Supporting an Interactive Classroom Environment in a Cross-Cultural Course
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Project Goals
• Challenges
  – Offer an international course
  • Materials from a US university
  • Students at a Chinese University
  – Overcome the language barrier
  – Create an interactive class
• Methodology
  – Tutored Video Instruction augmented with a Tablet PC based classroom interaction system

Project Background
• UW Professor received an invitation to teach a course at Beihang University in Beijing
  – But he could not spend the term in Beijing
  – Course timing prevented a live distance course
• Course: Senior Level Algorithms course
• One term pilot project
  – Supported by Microsoft Research Asia and Beihang University administration
  • Both schools major research universities

Tutored Video Instruction
• Lectures recorded from live classes
• Lectures shown by facilitators
  – Regularly stop lectures for questions, discussion, or class activities
  – Facilitators generally do not have the background to teach the course on their own
• Methodology originally developed by Jim Gibbons at Stanford University [Science 1977]
• UW TVI Project
  – Introductory computing offered at Community Colleges [SIGCSE 2001]

University of Washington Course
• CSE 421
• Senior Level Algorithms Course
• 10 week quarter
• 3 Lectures per week

Presentation Technology Classroom Presenter
• Tablet PC Presentation Tool
• Integrate digital ink with electronic slides
• Basic presentation features
  – Separate instructor/display views
  – Simple inking controls
  – Navigation and preview
  – White board
  – Instructor notes
• CSE 421
  – PPT slides
  – Extensive use of digital ink

CSE 421 Introduction to Algorithms (3)
Techniques for design of efficient algorithms. Methods for showing lower bounds on computational complexity. Particular algorithms for sorting, searching, set manipulation, arithmetic, graph problems, pattern matching. Prerequisite: CSE 322, CSE 326.
Tablet PCs to Support Active Learning

- Networked Tablet PCs for classroom activities
- In the UW course, students used Tablet PCs once a week for active learning
  - Students wrote answers on slides, sent them to the instructor
  - Instructor previewed results and selected slides to display to the class

Activity Examples

- Find a topological order for the following graph
- Find a minimum value cut
- Determine the LCS of the following strings
  - 001100
  - 001111
  - 001111

Involvement with Remote Site

- Set up visit
  - Met with Teaching Assistants
  - Tested all technology
  - Trained Teaching Assistants in facilitation
  - Gave classes to students to demonstrate technology and TVI
- Midterm visit
  - Observed classes
  - Gave lecture without recorded video
- Regular communication with Teaching Assistants
- Data collection

Course offering in China

- Three course sections of approximately 25 students each
- Three teaching assistants recruited
- Course materials originate at University of Washington
  - Recorded Lectures, Homework Assignments, Exams, Lectures summaries for TAs
- Grading and grade assignment performed at Beihang

Course Delivery

- Applications displayed
  - Webviewer for video replay
  - Classroom Presenter
- Teaching Assistants would show video or show CP for inking on slides or classroom interaction
Summary of Project Results

- **Offering successful**
  - Technology, institutional relationship
- **Cross-cultural issues**
  - English language materials were comprehensible
  - Classroom discussion primarily in Chinese
- **Facilitation model**
  - Significant support for facilitators
  - Classroom activities successful (and popular)
  - Facilitators innovative and reproduced some of the instruction
  - Interactive and informal classroom atmosphere

Language Issues

- **Lectures delivered in English**
  - Language exposure consider to be a positive side effect of the course
- **Teaching assistants facilitated in English**
  - But discussions were generally in Chinese
- **Students reported using lectures outside of class**
- **Instructor observations from site visit**
  - Chinese students had substantially more English listening than speaking experience
  - Recorded lectures did contain some colloquial usage and cultural specific references which were lost

Facilitation

- **Support provided for facilitators**
  - Lecture notes
  - Activities
- **Facilitators invested a larger effort in preparation**
  - Studying videos
  - Planning how to cover content
- **Active facilitation**
  - Worked through lecture examples
  - Led activities
  - Asked questions to students
- **Example: facilitators working through example from lecture slides**

Classroom Activities

- **Tablet PC supported activities**
  - Student submission model
  - Used for every lecture
- **Technology generally successful**
- **Considered very positive by students**
- **High rate of participation**
- **Provided a structure for active learning**

Classroom Environment

- **Contrast to traditional large lecture class**
- **Highly interactive class**
  - Interaction episodes measured by observation logs and videos of Beihang classes
  - Average of 13 interaction episodes per class, 10 with students speaking
  - UW class averaged about 20 interaction episodes per equivalent length of time
  - Beihang episodes averaged a greater number of rounds of communication
- **Class atmosphere was informal**

For more information

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