International Workshop / Special Session on
Adaptivity and Personalization in Ubiquitous Learning Systems

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Schedule

09:00 – 10:40 Session 1
- Adaptivity and Personalization in Ubiquitous Learning Systems
  Sabine GRAF and KINSHUK (National Central University, Taiwan & Athabasca University, Canada)
- Instruction formats and navigation aids in mobile devices
  Martina ZIEFLE (RWTH Aachen University, Germany)
- HCI Research for e-Learning: Adaptability and Adaptivity to Support Better User Interaction
  Vlado GLAVINIC and Andrina GRANIC (University of Zagreb, Croatia & University of Split, Croatia)

10:40 – 11:00 Coffee Break and Industrial Exhibition

11:00 – 13:00 Session 2
- Personalized E-Learning through Environment Design and Collaborative Activities
  Felix MÖDRITSCHER and Fridolin WILD (Vienna University of Economics and Business Administration, Austria)
- Avatars in Assistive Homes for the Elderly: A User-Friendly Way of Interaction?
  Martin MORANDELL, Andreas HOCHGATTERER, Sascha FAGEL and Siegfried WASSERTHEURER (Austrian Research Centers, Austria)
- Using Clustering Technique for Students’ Grouping in Intelligent E-Learning Systems
  Danuta ZAKRZEWSKA (Technical University of Lodz, Poland)
- Adaptation Criteria for Preparing Learning Material for Adaptive Usage: Structured Content Analysis of Existing Systems
  Stefan THALMANN (Innsbruck University, Austria)
What is Ubiquitous Learning?

- Origin in ubiquitous computing

  Ubiquitous computing as “a vision of computing power ‘invisibly’ embedded in the world around us and accessed through intelligent interfaces” (Lay, 2007)

- “Ubiquitous Computing” has been introduced by Mark Weiser (2001)
  - the most profound technologies are those that are invisible and used by people unconsciously to accomplish everyday tasks
  - Many small computers are embedded in daily life objects
  - Wireless communication between objects as well as the sensors
  - Sensors allow the objects to sense user information and environment information in the real world and provide users with personalized services
  - Ubiquitous computing supports and assists people in tasks about work, education, and daily life
What is Ubiquitous Learning?

- A **ubiquitous learning system** (ULS) supports learners through embedded and invisible computers in everyday life.
- allow students to learn at **any time and any place**
- encourage students to more **experiential learning** (such as learning by doing, interacting and sharing, and facilitate on-demand learning, hands-on or minds-on learning and authentic learning).
Mobile/Pervasive/Ubiquitous Learning

Definition based on mobility and embeddedness (Lyytinen & Yoo, 2002; Ogata & Yano, 2004):

Mobile learning
- High degree of mobility and
- Low degree of embeddedness

Pervasive learning
- High degree of embeddedness and
- Low degree of mobility

Ubiquitous learning
- High degree of embeddedness AND/OR
- High degree of mobility
Characteristics and Features of Ubiquitous Learning

  - permanency
  - accessibility
  - immediacy
  - interactivity
  - situating of instructional activities
  - adaptability (Bomsdorf, 2005)

  - context-aware
  - adaptive support
  - personalized support
  - seamless learning
  - adapt the learning material according to the functions of the mobile device
How can ULSs support students?

Learning through **experience in the real world, supported and guided** by the system, which is able to **adapt and personalize** its interactions and suggestions to the learner.

**ULS can:**
- Interact with learner → active and student-centered learning
- Guide them to suitable places → authentic learning
- Present/Suggest suitable learning material/activities → facilitate a more authentic learning experience
- Support learners in finding and interacting with peers and experts → support collaborative learning
Adaptivity and Personalization in ULSs

• Adaptivity and personalization is an important function in ULS
• Allows to identify right collaborators, right contents/activities, and right services in the right place at the right time based on the learners surrounding context
What is Adaptivity and Personalization?

**Adaptivity**: considering learners’ situation, needs, and characteristics automatically

**Personalization**: customization of the system

Different aspects need to be considered:
- What kind of information about the learner can be used for adaptation/personalization?
- What can be adapted/personalized in the system?
Which Information can be used for Adaptivity and Personalization?

Hypermedia & Web-based Learning
- Knowledge Level
- Learning Styles
- Cognitive Abilities
...

Mobile Learning & Context Awareness
- Students’ Location
- Surrounding Objects
- Features of Device
...

Adaptivity & Personalization Aspects in ULS
Which Information can be used for Adaptivity and Personalization?

• Types of situation parameters (Hwang, Tsai, Yang, 2008)
  – Students’ Context (gathered through sensors)
    • Current location
    • Time of arrival
    • Heartbeat
    • Blood pressure
    • …
  – Environments’ Context (gathered through sensors)
    • Location
    • Temperature
    • Information about approaching objects/people
    • …
Which Information can be used for Adaptivity and Personalization?

- Interaction Patterns (gathered through log files)
  - Preferred input modes
  - Given answers to questions
  - Stored documents
  - Settings the student made in the user interface
  - ...

- Personal data about students (accessed from a database)
  - Prior knowledge
  - Learning styles
  - Course schedule
  - Progress in the course
  - ...
Which Information can be used for Adaptivity and Personalization?

- Data about environment (accessed from a database)
  - Schedule of arranged learning activities
  - Notes for using the site
  - …
What can be adapted/personalized?

ULS can support students by:
1. Interacting with them
2. Guiding them to suitable places for learning
3. Providing learning material/activities
4. Supporting learners in finding and interacting with peers and experts

1. Interaction between system and learner
   - provide personalized hints at the right time considering different kinds of information (Yin, Ogata, Yano, 2004)
   - Suggest suitable learning activities depending on the location and students’ needs (Ogata et al., 2004)
What can be adapted/personalized?

2. Guiding learners to places where authentic learning can take place
   - generate a personalized navigation path according to students’ prior knowledge or interests (Graf et al., 2008)
   - asks a student to go to a specific place to observe and identify a plant (Hwang, Tsai, Yang, 2008)
What can be adapted/personalized?

3. Content presentation
   - adaptive navigation support
   - adaptive presentation
   - adaptation to a particular mobile device
What can be adapted/personalized?

4. Interaction between learners (or learners and teachers)
   - Asynchronous communication:
     • discussion forums
     • question & answer service
     • knowledge sharing service
   - Synchronous communication:
     • Assisting students to form face-to-face or virtual learning groups (Graf et al., 2008)
     • Showing who might be able to answer a question (Martin et al., 2008)
Conclusions

- Ubiquitous learning is an emerging and promising research field
- Offers a huge amount of data for provide personalized and adaptive support for learners
- Many areas such as mobile learning, ambient assisted living, human-computer interaction, and adaptive hypermedia need to contribute in the development and effective usage of adaptive and personalized ULSs