CLASSTECH OBSERVATION STUDY REPORT: JULY 2006

ClassTech Assessment Project Spring 2006
Interview of Faculty and Observation of 15 Selected Courses

Principal Investigators and ClassTech Assessment Team:
Joni Spurlin, Dianne Raubenheimer, Stan North Martin, Brad Mehlenbacher,
Janet Fortune, Virginia Lee and Lavanya Chintapalli

Executive Summary

During the spring semester of 2006, faculty who held courses in ClassTech rooms were purposely sampled and asked to participate in an observation study. The technology for this study was the technology used during the class time by the faculty. ClassTech provided the technology: a computer with Internet access, a projector for the computer, connections for faculty's laptop, a document camera, a DVD/VCR player and an overhead transparency projector. Of the faculty asked to participate, 15 completed the interview and allowed a researcher to observe their teaching; 13 of the 15 gave graded student work to the researchers. It should be noted that the technology was working on the day of observation in all cases.

Research Question 1: How does use of technology impact course's pedagogy, faculty workload, faculty attitudes, and amount of material delivered? **Question 2:** How does having the technology used in the classroom affect a) use of class time?

Technology impact on course's pedagogy:

- In general, classes observed were teacher managed, where the teacher controls the flow of information, questioning and learning direction within the session.
- A closer examination of how faculty implemented instruction during the observations showed that they mostly used traditional presentations (purpose of lesson was content to be learned).
- Looking at the functional uses of technology by faculty, the faculty use of technology was observed to be primarily for communication of information to students. Some faculty also used the ClassTech technology as a medium for inquiry.
- All instructors were classified in the single point SOLO taxonomy level in their observed instructor activity (e.g. transmit, tell, state, recognize, recall, note, name). Fewer instructors used other SOLO levels.
- The more types of technologies used and for functional purposes other than communication, the levels of instruction were at a higher cognitive level. The courses in which only PowerPoint was used for communication purposes the levels of instruction were at a lower cognitive level.
- Faculty in larger classrooms mostly used the technology for communication; those with smaller enrollments used more variety of technology types and functions, and more variety of instructional techniques.

Technology impact on use of class time:

- Some faculty (2 – 5) engaged students during the lesson, often or always. More than half of the faculty never provided feedback, allowed students to explore their own reasoning or to generate new knowledge. Three courses had students use technology during class. In many of classes the students were not observed to do anything except listen.
- Faculty interviewed said that the role of technology on student learning outside the class was also important because it allowed students **access to information 24/7**, increased student independence, increase students' time to study/do homework, gave immediate feedback on assignments (Webassign), and allowed access to examples and model answers. (One faculty member felt that the increased access to material reduced attendance at lectures.)

Technology impact on Faculty attitudes/workload:

- Faculty attitudes to the use of technology were very positive overall. Reasons given were that included that it is easier to teach the course the next time, assists student efficiency because they can access materials, enthusiasm for teaching had been increased or renewed, and allows for more interaction with student during class, helps to organize teaching, increases motivation, enhances comfort level of instructor in classroom.

Research Question 2: How does having the technology used in the classroom affect ….b) How students learn and c) Student achievement of course and program objectives?

- Technology, learning outcomes and assessment are not seen in relationship to each other. Faculty are generally not able to articulate this relationship, even with prompting. They do not articulate that technology is a particular tool for teaching that should be used to teach a particular learning outcome, and that an assessment task should assess that student learning outcome. They were not consciously thinking about the impact of technology on student learning.
- The level of instruction and student work was assessed through the SOLO taxonomy. Of the 15 faculty interviewed and observed, 13 faculty members identified a student work product. Twelve faculty used one or more specific test questions (formats varied from open-ended to multiple-choice) that related to the outcome. The faculty graded the work. The research team averaged the performance of those specific test questions/work. When comparing student performance to SOLO level of the test questions, in general, the lower the cognitive level of the task, the better the performance.
- Of the 13 cases with student work, 8 had a student outcome for the class at a **logically related** level, which means that the outcome was related to real life application. In contrast, 7 assessed students at a **single** level, which means that they were essentially giving tasks that asked for recall of knowledge and information without reference to context.
- The more varied the use of the types of technologies and for purposes other than communication; the levels of assigned tasks were at a higher cognitive level. Courses in which only PowerPoint was used and for only communication purposes the assigned tasks/tests were at a the lower level.

- However, we could not relate a specific functional use of technology to student performance. The students' performance reflects the level of the test questions/work more than the type of technology used or functional use of the technology.

DETAILED REPORT

I. STUDY QUESTIONS

The study was designed to address the following overarching questions:

Assessment Question 1:

How does use of technology impact course's pedagogy, faculty workload, faculty attitudes, and amount of material delivered? Specifically:

- Did having technology available affect the way faculty designed and taught the courses: How did faculty use technology? Did course or program outcomes change due to use of technology? Did assessment of students (how determined course grade) change? Did assignments change?
- Did type/amount of material presented change (e.g. more simulation, more use of web for examples, etc)
- How did technology influence faculty workload? (i.e. Did having technology available improve utilization of class time? Did having technology available increase preparation time?)
- Did faculty enthusiasm for the course change?
- Did technical support for using technology influence faculty's use of technology?

Assessment Question 2:

How does having the technology used in the classroom affect:

- Use of class time and assigned coursework
- How students learn (using following LITRE defined outcomes)
  - Problem solving
  - Empirical inquiry
  - Research from sources
  - Performance in discipline
- Student achievement of course and program objectives

II. STUDY METHODLOGY

The ClassTech assessment committee[1] developed the research design, interview protocol, and observation instrument fall 2005. In discussing the complexity of assessing the impact of the ClassTech technology on student learning, the team developed a model. (See Appendix A.) The research design is a case study design with cross-case analysis. We planned to purposely sample 20 faculty members who were using ClassTech classrooms. Purposeful sample criteria were: Innovative use of technology by the faculty member - based on responses to the survey spring 2005 (18 using simulation/data analysis/internet visuals) and 2 who said they were only using PowerPoint.

Using this model and the factors that affect student learning, the team developed an interview protocol and observation instrument and trained four researchers to use this methodology.[2] In order to increase inter-rater reliability on the observation instrument, an instructor was videotaped teaching in a ClassTech room and then each researcher watched the video and scored the classroom using the observation instrument. The inter-rater reliability was calculated for the 4 observers (74%). Adjustments were made to observation instrument to clarify any issues, based on discussion amongst observers, and each observer re-watched and re-scored video. The inter-rater reliability was recalculated at 89%, an acceptable level.

Thereafter, faculty were solicited to participate in the study. Those that agreed were interviewed, observed during a class session in which they used technology to teach a particular outcome, and evidence of student work on that outcome was collected.

For each faculty member involved in the study, a comprehensive case record was written drawing on interview data, observational field notes, the observation instrument, documentary evidence (e.g. syllabus) and student work. From these case records, cross-case analysis was done.

Interview Questions focused on the following issues:

Characteristics About Instructor:

- Role of technology in classroom
- Relationship between technology and anticipated student learning outcomes
- Faculty perceptions of the value of technology
- Identifying best time for observation which shows best use of ClassTech technology

Characteristics About Assessment:

- Identifying one learning outcome for the specific day, when researcher would observe
- Identifying evidence of students achieving that specific learning outcome

[1] ClassTech Assessment Committee members Fall 2005: Stan North Martin, Joni Spurlin, Dianne Raubenheimer, Brad Mehlenbacher, Deena Murphy-Medley

[2] Researchers chosen to do interview and observations: Janet Fortune, Dianne Raubenheimer, Virginia Lee and Brad Mehlenbacher

The observation instrument is a fairly complex rubric containing items in different categories, which followed our model, including the following:

Characteristics about Teaching and Learning Environment

- Learning direction (Bain, McNaught, Mills & Lueckenhausen, 2000)
- Instructor behavior (adapted from Classroom Observation Worksheet (UT))
- Lesson implementation
- Instructor activity based on SOLO taxonomy (Biggs, 2003)
- Technology use by instructor (Bruce & Levin, 1997)
- Student learning techniques during class time
- Student activities in class based on SOLO taxonomy
- Technology used by students during class
- Learning environment and classroom characteristics

Characteristics about Technology Functional Use

Bruce & Levin (1997) identified 4 main purposes for technology use:

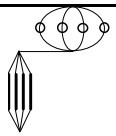
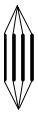
- Media for inquiry (theory building, data access, data collection, data analysis)
- Media for communication (document preparation, communication, collaborative media, teaching media)
- Media for construction (e.g., robotics, construction of graphs & charts, computer-aided design, designing virtual computer labs)
- Media for expression (e.g., drawing & painting programs, music making or composing, animation software, multimedia composition media)

Student work (Characteristics of Assessment)

- The researcher, together with the faculty member, identified a student learning outcome for date of observation.
- The faculty member selected a test or other assignment to assess those outcomes.
- Student artifacts were gathered as evidence of student performance on those outcomes. Artifacts included:
    - Homework
    - Test items
    - Classroom assessment techniques
- All work was "graded" by the faculty and stripped of identification.
- All tasks and student artifacts were related to the SOLO taxonomy levels by the researchers, to ascertain the level at which the task was set and the level at which students responded.

The SOLO taxonomy (Structured of the Observed Learning Outcome), which is based on the study of outcomes in a variety of academic content areas, was used to classify the student learning outcomes for the student work gathered, as well as outcomes and activities observed during the classroom observation. "As students learn, the outcomes of their learning display similar stages of increasing structural complexity. There are two main changes: *quantitative,* as the amount of detail in the student's response increases, and *qualitative,* as the amount of detail becomes integrated into a structural pattern" (Biggs, 2003). The SOLO taxonomy thus provides a means of evaluating at which level instructors and students were operating.

Table 1: SOLO Taxonomy

SOLO category	Representation	Type of outcome	
Unanticipated Extension (Extended Abstract)		Create Hypothesise Predict Theorise	Synthesise Validate Debate
Logically Related (Relational)		Apply Distinguish Classify Summarise	Outline Analyse Contrast Categorise
Multiple Points (Multistructural)		Explain List Describe	Define Solve Interpret
Single Point (Unistructural)		State Recall Note	Recognise Quote Name

Note: The terms in brackets are the original nomenclature used by Biggs (Biggs, 2003).
Adapted from: Center for Learning Enhancement and Research (CLEAR), The Chinese University of Hong Kong (n.d.). The SOLO taxonomy as a guide to setting and marking assessment.[3]

To obtain the courses for our sample, 33 faculty were asked to participate in our study; 16 agreed (48%). Of these 16, 15 also participated in the observation and 13 provided student work. The 15 who were interviewed and observed are the ones used for this report.

Table 2: Number of Faculty Contacted

	Number	Percent
Contacted	33	
Interviewed	16	48%
Did not respond to contact	10	30%
Declined participation	7	21%

We initially invited those faculty who had responded to the spring 2005 ClassTech survey as interested in participating in a study and who had also discussed interesting or innovative uses of the technology in ClassTech rooms. The initial contacts were also purposely selected to provide a sample across different colleges. After that list was exhausted because not enough courses had been obtained for our study, then other courses were selected from the list of survey participants based on maintaining a selection of courses across different colleges/disciplines. Table 3 shows relationship between the types of courses that became part of the study compared to those courses whose faculty did not

[3] See the following URL for more details:
www.cuhk.edu.hk/clear/download/PDC/05May%20Lang/guides/SOLO_assessment_grid.doc

participate. The results show that this was not a random sample, but a sample purposely selected.

The researchers hypothesized that there were several reasons for the low participation rate:

- Some of the selected course sections were taught by lecturers or adjunct faculty were mostly not interested or who did not had the time to participate. (Many of the courses taught in ClassTech rooms are large courses with multiple sections taught by instructors or adjunct faculty.)
- The selection of the sample was started in late February (already in mid-semester)
- Faculty did not feel their use of technology was of enough interest to warrant study.

Table 3: Distribution of Courses

	Used in study		**Selected but not participated**		**Courses Taught in ClassTech Rooms Spring 2006**
College or Course	**Number Interviewed & Observed**	**Percent Of Total**	**Did Not Participate**	**Percent Of Total**	**Percent Of Total**
CHASS	6	40%	10	56%	30%
COM	1	7%	3	17%	9%
COE	2	13%	3	17%	31%
PAMS	2	13%	1	6%	14%
Education	1	7%	0	0%	3%
CALS	3	20%	0	0%	9%
Nat Resources	0	0%	0	0%	4%
	15		17		
Level of Course					
100	2	13%	0	0%	8%
200	2	13%	6	33%	32%
300	8	53%	7	39%	19%
400+	3	20%	4	22%	40%
	15		17		

Comments about the study methodology:

- The interview process worked well.
- The faculty had a difficult time identifying an appropriate class period that would show the most innovative use of the technology, with an appropriate learning outcome and that also had student work that would indicate learning of the material.
- The training on the use of the rubric was useful and should be done next time. The observers had the rubric in mind during the observation, made notes during the class observed and then applied their ratings to the rubric after the class observation.
- The rubric was useful and provided important data.

- Obtaining student work was difficult for some courses.

Next time study is conducted:

- The interview questions need to be improved for more consistent standard interview questions across faculty.
- One suggestion to consider would be to have faculty be part of the design of the study and not just a "subject" of the study. That would give more buy-in to the process and allow them to better identify or design the observation time and appropriate learning outcome with student work attached. They could provide assistance in developing the study and help frame the question of interest, and join in analysis of the process. However, that process would be more time consuming for the faculty members.
- The assessment of student learning may also need to be done through a Classroom Assessment Technique, with the assistance of an assessment professional.
- A few modifications to the rubric will be needed, including having a space for learning outcome for that day on front sheet.
- Consider other ways to determine what and how well students are learning the material related to the observation class period(s).
- Anticipate the Time/Effort for the study. It actually took:
    - 1 semester to develop study and obtain IRB permission
    - 18 hours for training: Make videotape on which to train (5 hours); train everyone on technique (8 hours); revise observation tool (5 hours).
    - 7-9 hours total for each course (x15 courses):
        - 1 hour of time spent in contacting faculty for various purposes
        - 1 hour initial discussion with faculty and another hour for transcribing the interview notes
        - 2-4 hours of observation and coding
        - 1 hour of coding of student work with rubrics
        - 1 hour developing the case record summary
    - 80 hours for data analyses
    - 45 hours to write and edit report

III. RESULTS

III. Section A: Results related to Assessment Questions.

Question 1: How does use of technology impact course's pedagogy, faculty workload, faculty attitudes, and amount of material delivered? **Question 2:** How does having the technology used in the classroom affect a) use of class time (results for remaining parts of Question 2 in next section).

Observations (Data from observation rubric)

- In general, classes were teacher managed, where the teacher controls the flow of information, questioning and learning direction within the session. A student may be free to review an aspect of choice, but then, within that area the paths are laid down by the instructor.

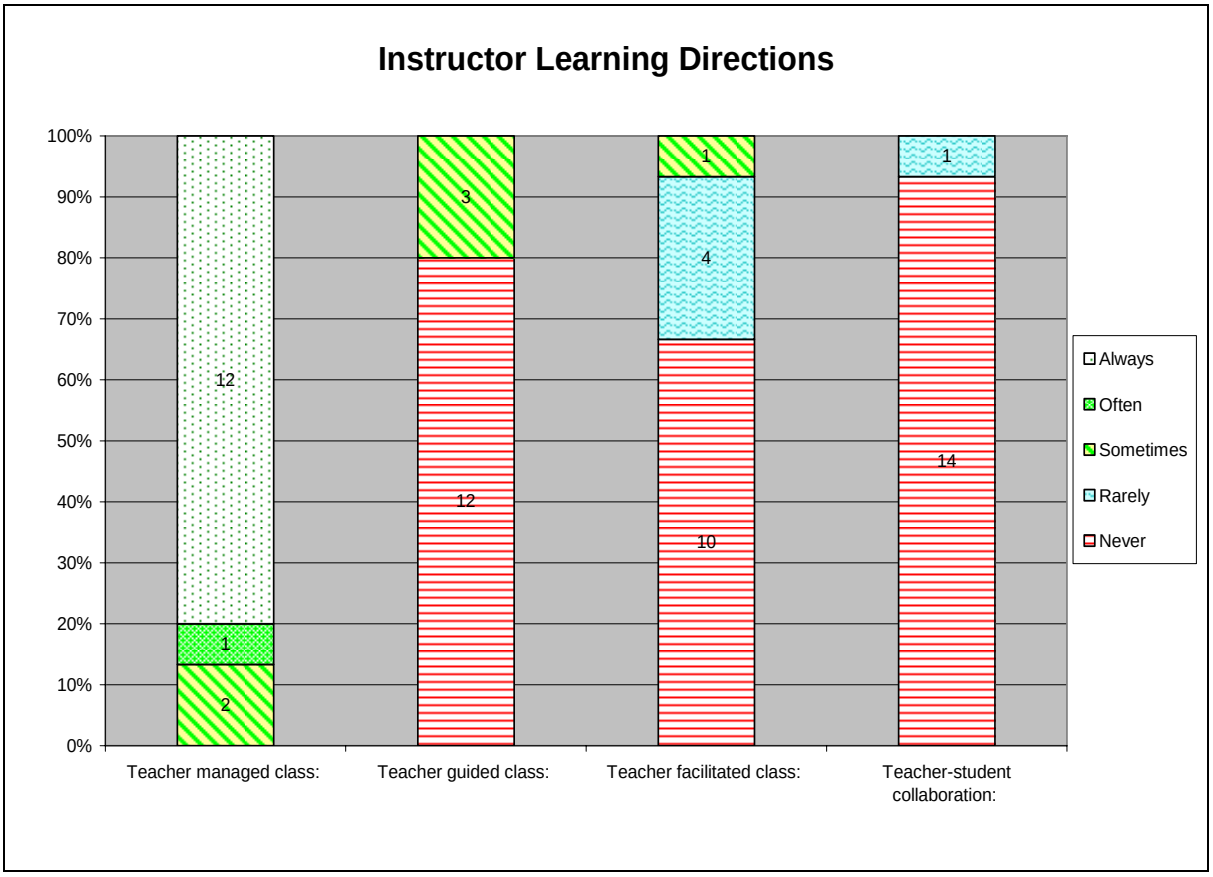


Chart 1: Instructor Learning Directions from Observation Rubric

- A closer examination of how faculty implemented instruction during the observations showed that they mostly used traditional presentations (purpose of lesson and content to be learned).

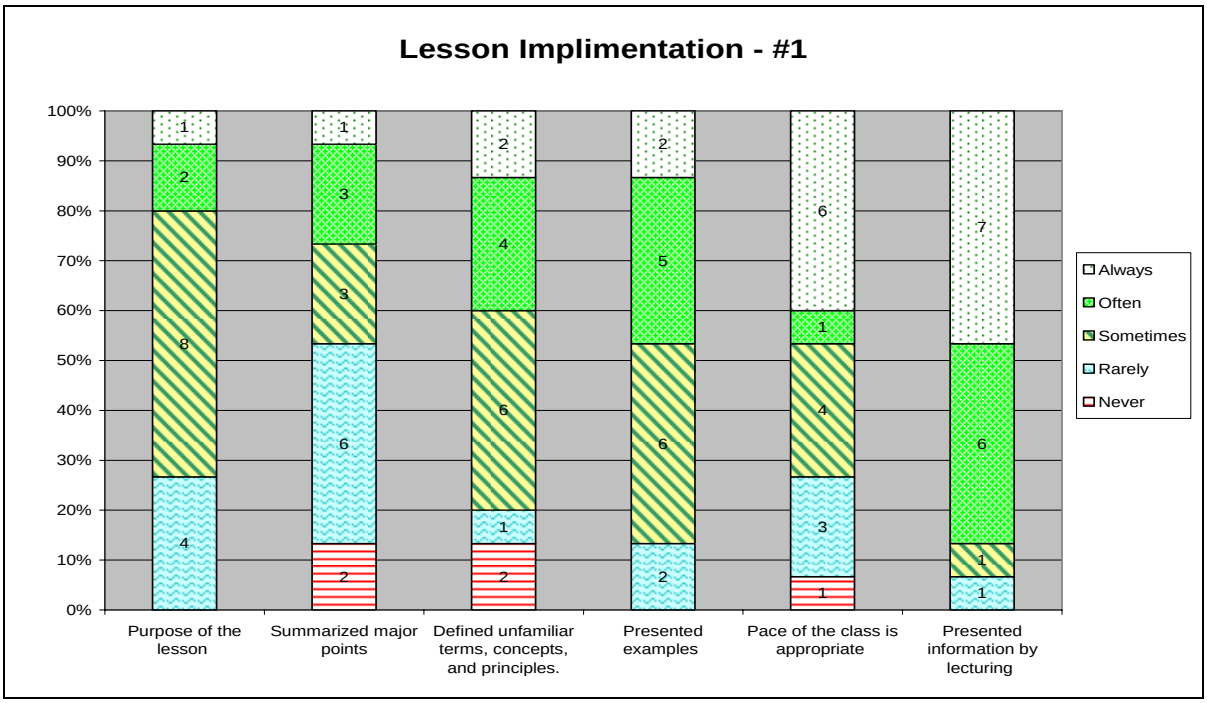


Chart 2: Lesson Implementation from Observation Rubric

- Some faculty (2 – 5) engaged students during the lesson, often or always.

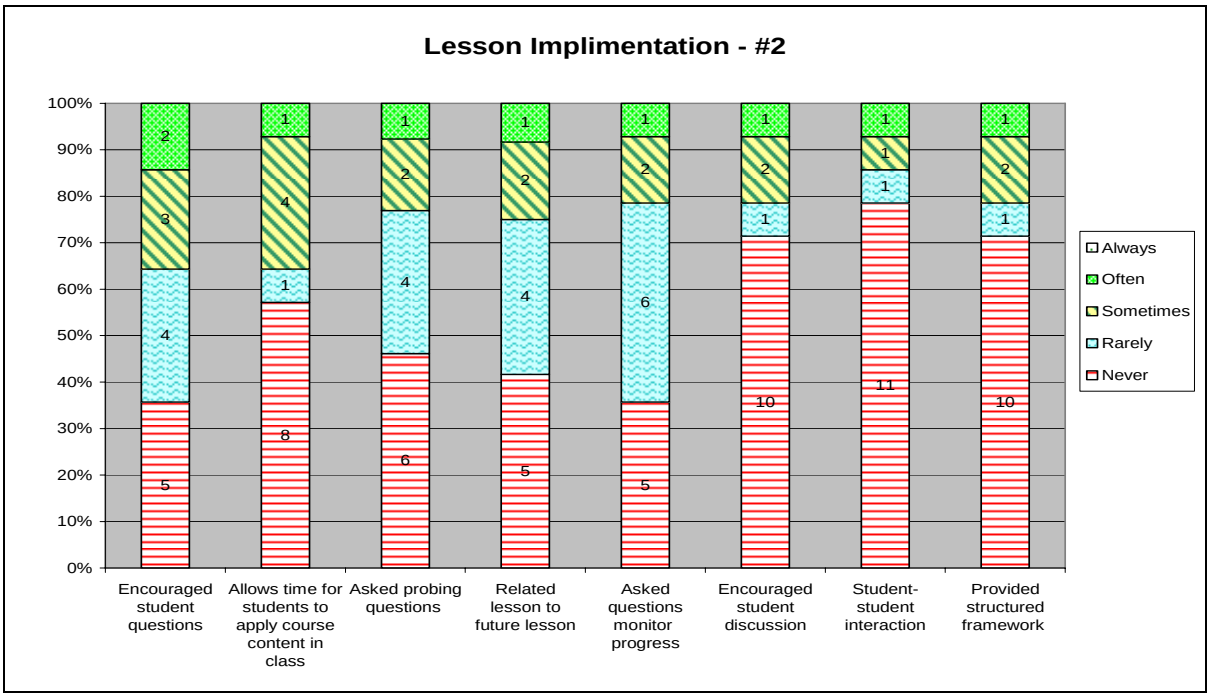


Chart 3: Lesson Implementation from Observation Rubric

- More than half of the faculty never provided feedback, allowed students to explore their own reasoning or to generate new knowledge.

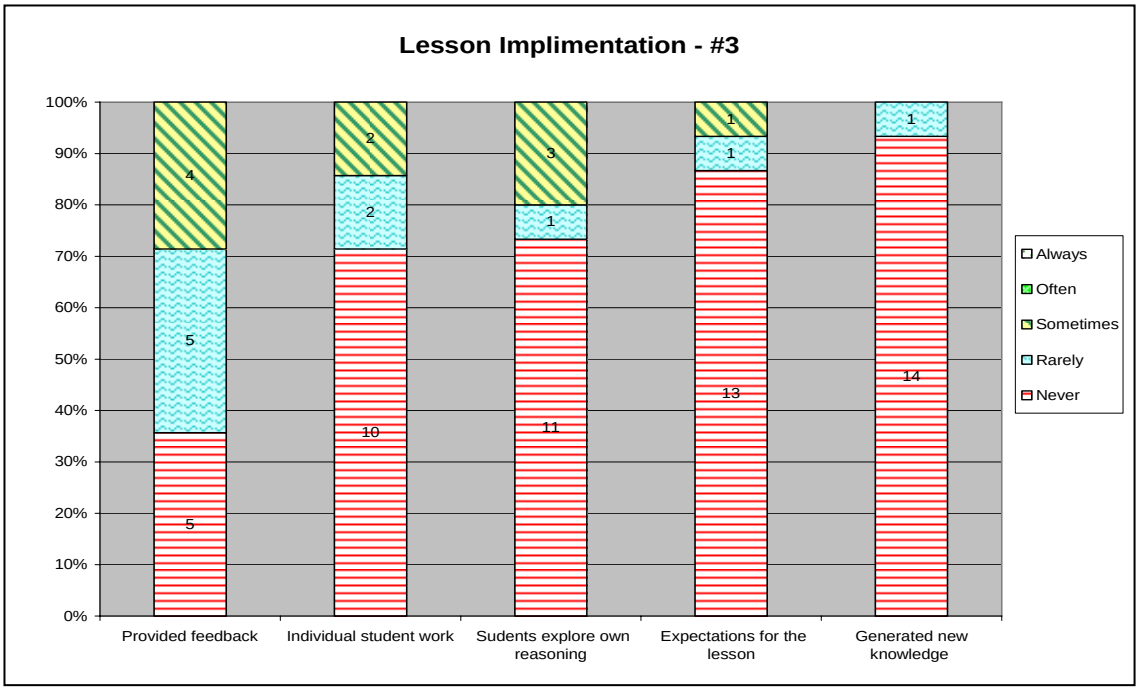


Chart 4: Lessons Implementation from Observation Rubric

- Looking at the functional uses of technology by faculty, the faculty use of technology was observed to be primarily for communication of information to students.

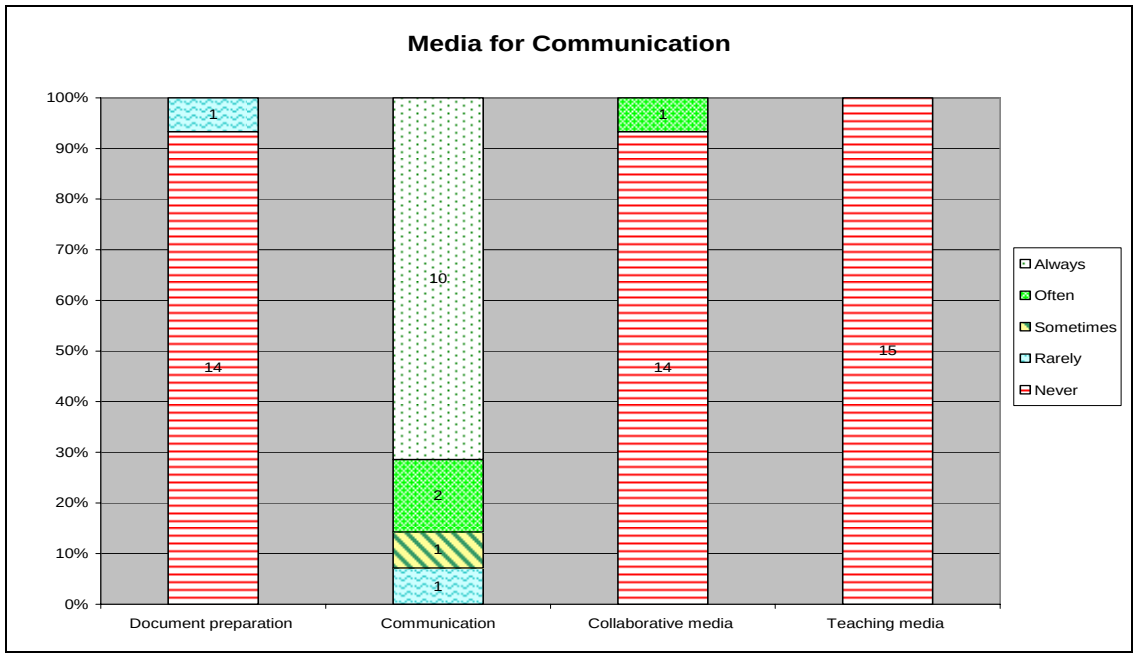


Chart 5: Function Use of Technology: Communication

- Some faculty also use the ClassTech technology as a medium for inquiry.

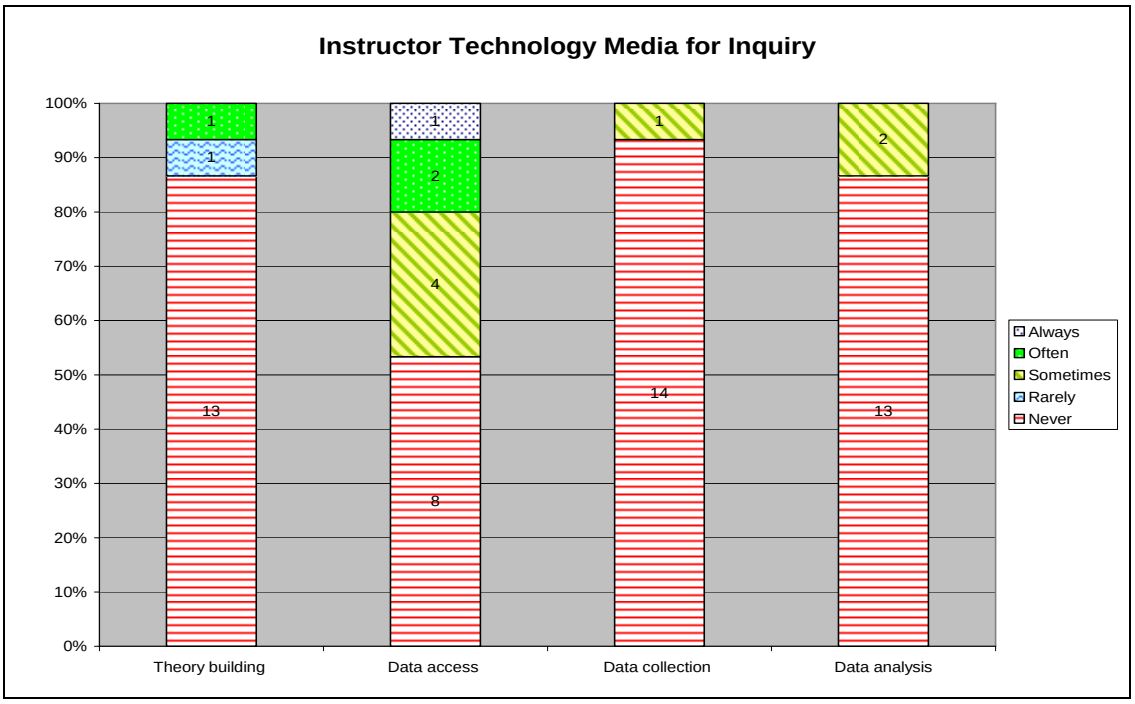


Chart 6: Functional Use of Technology: Inquiry

- All instructors were classified in the single point SOLO taxonomy level in their observed instructor activity. Fewer instructors used other SOLO levels.

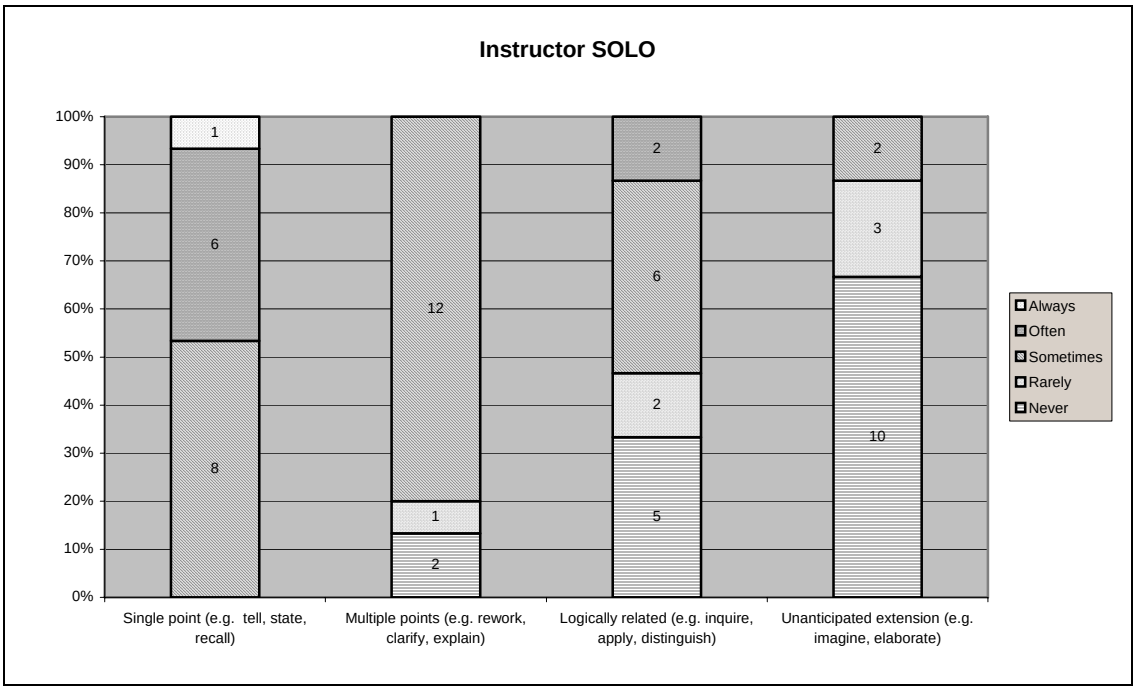


Chart 7: SOLO Level of Teaching

- Students were not actively engaged during the class periods. Many did not even take notes, as they knew the PowerPoint and notes from faculty was available on line.

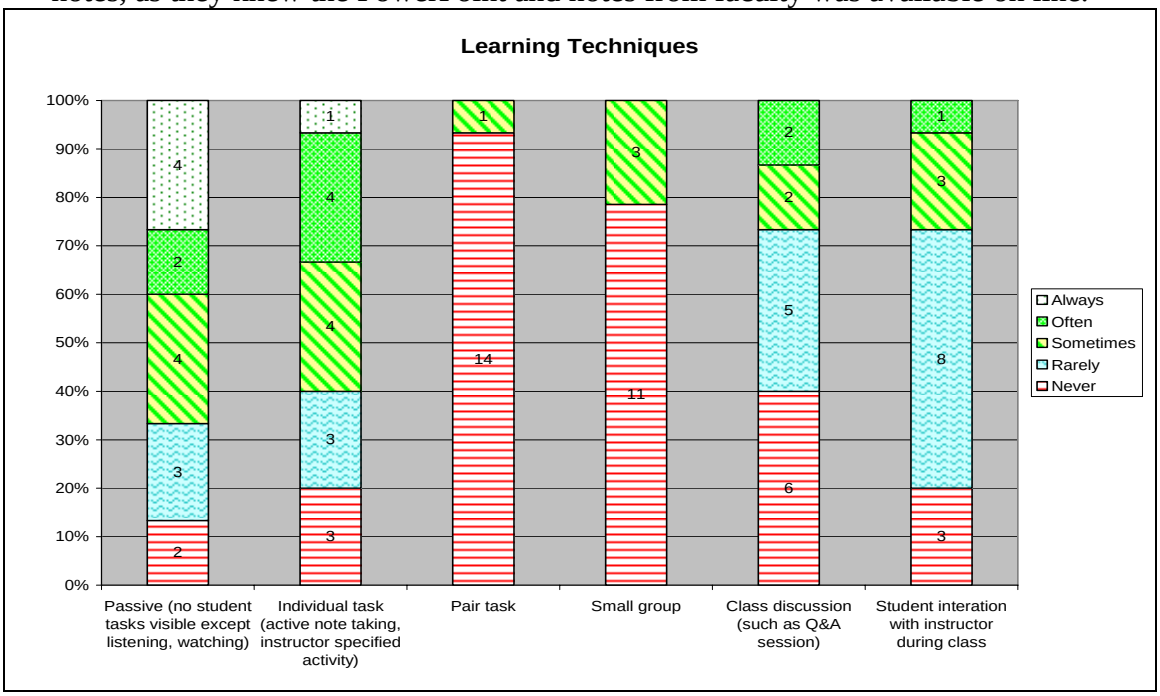


Chart 8: Student Activities During Class

- The SOLO level of student engagement during the class was classified by the observer and showed that if students were engaged at all during the lesson it was at the single point level.

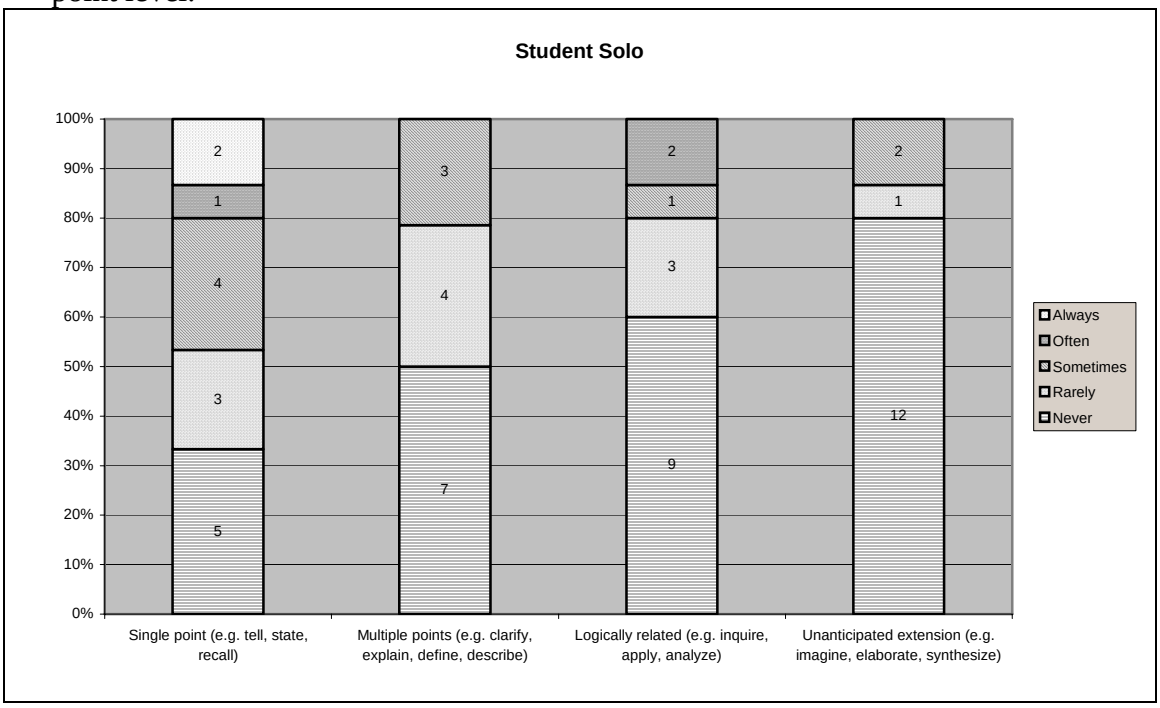


Chart 9: SOLO Level of Students During Class

Other observations

- Only 3 courses were observed in which students used the technology in class, and then it was for communication purposes.
- It should be noted that the technology was working on the day of observation in all cases.

Cross-case analysis identified themes and trends across all cases studied:

- Technology is a tool to organize teaching and make it easier for students.
- Overall, faculty felt that the purpose of teaching was to:
    - To provide students with access to materials (2 courses),
    - To motivate students to learn (3 courses),
    - For students to learn the content and/or structure of the discipline (10 courses),
    - For students to learn particular processes & skills important to the discipline (5 courses), and
    - For students to apply course content (3 courses).

- Faculty attitudes to the use of technology were very positive overall. Reasons given were that:
    - It makes it easier to teach the course the next time around,
    - It assists student efficiency because they can access materials,
    - Presentations are more accurate because of visual aids,
    - Helps to organize teaching,
    - Makes teaching more enjoyable,
    - Enthusiasm for teaching had been increased or renewed,
    - Enhances comfort level in the class,
    - Makes interaction in class more student focused,
    - Pedagogy should drive the use of technology, and not technology for its own sake.

III. Section B: Results related Assessment

Question 2: How does having the technology used in the classroom affect ...b) How students learn and c) Student achievement of course and program objectives

Interviews showed:

- Faculty continue to have difficulty identifying learning outcomes, especially when asked to specify a specific learning outcome related to a specific class period which was to be observed.
- Faculty had trouble stating where the technology had an impact on learning.
- They were not consciously thinking about the impact of technology on student learning. Many consider the technology of ClassTech rooms as an organizational tool only. They did not discuss the relationship of the technology to pedagogy.
- Faculty had difficulty identifying the exact student work that showed student learning tied to a specific class period and a specific learning outcome.

Cross-case analysis identified themes and trends across all cases studied:

- The faculty chose student work so that we could assess students' performance on the specific outcome related to the observation day. The researchers determined the SOLO level for that outcome and for the student work (referred to as the assessment of student learning). The level of the work task was determined, not the level of performance. Many of the outcomes and individual work tasks were at several levels for a single course. Examining the **highest SOLO** level of the outcome and tasks, the following were found.

  As a group, 8 out of 13 had a student outcome for the class at a **logically related** level, which means that the outcome was related to real life application. In contrast, 7 out of 13 assessed students at a **single** level, which means that they were essentially giving tasks that asked for recall of knowledge and information without reference to context.

Table 4: SOLO Levels of Outcomes and Student Work

	Level of outcome (Outcome identified related to the observation day) (Highest level – if more than one level)	**Level of related student assessment task** (Highest level – if more than one level)
Single	3	7
Multiple point	2	4
Logically related	8	2
Unanticipated extension	0	1

For individual instructors, 7 assessed at a lower level than their specific instructional outcome, while 6 assessed at the same level as the instructional outcome. Five out of 8 instructors, whose outcomes were at a higher SOLO level, also used technology for data access functions, that is, as media for inquiry. One instructor assessed students at

the highest SOLO level (unanticipated extension), where students were expected to critically reflect on scenarios and the application of theory to contexts the student might encounter in the future. This instructor set the assessment task at a higher level than the specific class outcomes (multiple point and logically related).

- Technology, learning outcomes and assessment are not seen in relationship to each other. Faculty are generally not able to articulate this relationship, even with prompting. They do not articulate that technology is a particular tool for teaching that should be used to teach a particular learning outcome, and that an assessment task should assess that student learning outcome.

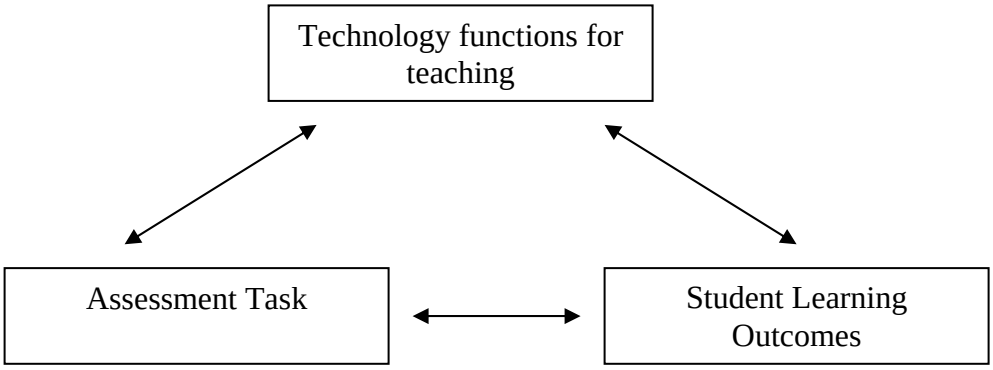


Chart 10: Relationships Between Technology And Assessment

Where a relationship is perceived, technology is seen as a tool to assess a particular outcome or body of course content, such as by using WebAssign as a tool to develop and administer a test or exam.

If there were outcomes identified in the syllabus (6 out of 15 cases), there were no specific indications of how each outcome would be assessed. That is, specific assessment tasks were not related to specific outcomes. All faculty used traditional tests, exams and quizzes as part of their student assessment strategy, and 7 did some form of other assessment, such as reports, presentations, discussion board and group tasks.

- Role of technology on student learning <u>outside</u> the class: **access to information 24/7** (9 responses), increased student independence, students have more time to study/do homework, keeping students on task, immediate feedback on assignments (Webassign), use software packages as a tool, and access to examples and model answers. (One faculty member felt that the increased access to material reduced attendance at lectures.)

- Faculty articulated that the value of using technology in relationship to student learning <u>in class</u> were as follows:
    - demonstration & visualization,
    - see applications of theory,
    - accommodate different learning styles,

- students process information because not taking notes,
- students have notes and materials before, in and after class, i.e. access to information is enhanced and faculty show them how to get to the material,
- students don't have to carry textbooks,
- students learn processes that can be applied in other contexts because it has been modeled by the instructor (e.g. writing excel macros).

Analyses of Student work:

- Of the faculty interviewed, 13 of the15 faculty gave the research team the specific student work that related to the outcome of the day observed. In 12 cases, the student work was exams. The instructor identified one or more specific test questions (formats varied from open-ended to multiple-choice) that related to the outcome. The faculty graded the work. The research team took the performance of those specific test questions/work and averaged the student performance on this work for each SOLO category. In general, the lower cognitive level of the task, the better the performance.

Table 5: Assessment of Student Performance

SOLO categories of student work	Number of courses that had student work related to observational day's outcome at each level[4]	How well student's performed on this level of task; averaged across tasks
Single	8	80.1%
Multiple point	6	71.8%
Logically related	2	57.5%
Unanticipated extension	1	92.5%

- To determine the "effect" of the technology and pedagogy on the performance, the SOLO level of the outcome and the type of technology used was compared to students' performance on the specific task. See Model in Appendix A. See Tables 6 & 7. Table 7 examines the same information as Table 6, except sorted by SOLO level of the assigned task. Because several courses had multiple levels of student work, each level for each course was examined separately.

- Faculty in larger classrooms mostly used the technology for communication; those with smaller enrollments used more variety of technology types and functions and instructional techniques. Those who used more technology for functions other than communication, tended to also assess students at a higher level of cognition.

- The student performance reflects the level of the work more than related to technology. Can not relate a specific functional use of technology to student performance.

[4] N's more in Table 5 than in Table 4, because Table 4 only included the "highest level"

Table 6: Examination Of Technology Compared To Student Performance; Examined By Each Case

N Of Courses	Types Of Technology Used By Faculty	Functional Use Of Technology At Least Sometimes	Average Class Size Day Of Observation	Learner Engagement - At Least Sometimes	SOLO Level Of Task Assigned	Average Perform-ance On Specific Task
6	PowerPoint & website	Communi-cation only	80	Passive and individual task	3 single; 2 multiple 1 single & multiple	78
7	**Variety:** -PowerPoint with diagrams and charts; and chalk -web to access on-line course syllabus projected for entire class - PowerPoint slides from WebCT Vista site and videos from website -video & PowerPoint -DVD clip; PowerPoint ; animations from web attached to text -doc camera on prepared notes; internet website on computer; laptop software simulation -doc camera to show student work and other materials; PowerPoint web on own laptop	All courses used for at least data access & communication	29	**Variety:** -individual task note taking; class discussion; interaction with instructor passive (listening watching) and interaction with instructor -small group; class discussion; interaction with instructor -individual task note taking; instructor specified task; small group -passive and individual task -passive (listening watching only) pair; small group; individual note taking	**Variety:** 3 of 7 have "logically related" or "unanticipated extension"	75

Table 7: Examination Of Technology Compared To Student Performance; Examined By Level of Task

N Of Courses	Types Of Technology Used By Faculty	Functional Use Of Technology At Least Sometimes	SOLO Level Of Task Assigned	Average Performance On Specific Task
4	PowerPoint & website	Communication only	Single only	81.6
3	PowerPoint & website	Communication only	Multiple only work	74.2
3	Variety -Video & PowerPoint -Doc camera on prepared notes; internet website on computer; laptop software simulation -DVD clip; PowerPoint; animations from web attached to text	All courses used for at least data access & communication	Single	80.0
3	Variety -Web to access on-line course syllabus projected for entire class -DVD clip; PowerPoint; animations from web attached to text -PowerPoint with diagrams and charts; and chalk	All courses used for at least data access & communication	Multiple	69.3
3	Variety -PowerPoint with diagrams and charts; and chalk -PowerPoint slides from WebCT vista site and videos from website -Doc camera to show student work and other materials; PowerPoint web on own laptop	All courses used for at least data access & communication	Logically related or unanticipated	69.2

- Comparison of the SOLO Levels of the instruction during the day observed, the student activities during that class period, the session outcomes and the assessment tasks are shown in Table 8. It can be seen that the more varied types of technologies used and for purposes other than communication, the levels of instruction and expectations of learning were at a higher cognitive level than those who only use PowerPoint for communication purposes.

Table 8: Comparison Of SOLO Levels Of Instructor, Student Activity, Session Outcome And Assessment Task

SOLO Levels				
Technology and Use	**Instruction (Highest level observed, at least sometimes)**	**Student activity during class (Highest level observed, at least sometimes)***	**Outcome (Highest level)**	**Assessment task (Highest level)**
The Six Cases that used PowerPoint and web; communication function				
	Logically related	None	Logically related	Multiple
	Logically related	None	Logically related	Single
	Multiple	Single	Logically related	Single
	Multiple	None	Multiple	Multiple
	Multiple	Single	Single	Single
	Single	Multiple	Multiple	Multiple
The Seven Cases that used various technologies with data access and communication functions				
	Unanticipated extension	Unanticipated extension	Logically related	Multiple
	Unanticipated extension	Logically related	Logically related	Unanticipated extension
	Logically related	Logically related	Logically related	Logically related
	Logically related	Logically related	Logically related	Logically related
	Logically related	Single	Single	Single
	Logically related	Single	Single	Multiple
	Multiple	None	Logically related	Single
*None= students observed to do nothing most of the time				

References

Bain, J. D., McNaught, C., Mills, C., & Lueckenhausen G. (2000). Relationship between academics' educational beliefs and their design and use of computer facilitated learning. In J. Bourdeau & R. Heller (Eds). *ED-MEDIA 2000*, pp. 1216-1218. Proceedings of the 12th annual World Conference on Educational Multimedia, Hypermedia & Telecommunications. Montreal, 26 June - 1 July. Norfolk, VA: Association for the Advancement of Computers in Education (AACE).

Biggs, J. (2003). *Teaching for quality learning at university.* New York: Open University Press.

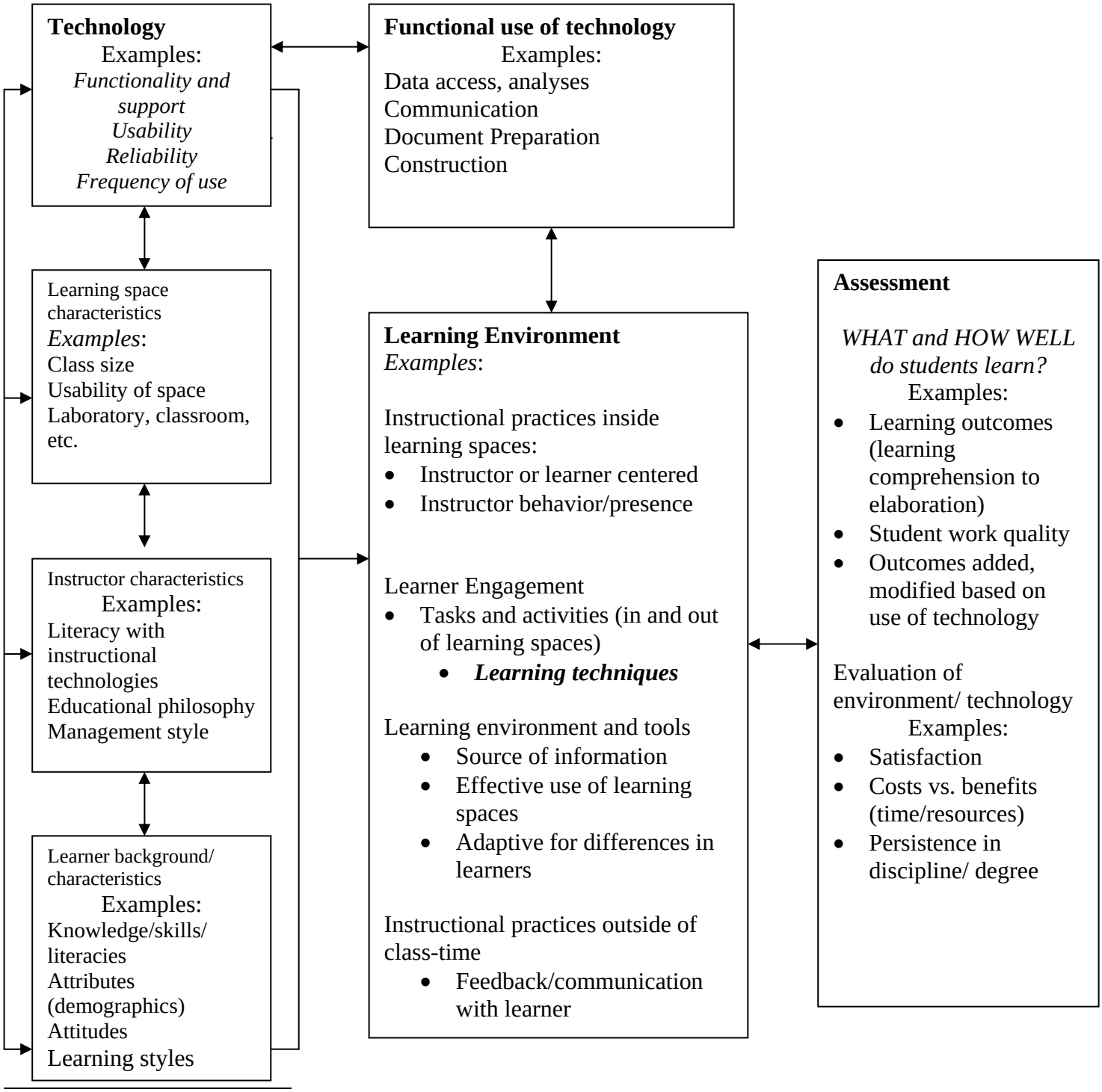
Bruce, B., & Levin, J. (1997) Educational technology: Media for inquiry, communication, construction and expression. *Journal for Educational Computing Research, 17*(1), 79-102.

Center for Learning Enhancement and Research (CLEAR), The Chinese University of Hong Kong (n.d.). The SOLO taxonomy as a guide to setting and marking assessment.[5] Downloaded from http://www.cuhk.edu.hk/clear/download/PDC/05May%20Lang/guides/SOLO_assessment_grid.doc

University of Texas. (n.d.). Classroom observation worksheet. Downloaded from http://www.utexas.edu/academic/cte/ClassWorksheet.pdf

Appendix A: Model

DRAFT FRAMEWORK FOR OPERATIONALIZING AND ASSESSING TECHNOLOGY — IMPACT ON STUDENT LEARNING[6]



[5] Joni Spurlin, Brad Mehlenbacher, Dianne Raubenheimer, Deena Murphy-Medley, Stan North Martin – based on Brad Mehlenbacher's "Five Dimensions of all Instructional Situations" in "**Usable E-Learning: A Conceptual Model for Evaluation and Design"**

Appendix B: Case Record

Name
Course #

1. How does the instructor describe their role in the classroom? (i.e. see observation rubric - learning direction; choose the best of the four roles and describe why you think that)
2. How does the instructor describe their use of technology in the classroom? (i.e. see observation rubric - technology use by instructor – which of these categories best fits what they said in the interview)
3. What is the faculty member's attitude about teaching because they use technology (e.g. enthusiasm, workload)?
4. How does the **faculty member** view their use of technology **in the classroom** impacting student learning?
5. How does the faculty member view the use of technology by **students in the classroom** impacting student learning?
6. How does the faculty member view the use of technology by **students outside the classroom** impacting student learning?
7. How does the faculty member describe assessment of student learning.
8. How does the faculty member describe the relationship between teaching using technology and assessment of student learning outcomes?
9. Did the syllabus contain learning outcomes/objectives?
10. Describe how the outcome for the observation time was identified?
11. Describe what student work was identified relating to this outcome.
12. What was the process for obtaining student work?
13. What is the outcome that relates to the observation day? This outcome should also relate to the student work (did it?, if not what is the outcome that relates to the student work). What is the SOLO level of that outcome?