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

- Ogata & Yano (2003) (based on mobile learning environments):
  - permanency
  - accessibility
  - immediacy
  - interactivity
  - situating of instructional activities
  - adaptability (Bomsdorf, 2005)
- Hwang, Tsai & Yang (2008) (based on aspects of context-awareness and adaptation)
  - *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?

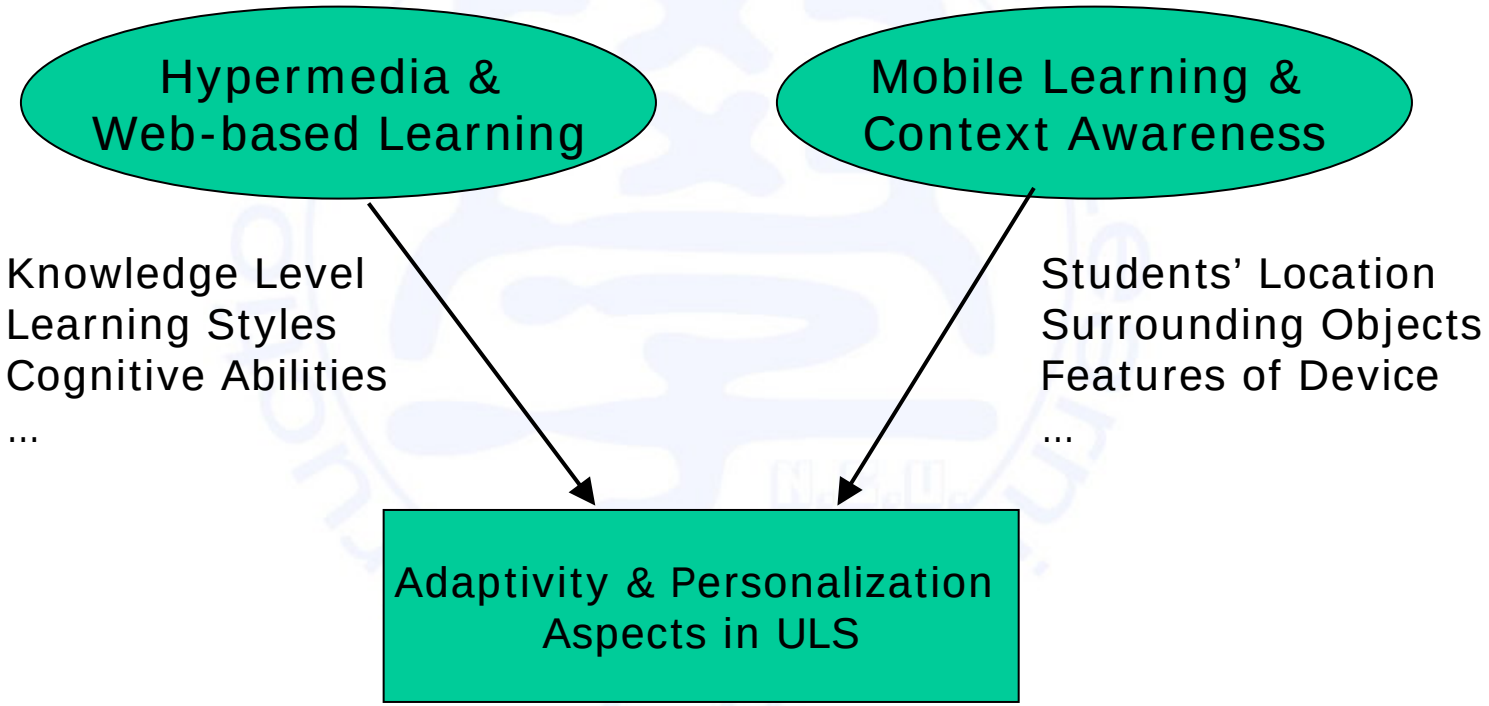
Adaptivity:considering learners' situation, needs, and characteristics automatically

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?



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