EISH – Exercises in Studying HCI

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ABSTRACT
This paper reports on the outcomes of the December 2006 CONVIVIO Faculty Forum and the proposed framework and guidelines for design exercises to stimulate creativity, developed at the Forum.

Categories and Subject Descriptors
H.5 INFORMATION INTERFACES AND PRESENTATION. H.5.2 **[User Interfaces**]; H.5.m [**Miscellaneous**]; K.3.2 [**Computer and Information Science Education**]: Computer science education, *Information systems education*.

General Terms
Design, Human Factors.

Keywords
Design exercises, design process, elaboration, reduction.

1. INTRODUCTION
The CONVIVIO Faculty Forum is held twice per year. The second 2006 CONVIVIO Faculty Forum [2] was held in Austria. The aim of the forum was to focus on 'teaching design' in the context of the human-computer interaction (HCI) or interaction design (ID) fields.

The forum gave us the possibility to learn from the experiences of others, but there was also space for some creative work. We created an informal platform to share ideas on teaching design: documenting approaches and methods currently used, illuminating practices through personal experiences, to collect examples of design activities, useful resources for teaching, etc. We also had a brainstorming session on new ways of teaching, learning, and experiencing design to stimulate creativity, as well as addressing the issue of possible strategies to address the issue of rapidly changing and newly developing technologies.

This paper reports on the outcomes of the forum, with the main emphasis on the attributes of good design exercises aimed both at stimulating creativity and allowing students to apply the techniques they were taught.

2. EXAMPLES FROM POSITION PAPERS
Each participant in the Forum was expected to submit a position paper detailing how they teach design and/or an example of a design exercise they use (or could be used) in their teaching This section briefly summarise the design exercise contributions.

- Alison Varey (Reflecting on Design [21]) presents a method of active and creative design exercises that include, for example, short visual thinking exercises, expressing the meaning of word with four black squares, creating colour schemes and mood board with segments of colour cut from magazines.
- Darelle van Greunen (Teaching Design for HCI [20]) describes exercises to describe the underlying conceptual model of personal diary, a wall calendar, a desk planner, and an electronic calendar; evaluating tourism web sites, etc.
- Gerrit van der Veer (DUTCH – Teaching Method-based Design [19]) describes the design of aware systems that allows monitoring and communication for the elderly and for young children.
- Helen Petrie (Design for All and Assistive Technology for Computer Science and Design Students [17]) describes a number of useful exercises in design for all and assistive technology, including experiencing disability and ageing by using assistive devices in restricted physical conditions, discussions and demonstrations with disabled and older

people, and designing for a specific disabled or elderly group.

- Ilari Jounila (Mental Models in Practice [5]) describes using card sorting techniques for specified scenarios.
- Irene Mavrommati (Teaching a Design Perspective [13]) describes using videos from case studies to experience the latest trends and developments, students co- lecturing on certain focused topics (i.e. interactive art, e-government, etc) and student projects involving creativity techniques in specific assignments, such as concept generation using user profiling, scenario development, story boards, video prototypes, etc.
- Konrad Baumann (Design Education Methods – Examples and Findings [1]) describes cultural probes (generating awareness for cultural and social differences between geographically remote societies or different user groups) and circular handover (products in several phases of development is handover to another student to continue the development) as design education methods.
- Lars Oestreicher (Teaching HCI in Practical Terms [15]) describes two design excercises, namely the redesigning of a printing dialogue and designing an interaction allowing a car buyer to select from a vast number of cars on a site, and also gives some general observations on using these exercises.
- Nestor Garay-Vitoria (HCI Design is not Only Software Design [3]) presents a design example to design alternative input devices, including a remote keyboard and a reduced keyboard. Students must both design and implement a workable prototype of the devices.
- Oguzhan Özcan (Breaking Rules in Interaction Design Education [16]) describes a method of 'breaking rules' to enable students to think creatively with regards to interaction styles, as well as an example of designing for a 'temporarily disabled' user (such as a waiter who must take an order on a PDA using just one hand).
- Paula Alexandra Silva (Understanding Materials [18]) describes a number of example approaches to design, including the Scrapheap Challenge, virtual crackers, and pin & play.
- Paula Kotzé (Design for HCI [6]) describes a project requiring students to design a website for use by an able-bodied person and persons with at least two human impairments (disabilities) and the problems students experienced in completing the project.

The use experiences accompanying each design exercise description has been seen as very valuable for the participants: not all good design exercises succeed, some fail due to reasons not anticipated. The varied nature of these exercises and use experiences provided a rich environment for the discussions and working sessions of the Forum, as described below.

3. DESIGNING DESIGN EXERCISES – WHAT'S THE 'EISHUE'

The outcomes of the forum were fourfold: a pool of design exercises that participants can draw from, a framework for creating new design exercises, properties of good and failed exercises, and guidelines for successful use of design projects in teaching.

3.1 A framework for exercises

A framework for design exercises, as illustrated in Figure 1, was sketched during the workshop, based on the discussions following the presentations of the position papers. We briefly outline the framework below (the framework has been contextualised since and a detailed discussion on the framework is provided in a separate paper [10].

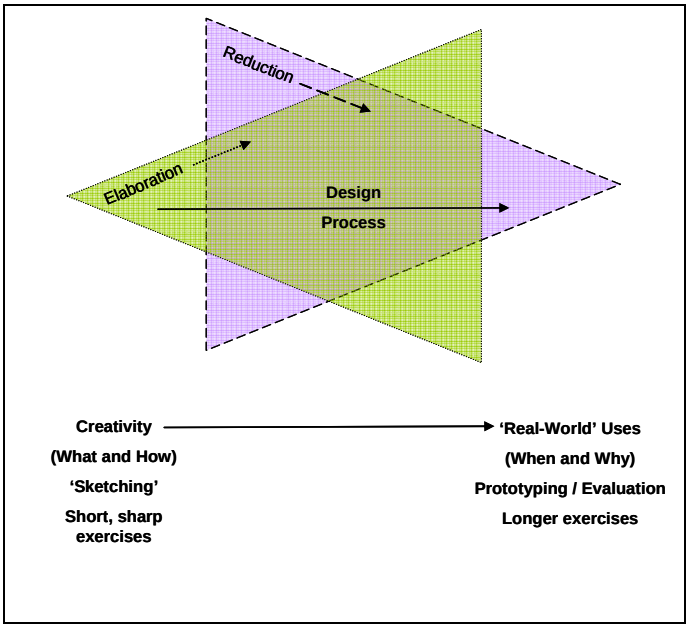

Figure 1: Framework for design exercises

The proposed framework for design exercises is roughly based on two theoretical frameworks: the graphic thinking for architects and designers framework proposed by Laseau [12] and the framework for teaching and learning design proposed by Kotzé et al. [11]. Laseau captures a number of interesting aspects of the design process in a simple model consisting of two funnels: an expanding funnel (elaboration) and a contracting funnel (reduction). In this model he balances permanent creativity and idea generation, on the one side, with the reduction resulting from decision-making as main forces in design, on the other side. These two ingredients of design benefit from quite different approaches and methods that can be characterized as sketching and prototyping, respectively. Figure 1 illustrates the idea that design is in some ways a continuum ranging from purely creative work to real-world implementations, i.e. from sketches to prototypes. Kotzé et al. propose a pyramid of competence model for learning (and consequently teaching) design for HCI based on the models of learning proposed by Gorman [4] and Miller [14]. The pyramid of competence model identifies four types of knowledge in design or technology knowledge transfer: *what*, *how*, *when* and *why* knowledge. The elaboration funnel and the reduction funnel address these types of knowledge in different ways, in terms of a continuum rather than separate stages or levels. Design exercises can be aimed at any point of this continuum, either starting at a specific point, or ending at a specific point.

This framework is supported by the combined outcome of the various brainstorming sessions in the form of a set of properties of good design exercises and reasons why good design exercises might sometimes fail.

3.2 Properties of design exercises

During the brainstorming session several properties of good and bad design exercises were identified. This section summarises the core of these properties, which is transferred into a set of guidelines in section 3.3.

3.2.1 Properties of good design exercises

Good design exercises (projects) should adhere to a number of basic principles in order to stimulate creativity and support learning outcomes. The design exercises should:

- Be relevant, preferably real, and tangible.
- Keep students motivated and engaged throughout.
- Be of appropriate span to the learning outcome envisaged:
  - Short and sharp for applying skills, methods and techniques (for example sketching).
  - Longer for reflection and understanding.
- Aim for continuity if at all possible, i.e. it is prefereable to have three days intensive work rather than several short exercises.
- Provide well defined constraints and limitations. The design space should be clearly defined, with clear rules of the game.
- Use interdisciplinary groups for short exercises. For longer exercises it can be 'bad', if one of the team members (acting as domain expert) starts to dominate the process.
- Allow for peer-critiquing (which should preferably not be grade relevant) without instructor's intervention (allegedly).
- Allow time for reflection by students.
- Separate designs results and implementation.
- Include project and time management as part of the plan.
- Have clear roles (definitions) for the all the actors involved: students, designers, consultants, and other stakeholders. Real clients might have to be briefed about the aim, scope and purpose of the design exercise.

One reflection on the properties above is that most of them concern giving the students clear rules of the game. This means that good exercises do not leave students with questions hanging, but provide both information *and* restrictions on the excercises.

3.2.2 When do good exercises fail?

Also some innately good design exercises may fail occasionally. The reasons for this failure can be varied, but the following issues have been identified as some of the main culprits:

- There is a failure to bridge the divide of creativity vs. pragmatism. For example the gap of 'sketch → prototype'. This is indicated in Figure 1 by the arrows.
- Students expect didactic work instead of being expected to try things out themselves. Sometimes the students presume that the proper answers have to be found in the literature, rather than by their own investigations.
- Exercises to understand 'why' are most difficult. 'Why' knowledge refers to the ability to argue about why a specific skill or method will be appropriate or not (see paper on framework for exercises for a detailed discussion on the levels of knowledge [10]).
- The exercises are too open-ended causing the students to be left with too much freedom in the exercise, making it difficult for them to see or understand the problem space.
- The real clients provide specifications of exactly what they want, i.e., a specification of the final product, rather than information about the needs. This reduces the design process.
- Students lacking motivation to do the exercise or the work in general.
- Students (and sometimes also teachers) having 'tunnel vision': assuming that there is a single good solution, reached by following a single process.
- Large project teams (more than 7): problems with the balance of contributions of individual members, one or two members dictating the process while other feel that their voice is not heard, etc.
- Too many different groups may create too much administration in the exercise: the logistic overhead demand is growing rapidly with the number of student groups.

This list of pitfalls is extensive and may in some case be contradictive (cf. the last two guidelines), and no single problem listed is a definite no-no. Thus the application of these guidelines is a judgement process, where the impact of a certain condition has to be weighed against the other alternatives. It can even be the case that the best exercises are also the most risky/uncertain. The guidelines are therefore to be regarded as a checklist on what to look out for. With experience a teacher can compensate for some of the listed issues, but in most cases it might be better to avoid them when possible.

3.3 Suggested guidelines

Following from the discussions around the good and bad in exercise design, the following set of guidelines was compiled as an attempt to assist lecturers in creating good design exercises:

- Try for relatively small interdisciplinary groups, co-production, or the each-one-teach-one principle.
- Students must have a clear understanding of the objectives of the exercise.
- Design exercises must be fun (to keep students motivated) and rewarding.
- Design exercises must focus on the understanding of materials and the application of skills rather than preparing a specific solution to a specific problem.
- Whenever possible, use real clients, but brief them well on the design situation. To promote creativity make sure they provide information on a requested artefact (and not design specifications or full requirements).
- Specify the various actors in the exercise situation and their roles clearly: the designers, the users, the evaluators, the clients, any other stakeholders, etc. In some cases even the final interactive artefacts can be seen as actors in the design process.
- Specify both context of use and design space clearly: set the boundaries of the *exercise and its context* but without constraining the individualism and the creativity.
- Prepare illustrating case studies, e.g., in preceeding lectures or in text materials to support the design exercise.

- Use competing designs in the exercises, e.g., by adding external motivators such as a mini-competitions to evaluate the resulting designs. By engaging the students to constructively criticise other designs, they will take the results back to their own design situations.
- Utilise group dynamics such as guided brainstorming and snowball brainstorming.
- In order to stimulate creativity (freedom), intervention by lecturers should be limited to ethic responsibility and when approached for assistance.

Many of the guidelines above reflect direct experiences from the workshop participants, that have been turned into constructive advice. This list of guidelines should therefore be regarded more as a check-list than a proper recipe for a successful exercise.

4. DISCUSSION ON OTHER ISSUES IDENTIFIED

One way, as a teacher, to achieve better design exercises is to learn from others, which was also the situation during the workshop where several design exercise ideas where displayed. The problem is often to find the appropriate way to present a suitable exercise, and many times the teacher is prone to reinvent the wheel.

One possible way of avoiding this situation is by collecting good exercises and posting them in some kind of publicly available repository. By collecting good, successful exercises, a repository could be used to distribute these to teachers. The need for such repositories was also posited in a previous workshop at the NordiCHI 2000 conference, where the need for a general repository for HCI teaching material was identified [7-9].

A design exercise repository would need to be carefully considered, in order to avoid cultural and linguistic problems in the designs. The example exercises that were described in the position papers for this conference are good examples of such design exercises.

One important addition to the design exercises is the experiences that come from using them. The exercises themselves are not always enough to understand how they work, but when accompanied some descriptions of the experiences from the appliccation of the exercises, including sizes of groups, procedures, etc. the design exercises have a potential to inspire teachers even more. This clearly came out in the various position papers.

Apart from the exercises and the use experiences, it is also necessary to post rationales behind the exercises, so that the teachers that will uitilise the resources will know how (and how not) to use the resources. In the same way, the guidelines for running good design exercises will have to be posted alongside the exercises themselves. In this way the repository could be a good support for teaching design and HCI in general.

5. CONCLUSION

Although the framework presented and the set of properties and guidelines require further refinement, it provides a starting point on which to base the development of design exercises to allow students to experience design, develop creativity and apply the theory they have learned along the way. Future research (and workshops) will aim to refine these after being put to test in a variety of contexts.

Epilogue: What's in the acronym?

The word 'eish', when translated from South African use, means shock, horror, despair, unknown, excitement, …, etc. This is also a proper word for the result coming from bad design. The same sounding word is used in Turkish to present 'create' or 'design'. Thus EISH, a very apt name for our framework. The acronym came about by coincidence after the phrase 'eish' has been spontaneously adopted by the participants of the workshop after being used by the South Africans attending. In the end it almost turned into a slogan for the workshop: "(Turkish) Eish to avoid (South African) Eish." onto which the whole workshop group responded with a collective: "EISH".

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