

Adaptivity and Personalization in Ubiquitous learning environments

Kinshuk
 Athabasca University, Canada
<http://kinshuk.athabascau.ca>

Research team:

Maiga Chang	Qing Tan
Jon Dron	Dunwei Wen
Sabine Graf	Guangbing Yang
Vive Kumar	Qingsheng Zhang
Oscar Lin	

Collaborations:

Catholic Univ of Chile (Chile)
 National Central Univ (Taiwan)
 National Cheng Kung Univ (Taiwan)
 National Sun Yat-sen Univ (Taiwan)
 National Univ of Tainan (Taiwan)
 Univ Politecnica delle Marche (Italy)
 Univ of West Indies (Trinidad)

Lecture based learning

Extensive literature suggests:

Everything else happens in the classroom, but learning!



No authentic or contextual environment!

So why we still do it?

Slide 2

Lecturing en masse!

Extensive literature suggests:

- Not every student learns the same way
- Not every student is at the same level
- Classroom learning is mostly from lecturer's notes ➡ students' notes!

So why we still do it?

Slide 3

Learning authentically and in context!

Elementary schools manage to take children on field trips

So, why we forget authentic and contextual learning in higher education!!

Why so much focus on rote learning!

Slide 4

Breakthrough!

(Not really! We know it already.)

Let's bring learning into education

Let's take learning outside of classroom
to the places where learning actually
takes place!

Let's focus on that one student!

Let's use technology smartly.

Slide 5

Vision

Learning so omnipresent
that no conscious effort is needed.

So how do we do it? →

Slide 6

Adaptivity in ubiquitous learning

Extensive modelling of learner's actions,
interactions, "mood", trends of
preferences, skill & knowledge levels,
implicit and explicit changes in skill &
knowledge levels

Real-time monitoring of learner's
location, technology use, and change of
situational aspects

Slide 7

Aims of the research

- Provide rich learning experiences to learners in authentic settings
- Widen access to education for remote and disadvantaged learners

By exploiting the benefits of
location, situation, device and learner modelling

By combining mobile technology, collaborative
learning, and multimedia-rich problem solving
with real-life objects

Slide 8

Location awareness

Personalization of learning experience through the use of location modeling

- Location based adaptation of learning content
- Location based optimal grouping

GPS navigation data

Cellular Network Base Station data

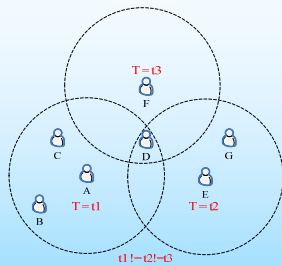
Slide 9

Location and context based learning



Slide 10

Location based dynamic grouping algorithm

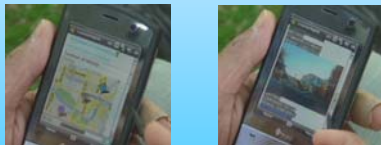


Location Grouping

Mobile Learner's Address
Mobile Learner's Cellular Data
Mobile Learner's GPS Coordinates
Mobile Learner's Other Location Info

Mobile Virtual Campus

Mobile Learner's Learning Profile
Mobile Learner's Learning Style
Mobile Learner's Learning Interests



Kuo, Y.-H., Tan, Q., Kinshuk, Huang, Y.-M., Liu, T.-C., & Chang, M. (2008). Collaborative Creation of Authentic Examples with Location for U-learning. *Proc of the Intl Conference on e-Learning 2008* (Vol. 2), Amsterdam, Netherlands, 16-20.

Slide 11

Location-aware collaboration




Slide 12

Surrounding awareness

Personalization of learning experience as per surrounding environment

- Identifying context-aware knowledge structure among different domains

QR Codes – Enriched learning through virtual  and real-life objects

WiFi Access Point identification

Bluetooth Access Point identification

Active and Passive RFIDs

Slide 13

Technology awareness

Personalization of learning experience through the identification of technological functionality

- Identifying various device functionality
- Dynamically optimize the content to suit the functionality

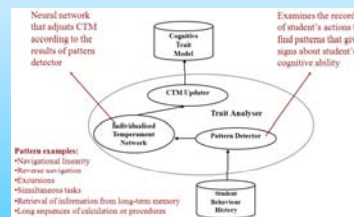
Display capability, Audio and video capability, Multi-language capability, Memory, Bandwidth, Operation platform

Slide 14

Learner awareness

Personalization of learning experience through the learner modeling

- Performance based model
 - Competency
- Cognitive trait model
 - Working memory capacity
 - Inductive reasoning ability
 - Associative learning skill
- Learning styles

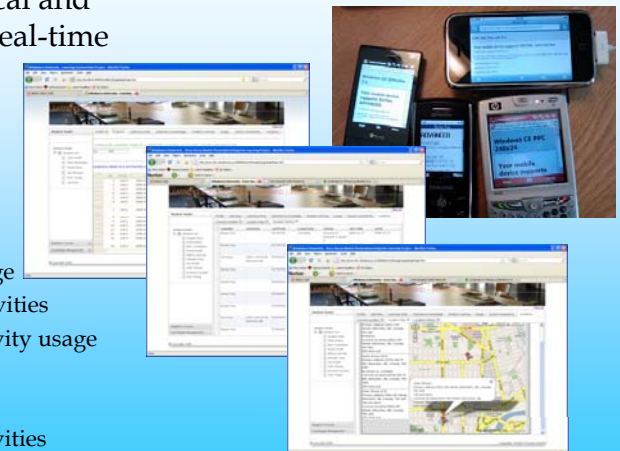


Slide 15

Dynamic learner modeling

Mining of historical and real time data for real-time adaptivity

- Learning activities
- Learning style
- Interests & knowledge
- Problem solving activities
- Learning object/activity usage
- Social activities
- Learner location
- Location related activities

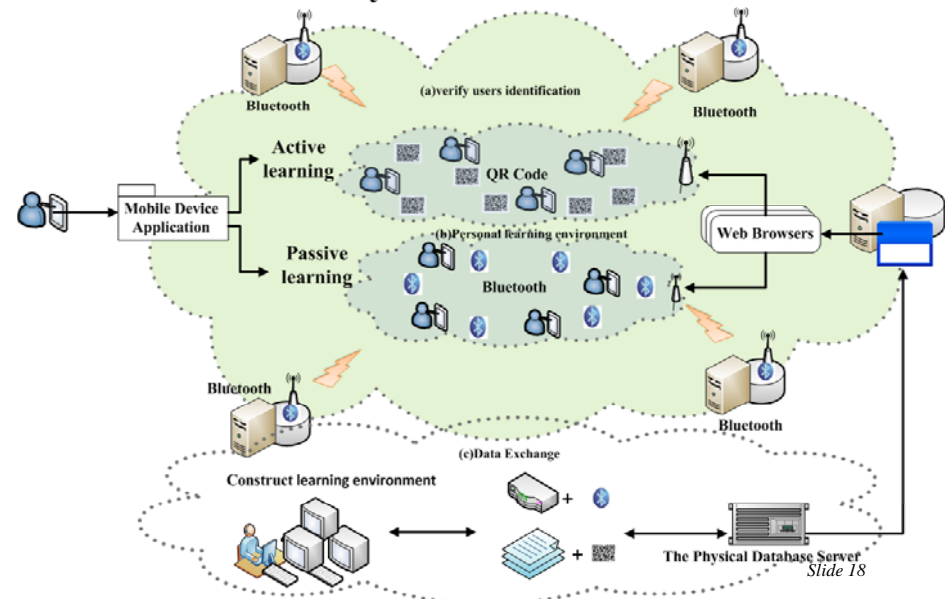


Slide 16

Mobile and ubiquitous educational environment

Slide 17

System architecture



Slide 18

The daunting question

So, where is the teacher in this equation?

Debate on the role of teacher:

Guide Vs Facilitator

Do we really have to choose?

Slide 19

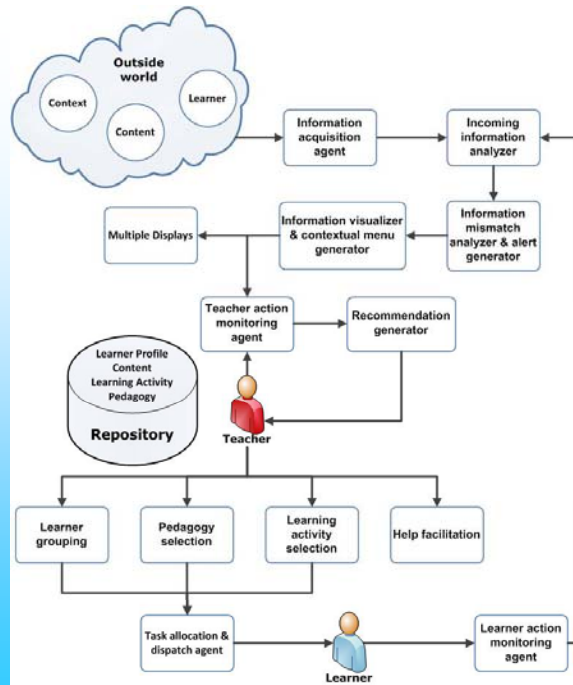
Teacher: The king of smartness (and of smart technology)

Real time bird's eye view of learners, their portfolio, their activities, their interactions, their successes and their frustrations

Guide individual learner or group(s) of learners as needed

"Walk" along side the learner if required

Slide 20



Slide 21

Thank you!

Slide 22