WebALT – Web Advanced Learning Technologies

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WebALT

- Web ALT project in Finland
- Technical Description
- Shared Development of Materials: an Assembly Line for Courses
- Course Content Definitions (CCDs)
- Roadmap to more effective delivery of high quality education

Web ALT project

- Project at the University of Helsinki supported by the Finnish Ministry of Education and the University of Helsinki
- Aim: To develop best practices in eLearning especially in mathematics and to use them in practice
- Materials and methods have to be developed so that they can stay usable for a long time and can take advantage of new developments

Looking for Partners in Content Development and in Course Redesign

- WebALT projects builds on best current technology
- Proper use of technology will result to a new and more efficient delivery of education
- We hope to build collaboration with several institutes to redesign traditional courses

Join the Crowd – Hopefully our Vehicle is better than this

Web Advanced Learning Technologies

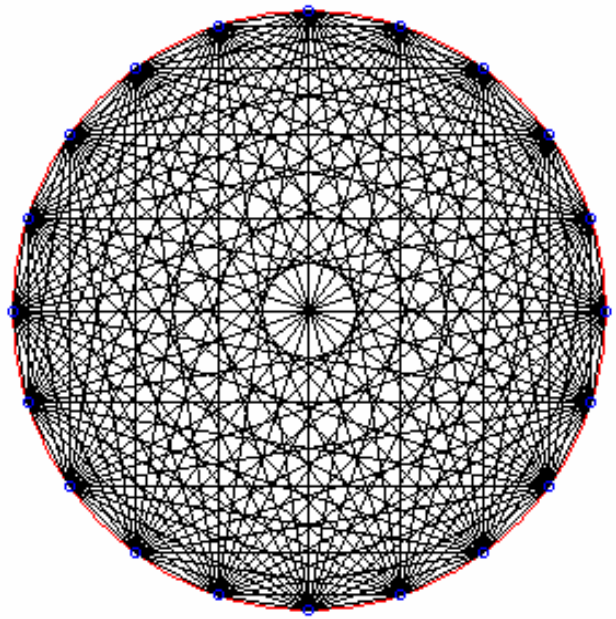
Aim: to use current tools to

1. Develop good sample content using the MathML/OpenMath, enable sharing
2. Educate colleagues – dissemination
3. User support

Horizontal vs. vertical development.

20 instructors developing and sharing educational materials

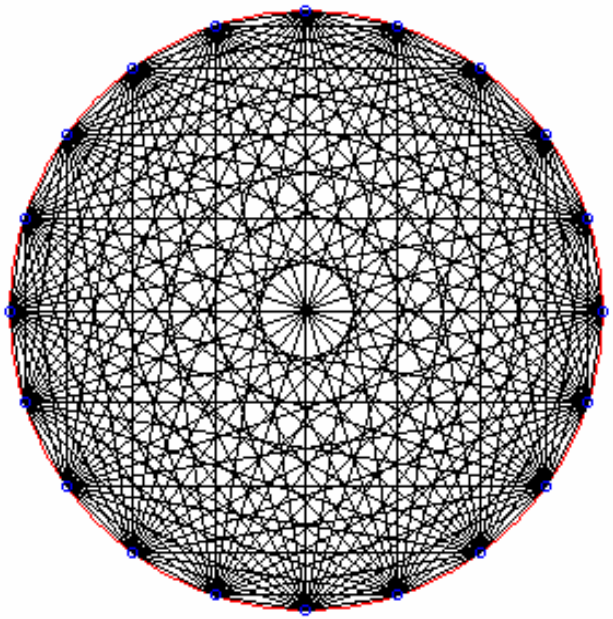
- A (pre-)calculus course at a large university may have 20 instructors
- Each instructor develops on-line materials
- Sharing does not happen
- Individual efforts have no permanent value

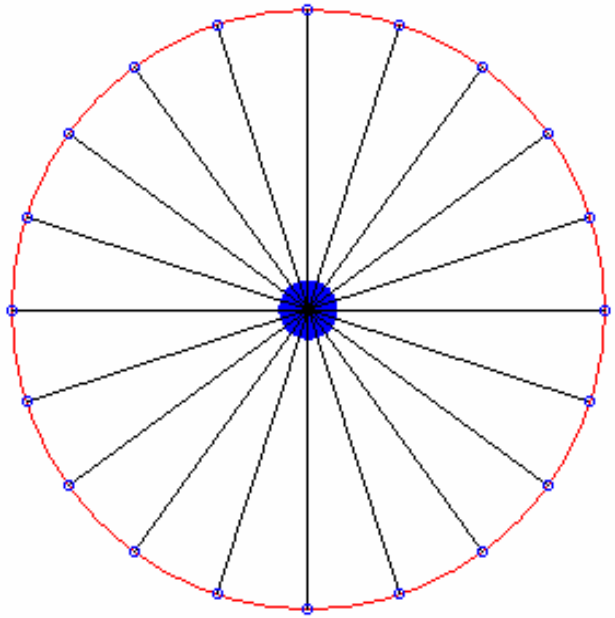


A common standard for educational materials via Course Content Definitions (CCD)

- Easiest to do in mathematics
- Advanced table of contents
- XML namespace

CCD makes sharing of materials possible

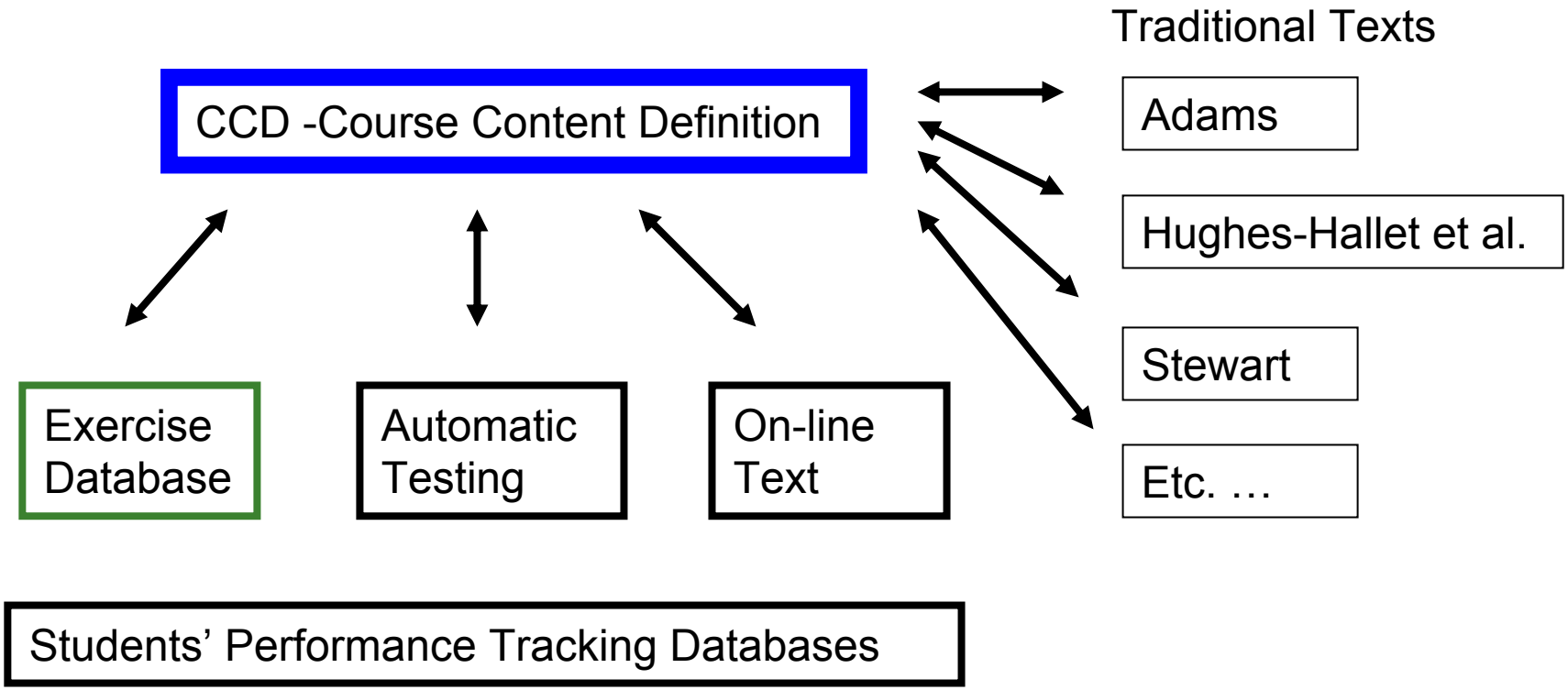




On-line Content in Math

- Adaptive presentation of materials at levels and languages suitable for the students
- Key added value: adaptive interactive exercises allowing:
  - Independent learning
  - Self assessments
  - Automatic testing with partial credits

Web ALT Architecture



Web ALT Exercises

- Exercises are problem trees
- Several Problem Types are supported (multiple choice, true/false, string, essay)
- Problems have dynamic levels of difficulty
- Everything is multilingual – instructors may view the materials in English and students may see the same materials in Spanish

Sample Exercise

Root Problem

$$\int \frac{x^5 - x^4 + 2x^3 - x^2 + 2x - 1}{x^3 - x^2 + x - 1} dx$$

Divide polynomials and find common factors → Integrate polynomials

$$\int \frac{5}{4x + 3} dx \rightarrow \int \frac{5}{4x^2 + 4x + 3} dx$$

Report Card with links to relevant on-line texts.

Web ALT Exercises

- Provide same type of help to students as professors during office hours
- Math content encoded either by TeX or by MathML
- XML files
- Support automatic testing with partial credit (through the subproblem structure)

Web ALT CCDs

- Initially local standards facilitating the collaboration of instructors teaching the same course at the same institute
- Building of a widely accepted CCD for a course like calculus is an evolutionary process: good local CCDs get more users and may become global

Calculus at FSU

- Cost of delivery of Calculus I at FSU is about $ 360K in a calendar year/over 100 sections of calculus I – III courses offered every year
- Automatic testing and proper use of Web ALT tools may make it possible to reduce the number of sections needed; estimated savings for Calc I only $ 200K/year
- To achieve this extensive exercise database and high quality on-line contents are needed

Roadmap

1. High quality on-line calculus ready by 8/04

2. Develop collaboration at the EU level to support a successful IST proposal

3. Use the on-line calculus to develop a comprehensive Calculus CCD

New delivery method for education based on advanced use of XML+MathML
WebALT for everybody

Support from the 6th FWP necessary to realize the above goals quickly.

Key enabling technology: CCDs

High quality online content for basic courses (Calculus, Linear Algebra). Offer the courses over the net. eTeaching / eLearning

Current Practice:

1. HTML + gifs, pdf
2. Printed materials presented electronically


STOP