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Student and faculty perspectives of a scalable, sustainable, higher education, learning-rich classroom

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Student and Faculty Perspectives of a Scalable, Sustainable Higher Education Learning-Rich Classroom

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Abstract

This article profiles the development of a sustainable, learning-rich room and provides student and faculty perspectives on its effectiveness. The room features mobile furniture and instructional technology – interactive whiteboard, student response systems and FLIP camcorders. Three faculty members were selected to use the classroom for instruction. Data was collected via student surveys and videos as well as faculty meetings, videos, surveys, and reports. Faculty made extensive use of the classroom infrastructure by employing a wide variety of active teaching methods. The success of the Learning Lab resulted has given administration new opportunities to explore innovative teaching through building learning rich classrooms.

"Good teaching is the creating of those circumstances that lead to significant learning in others." – Don Finkel (2000)

Creating such circumstances is often difficult in today's cash-strapped college environment, but this paper will share the steps in creating a scalable, sustainable "Learning-Rich Laboratory." In addition to sharing the process, this paper will profile the inquiry-based active teaching and learning that occurred in the lab and present the resulting data on the effectiveness of this lab for creating engaging teaching methods. Ultimately, our goal for this paper is to help other centers, as well as faculty members, create similar learning environments where new instructional techniques can be discovered and subsequently translate the experiences to other courses.

The goal of the Learning Lab is to create an ideal learning environment to implement active strategies by capitalizing on instructional technology and other teaching tools. The items purchased for the lab--a Smart Interactive Whiteboard (SB680i2-Unifi 45 projector) ($3300); Audio (SBA-NA USB audio system for 600 series) ($300); Chairs (Torsion/Go Tablet armchair) ($390/each); Whiteboards (Rolling 4 pt base Marker board 48"x66" w/casters) ($350/each)--totaled about $15,000. The intent was to significantly assist each faculty member in generating interactive learning strategies by using electronic instructional material. Data was collected in order to determine the effectiveness of these strategies so faculty can implement the best practices into their other courses.

In return for our dedicated services, each Faculty Fellow agreed in writing to:

- Grant full access to their lesson plans, online course sites, teaching material, etc., so that we may better assist in offering the most appropriate types of electronic tools;
- Provide their permission to capture all activities in class using video, audio, etc.;
- Allow the Center to share their image, work, etc. widely as a showcase example; and
- Assist/author in the preparation of a scholarly manuscript on teaching and learning.

As part of this learning-rich environment, each student agreed in writing to

- Be prepared and fully engage in the active learning activities;
- Permit the capture and use of their work, images, audio, etc.;
- Be on time, professional and behave as a serious student, on and off camera; and
- Treat the Center and its staff with care, concern and respect.

Literature Review on Learning-Rich Environments

The goal of our learning-rich environment is to maximize student engagement by creating a high degree of instructor-student as well as student-student interaction. Currently, there is only one journal dedicated to learning environments, Learning Environment Research Journal, (www.springer.com/education/journal/10984). Examples of innovative research on exploratory learning rich laboratories is limited, especially in those journals which do not focus on instructional technology. Further, previous research examining the effects of technology-rich classrooms on teaching and learning has been inconclusive. Cohen (1997) explored a high school technology-rich classroom for one year and found that the use of technology had a minimal effect on learning styles or the potential benefits of a constructivist environment. The results did seem to suggest that a technology-rich environment affects the written and unwritten curriculum in a classroom. For example, Zandvliet and Straker (2001) suggested that the appropriate physical conditions for a technology-rich learning environment are necessary to address the psychosocial aspects of student learning which distracts students and instructors from learning outcomes. Clark (1994) suspects that if any learning occurs in a technology-rich environment, it is most likely due to the type of active instructional method embedded in the deployment of instruction. Yet, the quality of their learning environments can predict how well students learn and how they feel about their learning (Taylor, Fraser & Fisher, 1997).

Thus, learning-rich environments require more than the infusion of sophisticated technology. For example, Bransford, Brown, and Cocking. (1999) have created an instructional model which identifies four major aspects, Learner-, Knowledge-, Assessment- and Community-Centered. Delving further into multiple roles for students and teachers, Collins, Brown, and Newman (1989) developed a model for ideal learning environments which contains four primary parameters: content, methods, sequence, and sociology. Although each of these dimensions has been explored throughout the literature, it is the combination and the differentiation of roles for teachers and students that is the hallmark of this model. The Learning Laboratory attempts to assist faculty members in addressing each of these attributes by using new active methods and instructional technology, which may not be available in traditional classrooms. Therefore, the purpose of this article is to examine the effectiveness of a learning-rich laboratory environment from both student and faculty perspectives.

Learning Lab Faculty Fellows Outcomes

Three faculty members were selected as the Center's Faculty Fellows for the spring 2009 term. The selection was based on the faculty members' previous engagement with the Center and interest in integrating additional active learning into their classes. To assess the effectiveness of the Learning Lab, data was collected from both the Learning Lab Faculty Fellows teaching the courses and the students enrolled in those classes. Feedback from the three fellows was generated in four ways. First, the three fellows took part in biweekly discussion meetings hosted by the primary author which centered on four questions:

1. What went well in the lab?
2. What did not go well in the lab?
3. What comments did students make?
4. How could the Learning Lab staff help?

Second, each fellow was provided a list of 145 active learning methods adapted from Angelo and Cross' (1993) *Classroom Assessment Techniques*; Silverman's (1996) *Active Learning: 101 Strategies to Teach Any Subject*; and Van Gundy's (2005) *101 Activities for Teaching Creativity and Problem Solving*. At the bimonthly meetings, each fellow tallied the number and type of active learning strategies which they implemented over the two week period. Third, each fellow also completed a short fifteen minute presentation on the highlights of their use of the Learning Lab. Finally, the fellows provided videotaped comments for a presentation highlighting the Learning Lab.

Student input was collected via pre and post class surveys (Appendix A).[1] The surveys asked eleven questions about student preferences for lecture; visual aids; instructional technology; frequency of asking questions; supplemental notes; communications in and outside of class; and the most important activities professors can do to make lectures interesting and attributes of an outstanding professor. The surveys were administered on the first and last days of class. Student feedback was also captured through video footage and informally through comments overheard by lab fellows and staff.

The results of the surveys indicated that high percentages of students preferred active learning strategies both prior to and following the courses in the Learning Lab. Students prior expectations of active learning were surprising, as many selected our university because our mission "to provide a superior, student-centered learning experience integrating liberal arts and professional education and preparing individuals for lasting achievement and responsible leadership in their careers and communities". In addition, we highly publicize some of the attributes which "What Makes our University Distinctive" on our website at http://pacific.edu/x4033.xml, which includes sections entitled learning tailored to you; practical learning; student community; and student centered education. Chi-square analyses were used to assess any significant changes in student learning

[1] Students agreed in writing, using an IRB approved form, to their data being used for this study

preferences. No significant changes were found as a result of taking a class in the Learning Lab (Table 1).

Table 1. *Student Survey Chi Square Data*

Item	X^2
3. Change in preference for lecture style	3.91
4. Change in the desired proportion of lecture and group work	2.02
5. Change in the desire to have different technologies used in the classroom	1.80
6. Change in the manner in which students wanted professors to ask questions	0.89
7. Change in preference for obtaining materials from lecture.	2.51
8. Change in preference for communicating with professors outside of class	3.43

*p<.05

Descriptive items on the pre and post surveys seemed to indicate that students who selected our institution expected an active learning environment. The tenth item on the survey asked students to choose the most important things a professor can do to make lectures interesting as well as informative. Students gave the highest marks for all three fellows on both pre and post surveys in the category “Shows enthusiasm for subject,” listing it as either first or second on their priorities. The second most popular ranking was, “Has good presentation skills- has clear and expressive voice, speaks at good pace, makes eye contact,” which remained similar from pre to post. The third most popular, “Adds personal stories/experiences/research,” also remained the same after both surveys were compared.

Despite the lack of statistical significance, the qualitative results do indicate that the Learning Lab did facilitate a high degree of active learning. The benefits of the Learning Lab seemed to split into two categories. On one hand, the Learning Lab Faculty Fellows felt that they were able to design

and implement more active learning strategies and assignments than in typical classrooms. At outset of the semester the fellows seemed to use a wide variety of strategies as they were exploring the best ways to make use of the lab. As the semester progressed, they seemed to settle into the types of strategies that best complimented their teaching styles and subject matter. On the other hand, it appeared that students subsequently embraced benefits offered by the technology of the lab and strategies it enabled. As the instructors began to incorporate technology into their assignments, both they and the students felt comfortable taking ownership of the course content.

First for faculty, the design and location of the lab facilitated active learning. Fellows commented that the movable chairs and roominess of the classroom allowed them to, "easily change class set-up…multiple times during class." Such set-ups included partnerships, small groups, and town hall meetings. By arranging the room in such ways, professors indicated that they could move more easily around the room to, "hear what groups are discussing," offer immediate feedback, and simply improve their interactions with students during such periods. These actions were hastened by the presence of movable whiteboards that were used for group notes, concepts maps, lists and other diagrams. Fellows also took advantage of the Learning Lab's location in the University's library. At some point in the semester, all three professors sent their classes into the library to gather information, observe behavior, or to use the library's technological resources. Due to this set-up, the instructors enjoyed the flexibility to try new ideas almost instantaneously. As one fellow noted, "If I had an idea about how to improve a class, I could often implement it on the spot rather than jotting down a note and trying it 'next time'."

Second, the technology in the Learning Lab clearly assisted the fellows' ability to carry out in active learning strategies. Internet access in the lab permitted them to integrate extremely current web content (e.g., articles, pictures, video) into their lessons, and in some cases actually calling up content in the midst of discussions. While the interactive whiteboard was an impressive way to display such visual content, the feature most appreciated by the instructors was the ability write on the board during class discussions and save the diagrammed information for incorporation into future

assignments. Professors noted that FLIP camcorders were an especially helpful element of lab. The availability of these cameras facilitated assignments in the courses, and they were also used as an evaluative tool to critique students' presentations. The student response system (clickers) was the third helpful pedagogical tool. Their clickers' effect was most dramatic when discussing sensitive topics because students were able to remain engaged anonymously. Clicker's also vividly demonstrated student learning. For example, one fellow used them to demonstrate, "the discrepancies between expectations" of the class before and after being presented with research findings.

For students the technology of the Learning Lab seemed to excite them, eliciting comments like "wow," "cool classroom," and "I like this class." Beyond the awe factor, the Learning Lab appeared to facilitate students' engagement with the instructor, their peers, and technology. Students' comments and behaviors demonstrated that the layout of the classroom encouraged increasing quality and quantity in interactions. One fellow indicated that, "students actually wanted to come to the board" to share their ideas. Students also began to naturally claim space in the lab, often space that was not specifically designated for instruction. In these cases it was common for students to take the class technology with them. In one instance, a group moved into the library (not part of the Learning Lab) and took a movable whiteboard and FLIP camcorder with them. In a similar vein, students grew increasingly comfortable using technology and incorporating it into their assignments. At the outset of the semester, students used the technology with trepidation, unsure how markers would work on the interactive whiteboard or how to upload video. However, by semester's end, one professor indicated that students, "presented and integrated many of the tools I use— interactive whiteboards, clickers, video—without me having to tell them."

The faculty fellows agreed that the Learning Lab's technology improved the students' ownership of the course content. The lab enabled students' voices to be heard in many different ways. First, students used the movable whiteboards, FLIP camcorders and interactive whiteboards, "to create, share, and present in a more visual way." Second, the clickers allowed even reticent

students to present their opinions and compare them to those of their classmates. Third, fellows felt the whiteboards, particularly the interactive whiteboard, helped students realize the relevance and value of their ideas. Placing their comments on these interactive boards was merely a start. What the lab then permitted was the ability to save those comments, post them on the class website, and incorporate those comments into future meetings, projects, or tests. It was a benefit of the lab that clearly heightened the importance of student contributions to the class. As one fellow said, "no matter where the discussion goes, students always know they and I are accountable" for all class information.

Discussion

The purpose of this paper was to share information on the development of a learning-rich classroom and examine its effectiveness from student and faculty perspectives. The results of our study indicate that the Learning Lab was a classroom that epitomizes the useful parameters of ideal learning environments (Bransford, et. al., 1999; Collins, Brown & Newman, 1998). This environment facilitated authentic and frequent interactive connections in the classroom. The effects of the success of this pilot program have led to the development of four similar classrooms for the next academic year.

First, the Learning Lab enabled higher levels of interaction to occur. Interactions were frequent between professors and students as well as amongst the students themselves. The interactive whiteboard and the clickers in the classroom enabled students and professors to interact in a variety of formats. The movable furniture allowed professors to modify the room to suit their needs. Both elements of the Learning Lab minimized the difference between the teacher zone and student space that may impede active learning.

Second, the Learning Lab also enabled knowledge to be collected, disseminated and generated in numerous ways. The lab's location in the library offered an active learning advantage in that students could be sent out to gather information and return to convey it to their peers. The interactive whiteboard allowed students and faculty to present information visually, but uniquely let

both students and professors to tinker with that information on the board. The currency of such information was also enhanced by the ability to cull articles, pictures, and video from the internet. The FLIP camcorders allowed students to generate their own knowledge and easily share it with the class. The "ownership of knowledge" that stemmed from the use of the FLIP camcorders clearly reflects the engagement with content that is a hallmark of the ideal active learning environment (Bransford et. al, 1999).

Dynamic assessment is a third element of ideal active learning environments that was achieved in the Learning Lab. Student critiques were a frequent form of assessment in the lab. Whether it was critiquing student presentations with clickers, video clips on the projector, or peer concept maps on the whiteboards, student feedback was consistent and regular. Student projects were also common in the Learning Lab. One professor assessed his students on their ability to plan and carry out a one-day fundraising event. Another class had to develop group videos on pop culture and gender. Thus the Learning Lab enabled professors to get beyond simply using essays and exams as assessments and to focus on student learning in dynamic and meaningful ways.

While these three elements combined to create the community-centered environment needed for active learning, it is the student perceptions of these environments that determine up how well students learn and how they feel about their learning (Taylor, Fraser & Fisher, 1997). Although there was no significant change in learning environment preferences, it was likely due to the high levels of interest in active learning at the outset of the semester. Given that these students attend a small, private university, a keen interest, and perhaps expectation, of active learning classrooms is no surprise. The qualitative results indicate that they took full advantage of the Learning Lab to interactive intensely with their peers and professors, improve their use of technology, and take ownership of the learning process for a true community-centered learning experience.

The Learning Lab was a success for both the Faculty Fellows and their students. The location, design and technology of the lab permitted fellows and students to increase creativity, interaction, enjoyment and most importantly, learning. The elements of the Learning Lab created by

the Center for Teaching and Learning the pedagogical tactics developed by the Faculty Fellows can serve as a model for other professors, departments, and/or institutions seeking to create active learning environments. In fact, the success of the Learning Lab has led to the establishment of four more learning rich classrooms at the University of the Pacific.

Further Work

Although this initiative was more successful than we had anticipated, and in a much shorter timeframe, there is always more we can do. The challenge of an experimental laboratory is to continue exploring alternate methods for teaching and learning. Some of the preliminary ideas for future capabilities involve installing webcams for capturing classroom activities; purchasing a set of FLIP camcorders so that students can work with these on a daily basis and/or check them out; developing a Learning Lab wiki where posts are made in a storyboard fashion; connecting student input to a Twitter account run by the Faculty Center for Teaching and Learning; telecasting the Learning Lab's activity to other schools (both in higher and secondary education); allowing open polling with mobile phones through sites such as www.polleverywhere.com; and collecting and posting the highlights of daily classes on a themed YouTube section. Of course, as more technology and active pedagogical methods are created, the Learning Lab will make itself available to take these risks and collect data so that other students and faculty members can benefit from technology-rich learning environments.

References

Angelo, T. & Cross, K.P. (1993). *Classroom Assessment Techniques*. John Wiley & Sons, Inc.; San Francisco, CA.

Bransford, J.D., Brown, A.L. & Cocking, R. (1999). *How people learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press.

Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research and Development, 42*(2), 21-29.

Cohen, V. (1997). Learning styles in a technology-rich environment. *Journal of Research on Computing in Education, 29*(4), 338-351.

Collins, A., J.S. Brown, & S. Newman. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics," in L.B. Resnick (Ed.), *Knowing, Learning and Instruction: Essays in Honor of Robert Glaser*. Hillsdale, NJ: Erlbaum.

Finkel, D. 2000. *Teaching with Your Mouth Shut*. Portsmouth, NH: Boynton-Cook Publisher's Inc.

Silverman, M. (1996). *Active learning: 101 Strategies to Teach Any Subject.* Needham Heights: Allyn and Bacon.

Taylor, P.C., Fraser, B.J. & Fisher, D.L. (1997). Monitoring constructivist learning environments. *International Journal of Science Education, 459*, 414-419.

Van Gundy, A. (2005). *101 Activities for Teaching Creativity and Problem Solving.* San Francisco: Pfeiffer.

Zandvliet, D. B. & Straker, L. M. (2001). Physical and psychosocial aspects of the learning environment in information technology rich classrooms, *Ergonomics, 44* (9), 838-857.

Appendix A

Student Survey of Teaching Methods **Name** _____ **Date**

1. Academic Level: (a) Freshman (b) Sophomore (c) Junior (d) Senior
2. Gender: (a) Male (b) Female

3. Preferred lectures (a) only most of the time. (b) supported with visual aids. (c) with student discussions/group work.
(d) with visual aids, questions/discussions, and student group work.

4. The ideal proportion of lecture (including use of various visual aids) and student group work
(a) 90% or more lecture and 10% or less student group work (b) 75% lecture and 25% student group work (c) 50% lecture and 50% student group work (d) 25% lecture and 75% student group work

5. A lecture using technology is more effective than one supplemented by traditional aids such as whiteboard and overheads.
(a) True for all cases. (b) True for most cases. (c) Occasionally true. (d) Rarely or never true.

6. Instructor should ask (a) a few questions of students. (b) many questions of students. (c) students to ask questions.

7. Preferred supplemental lecture notes available (a) online PRIOR to class. (b) online AFTER class. (c) at library.

8. Preferred communication WITH instructor outside of classroom:
(a) In person (during office hours or by appointment) exclusively. (b) Prefer in person, but will use e-mail occasionally for convenience. (c) Prefer via e-mail, but will use in-person conferences when necessary or convenient. (d) Via e-mail exclusively.

9. For you to achieve a high GPA, who plays the most responsible role? (a) Myself (b) Professors (c) Parents (d) Other

10. From the list below, choose the FIVE most important things a professor can do to make lectures interesting as well as informative. Rank these in order of importance, by placing a 1-5 on the line in front of the number, 1 being the highest importance.
___ Has good presentation skills- has clear and expressive voice, speaks at good pace, makes eye contact
___ Shows enthusiasm for subject
___ Encourages student participation through open ended questions
___ Varies format/pace/amount of lecture as compared to other activities
___ Uses visual aids
___ Uses innovative methods
___ Adds personal stories/experiences/research
___ Illustrates concepts by giving analogies or describing specific examples
___ Provides comfortable atmosphere that encourages students to ask questions/join in discussions
___ Includes time for student group work in most/all classrooms sessions
___ Explains complex concepts clearly
___ Moves about classroom
___ Other (please feel free to write your ideas in)

11. From the list below, choose the FIVE most important characteristics of an outstanding professor and rank in order of importance, by placing 1-5 numbers on the line next to the item, 1 being the most important.
___ Empathetic

___ Enthusiastic
___ Gets to know students as individuals
___ Humorous
___ Relates to students
___ Intelligent
___ Encouraging and supportive
___ Challenging
___ Available outside the classroom
___ Fair
___ Organized
___ Shows respect for students
___ Maintains discipline in the classroom
___ Uses methods that require us to use critical thinking skills
___ Other (please feel free to write your ideas in)