Stichting NIOC en de NIOC kennisbank

Stichting NIOC (www.nioc.nl) stelt zich conform zijn statuten tot doel: het realiseren van congressen over informatica onderwijs en voorts al hetgeen met een en ander rechtstreeks of zijdelings verband houdt of daartoe bevorderlijk kan zijn, alles in de ruimste zin des woords.

De stichting NIOC neemt de archivering van de resultaten van de congressen voor zijn rekening. De website www.nioc.nl ontsluit onder "Eerdere congressen" de gearchiveerde websites van eerdere congressen. De vele afzonderlijke congresbijdragen zijn opgenomen in een kennisbank die via dezelfde website onder "NIOC kennisbank" ontsloten wordt.

Op dit moment bevat de NIOC kennisbank alle bijdragen, incl. die van het laatste congres (NIOC2023, gehouden op donderdag 30 maart 2023 jl. en georganiseerd door NHL Stenden Hogeschool). Bij elkaar bijna 1500 bijdragen!

We roepen je op, na het lezen van het document dat door jou is gedownload, de auteur(s) feedback te geven. Dit kan door je te registreren als gebruiker van de NIOC kennisbank. Na registratie krijg je bericht hoe in te loggen op de NIOC kennisbank.

Het eerstvolgende NIOC vindt plaats op donderdag 27 maart 2025 in Zwolle en wordt dan georganiseerd door Hogeschool Windesheim. Kijk op www.nioc2025.nl voor meer informatie.

Wil je op de hoogte blijven van de ontwikkeling rond Stichting NIOC en de NIOC kennisbank, schrijf je dan in op de nieuwsbrief via

www.nioc.nl/nioc-kennisbank/aanmelden nieuwsbrief

Reacties over de NIOC kennisbank en de inhoud daarvan kun je richten aan de beheerder:

R. Smedinga kennisbank@nioc.nl.

Vermeld bij reacties jouw naam en telefoonnummer voor nader contact.

Tinkering with Technology in Human Computer Interaction Education

Danića Mast d.mast@hhs.nl
Chris Heydra c.g.heydra@hhs.nl

Communication & Multimedia Design
Faculty for IT & Design
The Hague University of Applied Sciences, The Netherlands

Introduction

HCI Technologies is the final course in the second year of the four-year bachelor (BA) in Communication and Multimedia Design (CMD) program at The Hague University of applied sciences (THUAS). This program focuses on Interaction Design, mainly for screen-based interfaces. Usability and User Centered Design are the main focus points of the program.
It is important to prepare Interaction Design students for a future where interfaces will be tangible, embodied and embedded. Technology is increasingly part of the space around us and the possibilities of applications are increasing [1, 3]. Therefore the goal of this HCI course is for students to research future technologies and implement them in an interactive installation. In this course, the technology (instead of the user) is the starting point. This is in contrast to the approach the students are accustomed to.

Tinkering

Tinkering with hardware and software has become more popular over the last few years [4]. However, few schools have integrated a tinkering approach in their curricula. To us, the tinkering approach means that students are stimulated to actively explore the possibilities of tangible, embodied and embedded subjects without predefined outcomes.

Course Goals

Our primary teaching objectives were to stimulate students to learn hands-on about future HCI technologies. We aimed to provide students with an environment that would stimulate experiential learning and creative invention [7].
Our goals were to let students take responsibility for their own progress, stimulate them to learn by looking, listening, discussing, researching and doing, with emphasis on the latter. Focusing on experimenting and documenting their experiments. Failed experiments are just as valuable as successful ones. By experimenting with technology, surprising concepts may occur.

Portfolio

Students kept track of their progress in an online portfolio. They documented their workshop homework, experiments and outcomes and reflected on their participation during the final lab weeks. At the end of the course, this portfolio was used for grading.

Course structure

The eight-week course was split in two parts: six workshop weeks and two lab weeks. Students received six ECTS for corresponding to 168 hours of work.

Workshop weeks

Each week started with a 90-minute lecture focusing on theoretical background, context within the domain of HCI and showcasing inspirational projects, followed by a 180-minute workshop focusing on hands-on experimentation within the same topic. During this time, students also attended other classes. Week 1 started with a kick-off introducing course structure and topics. Week 4 had an excursion and week 2, 3, 5 and 6, each focused on a specific topic:

1. Kick-off
2. Computer Vision
3. Augmented Reality & Virtual Worlds
4. Excursion to Dutch Electronic Art Festival (DEAF)
5. Robotics & Affective Computing
6. Ubiquitous Computing

We chose these topics aiming to provide a broad-based view on and a good foundation in the field of future HCI technologies combined with the interests and expertise of the lecturers [6].

Lab weeks

In week 7 and 8, 92 students (divided in 13 groups) worked on projects full time in a lab setting on one of the four topics they had previously been introduced to. During these weeks, students worked exclusively on this course.

Location

The lab weeks took place in the Dutch Innovation Factory in Zoetermeer, located in a renovated old factory, housing programs of THUAS and several ICT related companies. We worked in the not yet renovated basement that still felt very industrial. This was not the regular location where students had so far followed their classes, but in another city, outside their usual environment and comfort zone. We chose this location because we anticipated it would cause less outside distractions and motivated students to work full days at this location. Furthermore, anything was allowed in this location, we expected this unlimited space to stimulate creativity.

Materials

During the lab weeks we only provided students with basic materials that were not available on short notice for the students (sensors, actuators, Arduino's, VR headsets etc.).

Structure

The lab space was open each day from 9:00 to 16:30, students were supposed to be present during those hours. They could make their own schedule for each day, as long as they were present in the workspace (or out getting supplies). Guest lectures by artists and researchers were planned on some days to provide inspiration.

Supervision & Assistance

The lecturer that taught a topic in the previous weeks also supervised it during the lab weeks, assisted by senior students and designers. All assistants had experience building interactive installations.

Method

Students managed their project, using SCRUM [5, 2] that was introduced to them at the start of the lab weeks. Groups started each morning with a daily stand-up creating a plan for that day and each day ended with a daily review where that day's work was reviewed and tasks and goals for the next day were decided. Where possible, supervisors attended these meetings to keep track of the groups' progress.

Expo

At the end of the lab weeks students explained and demonstrated their work in a public exhibition. Students were encouraged to invite friends and family and we invited colleagues, business partners and interaction design professionals.

Assessment

Students were assessed individually, based on their portfolio. Criteria were quality, depth and scope of research and their reflection.

Projects

All 13 project groups had conducted interesting and successful experiments of which 11 project groups managed to turn into interesting working interactive installations.
A showcase of student videos on their projects can be seen on: http://goo.gl/Gdn0Rx

Conclusion /Evaluation

Technological & theoretical skills

We managed to give students a solid technological and theoretical foundation in the first weeks. We noticed students started the final lab weeks with the needed knowledge and skills. We were content with, and often amazed by, the experimentation that the groups performed during the lab weeks and the prototypes they created.

Tinkering

The tinkering approach, giving students no specific goal, and encouraging hand-on experimentation worked very well. Students managed to go outside of their comfort zone and expand their skills and knowledge beyond what was initially offered to them. Even though we only asked students to experiment and document and present the outcomes, all groups presented one or more working prototypes during the final expo.

Location

Providing a new and unfamiliar environment where experimentation is permitted and with minimal external distractions worked very well. Initially some students were shocked by the lack of luxury and atmosphere, but after the first days they managed to make their working area their own domain with a great atmosphere.

Responsibility & Ownership

We made it very clear to the students that they were responsible for, and had ownership of their work. They were responsible for their own progress and results. We encouraged them to evaluate their own progress.
Students are not used to this and they would seek validation from the supervisors asking if what they were doing was good enough? We would avoid answering in order to avoid becoming their external validation. This resulted in two behavioral reactions in the groups.
Some students reacted with passivity and adopted an attitude that if they're not being told what to do, they don't do anything and came in late and/or left early. We as supervisors ignored this behavior and rewarded students that showed an active involvement in their projects. Most students did notice that other groups were making more progress and this stimulated them to start working harder.
Other students found ways of validating their progress and results themselves by either debating within the group or devising tests they could perform. This was precisely the intrinsically motivated behavior and the learning environment we wanted to achieve. It was very rewarding to see that these students were learning, experimenting, tinkering and working towards an interactive installation not for a good grade, but for a good experience.

Participation

During the beginning of the lab-weeks some students showed passive behaviour. This behaviour lessened during the rest of the lab weeks, even though no action was taken by supervisors to reduce this behaviour. It would be interesting to research what causes this turning point in these students.

Further Work

Initially it was not our intention to use this course as a subject for research. Because of this no specific data on the effect of the tinkering approach was collected during the course nor can we draw definitive conclusions. We consider the course a success, based on enthusiasm of students and colleagues, this encouraged us to share our findings and we consider teaching this course for the first time as preliminary work for better-documented research on tinkering in HCI-education.
Next time we will teach this course, we are planning a more scientific approach by collecting data though observation, interviews and surveys, aiming to measure and optimize the effectiveness of tinkering in HCI-education.
One feature of the tinkering approach is that, unlike conventional learning, it has no predetermined objectives. Instead, students experiment, set their own goals within the boundaries of the subject matter and work towards a finished product. We consider these features to surpass acquiring knowledge and skills, but also forming attitude towards the subject. Measuring the attitude towards the subject would be an interesting topic to research.

Acknowledgements

We thank Arnold Jan Quanjer, Nick van 't End and Joey van der Bie for developing and/or teaching this course with us, all the teaching assistants for their help during the lab weeks, the Dutch Innovation Factory for providing an amazing lab space, the CMD program and the academy for ICT & Media (THUAS) for believing in our plan for this unorthodox course and supporting and facilitating it, and of course all students of the 2014 HCI Technologies course for their creativity and enthusiasm.

References

1. Dourish, Paul. Where the action is: the foundations of embodied interaction. MIT press, 2004.
2. Jongerius, Pieter, et al. Get Agile!: Scrum for UX, Design & Development. BIS Publishers, 2013.
3. Klemmer, Scott R., Bill Verplank, and Wendy Ju. "Teaching embodied interaction design practice." Proceedings of the 2005 conference on Designing for User eXperience. AIGA: American Institute of Graphic Arts, 2005.
4. Lamers, Maarten H., Fons J. Verbeek, and Peter WH van der Putten. "Tinkering in Scientific Education." Advances in Computer Entertainment. Springer International Publishing, 2013. 568-571.
5. Takeuchi, Hirotaka, and Ikujiro Nonaka. "The new new product development game." Harvard business review 64.1 (1986): 137-146.
6. Verplank, Bill, and Scott Kim. "Graphic invention for user interfaces: an experimental course in user-interface design." ACM SIGCHI Bulletin 18.3 (1987): 50-66.
7. Wong, William, et al. "Inventivity in HCI Education: Lessons from Limerick." Creativity: Experiencing to educate and design-Proceedings of the HCI Educators 2007: 29-30.