SUPPORTING CLASSROOM DISCUSSION WITH TECHNOLOGY: A CASE STUDY IN ENVIRONMENTAL SCIENCE

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Intro Environmental Science and Resource Management (ESRM) Series

- Integrate training in key skills into curriculum:
  - Critical thinking, writing, and problem solving skills
  - Working with people of highly varied interests
  - Responsibility for one’s work
- Interactive learning environment
  - Field trips
  - Guest lectures
  - 2-3 instructors
  - Writing assignments
  - Encouraging verbal discussion
  - Active learning exercises

Classroom Presenter

- Tablet PC-based classroom interaction system
- Facilitates active learning

A Novel Deployment of Presenter

- First UW deployment outside of computer science
- Very different activities
  - Fewer “right or wrong” activities
  - Interested to see what instructor goals would emerge

Why Technology?

- Facilitate distribution/collection
- Anonymous
- Integration with public display
- Artifacts chosen based on content, not student’s identity
- Student work on same level as instructor content
- All students consider question before any answers are discussed

Deployments

- ESRM 303 Autumn 2006, 23 students
  - First half of course, every day (10/20 classes)
  - Second half guest lecturers
- ESRM 301 Winter 2007, 21 students
  - 13/18 classes
  - Other days student presentations or guest lecturers
- ESRM 302 Spring 2007, 46 students
  - 6/19 lectures
  - Exclusively by one professor
  - Students worked in pairs
  - Focus on Autumn 2006 deployment
Activities Driven by Pedagogical Goals

- Helps define a set of techniques for designing activities to satisfy a particular goal
- Provides criteria for determining success of an activity
- Use the technology to effectively support specific goals
- Goals neither exhaustive nor mutually exclusive

Goal: Generating Artifacts for Class-Wide Discussion

- Shy students can participate anonymously
- Get used to having their work critiqued
- Easier for students to disagree with student-generated content than instructor-generated

Goal: Application/Reinforcement

- Ask students to think deeply about a concept
- Encourage deep understanding before building on a concept
- Focus on strengthening students’ understanding

Goal: Assessment

- Focus on instructor understanding students’ level of understanding
- Must be easy to tell quickly if answer is right or wrong

Goal: Collective Brainstorming

- Gather a diverse set of ideas
- Stimulate discussion

Student Evaluation: Autumn

- “Did the system have an effect on your learning experience?”
  - Positive effect: 86%
- “Did you feel more or less engaged when the system was used?”
  - More engaged: 86%
- “I learned from my peers and heard what other ideas were out there besides mine or the professor’s”
Instructor Evaluation: Autumn

- Instructors felt that creating activities made them more aware of their instructional goals.
- Instructors appreciated the ability to assess students' learning.

Evaluation Across Deployments

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<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Engagement: Positive Effect</td>
<td>86%</td>
<td>88%</td>
<td>67%</td>
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<tr>
<td>Negative Effect</td>
<td>5%</td>
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<tr>
<th></th>
<th>Autumn</th>
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<tbody>
<tr>
<td>Learning: Positive Effect</td>
<td>86%</td>
<td>81%</td>
<td>73%</td>
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<tr>
<td>Negative Effect</td>
<td>5%</td>
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Lessons Learned

- Technological problems place focus on technology, decrease student engagement.
- Works best when tightly integrated into class.
- If you can't identify a specific goal for the activity, it probably isn't necessary.

Conclusions

- Technology can be used to successfully support an experiential learning environment.
- Identification of instructor goals contributes to a more successful deployment.
- Technology problems have a large impact on student satisfaction.

Acknowledgements

- National Science Foundation
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- Hewlett Packard

Further Information

- ESRM Course Sequence: http://www.cfr.washington.edu/Acad/undergrad/esrm