I-Trace: Radiographic Anatomy and Cephalometry in Mobile Learning Environments
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I-Trace Project (2005–2007)

- i-Trace – Interactive Tracing and Graphical Annotation in Pen-based E-learning
- Aims to develop and evaluate new generation of hand-held devices and pedagogical concepts, especially pen-based learning technologies (PBLT) in educational context for future teaching—studying—learning (TSL) needs
- Co-run by universities of Catania, Rome, Naples, and Helsinki, and the Technical Universities of Bucharest and Cluj-Napoca, and Eedo Knowledgeware Corporation

Aims

- To understand better PBLT and the role of mobility for future teaching, studying and learning (TSL) needs
- To use and create appropriate pedagogical concepts and models for network-based mobile education (NBME)
- To develop a feasible pedagogical concept for studying dentistry in more student-oriented way

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Designing of the Study Module

- Consideration of the broad context and transdisciplinary approach → combination of multiple tools and uses for a purposeful TSL environment
- Planning of the TSL process based on the collaborative action of the students and the teachers (See e.g. Bonk & Reynolds 1997)
- Emphasis on pre-interaction phase when planning teaching process
- Taking into account pedagogical models and characteristics of TSL process

Implementation

1. Three contact units—orientation, checkpoint meeting and debriefing, plus two net-based units
2. Students split up into pairs with one Tablet PC
3. Pairs designed their schedule and working plan for the net-based units
4. The first task in the net-based unit was to get acquainted with the learning environment
5. Students used groupware with their tablet PCs to comment their experiences and problems with the Web-Trace cephalometric software
Implementation

6. In the second F2F meeting students traced ten cephalometric cases
7. In the second net-based unit students traced and evaluated as many cases as they like to, in addition to these ten obligatory cases
8. Teachers provided feedback on the process (comments for questions)
9. Students reported on their work and problems in the groupware
6. Debriefing
Theoretical Background

Pedagogical model—Plan or model by which it is possible to direct the planning of instruction and design teaching and studying materials (Joyce & Weil, 1980)

Decisions and activities in the TSL situation are often based more on everyday information emerging from intuition and experience than the research information (Kansanen et al., 2000; Jyrhämä, 2002)

More freedom of choice and skill to choose the most effective pedagogical solution when having the know-how from theory and different pedagogical models (Vahtivuori-Hänninen, 2004; Tissari et al., 2004)

With the aid of pedagogical models, it is possible to find means for the design of research-based, reflective and high-quality network-based mobile TSL environment
Theoretical Background

- Mobile learning as learning and communication, in which different tools and mobile technologies are used (Tella, 2005)
- As mobile technologies, all different mobile, "portable" and "hand-size" multi-media communicators, smart telephones, PDA gadgets etc.
- Wireless, mediated communication between people → Mobility regarded as movability (Kynäslahti & Seppälä, 2003; Lehtonen & Vahtivuori-Hänninen, 2004)
- Elements of mobility: convenience—rationality, expediency, immediacy and quality of life (Kynäslahti 2003, 47)
- In mobile learning environment, mobile tools can be seen as a range of tools that support thought and activity and are well suited to a particular TSL situation and activity (mind tools)

Research Questions

1. How, from the students' perspective, do the teaching methods used support students' learning and studying?
2. What characteristics of the pedagogical models can be seen in the study module?
3. What are the students' perceptions of the usability of the software and platform?
4. How, from the students' perspectives, does mobility is implemented and support studying and learning?

Research Methods and Data Collection

- Both qualitative and quantitative methods
- Ethnographic research
- Data collection methods used comprised 1) participant observations, 2) transcribed interviews of the students (N=9), and 3) a network-based questionnaire (N=48)
- Network-based discussions of the students participating in the study were stored in the groupware
- F2F meetings were recorded by digital video
- Content analysis, statistical comparisons (KW test), and descriptions were applied forms of analysis

Some Findings RQ 1 & 2

- The factors which promoted new skills most
  1. Drawing the pictures independently
  2. Clear and well-implemented pedagogical course structure
  3. Good-quality tutorial of the software
- Lack of elements of the collaboration models or group investigation model
- Instead of a real collaboration, a communicative and reciprocal teaching model and peer support was implemented in the face-to-face meetings
- Students reported this study method to be suitable for learning cephalometric tracing
- Four out of five of all students felt that this study method activated their learning considerably and was interactive.
- Two thirds of the students reported this study module was dealing with real life problems and situations and will benefit their future work as dentists

Some Findings RQ 3

- Software was very inspiring and the primary reactions of the users were positive
- Usability and quality of the tutorial was found very good
- Students had much technical difficulties with the software
  - Wireless connection of the HU Hupnet was too slow for the fluent use of the Web-Trace software
  - Evaluation tool worked well only occasionally—approximately 20% to 25% of the X-rays could be evaluated easily by the students
Some Findings RQ 4

- Students experienced to be free to work wherever and whenever they wanted, at home or at the university – authentic environments and crossing borders of time and space
- More than half of the students found that mobility supported their studying and learning – SL process is on and possible “all the time in a relax and natural way”
- Three out of four students found that the mobility of the equipment enhanced their studies above moderate
- Studying dentistry very much based on practical skills and competences, which must be trained in the the real-life situations
  ➔ Scepticism about the full potential of the mobile learning environment in dentistry
- Movability and the mobile devices were found very promising and useful to support TSL process in the near future

Conclusions

- A higher theoretical level is demanded when designing NBME than face-to-face teaching.
- Engagement and tight collaboration between different levels of (TSL) organization and partners is crucial.
- Enough resources and time available for teachers’ guidance is needed.

Conclusions

- New working methods and network-based mobile learning environment motivated the students.
- Mobile learning environment supported teaching and guidance in network-based environments.
- Mobile learning and the educational use of PBLT is a possible way to organize TSL process in higher-education context in more student-oriented way.