PBL in HCI Teaching:
A case study

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Creative multimodal information spaces for problem-based learning

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Aim of the project

- Address problems related to the implementation of PBL pedagogy in higher education - that students are often disengaged from active collaboration, fertile discussion, and physical interaction around emerging group artifacts.
  - focus on design education

Our goal:
  - support student fertile discussion of alternative views,
  - motivate physical interaction and collaboration around the construction of group artifacts,
  - encourage student reflection on the experience

Project phases

- **Phase 1:** review of contemporary research and practice with regards to the implementation of PBL pedagogy and the nature of information spaces in higher education internationally.

- **Phase 2**: construction of creative, multimodal information spaces for PBL, iterative cycles of envisioning, prototyping, enactment and evaluation of user experiences through in-class explorations. *(Current)*

- **Phase 3:** consolidate with a framework comprising the construction of creative, multimodal information spaces. The space will be ideal for the implementation of PBL in the university classroom.

The case study: Overview

- Introduction

- Academic Context

- Course Content and Structure

- Creative Multimodal Information Space

- Data collection and analysis

- Results

- Key Findings

- Future Research

Introduction

Aim of the study:

- Employ PBL pedagogy for the teaching of a course in Human Computer Interaction (HCI) to explore its potentials and limitations.

- Situate PBL in a multimodal information space to explore how the interaction of physical and digital tools in the PBL environment promotes learners' engagement and collaboration.

Problem Based Learning (PBL): a curriculum and an instructional method in which the problem drives the learning.

- Students discover what they need to learn before they can solve the problem.

Academic Context

- Postgraduate Course "Human Computer Interaction"

- **2 tutors**

- **30 students of postgraduate programs** at Cyprus University of Technology in:
  - Interactive Multimedia,
  - Computer Games Design,
  - Graphic Communication and
  - Technologies for Communication and Learning

- **New blended PBL model developed**

Course Content

- **Topics:**
  - HCI principles
  - Cognitive Psychology and HCI
  - Data gathering and analysis
  - Design Process (Requirements, Prototype, Design)
  - Evaluation (User evaluation, Expert evaluation)

- **PBL problem**

"Empowering the Crowd: Changing Perspectives Through Collaboration"

Design an object, interface, system or service intended to help us to develop and share awareness, understanding or appreciation for our collective and collaborative crowd experience as it relates to our changing perspectives through collaboration.

Course Structure

- Organization (per week):
  - 1-hour Mini lecture ➤ Served as the initial trigger for students learning.

  - 2-hour Group activities ➤ Aimed to enable active collaboration within each group.
    - Reflection
    - Brainstorming
    - Self-study assignment

Figure 1: Group Activities Session (5 Groups of 5-6 students)

Creative Multimodal Information Space

- **Face-to-face learning space**
  - Range of display surfaces and hand-held devices facilitating exploratory thinking and physical interaction
    - e.g. ceiling-mounted projectors, tools in the creativity box

- **Individual learning space**
  - Capture of information and study the material at home
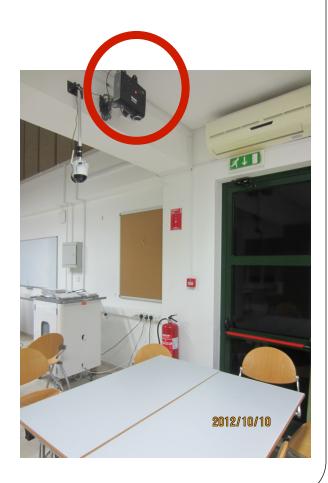   - e.g. use of iPod, HTC tablet and Facebook

- **Networked/Social Learning Space**
  - Comment, review and reflect upon captured data
    - e.g. Facebook after-class activity

❖Ceiling-mounted projector

- Used for downwards projection onto the group's workplace.
  - Improves communication and collaboration
  - Research
  - View of Facebook group

❖Laptops

- Used for:
  - Individual research
  - Typing notes
  - Uploading notes on FB

❖Creativity Box

- Includes:
  - HTC tablet
  - iPod Touch
  - Inkling Infrared Pen and Pen Reader
  - Vicon Revue Sense Camera
  - Other stationery e.g. markers, pens

❖Facebook Group

- Used for:
  - Uploading pictures and videos of in class activities
  - Sharing To-Do list/ Homework assignment
  - Exchanging ideas, comment on the group project, report progress during the week

Data Collection and Analysis

Data Collection

- Observation Field Notes and weekly Reflections by the tutors
- Facebook Interactions
- Questionnaire on Motivational Beliefs and Collaborative experience
- Focus Groups

During the course

After course completion

Data Analysis

- Descriptive Statistics for Questionnaire Data
- Thematic analysis of Students' Focus Groups, Field Notes and Tutors' Reflections
- Content analysis of Students' Facebook Interactions (processing now)

Results: Quantitative analysis (1)

Subscale	# Items	Cronbach's Alpha	Means (SD)
1. a) Task Value	6	.890	6.02 (.75)
b) Academic Self-Efficacy	6	.893	5.64 (.65)
2. Technology Expectations	6	.963	5.57 (1.07)
3. Technology Self-Efficacy	6	.926	5.89 (.74)

Table 1: Subscales and Descriptive Statistics for Questionnaire on Motivation (N=29)

Results: Quantitative analysis (2)

Subscale	# Items	Cronbach's Alpha	Means (SD)
1.Communication and Interaction	6	.855	6.16 (.62)
2. Reflection	5	.908	5.79 (.93)
3. Perceived Learning	5	.776	6.25 (.75)
4. Overall Satisfaction	5	.927	6.01 (.87)
5. Frustration	4	.789	2.00 (1.22)

Table 2: Subscales and Descriptive Statistics for Questionnaire on Collaboration Experience (N=29)

Results: Qualitative analysis

- In line with previous findings.

- Positive attitude towards course structure and groups.

- Variations in the usefulness of different tools in the multimodal information space.

- Facebook was a great communication and collaboration tool.

*"Throughout the course, the **learning spaces complement one another**. What we discussed on Facebook during the week was revisited during our face-to-face tutorial. [ ] All of it was important for our collaboration – if one thing was missing our collaboration would be difficult or less successful."*

Key Findings

- Participants felt highly satisfied with the information space and learning experience.
- The information space was positively perceived by students.
- Frustration levels varied suggesting the need for improvement.
- Continuity and harmony in the information space.

Overall:

- Understanding for how different physical and digital tools can be used together.
- Harmony among devices and spaces can be achieved during a PBL activity.

Future research

- Based on the high variations on the frustration levels a detailed analysis on the use of individual tools in the information space is needed to identify areas of use and users' characteristics.

- Improve multimodal information space by adding a vertical surface and by increasing the digital devices to support groups' multitasking based on focus group suggestions.

- Include video data to capture students interactions with each other and the information space for a more detailed analysis.

Thank you for your attention!

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