Teaching HCI with a Studio Approach: Lessons Learnt

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HCI teaching: some challenges

- HCI: A ‘living curriculum’
  - Multidisciplinary field
  - Several neighboring fields or subfields
    - interaction design, participatory research, usability, ...
  - Textbooks and/or cookbooks
  - Post-/Undergraduate programmes in HCI
- HCI: a highly dynamic field (‘waves of HCI’):
  - Methods on design and evaluation of interactive systems
    - design thinking, software engineering and empirical testing, ...
  - Interactive technologies
    - Natural User Interactions: voice, gaze, gesture, ...
  - Applications
    - Continuous penetration of computing technology in everyday life...
Design studio pedagogy in HCI

• Design studio teaching/learning: a unique set of concepts, like:
  – the design brief
  – the desk crit
  – the design review (or jury)
  – the portfolio
  – presentation to the client(s)

• Some issues of transition from lecture-based to studio-based HCI teaching and learning:
  – Lectures?
  – Problem (project) at hand? (which/what? Abstract vs. concrete)
  – Interactive technologies applied?
  – Collaborative technologies employed?
HCI studio approach: context and goals

• Context:
  – Title: ‘Design of Interactive Systems Studio’
  – Department: Product and Systems Design Engineering
  – Course program direction on ‘Design of Interactive Systems’:
    • Ten related courses. Students must attend at least six to apply for the studio course.
  – Semester: 9th (just before Diploma thesis)

• Educational goals
  – (a) creative use of HCI and design methods, techniques and tools;
  – (b) experimentation and prototyping with contemporary interaction technologies;
  – (c) iterative user research, design, prototyping and evaluation
HCI studio approach: pedagogical principles

• A blend of:
• Design studio activities
  – Design brief, desk-crit, design reviews, portfolio, open presentation
• HCI and interaction design methods and practices
  – Field visits, interview (strategies), observation
  – Concept modelling, wireframes, low-fi prototyping
  – Technical testing, user interface design, interactive prototyping
  – Empirical evaluations: inspections, user testing, field testing
• Problem-Based Learning (PBL)
  – Ill-defined, open-ended, authentic problems at hand.
  – Work in groups, co-construction of knowledge.
  – Student-centered, active, self-directed learning.
  – Tutor as facilitator.
HCI studio approach: Course activities and process

**Phases**

1. Research and inquiry
2. Conceptual design
3. Technical tests and prototyping
4. Evaluation

**Methods, techniques, tools (indicative)**

0. Introduction to the course and sensitization
   - Tutors' presentation of the thematic topic.
   - Review of past projects.
   - Field trips(s).
   - External talks (clients).

1. Research and inquiry
   - Desktop research.
   - Scientific literature readings.
   - Observation (strategies).
   - Interview (strategies).
   - Contextual inquiry.
   - Customer journey maps.
   - Affinity diagrams.
   - Stakeholder maps.
   - User groups and personas.
   - Content inventory and audit.
   - Brand identity issues.
   - Card sorting.
   - Design brief.
   - UML Use cases.

2. Conceptual design
   - Process:
     - Brainstorming.
     - Interpretation sessions.
     - Scenario-based design.
     - Paper prototyping.
   - Modeling:
     - Vision.
     - Concept model.
     - Storyboards.
     - Swim lanes.
     - Information architecture.
     - Wireframes.
     - User interface designs.

3. Technical tests and prototyping
   - Web technologies (HTML5).
   - Desktop technologies (Universal Windows Platform).
   - Mobile apps (Android).
   - Game engines (Unity).
   - Mid-air interactions (Kinect, Leap motion).
   - Physical computing (Arduino).
   - Various software tools for 3D modeling, animation, sound audio, and imaging.

4. Evaluation
   - Design reviews (juries).
   - Usability inspection methods:
     - Heuristic evaluation.
     - Guideline inspection.
   - User experience and usability testing:
     - Summative testing (quantitative, usability problems).
     - Comparative testing (quantitative, performance measures).
## HCI studio approach: student projects

<table>
<thead>
<tr>
<th>Year</th>
<th>Thematic area</th>
<th>Students</th>
<th>Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Smart home</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>2016</td>
<td>Cultural heritage</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>2017</td>
<td>Cultural heritage</td>
<td>32</td>
<td>7</td>
</tr>
<tr>
<td>2018</td>
<td>Experiential tourism</td>
<td>30</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project name and short description</th>
<th>Main interactive technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orasis: Accessible Museum Collections for the Visually Impaired: Combining Tactile Exploration, Audio Descriptions and Mobile Gestures</td>
<td>Mobile app (Android), touch gestures, Arduino (touch sensitive), 3D printing.</td>
</tr>
<tr>
<td>Cycladic sculpture: A Kinesthetic Approach to Digital Heritage using Leap Motion: The Cycladic Sculpture Application</td>
<td>Game engine (Unity), mid-air manipulations (Leap motion).</td>
</tr>
<tr>
<td>Gocha: A Pervasive Role-Playing Game for Introducing Elementary School Students to Archaeology</td>
<td>Mobile app (Android), location-based sensors (Beacons).</td>
</tr>
<tr>
<td>The Loom: Interactive Weaving through a Tangible Installation with Digital Feedback</td>
<td>Game engine (Unity), Arduino connected to a wooden loom replica.</td>
</tr>
<tr>
<td>i-Wall: A Low-Cost Interactive Wall for Enhancing Visitor Experience and Promoting Industrial Heritage in Museums</td>
<td>Touchboard (capacitive sensors), animated narratives (projected).</td>
</tr>
<tr>
<td>THREADS: A digital storytelling multi-stage installation on industrial heritage</td>
<td>Desktop app (UWP), multitouch screen, Arduino</td>
</tr>
<tr>
<td>Design of an Interactive Experience Journey in a Renovated Industrial Site</td>
<td>Desktop app (UWP), multitouch screen, Arduino</td>
</tr>
</tbody>
</table>
HCI studio approach: Lessons learnt...

• **Course kick-off and sensitization**
• **Field visits** are vitally important
  – Authentic setting
  – External guests, who provide short talks or tours, and they play the role of clients or end-users
  – Sensitization moments and material
  – Some practical difficulties...
• Late or delayed finalization of the **design brief**.
  – Not surprising
  – A high risk for further project development.
  – We put pressure to students to be ready from first day of the course.
Research and inquiry

Students are quite resourceful in desktop research.

– But they fall short in critical readings of scientific literature.

They are considerably assisted by contextual research like interviews and observation,

– however, they are often carried away and may lose research focus.

Requirements engineering and modelling is often not satisfactory

– Not much time for iterations... we let them revisit their specifications in later iterations.
• **Conceptual design**
  - Concept modelling is often satisfactory, after iterations
    - We typically allow students to revisit their concept modelling.

• **Low fidelity prototyping** often provides insights to students
  - We devote several course hours into peer testing, i.e. students conduct low-fi prototyping sessions with their peers, in class.

• **Detailed user interface design** is a strong
  - they like it and they invest time and effort.
  - Carefully selected set of user scenarios.
HCI studio approach: Lessons learnt...

• **Technical testing and interactive prototyping**

• **Lasts for more** than any other project phase
  – ultimately the most important aspect of the project
  – we encourage integration of technologies

• Simple tests are to be conducted **early**
  – We spend several course hours in testing
  – This is the activity that we sometimes help the most...

• It may take **too long and squeeze evaluation work**.
  – We encourage students to conduct a series of evaluations.
HCI studio approach: Lessons learnt...

- **Empirical evaluation**
- **Mandatory activity**
  - and it occurs at least twice: at low-fidelity prototypes and at interactive prototypes
- **User testing is often short and qualitative**, with a few participants, but it is often substantial in terms of findings.
- **Usability inspections may be also organized** with tutors or peers as participants
- All these evaluation activities **help students realize the shortcomings** of their designs and to some extent address them to the final version.
The course requires some background of HCI theory and interactive technologies.
- It may be applied instead or just before final thesis at both undergraduate or postgraduate level.

It integrates the pedagogies of studio and PBL with HCI and design methods.

Peer tutoring works best (2 tutors in each course)
- richer feedback
- sometimes parallel supervisions

The course is quite demanding for students, with several phases and deliverables.
- A good tracked record for the course and their portfolio.

It brings students into authentic conditions of HCI and design practice.