



Athabasca University 

SCHOOL OF COMPUTING & INFORMATION SYSTEMS

A Flexible Mechanism for Providing Adaptivity Based on Learning Styles in Learning Management Systems

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Why learning styles?

- Why shall we consider learning styles in technology enhanced learning?
 - Complex and partially inconsistent field
 - Learners have different ways in which they prefer to learn
 - If those preferences are not supported, learners can have difficulties in learning
 - Previous studies showed that providing learners with course that fit their learning styles has potential to help learners in learning

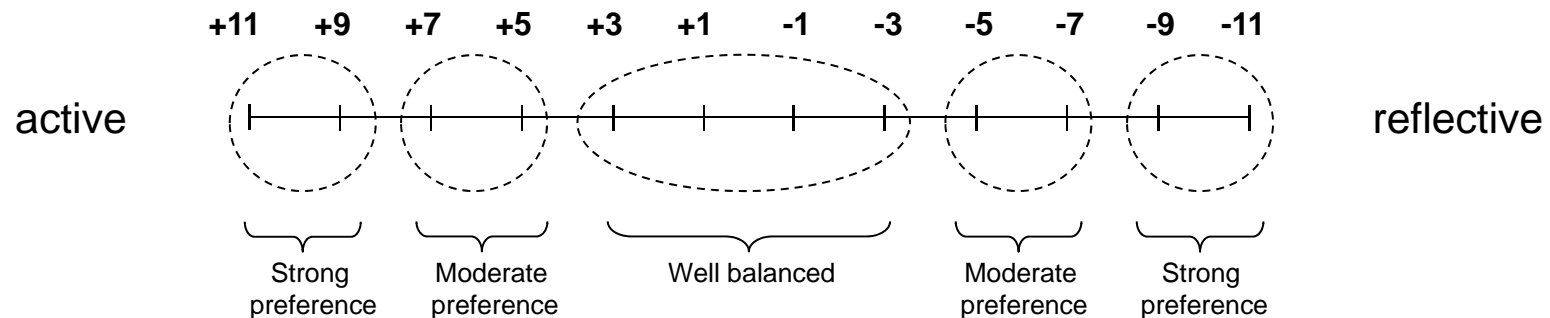
Felder-Silverman Learning Style Model

- Each learner has a preference on each of the dimensions
- Dimensions:
 - Active – Reflective
learning by doing – learning by thinking things through
group work – work alone
 - Sensing – Intuitive
concrete material – abstract material
more practical – more innovative and creative
patient / not patient with details
standard procedures – challenges
 - Visual – Verbal
learning from pictures – learning from words
 - Sequential – Global
learn in linear steps – learn in large leaps
good in using partial knowledge – need „big picture“



Felder-Silverman Learning Style Model

■ Scales of the dimensions:



→ Strong preference but no support → problems

■ Differences to other learning style models:

- describes learning style in more detail
- represents also balanced preferences
- describes tendencies
- domain-independent
- flexible stable

Why learning management systems?

- Why shall we consider learning styles in learning management systems (LMSs)?
 - LMSs are commonly used
 - LMSs typically do not provide adaptivity for learners and deliver the same course for all learners

Aim of Research

- Extend LMSs so that they can automatically generate courses that fit students' learning styles
- Make our approach applicable for LMSs in general
- Ask teachers for as little as possible additional effort

Previous Research

- Adaptive mechanism has been designed, implemented in Moodle and successfully evaluated with more than 500 students
 - Adaptive mechanism was based on predefined course structure and 6 types of learning objects (Content, Outlines, Conclusions, Self-assessment tests, Examples, Exercises)
- Works well for courses with practical focus but does not work well for courses with theoretical focus

How to make the mechanism more flexible?

■ Requirements

- Generic and work for different LMSs
- Require from teachers as little as possible additional work
- Restrict teachers as little as possible in their course design

■ Solutions

- Use only types of LOs that are available in most LMSs
- Only ask teachers to annotate LO with the type once they create them
- Use a course structure that allows many different types of LOs but does not require each type of LO to be available in each chapter/section

Considered types of learning objects

- Commentaries
 - Content Objects
 - Reflection Quizzes
 - Self-Assessment Tests
 - Discussion Forum Activities
 - Additional Reading Material
 - Animations
 - Exercises
 - Examples
 - Real-Life Applications
 - Conclusions
 - Assignments
- Teachers can add many different types of LOs in their courses
- Teachers can add types of LOs wherever they feel they fit (as they usually do in LMSs)
- Teachers does not have to add types of LOs
- However, the more LOs are available in the course, the more adaptivity can be provided

How to provide adaptivity?

- Adaptive Annotation
 - Distinguishing between recommended and standard learning objects
- Adaptive Sequencing
 - Changing the sequence in which types of learning objects are presented

Structure of a course

Chapter 1:

Commentary

Few LOs that raise a student's interest [0..2 types of LO]*

Self-assessment tests, animations, exercises, examples, or real-life applications

Content

Conclusion [0..1]

Remaining LOs*

Self-assessment tests, animations, exercises, examples, real-life applications, additional reading material, reflection quizzes, and forum activities

Conclusion [0..1]

Assignments

Chapter 2:

...

*Sequence of LOs is based on how well the types of LO fit to the student's learning styles

Adaptivity in LMSs

Course: Introduction to Computing and Information Systems - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://adapt-dev.athabascau.ca/moodle19/course/view.php?id=5

Introduction to Computing and Information Systems

icore_moodle ► COMP200

People

Participants

Activities

Assignments
Forums
Quizzes
Resources

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Go

Advanced search

Administration

Turn editing on
Settings
Assign roles
Grades
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Restore
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Reset
Reports
Questions
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Unenrol me from COMP200
Profile

Weekly outline

News forum
General Course Discussion

Assignment 1
Assignment 2
Assignment 3

1 March - 7 March

Unit 1: Computer Basics

Unit Commentary

Section 1: Why Study Information Systems?

Commentary *Area before content*

Animation

Real-Life Application

Content *Area after content*

Self-Assessment Test

Exercise

Forum Activity

Example

Reflection Quiz

Additional Reading Material

Conclusion

Assignment

Section 2: Information Processing Overview

Done

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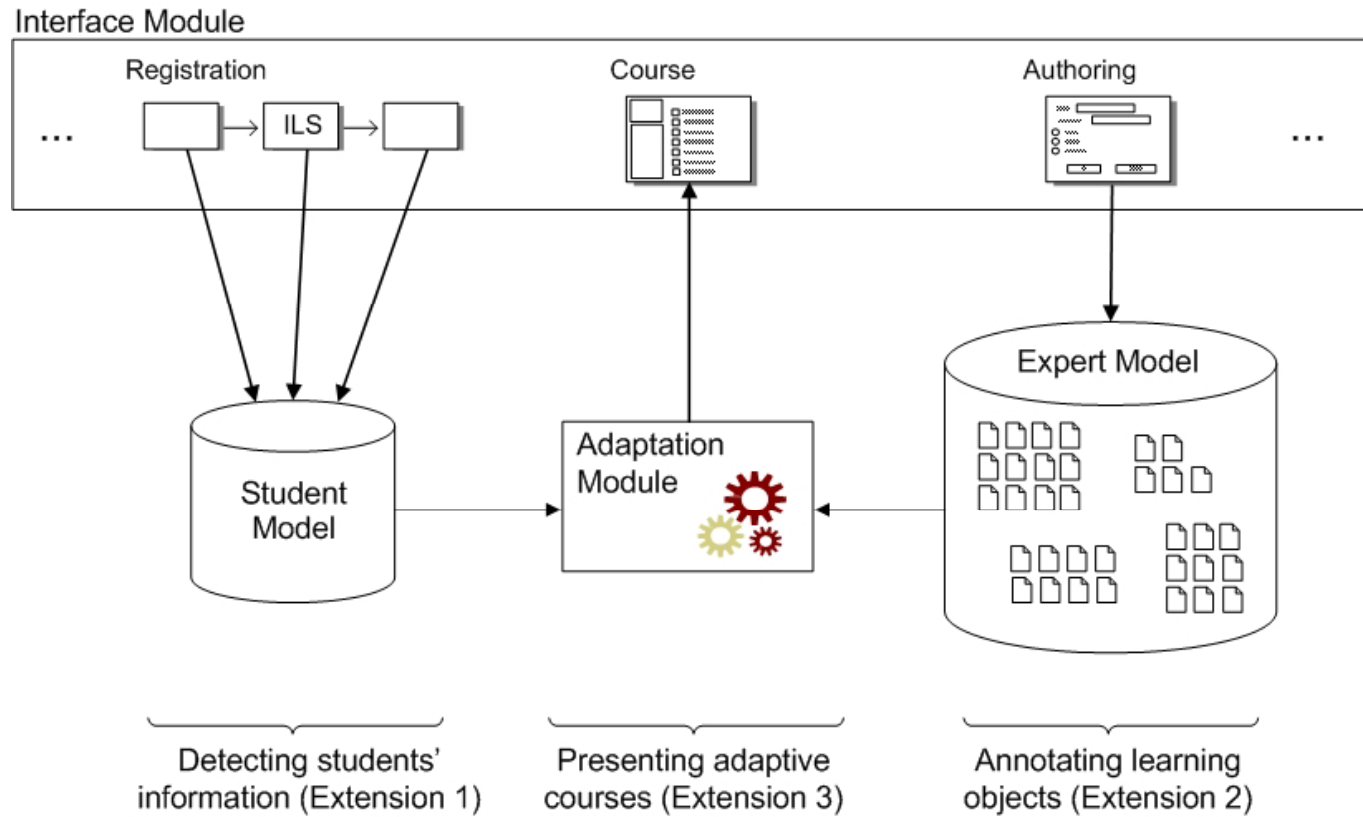
Commentary

Content

Conclusion

Done

Extensions of the LMS architecture



Conclusions & Future Work

- Introduced an adaptive mechanism that enables LMSs to automatically generate courses that fit students' learning styles
- Aimed at asking teachers for as little as possible additional effort
- Aimed at restricting teachers as little as possible in their course design
- Future work
 - Developing a tool that allows teachers to add additional types of LOs
 - Automatic and dynamic student modelling
 - Evaluation of our concept