Challenges in Interactive Distance Education

University of Washington Center for Collaborative Technologies

- Established by Microsoft Research External Research and Programs in July 2007
- Goals:
  - Investigate educational and other collaborative scenarios
  - Extend and maintain the ConferenceXP platform
  - Build the community of users and developers

Core Technology: ConferenceXP

- Platform for real-time collaboration
- Project began at MSR in 2001
- Codebase ownership transferred to CCT in July 2007
  - Licensed with MSR academic use license
  - Numerous successful deployments for synchronous distance learning

ConferenceXP Releases

- ConferenceXP 4.1, December 2007
  - Localization with human verified Chinese version
  - x64 and Vista support
- ConferenceXP 5.0, August 2008
  - Conference diagnostics, security, high-quality audio, improved unicast support
- ConferenceXP 5.1, Beta released March 30, 2009
  - Diagnostic logging, audio codec, further unicast improvements,DV Audio, move codebase to VS 2008

Effective use of technology in education

- Deploy our technologies in innovative educational scenarios
- Internal Deployments
  - Working with our own classes
  - Opportunity to innovate
  - Pressure to make things work
- External Deployments
  - Broad range of ideas
  - User suggestions
  - Feedback on ideas

Lessons Learned using the Classroom Experience Project

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How to fail at video conferenced teaching
What we hoped to achieve

- Increased interaction between sites
- Ability of remote students to interact with the instructor
- Ability of instructor to engage remote students
- Student interaction across sites
- No degradation of experience of local students
- No System Administrator

What happened

- Week 1
  - Used old system (for comparison)
- Weeks 2-4
  - Bad patch cable caused 30% packet loss, maiming Conferencing app
- Weeks 5-9
  - Router incompatibilities caused intermittent multicast failure (~15 minutes between failure)
- Weeks 10-12
  - Worked as expected

How to fail at a distance course

- Transmission failures
- Production quality
  - Lighting, room noise, camera management
- Structured presentations limit activity
- Classroom issues
  - Table layout, overhead positioning
- Attitudes

Student Reactions

- Repeated failures reduced students attempt to interact across sites
- Even intermittent failures had significant psychological impact
- Students recognized that we were attempting to do a good job (we were present in the remote classroom, and shared their pain)
- With our workarounds (high latency video, conference phone) students did not participate.
- In spite of technical difficulties many students chose to attend the remote site (commuting 15 miles in traffic being an alternative)
- Local students complained of intrusiveness of interruptions. Had little sympathy for remote students.

ConferenceXP Project

- Full reset after Spring 2002 train wreck
- Applied lessons learned
  - Reliability of software
  - Production issues
- Re-engaged with UW PMP, Spring 2003
- Expanded to 4-way courses
  - UW, UCB, UCSD, Microsoft
- Spring 2008, UW, Microsoft, LUMS Pakistan
Distance Classes in UW CSE Master’s Program

- Initial phase
    - Polycom + Netmeeting for PPT and SmartBoard
  - MSR DISC Project
    - Target: UW, CMU, UCB, Brown graduate class
    - Spring 2002
- ConferenceXP
  - Since Spring 2003
    - UW, MSR, UCB, UCSD

ConferenceXP

- High quality, low latency video to support interactive classes
- High bandwidth internet video conferencing
  - Internet2
  - Multicast
- Single machine deployment
  - High end PC
  - Performance limit: handling multiple high resolutions video streams
- Innovative presentation tools

Going International

- March 29, 2008, LACCIR Meeting
  - Latin American and Caribbean Collaboration for ICT Research
- Seattle and University of Chile, Santiago, Chile
  - Seminar, October 15, 2008
  - Richard Ladner / Jaime Sanchez
- CXP Unicast reflector

Masters class, UW - Pakistan

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

Technical Challenges

- Ensuring adequate bandwidth
  - Limited bandwidth to Pakistan
  - Reliability
  - Multicast
  - Ensuring this did not compromise UW-MS class
  - Limited time to prepare
**Fred’s whiteboard**

**Basic PMP setup (2 sites)**

**3-way setup for UW, MS, LUMS**

**Use of Classroom Presenter**
- Tablet PC based presentation and classroom interaction system
- Ink based presentation
- Classroom activities

**Classroom Presenter**

**Classroom Activities**
Status

- Full connectivity for nine of ten weeks
  - One lecture originated from Pakistan
  - Failure occurred on UW/MSR Link
  - Participation of audio (microphone issues)
- Improving audio (microphone issues)
- Participation of students from Pakistan
  - Student submissions
  - Questions and discussions
- Multiple rounds of audio communication

Key lessons

- Participants must have incentive for a distance course
- Instructor must make an effort to create multisite interaction
- Active participants at remote site help

What we’ve learned from all of this

- Value of electronic materials in the process of classroom instruction
- Tools for teaching
  - Teacher and students drive the process
  - Flexible and unpredictable use
- Importance of high reliability
  - And attention to address issues
- Broader context – interplay of technology and other issues

For more information

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