Development of an Advanced Classroom Technology Laboratory: An "Incubator" for Next Generation Learning

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Abstract

This article explains the history of an Advanced Computer Technology (ACT) laboratory at Middle Tennessee State University Honors College. The ACT laboratory serves as an incubator classroom, and as a testing and experimental learning environment for faculty and students. Interviews with four administrators involved with the planning and procurement of the room (along with five faculty who had actual experience in teaching with the new equipment) are provided. This article details the history of the room's inception, along with a list of advantages and suggestions for improvement from faculty who have taught classes in this space. An actual schematic of the current room is provided to help readers envision its capabilities.

Keywords: ACT laboratory, Community Collaboration, Leaderful practice, Flexibility, Communication

Introduction

Organic, de-structured, flattened, and de-layered are all euphemisms associated with a rapidly changing organizational environment. In the era of advanced computing and electronic information however, organic is also associated with a free flowing stream of communication that is generated among individuals within organizations. Not only may institutions as a result be more fluid, but they may also be more productive. A Gallup survey reported by LaBarre (2001) for example found that the most "engaged" workplaces had substantially lower turnover, higher than average customer loyalty and productivity, and higher profitability. A decentralized structure also has implications for diminished bureaucracy, enhanced management capabilities, and over the long term, a participative mode of self-governance (Nakamura, 1996).

In *Creating New Spaces for Learning* (2007) the authors assert that learning spaces, especially within institutions of higher education, should mirror these new organizational environments so that they are able to enhance students' preparation for employment. They argue that space should be designed for "socially catalytic" interaction, in which projects can emerge through brainstorming, informal chat, and civil dialogue. This "cyber infrastructure" is characterized as more of a "studio" than a classroom, which should be (1) multidirectional; (2) connected to other spaces; (3) student-centered; (4) with varied and multiple activities; and (5) with more faculty student interaction. The authors further explain that the building blocks for this new type of community are technology, physical space, and curriculum. In this welcoming "studio" space, opportunities for learning permeate the entire campus (Bickford, Wright, & Dittoe, 2007).

Raelin (2003) reiterates managing in a way that promotes the unfettered contribution of all members - in what he terms a "leaderful" community, where everyone regardless of rank may serve as a leader depending upon the circumstances. He describes leadership as concurrent (e.g., multiple people serving in a leadership role at one time, where leading is considered the potential domain of all members), collaborative (in which everyone's opinion is considered important and is frequently solicited), compassionate (in that it respects the dignity of others) and collective, in that it is based on a community model. He argues that these new skills will be required in organizations that "…are becoming more fluid,

experimenting with virtual and network structures that have begun to even challenge our conventional notion of 'internal' and 'external'" (Raelin, 2003, p. 17). In such fluid environments individuals must be able to readily step up to the plate to serve in whatever role is required of them. "Leaderful" practice is then mutual, multidirectional, and reciprocal. In line with this assertion Pollard argues in *The Soul of the Firm* that "…the mission of the firm is understood to include the personal development and growth of every worker" (1996, p. 21).

At Middle Tennessee State University (MTSU) this philosophy has been implemented in the form of a newly renovated learning space in the Paul W. Martin Honors College. The purpose of this article is to describe the experiences of faculty who have taught in an Advanced Computer Technology (ACT) laboratory learning environment at Middle Tennessee State University (MTSU), and, to explain the room's development from the MTSU administrators involved in the classroom design. Results of interviews with four administrators and five instructors who have actual experience in teaching in this laboratory are provided, along with future directions for technology-enhanced classrooms and instructional applications.

History of the ACT Laboratory

The Honors College classroom renovation project began over two years ago, when it was determined that student computers in the Honors College laboratory were not being used in the manner for which they were intended. Students for the most part liked to work in informal, small groups, rather than in small individualized carrel spaces as the room had been originally configured. The increased emphasis on collaboration within the MTSU Learning Community provided an incentive for a redesign of the physical space within the room itself, and, an exploration of electronic learning and teaching tools premised on a community model. One administrator remarked that it is important to look at ways of redesigning classroom delivery, as students today are more intuitive as a result of growing up with a variety of technology. Consequently, building community will result when faculty learn how technology can further their instructional goals.

University administrators and classroom technology staff from the Information Technology Division, along with a consultant (The Sextant Group), who specializes in audio, visual, and technology design, met for a period of several months to identify how the emergent technology could be configured for an Advanced Computer Technology classroom that would best serve student needs.

Goals for the ACT lab included:

- providing opportunities for new pedagogical approaches
- accommodating variable student learning styles
- encouraging student-to-student collaboration
- serving as a way to record classroom discussions and preserve course material
- increasing the marketable skills of students ("Honors College," Fall 2006, p. 2)
- testing equipment to see if it was appropriate for campus wide usage

The technology in the room includes a mobile instructor station (a Polyvision "Walk-and-Talk™ cordless lectern") with a tablet computer and annotation screen, ("Honors College," 2006), a VCR, DVD player/recorder, a visual presenter, a ceiling mounted projector, eighteen tablet personal computers, and four wall mounted plasma screens with laptop connections that can be displayed through the ceiling mounted projector and the Polyvision Thunder™ Virtual Flipchart™ System. In addition, the equipment, along with lighting and window shades, can be controlled through a Crestron control panel. The room also showcases furniture that was specifically designed for flexibility with ease of movement, as well as student comfort. The chairs can be placed in various configurations, including grouped around one of four plasma computer screens that are each stationed in a different quadrant of the room, strategically positioned to facilitate student group collaboration and activities.

Unique to this room is the Polyvision Thunder™ Virtual Flipchart™ System, an electronic flipchart that can simultaneously display up to six electronic views at a single time. It was initially designed for corporations, but was more recently introduced into the higher education environment. Middle Tennessee State University was one of the first institutions to create a classroom featuring the integration of all of these advanced technologies. One administrator remarked, "We need to look at our students as they come through with intuitive capabilities, and how it affects students minds' and the way they learn."

The Thunder™ system can be connected to other Thunder™ systems in remote locations, creating a "virtual meeting room" in which team members do not need to be present in order to participate. Pages can be saved in PDF format and displayed as Web pages, or sent via e-mail ("New Classroom," 2007). Text on the Thunder™ whiteboard is dynamic in that it can be seamlessly reordered, easily moved into another part of the electronic page, or "thrown in the trash" (a process which is graphically displayed on the screen). Notes made on the Thunder™ system may also be saved and retrieved at a later time, as well as sent to a USB storage device. Moreover, images can be imported from an attached scanner and displayed on an electronic page, along with video from the VCR or DVD players. Content from multiple classroom tablet PC's or an external computer (when provided with the appropriate IP address) can also be shown, and control of the Thunder™ easel can be shared among participants. Any pictured item may be annotated with a special marking pen and included in the archived file.

To officially open the laboratory, a demonstration of its capabilities was held for representatives from MTSU and the local business community. The demonstration included a simulated class with the use of collaborative exercises, and role playing with the use of an online game ("Virtual U") in which participants worked with one another to simulate managing a higher education institution. Further demonstrations were also conducted to showcase the use of this cutting edge technology for departmental and committee meetings (note: a schematic of the ACT Laboratory is provided in Figure 1 at the end of the paper). Classes commenced in the ACT laboratory one semester after the demonstration.

Method

Five faculty and four administrators at MTSU agreed to participate in interviews regarding their experiences within the ACT laboratory and their role in the planning process, respectively. The questions that were posed of faculty appear below:

- How did you find your experiences within this classroom?
- What type of applications did this technology facilitate? What was possible in this space that would have been impossible or difficult in a traditional classroom, or in a traditional master classroom?
- Describe some of the student projects and instructor applications that you performed in this room.
- Describe some of the challenges that you encountered with this technology.

Questions posed of individuals involved with the procurement and maintenance of classroom equipment included:

- How did you decide on this particular technology? What is the history of this technology, and what did the procurement process entail?
- Are there any other applications of this technology in the world?
- Is there anything that you would have done differently with regard to installation and vendor dialogue?

Participants were encouraged to add their own observations and commentary, in addition to the pre-scripted questions that were posed. Open-ended questions allowed for participants to elaborate on concepts they found of particular interest, and to contribute their own observations and ideas. Data was collected by written notes and later transcribed to a word processing format. Interviews were conducted between September and November of 2007, with each individual session lasting between twenty and thirty minutes.

Interview Results

When interviewed, faculty identified advantages to using the laboratory, and they also shared what they liked about their experiences. Common themes that emerged included a collaborative environment, less paperwork, more peer interaction, and enhanced technological capabilities. These responses are summarized below:

- The format facilitated applications in both undergraduate and graduate science and behavioral courses. Faculty who taught in these disciplines liked the informal environment, which they felt enhanced connectivity inside the classroom.

- Because students worked in groups where the results from plasma screens could be broadcast to the front of the room, less paperwork had to be generated, and faculty did not have to do as much preparation ahead of schedule.
- Students were more comfortable presenting their in-class research projects on tablet personal computers. In addition, they received practice in gathering information.
- The room facilitated participation, small group problem solving, role play, and simulation.
- Thunder™ was used to capture "talking points," which could be saved and later e-mailed to students.
- Web-quests could be performed during class time.
- The room provided the capability to capture a presentation on DVD, which could then be given to another student group for evaluation and "interactive feedback."
- Students' confidence level was boosted when they saw that they could present "on the fly" and provide a fresh perspective to their peers; one faculty remarked that "…students can collaboratively develop a power-point for impromptu presentations."
- The technology was especially useful when it is important to show students "something in the background," along with an actual application, such as the database that is underlying a geographic information system map and the map itself.
- One instructor remarked that there should be training provided by the professor to make students aware of the benefits of the ACT laboratory as compared to a traditional classroom. One such benefit might include "Projection from multiple sources that enables students to more easily see the source of the change caused by an intervention."

As the intent of an incubator classroom is to test and experiment new pedagogical and technology techniques, faculty were also asked to comment on what noted improvements they would like to see in future ACT laboratories on campus, along with changes they would like to see in the current room. These comments appear below.

- Use of AMEX technology instead of Crestron would have enabled the in-house IT staff to both repair and maintain the equipment, because AMEX is the controller standard at MTSU.
- Chairs should not be as heavy, and they should have multidirectional wheels.
- A dedicated IT staff member who can help faculty when they reach a difficulty, and/or who can help train them on equipment is essential.
- Have a backup whiteboard.
- Include flipcharts at each of the plasma groupings. According to one faculty interviewed, "PowerPoint was not viewed as a malleable draft;" when in actuality, the traditional flipchart was more suited to brainstorming.
- The tablet computers were very slow, and were often shelved in the storage unit without being linked into the charger system.
- A closet with a set of wall hooks for coats and backpacks would have removed clutter from the floor.
- The building closed around 4:30 p.m., which created reliability and technical support issues.
- The "pointing stick/track ball" on the notebook computers was cumbersome to use; a "touch pad" would have been more efficient and easier for students.

Faculty concerns were shared with university administrators and information technology staff. As a consequence, considerations for new classrooms/laboratories planned on the MTSU campus will include:

- Increased capacity for up to 20 students
- A traditional instructor station.
- Thunder™ projection and the traditional projection on different walls so that seven displays can be viewed at once
- Shelving for the notebook computers so that students can open them inside the closet
- A mobile lectern with a laptop instead of a "walk and talk" lectern
- Chairs with bi-directional wheels
- Hardwood flooring.

Although faculty and administration did not collaborate prior to the design of this particular space, there is ongoing consultation with faculty, academic affairs officers, and classroom technology support personnel prior to determining classroom technology configurations.

Discussion

Tinzmann et al. (1990) describe collaborative learning as a collective event, driven by learners who are self-determined and knowledgeable, and who are led by teachers who behave as mediators. Optimally, they suggest that this type of connection occurs in an environment where there is "shared authority among teachers and students," (¶ 9) which allows for [use of] "diverse media for communicating ideas" (¶ 18) in which students are active participants. In this type of learning enclave there is an emphasis on content as well as process, and an attempt to incorporate dialogue, or a dual-party participation and examination of speech within the classroom. In conjunction with this assertion, Bruner (1987) describes the process of "scaffolding," in which individuals become responsible for their own learning. Because MTSU recognizes that the role and desires of incoming students are changing, (as Tinzmann et al. articulate), its goal was to create a cutting edge learning space that would provide more freedom and creative license for faculty, along with enhanced opportunities for students to synergistically learn from their peers through observation, open critique, feedback, and learner driven outcomes. At MTSU the design process, implementation, and the democratic response to faculty feedback (with regard to the incubator classroom) all demonstrate a desire to collectively evolve traditional instruction so that it is more responsive to changing student needs. Because students have so many shared electronic, or "Web 2.0" resources at their disposal, their expectations in terms of learning environments are radically different from even a few years ago. Individuals who regularly use blogs, wikis, and social networking tools may naturally respond better to a classroom in which chairs are not rigidly placed in preset patterns, and in which there is a free-flow of give and take between themselves and the instructor. In this space the "sage on the stage" is transformed to the "guide on the side" in an attempt to proactively stimulate interaction that is seen as both natural and beneficial for students.

Future incarnations of the incubator classroom will incorporate the iterative feedback process to enhance student learning, and to facilitate faculties' ability to effectively reach their constituencies. Learning in this case then becomes a transformative event and an instructive process, which evolves with time in response to a student driven mandate. The incubator classroom is partly an answer to Palmer (1998), who exhorts academics to mimic the democracy and leadership experiences that students experience daily in their electronic social lives.

Conclusion

The MTSU ACT laboratory (one of the first of its kind in the country), integrated a confluence of cutting edge technologies to provide a classroom community model which facilitated two-way communication. Although this room was on "the bleeding edge of technology," (as one MTSU administrator stated), the first incarnation netted a positive benefit to both students and instructors, while at the same time providing essential feedback on how to reconfigure future classroom and laboratory designs.

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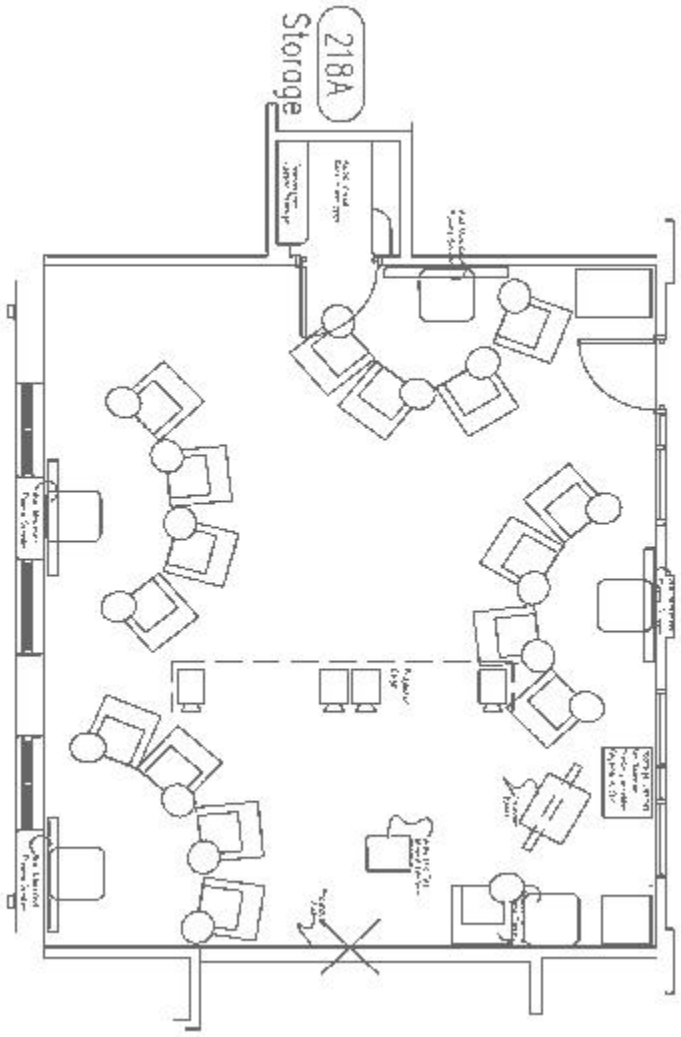

Figure 1. Current ACT Laboratory Configuration

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