good practical way to do parallel design. It is very useful for students to discuss each other's ideas. People could arrive at very different design solutions reflecting the existing design space, e.g., color-coding, different granularity, transparent packages. Training the student's ability to figure around everyday designs and their benefits and drawbacks is useful. Why can the specification of what is on the different floors only be read outside the elevator?

How can one teach or learn innovation? Is it even possible? Brainstorming sessions can be very useful to be able to achieve creativity. Observation is very useful to learn benefits/drawbacks with different design solutions. Showing system developers how the users actually used the system repeatedly actually made them understand and want to correct their designs rather than addressing an evaluation report.

The people that today are educated in HCI so far seem to have turned up as teachers, due to the heavy increase in the subject. Those who at last reach the market usually ends up as consultants. There is a need for HCI education for people who finally end up in supervisory or strategic decision making situations. People who study law, economics and business applications might eventually end up in supervisory positions in a company.

We must promote an increase in HCI education at all levels. An English survey concluded that 6% of the Englishmen physically abuse their computers and 2/3 of the Englishmen do not know how to program their VCR.

Discussion

Prior to the workshop an informal survey was performed in "ASKEN" the web service that support Swedish students with search possibilities on courses and education programs that exist in Sweden. This survey shows that a large number and a great variety of different courses are offered today, many of them not at all known by the participants. You could take HCI for 3 weeks or for one year. HCI courses were hidden underneath non-descriptive names and in combination with very many different courses. Evidently there is a need for a Scandinavian curriculum for HCI education.

In addition to this, if you analyze job openings in the newspaper you'll see that HCI experts are sought under titles, such as usability managers, human factors specialists, IT-strategist, ergonomist, etc., lacking a commonly understood concept for the role needed. A commonly agreed HCI education curriculum could make it much easier to market the subject of HCI to the industry.

Conclusions

This workshop concluded that there is a need for (among many other things):

- a more thorough survey on the courses taught at the universities in Sweden.
- a forum for exchanging educational ideas in Sweden.

- an educational data bank where educational material, tips and text book evaluations can be found.

On the other hand, we all also received several ideas and tips on how to focus and plan the coming educational events. One interesting possibility would be to try to establish some kind of a lecturer's network. This network could, in the longer perspective, serve several purposes:

- to be supportive in need of inspiration
- to be a source of guest lecturers
- offer mentor-ship for new teachers

Still this is to be developed in a moderate pace so that the effort is not too large. One risk is that too much is started at the same time, which will not be beneficial. A principal issue to resolve in coming workshops would be how to proceed the work that has started with this workshop, and to lay some initial foundations for an educational network.

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