



The Vision of How to Assess Student Learning in Technology-Enriched Classrooms

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UNC TLT Conference March 2006

Session Documents: <http://www.ncsu.edu/classtech/workshops/unctl2006/>



LITRE

Learning in a Technology-Rich Environment

NC STATE UNIVERSITY

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Session Outcomes

- By the end of the session, participants will be able to
 - Consider different approaches to assessment of the interrelationships of technology, teaching and learning.
 - Review and revise their own assessment processes.
 - Acquire resources to develop assessment and research practices on their campus.



Session Overview

- ClassTech and the Learning in a Technology-Rich Environment (LITRE) Quality Enhancement Plan
- Assessment plan & results from 2004 –2005
- Adding pedagogy and theory to assessment
- Vision of Assessment
 - Framework
 - Assessment plan overview 2005-2006
 - Details of Student Learning Assessment including interview process and observations
- Questions from audience



ClassTech's Roots (1)

- Pedagogical needs, supported by technology, have emerged
- Requests for technology percolating up to deans, dept. heads
- \$525M in new capital projects will increase number of classrooms by 20%
- NC State's quality enhancement plan for Learning in a Technology Rich Environment (LITRE)





ClassTech's Roots (2)

- Implement basic technology
- Support the users
- Maintain the equipment
- Assess the outcomes
 - Equipment usefulness, functionality, training, support





Meanwhile...

- Preparing NC State's Quality Enhancement Plan: Learning in a Technology Rich Environment (LITRE)
 - Scholarly inquiry focused on enhancing the technology-rich *learning* environment
 - Investigative process through which new approaches to student learning, using technology, are proposed, vetted, empirically evaluated, and if the evaluation results indicate, deployed and routinely assessed
 - Evidence would be collected and analyzed to inform future projects



2004-05 Assessment Questions

- Evaluate the impact of using technology on faculty workload, pedagogy, attitudes, and amount of material delivered.
- Assess faculty and student perceptions of the degree to which technology, used inside and outside the classroom, has impacted learning.
- Assess satisfaction of students, faculty and technical staff with the use of this technology in academic settings.
- Identify technical issues involved in using technology in the classroom, for students, faculty, and technical staff.



ClassTech Assessment Methods

- Online faculty survey of those teaching in ClassTech rooms
- Several in-depth interviews of faculty
- Quick in room surveys of students and faculty
- Interview of ClassTech technical support staff
- Log of equipment usage from a subset of ClassTech rooms
- UPA surveys of sophomores and graduating seniors and the annual ResNet user survey





ClassTech Results – 2004-2005

1. Impact of technology on workload, pedagogy, attitudes, amount of material delivered....
 - Overall favorable perceptions of technology use on *faculty workloads*
 - No significant evidence of direct impact on *pedagogy* or *assessment methods*
 - Almost half (48%) of faculty respondents felt *pace* was faster with technology
 - Half said technology allowed for wider *variety* of topics
 - Most (61%) said they were able to cover material in more *depth*



ClassTech Results – 2004-2005

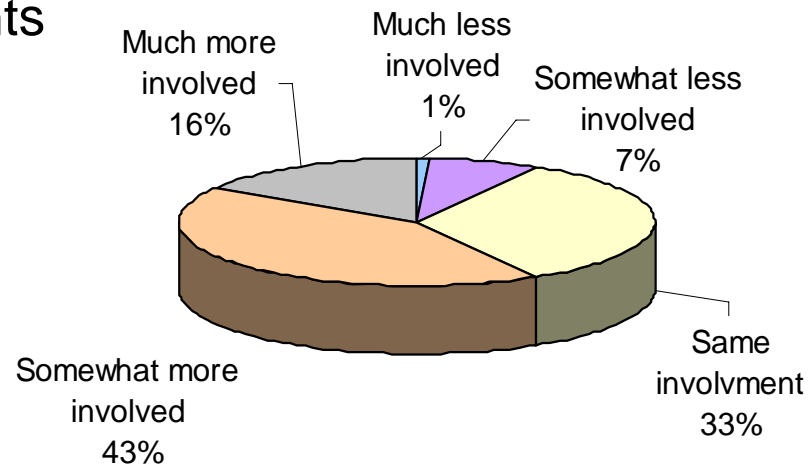
2. Faculty & student perceptions of how technology use inside/outside the classroom impacts learning....
 - Most faculty surveyed or interviewed had difficulty directly addressing the impact of technology on learning outcomes
 - In-class student surveys indicated 81% felt it positively affected their learning
 - UPA student surveys generally positive or no difference on how technology impacts learning



ClassTech Results – 2004-2005

2. Faculty & student perceptions of how technology use inside/outside the classroom impacts learning....

- Most faculty felt students were more involved in learning process when using technology compared to teaching without it





ClassTech Results – 2004-2005

3. Satisfaction of faculty, students & technical staff with use of technology in academic setting....

- Faculty surveyed—only those using ClassTech rooms, so biased—overwhelmingly appreciated and made extensive use of the tools: 76% said having networked computer was essential (51%) or important (25%) in teaching their class
- Most students surveyed in classes prefer moderate (71%) or extensive (21%) use of instructional technology
- Most students agreed (61%) or strongly agreed (13%) that the instructional technology accommodated their needs and learning styles.
- See full results www.ncsu.edu/classtech/survey_results/



ClassTech Results – Difficulty of Assessing Impact on Learning

- Surveys and interviews tried to find out how and why faculty used technology in their class
- Attempted to determine if any impact on course objectives, desired learning outcomes, methodology

However,

- Faculty were able to talk much more about what they did with the technology and how it impacted the way they taught or used their time
- Much more difficult to get at how it impacted student learning



Therefore....

- Beginning Fall 2005, added members to assessment committee who understood more about pedagogy and theory
- **Assessment Committee:**
 - Stan North Martin, Associate Director, Computing Services
 - Joni Spurlin, University Director of Assessment
 - Brad Mehlenbacher, Associate Professor, Education
 - Dianne Raubenheimer, Director of Assessment, College of Engineering
 - Deena Medley-Murphy, Graduate Student



Instruction and Learning with Technology: Classroom Dimensions

Dimensions	Activities/Attributes
Learner Background & Knowledge	Biological (age, gender, race), Abilities (cognitive, physical), Literacies (computer, domain, textual, visual), Socioeconomic (income, geographic, organizational), Personal (learning style, attitude, motivation, self-monitoring)
Learner Tasks & Activities	Represent task + set information goal, Navigate to related topics, Scan information, Understand information, reading to learn, to do, to analyze, to compare, confirm, correct, submitting to computer (ie., goal, intention, action, interpretation, evaluation)
Social Dynamics	Instructor presence, Cognitive + social learner identity, Boundaries, Frequency + duration of communications, Responsiveness, Group management and self-assessment
Instructor Activities	Content, set objectives, information exchange requirements, topic pacing, sequencing, adaptation to audience, methods of evaluation, strategies for topic elaboration
Learning Environment & Tools	Selection of instructional materials, e.g., reading and writing tools, individual and shared documents, viewing and dissemination methods, atmosphere that promotes mentoring and open exchange of ideas and discussion; ergonomically designed for optimal usability



Instruction and Learning with Technology: Terminology

- Instruction
 - Stressing problem-based goals and authenticity in projects and learning activities. Adaptation to audience, communication of content, generating objectives, drawing on prior knowledge, information exchange requirements, strategies for topic elaboration, topic pacing and flow, sequencing, methods of evaluation (Savery & Duffy, 1995, 1996).
- Learning (individual and distributed cognition)
 - Comprehension (selection, working memory, cognitive workload)
 - Integration with existing knowledge structures (strategies for potential storage in long-term memory, information mapping, organization, schemata)
 - Development of new connections between the new information and existing state of understanding (associative meaning, mental models), and
 - Elaboration toward a richer understanding of the subject matter in question, leading to expert understanding and/or behaviors (Kirsh, 2005; Simon, 1979).
- Technology
 - “Like a textbook or any other cultural object, technology resources for education ... function in a social environment, mediated by learning conversations....” (Bransford et al., 2000, p. 26).
 - Learning Environments are *efficient* (in terms of resources, task support, and time), *ergonomically effective* (have the capacity for producing desired results), *economical* (in terms of time and resources for learners and instructors), *educational* (in facilitating and promoting learning), and *equitable* (equally usable to all learners) (Mehlenbacher, et al., 2000, 2002, 2005).

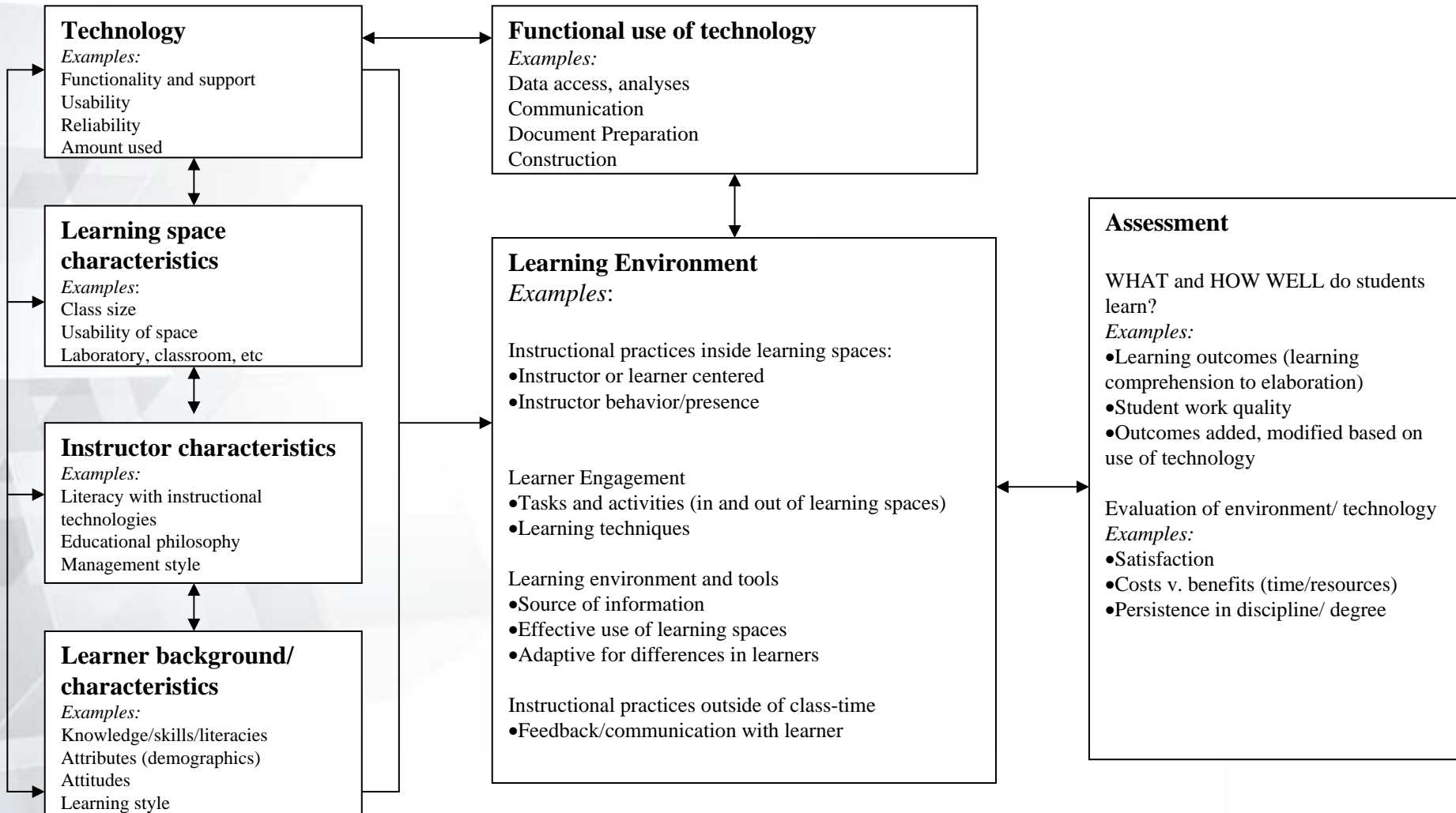


Vision of Assessment

- Framework based on literature
- Assessment Plan for 2005-2006



Draft Framework (see handout)





Modified ClassTech Assessment 2005-2006 (see handout)

- How does use of technology impact course's:
 - pedagogy
 - faculty workload
 - faculty attitudes
 - amount of material delivered
- How does having the technology in the classroom affect:
 - use of class time and assigned coursework
 - how students learn (following LITRE defined outcomes)
 - student achievement of course and program objectives
- Are students, faculty and technical staff satisfied with the use of this technology in academic settings?
- What are the challenges of using technology in the classroom for students, faculty, and technical staff?



Assessment Methods 2005-2006

- ClassTech Assessment Team to define model that incorporates
 - technology
 - pedagogy
 - learners
 - environment
 - outcomes
- Survey faculty who use rooms (More in-depth in spring)
- Automatic tracking of usage in some of the rooms
- Interviews with faculty and classroom observations in 20 courses
- Sample of student work in observed classes to assess student learning
- Student surveys in selected classrooms
- Focus group with technical staff
- Review of problem call tracking logs



Details on One Method

- Classroom Observations and Interviews
- Spring 2006



Assessment Spring 2006

- Developed research design, interview protocol, and observation instrument – fall 2005
- This is a case study design with cross-case analysis
- Purposeful sample of 20 faculty using ClassTech classrooms
- Video-taped an instructor teaching in a ClassTech room
- Trained 4 research observers to use the interview protocol and observation instrument
- Each research observer watched the video, scored the classroom using the observation instrument
- Calculated inter-rater reliability for 4 observers
- Made adjustments to observation instrument base on discussion amongst observers
- Re-watched and re-scored video and re-calculated the inter-rater reliability



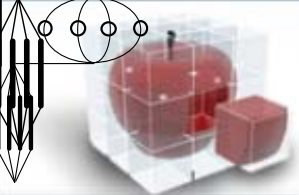
Interview Protocol

- Questions focus on
 - Identifying learning outcomes
 - Role of technology in classroom
 - Relationship between technology and anticipated student learning outcomes
 - Faculty perceptions of the value of technology
 - Evidence of students achieving the learning outcomes
- Interview data will be analyzed for emerging themes, with cross-case analysis.

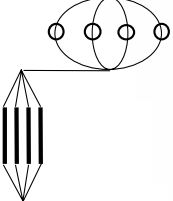
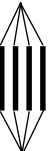




Observation Instrument

- The observation instrument is a fairly complex rubric containing items in different categories, including
 - Learning direction
 - Instructor behavior
 - Lesson implementation
 - Instructor activity based on SOLO taxonomy
 - Technology use by instructor
 - Student learning techniques
 - Student activities based on SOLO taxonomy
 - Technology used by students during class
 - Learning environment and classroom characteristics
- Observers rate frequency of occurrence
- Data analyzed for trends in various categories



SOLO taxonomy (Biggs, 2003)

SOLO category	Representation	Type of outcome	
Unanticipated extension		Create Hypothesise Predict Theorise	Synthesise Validate Debate
Logically related answer		Apply Distinguish Classify Summarise	Outline Analyse Contrast Categorise
Multiple points		Explain List Describe	Define Solve Interpret
Single point		State Recall Note	Recognise Quote Name



Student Artifacts

- Artifacts providing evidence of student learning outcomes include
 - Homework
 - Test items
 - Classroom assessment techniques
- Student work is graded
- Tasks and artifacts will be rated by the research team for SOLO taxonomy level
- Data will be triangulated with observation and interview data



Current status

- Interviews conducted with most of the 20 instructors
- About half of the observations have been done.
- Student work starting to be collected.



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Questions?



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Resources

- Session documents & other resources:
<http://www.ncsu.edu/classtech/workshops/unctl2006/>
- Resources on assessment of technology related to student learning: <http://www2.acs.ncsu.edu/UPA/assmt/litre/>
- Quality Enhancement Plan for Learning in a Technology-Rich Environment at NC State:
http://litre.ncsu.edu/pdf/litre_gep.pdf
- LITRE Goals and Assessment Plan:
http://litre.ncsu.edu/dfiles/goals_short.html
- 2003 LITRE Faculty Survey Report:
http://litre.ncsu.edu/fac_sur.pdf
- Classroom Technology @ NC State:
<http://www.ncsu.edu/classtech/>



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