

Center for Collaborative Technologies

Richard Anderson
Department of Computer Science and
Engineering
University of Washington

7/30/2009

I-Tech

1

Research in Educational Technology

- Overview of projects, technologies, and interests
- Opportunities for collaboration

“Develop educational technologies and methodologies to expand the reach of education”

7/30/2009

I-Tech

2

Past and Current Projects

Video conferenced distance education

UW PMP
DISC
ConferenceXP
Center for Collaborative Technologies
UW-LUMS

Presentation systems and classroom capture

Classroom Presenter 2.0
WebViewer
Classroom Presenter 3.0
Lecture editing

Classroom interaction systems

Classroom Feedback System
CATs for CS1
Structured Interaction Presentations (SIP)
Student submissions with CP

Tutored Video Instruction

UW CC TVI Project
Beihang TVI project
Digital StudyHall

7/30/2009

I-Tech

3

Research Approach

- Deployment driven
 - Classroom use
 - Identify novel deployments
 - Technology development and promotion
- Goals and success criteria
 - Adoption of technology and methodology
 - Influence educational practice

7/30/2009

I-Tech

4

Today's Talk

- Distance Learning and Video Conferenced Classes
- Tutored Video Instruction
- Lessons learned and remaining challenges
- Future projects

7/30/2009

I-Tech

5

Video Conferenced Teaching

- Multi-site internet based audio-video conferencing
- UW Master's Program
 - Site-to-site courses between UW and Microsoft since Winter 1997
 - www.cs.washington.edu/education/dl/course_index.html
 - Master's level courses
 - Goal: interaction across sites
 - Approximate single classroom
 - Various technologies have been used since the program was introduced

7/30/2009

I-Tech

6

ConferenceXP and Related Projects

UW Center for Collaborative Technologies

Fred Videon
University of Washington, Computer Science & Engineering

Outline

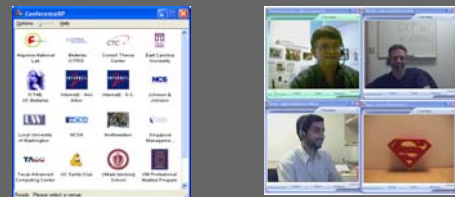
- UW Center for Collaborative Technologies
- Projects
 - ConferenceXP
 - Classroom Presenter
 - Lecture Capture & Playback
- Deployments
 - Professional Masters Program

UW Center for Collaborative Technologies

- Established by Microsoft Research in 2007
- Investigate education and other collaborative scenarios
- Particular focus on ConferenceXP
 - New Development
 - Innovative Deployments
 - Build the community of users and developers

ConferenceXP

- Platform for real-time collaboration
- High quality, low latency multipoint conferencing
- Targeted for standard PC and high quality network
- Works with commodity cameras and audio equipment
- Built-in collaboration tools including presentation, whiteboard, screen sharing, video playback, chat

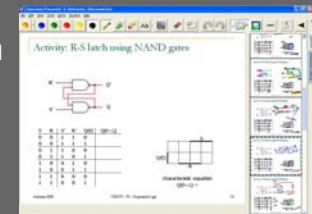


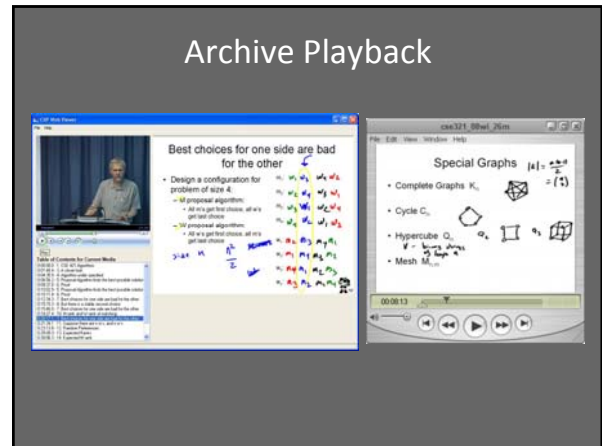
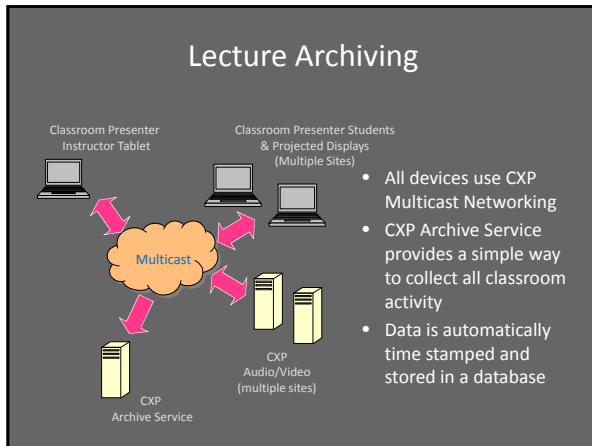
A Brief History of ConferenceXP

- Project began at MSR in 2001 as DISC
- Successful deployment for distance learning, Spring 2003
- First 4-way distance learning deployment Autumn 2004
- July 2007, CCT Established
- ConferenceXP 5.0 release August 2008
- ConferenceXP 5.1 release May 2009

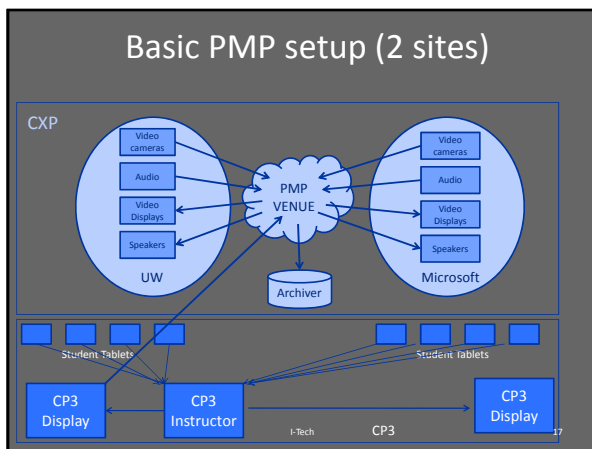
Classroom Presenter

- TabletPC based presentation and classroom interaction system
- Ink based presentation
- Classroom activities
- Presentation displayed on local and remote systems





- ### Deployments: Professional Masters Program
- Site-to-site courses between UW and Microsoft since Winter 1997
 - Master's level courses
 - Goal: interaction across sites
 - Approximate single classroom
 - Using ConferenceXP & Classroom Presenter since 2003



PMP 4-Way Courses

- Quarter-length classes between UW, UCSD, UC Berkeley, and MSR
- Met the originally stated goal for ConferenceXP

- Courses
 - 2004: Public Policy
 - 2005: Cyber Security
 - 2006: History of Computing

Resources & Contacts

- CCT Website/Wiki
cct.cs.washington.edu
- Announcements Email List
cct-announce-request@cs.washington.edu
- Contacts:
cct@cs.washington.edu
fred@cs.washington.edu
anderson@cs.washington.edu

Masters class, UW - Pakistan

- Masters class
 - University of Washington
 - Lahore University of Management Science
 - Microsoft
- Computing for the Developing world
- Spring 2009



7/30/2009

I-Tech

20

Challenges

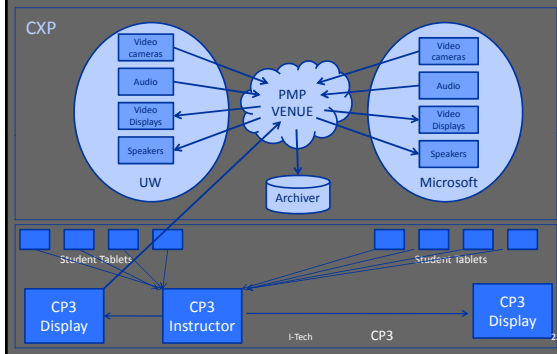
- Adequate bandwidth
 - Limited bandwidth to Pakistan
 - Reliability
 - Multicast
- Not compromising UW-MS class
- Creating interaction across sites
 - Multiple view points

7/30/2009

I-Tech

21

Basic PMP setup (2 sites)

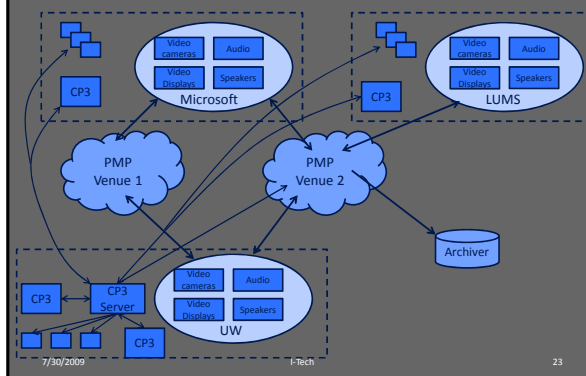


7/30/2009

I-Tech

22

3-way setup for UW, MS, LUMS



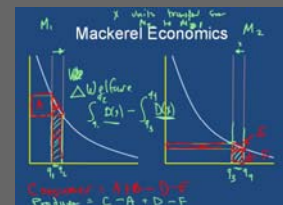
7/30/2009

I-Tech

23

Use of Classroom Presenter

- Tablet PC based presentation and classroom interaction system
- Ink based presentation
- Classroom activities



7/30/2009

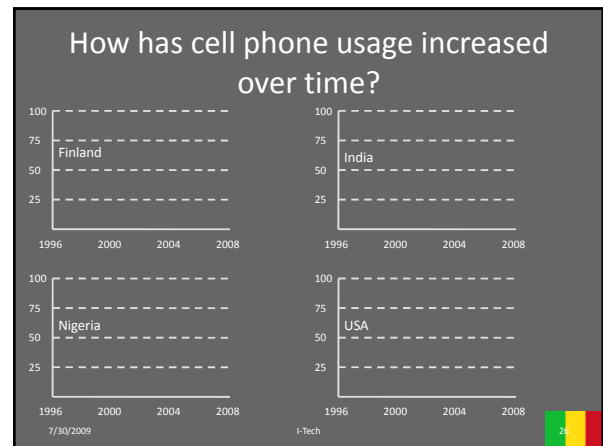
I-Tech

24

Classroom Presenter

Instructor

The screenshot shows the Classroom Presenter interface. At the top, it says 'Instructor'. Below this, there are three windows. The largest window on the left is labeled 'Public Display' and contains the text: 'Draw a picture of yourself. To submit your picture, first press Select All, and then Send Selection'. To its right are two smaller windows, each labeled 'Student', which also contain the same text. At the bottom left, the date '7/30/2009' and 'I-Tech' are visible. At the bottom right, the number '25' is displayed.



Hostile PC Infrastructure

- Every flash drive in Africa is infected by viruses. WHY???

7/30/2009 I-Tech 27

Tutored Video Instruction

- Video recorded lectures shown with facilitator
 - Original model: lectures stopped by students for discussion
 - Peer tutors
- Developed by Jim Gibbons at Stanford University
- Positive results reported in Science [1977]

The figure contains two small charts. The left chart is a bar chart titled 'Stanford Engineering Graduate Students' showing data for three categories: 'No Tutoring', 'Tutoring', and 'Control'. The right chart is a scatter plot titled 'Stanford Engineering' showing a positive correlation between 'Initial Test Score' (x-axis) and 'Final Test Score' (y-axis). At the bottom left, the date '7/30/2009' and 'I-Tech' are visible. At the bottom right, the number '28' is displayed.

UW TVI Projects

- Introductory programming
 - Address community college articulation
 - Experiment with alternate approaches to introductory computing instruction
- UW – Beihang Algorithms course
 - Offering of Computer Science course in China
- Digital StudyHall
 - Primary education in rural india

7/30/2009 I-Tech 29


Tutored Video Instruction

- Recorded lecture materials
 - Generally based on live classes
- Class model
 - Lecture playback alternating with facilitator led discussion
 - Facilitation models
 - Gibbons: Peer instruction
 - Active facilitation

7/30/2009 I-Tech 30

UW-Beihang Algorithms class

- Offer course based on UW course in Beijing
- UW Instructor could not give the course in Beijing
- Scheduling prevented live course offering
 - 1:30 pm Seattle, 4:30 am Beijing
 - Materials captured from live classes
- Tutored Video Instruction
 - Slides, talking head, digital ink



7/30/2009 I-Tech 31

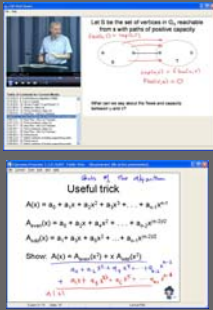
Involvement with Remote Site

- 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

7/30/2009 I-Tech 32

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



7/30/2009 I-Tech 33

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

7/30/2009 I-Tech 34

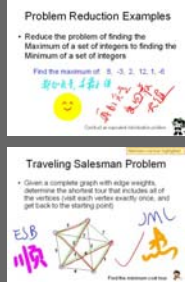
Language Issues

- 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

7/30/2009 I-Tech 35

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



7/30/2009 I-Tech 36

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

7/30/2009

I-Tech

37

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

7/30/2009

I-Tech

38

Digital StudyHall



7/30/2009

I-Tech

39

Digital StudyHall

- Tutored Video Instruction for primary education in rural India
- Based in Lucknow, India
- Founded by Randy Wang and Urvashi Sahni
- Starting an NSF funded multi year evaluation study

7/30/2009

I-Tech

40



7/30/2009

I-Tech

41

DSH status

- Original schools in Lucknow
 - Kannar, Madantoosi
- Expansion in Lucknow
- Independent Hubs
 - Pune, Bangalore, Dhaka, Calcutta
- Spinoff projects
 - Digital Green
 - Digital PolyClinic



7/30/2009

I-Tech

Chinhat evaluation study

- Chinhat Development Block
 - Periurban district of Lucknow, Uttar Pradesh
- Schools surveyed in 2005 Unesco study by Urvashi Sahni
 - 18 primary schools evaluated
 - Grades 1 to 5
 - Government schools
 - Town and rural schools
 - Deficiencies identified in initial study
 - Lack of teachers
 - Poor quality facilities



7/30/2009

I-Tech

Study design

- Select 12 schools from Chinhat Development Block
- Each school will have one class for control, one class for treatment
 - 3rd grade English, 5th grade Math
- Regular tests for students
 - Pre-test, Post-test, Monthly quizzes
- Regular classroom observations
- Regular teacher interviews
- Two academic years

7/30/2009

I-Tech

44

Study Status

- Visited all schools and completed school selection
- Pretesting at start of school year (July 09)



7/30/2009

I-Tech

45

Research Question 1: Deployment

- What contributes to success or failure of DSH deployments



7/30/2009

I-Tech

46

Research Question 2: Student performance

- Does the use of DSH produce measurable gains in student performance



7/30/2009

I-Tech

47

Research Question 3: Pedagogy

- Are the teachers successful in adopting the DSH teaching model?
- Does this transfer skills/knowledge to the teachers?



7/30/2009

I-Tech

48

Future Work

- ?

7/30/2009

I-Tech

49

For more information

- Richard Anderson
 - anderson@cs.washington.edu
- Fred Videon
 - fred@cs.washington.edu
- Center for Collaborative Technologies
 - cct.cs.washington.edu
- Classroom Presenter
 - classroompresenter.cs.washington.edu

7/30/2009

I-Tech

50

Acknowledgments

Jay Beavers, Jane Prey, Chris Moffatt, Jaime Puente, Lolan Song, Todd Needham, Lee Dirks, Jason Van Eaton, Tony Hey, Harry Shum, Paul Oka, Ruth Anderson, Craig Prince, Valentin Razmov, Natalie Linnell, Joe Tront, Gaetano Borriello, Ed Lazowska, Hal Perkins, David Notkin, Andrew Whitaker, Fred Videon, Oliver Chung, Crystal Hoyer, Beth Simon, Jim Fridley, Tom Hinkley, Ning Li, Jing Li, Luo Jie, Jiangfeng Chen, Umar Saif, Mansoor Pervaiz, Urvashi Sahni, Randy Wang

Microsoft
Research

I-Tech

51