Flipped Classroom with distance technology

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Course: Introduction to Algorithms
Serves: Graduate students

Challenges
- A diverse student group from CS, CCIB, and MBS programs on two campuses (Camden + NB)
- Technical content involving lots of math, logical reasoning, and analysis of abstract problems

The Plan
Flipped classroom; Synchronous interaction with feedback
Course Content and Learning Goals

- Develop a formal understanding of resource complexity
- Create, experiment with, and analyze common ways of storing data for efficient access (data structures)
- Design algorithms for typical problems in computational science
- Analyze the algorithms for correctness and efficiency
Why Flipping Makes Sense

- Diverse population from the Business school; CCIB PhD program; and CS Masters program.
- Students learn by actually solving problems, and not watching others solve them!
- Students learn in teams.
- Continuous assessment during class time.
Flipped Classroom

**Material**
- Videos from an MIT course
- An e-textbook with built-in tools for animating programming demonstrations
- Supplementary PDFs on specific topics

**Interactions**
- Formative assessments (Socrative)
- Identifying and clarifying muddiest points
- Sakai quizzes
- Interactive workbooks for “literate” programming
Distance Learning Technology

Digital Classroom
- Used to display explanations, code and web-based apps
- iPad/Classview or PC display

Lifesize System
- Used to connect Armitage 124 (Camden) with Tillett 118 (Livingstone)
Some Details ...

**Digital Classroom**
- Instructor PC
- IPad Air connected through Apple TV
- Can switch between PC and IPad

**Lifesize 220i System**
- Several HD cameras, microphones and rear/front displays
- Can switch between projection view and PC display capture
- Similar systems in Tillett and ATG
How It Works
Prepare
Topics and video links published on Sakai: homework!

Assess
Sakai quiz; Socrative quiz; Warmup Problem; Muddiest point

Explain
IPad tools like Explain Everything to create publishable boards

Challenge
Teamwork to solve problems (theory and programming)

Interact
Sakai forums; regular chat sessions; office hours
Lessons Learned

**Classroom Technical Glitches**
Lifesize system issues: connectivity; controls; camera placement

**Interactivity**
Lack of visual cues for initiating dialogue

**Limitations of Course content/technology**
One solution would have an integrated (projectable), sharable, writable whiteboard!
Future Directions

1. Improve interactivity through better apps
2. More use of content-specific tools: e.g. algorithm animation
3. Distance learning technology versus fully online: an ongoing (internal) debate!