

# Towards a Constructively Aligned Approach to Teaching Interaction Design & Children

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## ABSTRACT

This paper proposes the principles of constructive alignment as foundation for course design within Interaction Design and Children (IDC). While the field has existed for over a decade, there is still no settled curriculum for teaching it. The paper demonstrates how intended learning outcomes in combination with related work and research on teaching IDC can be used to develop a course in IDC, and exemplify this with a brief description of the development of a recently completed course. The contribution of this paper is to support anyone who intends to start teaching in this area, to stimulate discussion in the community, and contribute to an emerging curriculum for Interaction Design and Children.

## Categories and Subject Descriptors

H5.2. Information interfaces and presentation: User Interfaces – Theory and Methods

## General Terms

Design

## Keywords

Interaction design and children, teaching, curriculum, CCI.

## 1. INTRODUCTION

IDC - Interaction Design and Children (or CCI - Child Computer Interaction) is a growing area in both research and design, and the community has more than quadrupled in size over the last eight years [14]. Despite this extensive growth, there is still no settled curriculum for what to teach in the field of IDC, and very little discussion on how to do it. This can be illustrated by a survey of the proceedings of all the IDC conferences so far, where only 3 papers were found dealing with development of teaching for IDC; one work in progress paper at IDC'13 [6], one workshop at IDC'11 [7] and one position paper from that same workshop [13]. To improve the design practice in the IDC area, we believe that it is necessary to not only study and improve methodology in a research context, but also how to transfer the gained knowledge to new generations of designers, to ensure its use in design. This topic is investigated in the two year project DEVICE: Design for Vulnerable generations – Children and Elderly, where a

combination of current best practices from academia and industry, design explorations and teaching experiments are used to suggest an approach to teaching design for and with children and elderly [6].

In this paper we briefly present the development of one pilot study from the DEVICE project; a master level course on interaction design and children. The course development is based upon the work within the project, related work [e.g. 7, 13], and on the principles of constructive alignment [4], which is a major current pedagogical trend within higher education. This means that the design of the course is based on a set of intended learning outcomes for students, describing the skills they should be able to demonstrate upon completing the course. The paper is an effort to stimulate the discussion on what a curriculum for teaching IDC could be and to contribute to the community by presenting our experiences and material that others can draw from when teaching IDC. In line with this, all the material from the course is publicly available at <http://ixdeth.se/courses/2013/ciu235/> for anyone interested in investigating the material or to adapt it for use in teaching.

## 2. BACKGROUND

Based on an inventory of several courses, Gilutz et al suggest the following eight topics as critical to teaching IDC in a multidisciplinary context [7]: *Communication* (facilitating various forms of interpersonal communication, children's media use and literacy), *Psychology* (Human development, learning theories, motivation), *HCI* (general), *Children's HCI* (History and current trends), *Pedagogies*, *Technologies*, *Experiences* (Designing for play, education, development, health, and communication), and *Design* (Methods and adaptation). This is elaborated further by Read [13], who suggests two different curricula, one for undergraduate students, and one for postgraduate students. The undergraduate curriculum, titled *Designing cool stuff for children working, learning and playing*, aims to introduce designing interactive technology for children and to provide skills to evaluate interactive technologies for children by demonstrating how children act around and use interactive technologies [13]. In the postgraduate curriculum, titled *Child Computer Interaction*, Read suggests that the aim is to introduce students to the theory and practice of Child Computer Interaction, to give them skills to be critical and reflective designers of interactive technology for children, and to equip students with tools and techniques for carrying out and design safe, ethical research studies with child participants in the field of HCI and CCI [13].

This brief overview of related work on teaching in IDC exemplifies discussion on topics to be covered, rather than expected learning outcomes and what to include within the suggested topics. In the next section we describe an IDC course development taking on the perspective of constructive alignment as well some suggestions regarding content.

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### 3. COURSE DESIGN

A 7.5 ECTS credit project course was given within the Interaction Design and Technologies (ID&T) master's program at Chalmers University of Technology in Gothenburg, Sweden. The program is based on four pedagogical ideas. Firstly, a mix of theory and practice, applied in constructively aligned courses. Secondly, a mix of given and open problems; the former to practice application of certain skills the latter to practice problem solving and innovation. Thirdly, a large amount of project work where students work in mixed groups in a studio environment, similar to the situation in real life. Fourthly, students are trained to present their work to the public, as exhibitions, or taking part in conferences and contests. These principles are based on current pedagogical research, see for instance [11] pp 57-70 and were taken into account when designing the course. That the course was designed to fit within the ID&T program meant that all students could be assumed to have taken a basic course in Human-Computer Interaction, one in Interaction Design Methodology and a course on Prototyping Techniques, in extension to their various bachelor backgrounds in e.g. engineering or design.

#### 3.1 Intended Learning Outcomes

The course was designed along the principles of constructive alignment. Using constructive alignment, the teaching system should align activities and methods to the learning objectives (intended learning outcomes) to facilitate for students to construct meaning (knowledge) [4]. The intended learning outcomes should be stated in such a way that it becomes clear to students what skills and knowledge they should be able to demonstrate after the course and the teaching should then be designed to facilitate for students to reach them. Thus, when defining a course in interaction design and children, the intended learning outcomes becomes the natural starting point describing the teacher's intent with the course. Since the purpose of the course is to teach the essentials of interaction design for children, the learning outcomes can also be seen as a description of the core skills needed by practitioners in the field according to the authors' opinions.

The learning outcomes for the course are divided into 3 categories, *Knowledge and understanding*, *Skills and abilities* and *Judgment and approach*:

##### *Knowledge and Understanding*

- K1 Describe stages of child development relevant for design
- K2 Describe methods for working with interaction design and children
- K3 Describe the similarities and differences of children and other intended user groups
- K4 Describe considerations for involving children in the design process

##### *Skills and abilities*

- S1 Create designs specifically adopted for children
- S2 Design with regards to both children and caretakers
- S3 Modify design methods to fit the context and needs of children
- S4 Identify needs and requirements for children and caretakers

##### *Judgment and approach*

- J1 Evaluate designs taking into account the needs of children

- J2 Make an informed evaluation of the ethical and societal impacts of a design
- J3 Criticize designs and design processes with respect to the needs of children

When defining the criteria for *knowledge and understanding* the focus was to catch the most central theoretical knowledge on which to base a design process. The criteria for *skills and abilities* focus on what the designer should be able to do in a design process. The criteria for *judgment and approach* are intended to capture that students should be able to make a critical analysis of (a proposed) design, taking the needs and perspectives of children into account as well as performing evaluation with children. Once the intended learning outcomes have been settled, the focus of the rest of the course design process becomes to define tasks and material that ensure that the students fulfill the outcomes upon completing the course. A brief description of the results from this process follows below.

#### 3.2 Literature

The core literature used in the course was the paper "Interaction design and children" by Hourcade [9], which covers a lot of the basics of the field. To cover aspects of evaluation and ethics, parts of the book "Evaluating Children's Interactive Products" by Markopoulos et al [12] was used. In addition to this a number of research papers by authors such as Druin [5], Antle [1], Bekker et al [3], Walsh et al [17], Kärnä et al [10] Read & MacFarlane [15], Resnick & Silverman [16] and Guha et al [8] were included in the course literature to add additional material and depth. Finally, the students were also introduced to the Developmentally Situated Design (DSD) cards [2] since these represent a valuable and useful compilation of knowledge directly useful in design for children. The students were further encouraged to find additional literature related to the topics of the course and to their projects.

#### 3.3 Teaching Modalities

Following the common approach of the ID&T program, the course applied a combination of teaching methods and a mix of theory and practice to stimulate the students' learning. To practice presentation and feedback skills, presentations were held twice.

##### 3.3.1 Lectures and Exercises

The course lasted for eight weeks during which one whole day the first seven weeks was scheduled for the course. In addition to the scheduled time students were expected to work on their own for roughly one and a half day each week. The eighth week was an examination week during which the students had the opportunity to work on their project reports to hand in for grading. Each scheduled day contained a mixture of activities. Typically, there was a lecture on some parts of the course contents, followed by an exercise on the same topic, to enforce learning and to mix theory with practice. The topics of the lectures of the course were:

- Child Development
- Ethics and Regulations
- Pedagogical perspectives
- Design for and with Children
- Design for Children with Disabilities
- Evaluation with children
- Design for Formal vs Informal Learning Contexts
- Principles of Screen and Web Design for Children
- Case studies

The reasoning behind the order of the presentation of the material was to first present important characteristics of children relevant for design, then methods for working with design for and with

children and finally present specific guidelines that can be useful when designing and evaluating for the target group.

### 3.3.2 Literature Seminars

The course contained 3 mandatory literature seminars, which lasted for about 2 hours each. In the first seminar the focus was to get some touch on the foundations of the field of Interaction design and children. Two foundational papers were chosen [9, 5], and the students were to prepare either a research trend presentation based on chapter 7 in Hourcade or a presentation of Druin. The second seminar was more focused on inspiring the students in the areas of design and selection of methods to use when co-designing with the children. The students were to read four papers [16, 10, 17, 3], list advantages and disadvantages with each approach, and be prepared to argue for or against any of the four papers and their approach. The third seminar focused on evaluation, and was based on [1, 15, 8], the students were to consider the different approaches to evaluating children's participation in a design process.

### 3.3.3 Design Project

A major part of the course was a design project running throughout the course. The aim of the project was to provide all students with practical hands-on experience from planning and executing design for and with children. The project was done in groups of 2-3 students and the task was open-ended, with no specific restrictions on what kind of topic to address.

During the project students had to have at least three encounters with children for observation, co-design and evaluation. The purpose of the first session was to learn more about the target group. The purpose of the second encounter was to practice co-design with children and get input for design. For the final evaluation session the students needed that the project had resulted in a prototype that could be evaluated with children. This could, but did not have to, be a hi-fi working prototype. The encounters took place in the children's ordinary environment.

The project groups had weekly supervision meetings with a teacher to follow up progress and discuss problems and ideas. The supervision mostly concerned how to plan and structure activities with the children, and how to inform the parents. The students seemed to be confident in the design and technology parts, but lacked the experience and needed support on what was possible to do with the children and how to go about performing the methods.

The course was graded on the group project only, but the students had to attend seminars, exercises and also hand in two individual exercises. All students received written feedback on their projects, exercises and individual hand-ins.

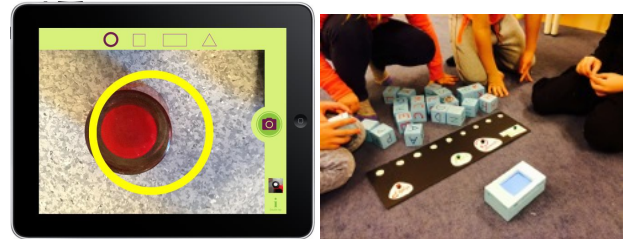
## 4. OUTCOME

19 students took the course. Of these, 18 were students at the ID&T program and one majoring in Industrial design.

### 4.1 Student Projects

The course ended up with seven different projects. The student projects varied from applications for smartphones and tablets to physical interaction toys, and ranged from partly developed prototypes to fully implemented designs. CamQuest is an example of an app, and is an attempt to change the common attitudes towards the use of tablets in preschools, and to promote the advantages of using the tablet as a pedagogical tool. The aim is to enable children to learn about two-dimensional geometrical shapes by exploring and taking photos of the surrounding

environment by using the tablet camera together with fellow preschoolers, see Fig 1a.



**Figure 1: a) Interface of CamQuest b) Evaluation of Blocks**

An example of a more tangible project is Blocks, which consists of augmented alphabet blocks with screen based and auditory feedback, see Fig 1b. The challenge is to spell words, presented by a voice, by using alphabet blocks. It is a learning tool designed to nurture the cognitive and social development of 6-7 years olds. This learning tool combines technology and tangible aspects to garner positive effects (in terms of learning) from both realms.

## 4.2 Course Evaluation

The course was evaluated through a meeting in the middle of the course, again when the course was completed, using a questionnaire developed for DEVICE, and with a meeting about two months after the course. 17 students completed the questionnaire at the final presentation, consisting of 9 multiple-choice questions and 3 open questions to leave comments and suggestions for improvements to the course.

The multiple-choice questions asked about the students general impressions of the course and teaching, what they had learned and so on. Overall, the results on the content and learning experience were positive. Some re-occurring themes could be found in the answers to the open questions. Most notably students really appreciated the direct involvement working with the children and the knowledge and understanding gained from this. Regarding what they learned, many commented about that they had gained an understanding of children, but also generally about the need for understanding users. Related to some of the above is also that many students appreciated that the course covered material on child development theories. Students also liked the theory covered in the literature and the literature seminars. Other things appreciated by the students were also the exercises, the project and design methods. One thing that the students missed was considerations regarding gender issues.

## 5. DISCUSSION

The intended learning outcomes describes the author's view of what a course in IDC could cover in that it describes what students should learn. Of course, what these learning outcomes should be is an open question and one of the aims of the present paper is to stimulate a discussion around these issues. We acknowledge that depending on the goal of the course and the school in which it is taught, different methods and content may be used to teach IDC [7]. The conducted research on related work and best practices in academia and industry have been useful as input on what to teach to fulfill certain learning outcomes and were also useful as input when defining the learning outcomes. When defining a course based on intended learning outcomes it of course becomes important to verify that the course content actually ensures that the learning outcomes are met. A first analysis shows that most of the learning outcomes were met, for instance K1 was met through literature [9] and a lecture, and J1 through a lecture, literature [12] and several practical tasks.

What students appreciated most of all in the course were the forced encounters with children. Meeting the children and working together with them was a most efficient eye-opener that also served to make all the different parts of the course come together. In the meetings with the children, the students could really see how and what they had learned about theory and methods became directly useful. The authors agree with [13], that one essential question that influence choices regarding the course design, as well as the motivation of the students, is how and if the course will be examined. The time to get insight into this field is limited with one course, why we suggest to focus on what has been learnt and to what extent the students have developed their knowledge and understanding within IDC in accordance with the intended learning outcomes rather than judging the novelty and quality of the designs. For future editions, the course could be extended to topics such as media use, theories of play, gender issues, and ergonomics.

## 6. CONCLUSION

This paper proposes the principles of constructive alignment as an approach for course design in IDC, exemplified by a brief description of the development of a master's level course. The work is based on two years research performed by the DEVICE project on development of design teaching for children (and elderly) as well as on current pedagogical research on how to teach interaction design. A set of intended learning outcomes were used as the basis for the course design. Despite the fact that the field of interaction design and children has been around for at least ten years, rather little work has been done on development of teaching curriculum for the field. This paper can serve as an inspiration for others developing courses in the same area. To facilitate this all the material used in the course is freely available online. It is the hope of the authors that the work can serve as a starting point for discussions on further development of curricula for teaching IDC.

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