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Final Report of the Information Technology Subcommittee for the Campus Master Plan

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Recommended Citation

Mehta, Apurva; Ayyagari, Ramakrishna; Berry, Eric; Cesario, David; DePalma, Christine; Fejer, Peter; Flynn, Meghan; Galaitsis, Kitty; Jessoe, John; Lo, Lusa; Ortiz-Zapata, Daniel; Perelson, Virginia; Pollard, Mike; Polley, Kathleen; and Soule, Jamie, "Final Report of the Information Technology Subcommittee for the Campus Master Plan" (2009). *Campus Master Planning Publications*. 1.
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UNIVERSITY OF MASSACHUSETTS BOSTON

Final Report of the

Information Technology Subcommittee

for the Campus Master Plan

September 30, 2009



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1. Introduction

In May 2008, the Information Technology Subcommittee of the Campus Master Plan Steering Committee was formed to recommend standards and guidelines for UMass Boston's technology infrastructure.

Committee goals

- Recommend standards and guidelines for UMass Boston's technology infrastructure and equipment that supports and promotes the learning, teaching, and research requirements of the campus community.
- Recommend technology guidelines that align with the University's Strategic Plan that are formulated within the context of UMass Boston's Campus Master Plan.

These recommendations will assist and inform the planning and design of new and renovated campus facilities and specifically address the technological needs of classrooms, laboratories, offices, informal study areas, and social spaces.

2. A Note on Information Technology Systems and Infrastructure

Information Technology continues to grow and change in unpredictable ways. The dynamic state of technology offers challenges and opportunities to the master planning process within an institution of higher education. Information technology, such as telecommunications (voice and data), video, cable television, security, fire alarm, and low voltage control (building management systems), is constantly changing and driven by each building's specific needs. It is likely that the campus will engage itself in a full study to determine the current and future needs of each building as well as the campus as a whole. This study may lead to the development of a campus information technology master plan. This plan would focus on the campus infrastructure as a whole yet also focus on each building's (new or existing) programmatic infrastructure needs.

At this time, it is known that the information technology plan for the campus and each building will include the installation of conduit distribution systems, copper, single mode fiber optic cables, multi-mode fiber optic cables, coaxial cable, and power limited cabling. The campus information technology systems and infrastructure will also be designed with spare capacity to accommodate future growth and emerging technologies.

3. Methodology

Beginning in May 2008, the committee met formally about once a month. The following strategies and activities were explored to meet the committees charge:

- Collecting data and reviewing research on best practices in learning space design, classroom design of the future, present, emerging and future technologies.
- Conducting site visits to institutions of higher learning that are currently engaged in the design and building process of new learning spaces
- Surveying faculty on their perspective on technology as an integral part of pedagogy as well as students preferences and thoughts on technology needs.

The information gathered from these strategies was critical to help inform the committee. The recommended standards and guidelines are founded upon the analysis of this information.

All of the information collected, considered, and disseminated to the committee can be viewed by visiting: <http://sites.google.com/a/umb.edu/it-masterplan/>.

4. Collecting Data and Research

The committee spent a lot of time engaged in research and sharing information with each other about information technology standards and guidelines within institutions of higher education. The committee also collected data from several sources including consultants who specialized in the design of learning spaces, Educause, Eduventures, and site visits.

4.1 Dr. Linda Garcia and Dr. Homero Lopez

In 2008, UMass Boston's Chief Information Officer and Vice Provost for Information Technology met the two consultants, Dr. Homero Lopez and Dr. Linda Garcia, at a Society for College and University Planning (SCUP) conference. After learning more about UMass Boston, the consultants agreed to visit the campus to share their expertise about designing new and renovated spaces.

The consultants spent the day with members of the committee and also had the opportunity to spend time with members of the Master Plan Steering Committee, academic deans, and vice chancellors. Drs. Garcia and Lopez provided the UMass Boston team with valuable information on classroom design possibilities as well as information on how the learning styles of today's students are different from the learning styles of previous generations of students.

The following section provides some summarized notes and excerpts from their visit.

Traditional classrooms and lectures halls are the most fundamental physical spaces for teaching and learning in higher education. They have remained largely unchanged, despite the inherent challenges in their design—challenges that directly impact teaching and learning.

Traditional classroom design dictates how teaching and learning is implemented and encourages fixed roles for teachers and students, particularly the lecture based teaching style. This is most apparent in the single location where most lecture based teaching is implemented—along the wall of the ink or chalk board or projector screen. A recent report indicated that 71% of undergraduates encounter the lecture method in America's colleges and universities, in stark contrast to the collaborative learning environment that 67% of them prefer (Student Affairs Administrators in Higher Education (NASPA), 2007).

The "role bound" challenge creates further barriers to high levels of engagement between students and teachers. This challenge impedes what the Community College Survey of Student Engagement refers to as "good educational practice"—defined as practice that promotes high levels of student learning and retention.

The lack of flexibility found in traditional learning spaces presents many other obstacles to effective teaching and learning. These obstacles affect the opportunities for collaboration, peer interaction, mentoring, reflection, and coaching. Further, colleges seeking to integrate enhanced technology into teaching spaces encounter physical infrastructure limitations to seamless access to electronic information systems, presentations systems, media, power access and lighting control.

The term “millennial,” refers to the generation of young adults, approximately 80 million of them, born between 1980 and 1995. Millennial students bring learning styles and modes of interaction that are often “out of sync” with traditional learning spaces. Those who have studied this generation, find that millennials tend to tune out when they are relegated to the role of passive learners, when they are not actively engaged in the learning process, and when their dependency on technology is absent as a stimulus in the learning process. As a result, they “collide” with the traditional physical learning spaces found within higher education. The impact on their learning experience is becoming apparent. Research within the field of higher education is finding that millennials disengage from the very learning community colleges and universities have to offer. Drs. Garcia and Lopez shared two YouTube videos which provided one view on how today’s generation of students learn and interact with each other as well as how they spend their time. These videos can be viewed by visiting: http://www.youtube.com/watch?v=_A-ZVCjfWf8 and <http://www.youtube.com/watch?v=dGCJ46vyR9o&feature=related>.

Figure 1: Transitioning from Disengagement to Engagement

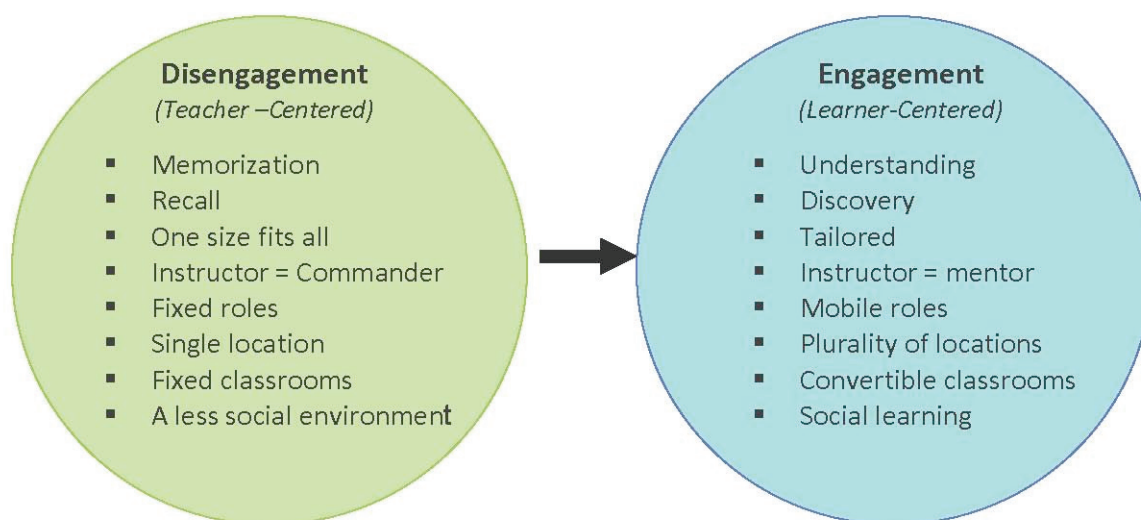


Figure 1: From Design Learning Spaces (provided to UMass Boston by Dr. Homero Lopez and Dr. Linda Garcia)

New types of learning spaces in higher education are emerging to respond to the many challenges inherent in traditional classrooms and lecture halls. A number of institutions have adopted a Learning Studio model to replace the “space challenged” classroom. Herman Miller, a leading office furniture manufacturer, refers to the Learning Studio as a reinvented classroom that reframes the relationship between teachers and students. It discourages the traditional “sage on the stage” role of the teacher. It features flexibility, space for collaborative and social interaction, integrated technology, comfort, and ambiance. Most importantly, the reinvented space changes traditional roles and facilitates engagement between teachers and students.

The redesign of the physical space can facilitate systemic changes in the teaching and learning process. Teachers are encouraged to expand their traditional lecturer role to include facilitator, coach, counselor, and mentor and they are expected to design and guide active and collaborative student learning. Students no longer have to just memorize and regurgitate information. Rather, they can discover, construct, and understand in a more meaningful active environment. The new teaching and learning environment sends cues to teachers that the space can be used more creatively. The potential technology, media, and presentation access can be reached at whatever infrastructure and investment levels are desired.

The consultants discussed four different kinds of spaces – (a) small (traditional) spaces, (b) large enrollment classes, (c) specialized spaces such as labs, and, (d) open and informal social spaces.

Some of the common themes and guidelines for the design of these areas included:

- Lighting – should be bright
- Mobile and sturdy furniture that provides the ability to collaborate with others and work in groups/teams easily
- Wireless access
- Ability to recharge portable devices
- Comfortable furniture in social spaces
- Technology to collaborate and present work easily

The consultants recommended Educause and Herman Miller as resources to utilize as UMass Boston learns more about designing learning spaces.

4.2 Educause

In the spring of 2009, Educause released a special issue of its quarterly magazine on Learning Spaces (<http://www.educause.edu/EDUCAUSE+Quarterly/EQVolume322009/EDUCAUSEQuarterlyMagazineVolum/163844>) that highlighted various planning and design initiatives in Europe, Canada, and Australia. The committee read and discussed the articles within this publication and it served as a significant resource as the committee considered its recommendations on technology standards and guidelines. A case study (University of Buffalo) highlighted in this publication is mentioned in the learning environments section of this report.

4.3 Eduventures

The committee worked with UMass Online to collaborate with Eduventures, the industry leader in research and consulting for higher education institutions. This organization surveyed higher education institutions on emerging teaching and learning technologies. The survey was inspired by an inquiry on how higher education institutions are preparing for technological evolution, what technologies will be particularly prominent in the online space during the next three to five years and how technological evolution will be accommodated via infrastructure.

Key findings of the results of this survey, published in a July 2008 report by Eduventures, included:

- Institutions are strategizing to keep pace with the emergence of new technologies in teaching, learning, and research
- Support services will be needed for supporting the use of new technological tools (including professional development seminars, enhanced training, instructional design and technical support, and accessibility to support online).
- All of the survey takers believe that emerging technologies will affect the sharing of research across institutions/units.
- Of those survey takers, 44% indicated that their institutions are currently planning on constructing new buildings and/or classrooms. In general, the infrastructure necessary to support emerging learning, as perceived by survey respondents, runs the gamut from a learning center for exploration and experimentation with emerging learning technology to increased bandwidth, revamped technology infrastructure, and improved information technology support.

The report in its entirety, including survey questions and responses, can be found in Appendix A.

5. Site Visits

Members of the committee visited two local higher education institutions– Simmons College and the Franklin W. Olin College of Engineering (Olin College). Simmons College is located in the Fenway and Longwood Medical area in Boston, Massachusetts and Olin College is located in nearby Needham, Massachusetts. In addition to these two site visits, the committee also spoke with a faculty member at MIT regarding its Technology Enabled Learning (TEAL) classroom.

5.1 Franklin W. Olin College of Engineering

Olin College is a new higher education institution and members of the committee were curious to visit a new college campus. The vice president for operations and chief information officer of Olin College welcomed two committee members to its campus and the individual responsible for information technology infrastructure as well as technology within classrooms led the tour.

The representatives from Olin College provided the UMass Boston team with valuable information about its campus planning and construction process. The following information highlights some of the information learned from this site visit:

- Representatives from Olin College, including faculty members, visited Claremont College and other engineering colleges to learn from their planning and building approaches.
- In addition to reaching out to faculty members and staff, a student information technology working group was established. This group was consulted with throughout the planning process on a monthly basis.
- Olin College spent a considerable amount of time building partnerships with various vendors. As a result of these partnerships and relationships, the vendors were willing to work closely (consulting) with students.

Classrooms at Olin College feature:

- o Mobile furniture
- o Wireless connections to the internet
- o Space that is designed to be used for other purposes (flexible design)
- o Boards on the walls that allow students to exhibit their work. These boards are reusable.
- o Dual projectors in all classrooms
- o AV is managed within all classrooms by a touch screen panel control system. There is one type of touch screen panel in use in classrooms on campus. Projectors are all Internet Protocol (IP) based. All classrooms have a document camera. Digital video cameras loaned out by a central media services area. No cable television exists but Internet Protocol Television (IPTV) is available. Streaming video services are outsourced.

Science teaching labs feature:

- o Mobile furniture
- o Open spaces
- o Cork / rubber floors
- o All IT/AV equipment is IP based
- o Nearby faculty offices

Social spaces feature:

- o Fireplaces
- o Glass doors for group study areas
- o An abundance of electrical and data outlets

5.2 Simmons College

For the past three years, Simmons College has been constructing new academic buildings on its campus. In addition, it has also made significant renovations to its library. In an effort to learn from peers in the area, three members of the committee had the opportunity to visit Simmons College to hear more about its planning process as well as some of the lessons learned throughout this process. While visiting the campus, the UMass Boston representatives met with the Dean of Libraries, the Dean of Information Technology, and a faculty liaison from Simmons College.

The representatives from Simmons College were happy to provide details regarding information technology equipment and infrastructure for the campus. From its research, it finds and plans for the average life cycle of educational technology to be 3-4 years. Information technology infrastructure for the campus is expected to last for 10-15 years. Through its planning and construction processes, it has learned that running a fiber connection to each outlet is expensive. A copper connection will be less expensive and will provide the campus with the equivalent speed.

In addition, the representatives from Simmons College also shared some general comments about planning for new buildings with the UMass Boston team, including:

- Most group study rooms have educational technology equipment within them. Some group study rooms were designed not to have any technology within them.
- Simmons has many small areas on its campus equipped with technology for students to use.
- New buildings have classroom capture systems (systems that provide the ability to record a presentation along with the synchronized corresponding audio in a format that can be redistributed via computer or other means to users outside the classroom), personal response systems (small remote devices such as clickers that provide instructors with an electronic way of interacting with students), Apple Podcast Producers (a solution for encoding, publishing, and distributing high-quality podcasts), Blu-ray DVD players (enables recording, the rewriting and playback of high-definition video (HD), and the storage of large amounts of data, offering more than five times the storage capacity of traditional DVDs), and other similar technologies that promote and foster collaboration, teaching, and learning.

- The concept of and space for data closets must be considered while designing or renovating spaces.
- The representatives from Simmons College also provided the UMass Boston team with some advice for reaching out to faculty members and students. They recommended asking faculty members specific questions about how they teach. For example, what do faculty members require to teach in a classroom? They also highly recommended sponsoring focus groups with faculty members and students. Although Simmons College did not generate any surveys, they did think it would be another way to reach out and learn from the campus community.
- During the design of new and existing learning spaces, the campus created a mock classroom that was used to help determine how proposed ideas for the spaces would work and function.
- The representatives from Simmons recommended spending time and resources on appropriate signage, security and access control, and support models.

5.3 MIT: The Technology Enabled Active Learning Classroom

After being suggested as a possible site visit for the committee, one member of the committee reached out to a faculty member at MIT involved in the design of the Technology Enabled Active Learning (TEAL) classroom at MIT.

The TEAL classroom was designed and built before MIT's Stata Center (several academic departments, classrooms, and a public cafe are located within this building). MIT took a lot of lessons learned from the TEAL classroom to the design of the Stata Building. TEAL was designed with the thought that there would be short lectures and lots of interaction between instructors and students. Although it was designed primarily for physics classes other disciplines are open to and do use it as well. They have found that it is now mostly used for long lectures. The faculty member noted the following points as lessons learned from the TEAL classroom:

- Issues with lighting (the space is uniquely designed and this created some limitations with lighting options).
- Storage space (it is important to understand how much storage space is needed for classrooms, especially ones designed around a specific discipline).
- Work space (although TEAL is a great classroom space, there is often not enough work space for students to work on projects during class, etc.).
- The room is designed to fit about 117 students (9 at each round table). There isn't a lot of room to walk around within the classroom at full capacity (the design concept was for the room to be designed for collaboration and interaction).

In summary, some common themes and trends emerged from information collected from these three institutions. Classrooms at these institutions were designed to be flexible spaces that foster collaboration and various teaching and learning styles. All institutions stressed the importance of considering how spaces would function and how they would be supported. For example, space for data closets and storage is important to consider when designing new or renovated classrooms and it is also important to plan for staff to support what is designed. Simmons College also recommended that planning for new classrooms incorporate the design of appropriate signage, security, and access control. Throughout the planning process, all three institutions reached out to faculty members and students through various means (one-on-one meetings, focus groups, and committees) to dialogue and collect input and feedback.

6. Faculty Focus Groups

In an effort to solicit feedback from faculty members, the committee sponsored two faculty focus group sessions during academic year 2008-2009 (November 2008 and March 2009). At the focus group sessions, the committee spoke about its charge and its work to date, presented a slideshow of classroom design concepts, and engaged in a dialogue with faculty members about technology as it relates to pedagogy and the classroom. The committee was interested in hearing about the types of technology that faculty members currently use in the classroom, the types of technology that faculty members would like to use in the future, opportunities and challenges of technology in the classroom (infrastructure), and ideas regarding how technology could be more “green” on campus. About fifty faculty members participated in the focus group sessions. In an effort to reach out to as many faculty members as possible, including those who were not able to attend the focus group sessions and online instructors, the subcommittee also created a blog on the design of learning spaces and created a Facebook event page which it used as an outreach tool. The subcommittee’s blog can be accessed by visiting: <http://blogs.umb.edu/designoflearningspaces/>.

6.1 Classroom Technology

Faculty members engaged in a dialogue with committee members about the technology that they currently use in the classroom and the technology that they would like to use in the future. Faculty members who participated in the focus group sessions varied from those who understood the basics of technology options in the classroom to the tech savvy. In short, the committee learned that faculty members feel that technology that is flexible is important for teaching and learning. Some of the technology mentioned includes: whiteboards, smart boards, graphic tablets, classroom capture systems, built in laptops and computers, videoconferencing systems, clickers, and small devices to download software and display notes. Faculty members noted that rich technology present in a classroom helps to allow for “teachable moments”. Some participants also noted that traditional blackboards are still effective pedagogical tools.

As faculty discussed the types of technology that they would like to use in the classroom, they also expressed interest in testing options before full implementation. There was also an interest in additional accessible technology options that can be used by people with a wide range of abilities and disabilities. It was suggested that a few mock classrooms be setup where faculty members can test new technologies before final decisions are made.

Faculty members also expressed concern about technology maintenance and noted that on a basic level that proper ventilation as well as training on systems is important as well as regular cleaning.

It was also mentioned that faculty members need to be mindful of how technology can be used improperly or unethically by students while in the classroom (i.e., web surfing, online games, or other activities) and taking exams (i.e., academic dishonesty).

6.2 IT Infrastructure

Faculty members expressed the need for the IT network to have increased bandwidth and storage capabilities. The demand for bandwidth is increasing as student enrollment grows and new teaching and learning technologies become embedded in course offerings. In addition to an initial increase of bandwidth, faculty members also desire to see that the IT network have the capability to scale to meet future needs. As more and more faculty members and students are bringing laptops and other portable devices to campus, there is a need to have additional power and interface outlets available. There also should be additional IT support for multiple operating systems and greater access to specialized software that faculty and students need. In addition, faculty members noted that it would be helpful to rely on support teams (teams of students for example) to assist them with IT/AV troubleshooting as needed. Faculty members noted that the wireless network should be reliable and secure throughout the campus and felt that hardwired connections are still needed to support these wireless connections.

6.3 Green Computing

There were several ideas shared regarding green computing at UMass Boston. In general, many of the faculty members who participated in the focus group sessions felt that the campus could use less paper. Some suggestions to achieve this include using desktop virtualization, and built in laptops or computers in classrooms. Some other green computing ideas included using mini-computers/end computing options for certain kinds of applications, using virtual conferencing systems, and using VM ware rather than servers.

6.4 Faculty Offices and Classroom Furniture

The committee also asked faculty members about faculty offices and classroom furniture. Faculty members noted that it would be convenient if faculty offices could be located near or connected to teaching classrooms. Several faculty members also mentioned the desire to have additional shared resources such as conference rooms, collaborative space, and administrative support.

As teaching styles vary, faculty members noted that classroom design and furniture should allow for its layout to be easily rearranged. Furniture should be flexible (on wheels for example) and easily portable but also durable and functional. Some faculty members also suggested that some classrooms and teaching labs be designed specifically for the subject being taught.

7. Student Survey

In addition to soliciting feedback from faculty members, the committee was also interested in hearing from students. The committee created a survey which asked students questions about technology and learning spaces. The students were informed that their input would help the committee make recommendations for information technology requirements as they relate to learning and teaching in support of UMass Boston's Master Planning efforts.

The link to the survey was sent to the committee members to enhance the readability and appropriateness of the survey items. After two iterations, the survey was deemed suitable to be administered. The link to the survey was sent to students (graduate and undergraduate) via email. To enhance the participation incentives were provided randomly.

496 responses to the survey were received. The survey was broadly divided into two themes: individual study areas and group study areas. The results indicated a lot of similarities between these two themes. The students responded that the following are important from the group study perspective:

- Natural light and lighting
- Access to wireless networking
- Access to printers
- Access to electrical outlets
- Mobile and comfortable furniture

For individual study, the students (in addition to items mentioned under group study) indicated the following are important.

- Quiet spaces (cell phone free zone)
- Access to food / drinks

Further, students also indicated desired features in new classrooms. Use of technology, ability to recharge laptops and space to present projects were highlighted in addition to the above points. The survey also revealed that students access computers in labs the most (laptops are second). The students expressed the need for more computers on campus.

A copy of the student survey instrument can be found in Appendix B.

8. Recommendations: Guidelines and Standards

8.1 Learning Environments at UMass Boston:

Lecture Style Classrooms

UMass Boston's classrooms today were designed for teaching and learning in the 1960s. Most classrooms on campus include wall-mounted slate chalkboards for information sharing. As a result of this design of classrooms, faculty members typically stand in front of the class and teach students assembled in rows of desks. Drs. Garcia and Lopez described this design as the "built environment".

Teaching and learning styles and methods have changed a lot since the 1960s. As a result, classrooms of the future must allow for the flexibility needed to accommodate the changing teaching and learning styles of faculty and students. It also should be noted that learning happens everywhere on a college campus—in traditional classrooms, in residence hall lounges, in quiet study spaces, and in outdoor areas. For the purpose of this report, the committee explored two main learning environments—the lecture style classroom and social spaces.

From its research, site visits, and outreach efforts, the committee makes the following design recommendations for future lecture style classrooms at UMass Boston:

Layout/Furniture

- Comfortable, flexible (i.e., on wheels, lightweight, adjustable heights, etc.) and sturdy furniture that allows for easy reconfiguration.
- The instructor podium/lectern should be close to the technology rack (easily accessible).
- Classroom walls should have a writing surface which allows for collaboration. A glass surface writing board should not be used as these do not display text well and are expensive.
- There should be black/whiteboards available for teachers and students to present material.
- To foster teaching and learning in large classrooms, lectures can be video recorded and displayed on projection screens. When notes are provided on boards, they also can be displayed on screens.
- An area where students can post printed or handwritten work on a wall to share with others should be available.
- Furniture should be comfortable and durable and able to be used by both right-handed and left-handed people. It should also be ADA compliant.
- Furniture (desks and workstations) should allow for plenty of room for notebooks, textbooks, and laptops.
- The layout and furniture of all classrooms should be practical and large enough to accommodate group work (i.e., rearrangement and movement of furniture).
- Whenever possible, there should be multiple projectors installed in classrooms. Multiple projectors provide the capability to display multiple media (i.e., PowerPoint presentations, documents displayed on document cameras, etc.).

- The campus community should have the opportunity to make recommendations on the selection of classroom layout and furniture. It is recommended that a few mock classrooms be setup where the campus community, especially faculty members and students, can “test-drive” furniture options and provide feedback before final decisions are made.

Technology (including audiovisual media)

- Each classroom should be equipped with an overhead projector (or smart or electronic white-board) and a technology rack which should include a DVD player, a document camera, a space for a personal response system/clicker receiver, a computer, a touch screen panel for AV control, and a cable to connect a laptop. The touch screen panel (brand, interface, and size) should be standard across all classrooms making it easier for support and use by faculty. The minimum size touch panel in classrooms should be 8” - 10”. The interface on the panel should also be user friendly and incorporate UMass Boston’s branding into its design (logo, etc.).
- Projection screens should be available in all classrooms. The location of the projection screen (s) should not block most of the instruction area or access to light switches, touch screen panels, etc.
- When there is a need for space that allows for students to work in teams and present to the entire class, classrooms should be equipped with screens along the walls which allow for students to project their work to be viewed by the entire class (displayed on all the screens).
- Keep it simple. Technology should be easy to use and maintain.

Information Technology Infrastructure

- Electrical outlets must be distributed throughout the room for overhead projectors, computer access, and other equipment. The number of outlets will depend upon the size of the room. It would also be convenient for some electrical outlets to be floor mounted.
- All classrooms should have secure and reliable wireless access.
- Wired internet access will also be available along the classroom walls.
- Rooms that have preset tables should have a wireless microphone, the ability to project data onto a projector, an electrical outlet, and a wired internet jack or high speed network connectivity.
- Adequate and secure storage space (including data closets) should be provided near the classrooms. It would be also preferable that a small AV closet exist within or shared between classrooms.

Environment – Lighting, Temperature, and Acoustics

- The lighting system must provide a comfortable level for reading and writing at student desks or stations. Lighting should always allow everyone in the room to see each other's faces easily and to foster class discussion and collaboration. When possible, natural light should be utilized.
- Overhead and diffused lighting should be used. The lighting should be set so that it can be easily controlled, with automatic sensors that shut the lights off when the room is not in use.
- All classrooms should have two separately controlled lighting areas – seating area and instructional area. The ability to dim both areas should also be possible. Faculty members should be able to adjust the lighting quickly to respond to changing educational needs.
- When the classroom is dimmed for projection, some lighting will be required at the presentation area. Lighting on the equipment rack or technology controls may be needed.
- A steady standard for classroom air temperature is 72 degrees Fahrenheit with 35-50% relative humidity and five air changes per hour.
- Carbon dioxide sensors can be used to vary the ventilation rate to adjust for real room occupancy, resulting in an energy savings.
- Noise from technology systems should be taken into consideration when designing Heating, Ventilating, and Air Conditioning (HVAC) systems including ductwork, diffusers, and fans.
- The design of HVAC systems should consider the concept of a flexible classroom (mobile furniture, etc.).
- When choosing materials for the classroom (furniture, technology, etc.), acoustics should be considered. All students and professors should easily be able to hear and be heard in the classroom.

8.2 Learning Environments at UMass Boston:

Study and Social Spaces

Students also learn and interact in common spaces outside of the classroom. These spaces include areas such as hallways, corridors, cafeterias, and lounges. The committee refers to these areas as study and social spaces.

In a case study on the learning landscape at the University of Buffalo featured in the previously mentioned Educause publication, the concept of "learning corridors" was explored. Learning corridors are systems of distributed seating areas along corridors to allow conversations to continue after class. Four kinds of learning corridors were designed at the University of Buffalo, including study nooks, linear cafes, open theaters, and study booths.

Study nooks are small informal spaces carved from formal learning spaces to encourage interactions, generate activity, and provide a comfortable waiting area to work. Linear cafes are collaborative tables located to take advantage of light and views, animated with food service and access to power. Open theaters are demo spaces for sharing informal presentations by students, faculty, or librarians, that allows passerby to join. Study booths are small glass-enclosed study spaces for concentrated work between classes or for private calls.

From its research, site visits, and outreach, the subcommittee recommends that the design of future buildings (and the renovation of existing buildings) include social and study spaces. Hallways and corridors, when possible, should be designed to provide thoughtful common spaces for social interaction. These spaces should be considered as networking and social areas, not just passageways.

Additional recommendations on the design of study and social spaces include:

- Wireless network that is secure and reliable.
- Spaces should have access to power outlets and wired network connections.
- Proper lighting for reading and use of computers. When possible natural light should be utilized.
- Food options should be nearby (cafes and/or vending machines).
- Privacy should be designed into some areas for quiet study, while others should be designed for social interaction.
- Provide soft seating, table (end or coffee tables), rugs, lamps, and plants to make it feel like a specific space.

Photos of classrooms and social and study spaces that reflect many of the committee's recommendations can be found in Appendix D.

9. A Note on Distance Education

Over the last 10 years, institutions of higher education have seen an increased demand for distance education courses and programs. Distance education extends the process of teaching and learning from the campus to multiple locations. It broadly defines a condition of learning where instructor and student are physically separate for most or all of the experience. Interaction is mediated by technology that allows for students and instructor to engage in the process of education. UMass Boston offers many distance education options, including a number of online courses, certificate and degree programs, as well as professional development programs. As it is expected that UMass Boston will continue to develop distance education courses and programs, the committee recommends that the master planning process consider the technology infrastructure needed to accommodate this type of teaching and learning. In terms of classroom design, there would be a need to design some classrooms to accommodate distance education courses. These classrooms would require additional and specialized technology equipment, including the ability to conduct video conferences. These classrooms should also be designed to be flexible to accommodate other types of activities that require distance education technologies, such as business meetings using video conferencing.

10. Research and Information Technology Infrastructure at UMass Boston

Research at UMass Boston is on the move. The campus desires to be nationally recognized as a prominent, public research university, and, as a result, one of Greater Boston's finest research institutions.

During the course of its work, the committee heard from many faculty members regarding an information technology infrastructure that supports the needs of a growing research university.

After comparing feedback received from faculty members and students and reviewing the Final Report of the Research and Graduate Studies Committee for the Chancellor's Strategic Planning Task Force (May 11, 2007), the committee would like to adopt one of the report's recommended goals, section, "I. Continue expanding IT resources to support research activities".

The goal states:

"The university data network should be updated as soon as possible to enable researchers to take full advantage of maximum available bandwidth for data-intensive research activities. Other needed research support services include the expansion of central massive data storage, file backup systems, and central data servers. IT services should evolve with the needs of the research community. For example, in meeting the special needs of researchers, IT must remain flexible in its support of multiple operating system platforms. This support should include both hardware and software, and it should extend to researchers' individual workstations. In particular, IT should enhance the level of support it provides for hardware and applications based on the Unix operating system, which is essential for the functioning of special purpose research resources. Support for data visualization center and a high performance computing (HPC) cluster are essential to expand research." – Final Report of the Research and Graduate Studies Committee for the Chancellor's Strategic Planning Task Force (May 11, 2007).

11. A Note on Costs

As UMass Boston proceeds with its master plan, consultants will work with the campus to identify how technology functions within its organization. The consultants will then propose some solutions that often include the latest technology trends and innovations on the market. It will be important for the campus to consider the important feedback and input on teaching and learning that it has received from the campus community when making decisions on technology. In addition, the campus should also work with professionals to gain an understanding of maintenance and service costs and contracts.

In an effort to generally explore the topic of cost for audio visual equipment installed in current classrooms on campus, the committee accessed information from UMass Boston's Office of Information Technology regarding recent costs for upgrading and renovating classrooms on campus. This initiative is commonly referred to as the Technology Enhanced Classroom (TEC) project.

There are three types of TECs on campus:

Level I TECs have the following equipment installed:

- Data/video projector
- Projection screen
- VHS video playback
- DVD video playback
- Audio amplifier with stereo speakers
- Wall mounted control panel
- Cable for connecting a laptop computer
- Cable for connecting to the campus network and Internet (RJ-45)
- Laptop computers available for use in TECs from Media Labs
- Intercom to call the McCormack Media Lab for technical assistance

Estimated cost of upgrading and renovating a classroom for Level I TEC status: \$14,000

Level II TECs have the following equipment installed:

- Data/video Projector
- Projection Screen
- VHS Video Playback
- DVD Video Playback
- Smart Sympodium or Document Camera
- Audio Amplifier with Stereo Speakers
- Teaching Station with all Source Equipment
- Teaching Station Mounted Control Panel & Boundary Microphone

- Cable for connecting a Laptop Computer
- Cable for connecting to the Campus Network and Internet (RJ-45)
- Desktop Windows XP Pro Computer with connection to Network
- Intercom to call the McCormack Media Lab for technical assistance

Estimated cost of upgrading and renovating a classroom for Level II TEC status: \$25,000

Level III TECs are auditoria style classrooms and have the following equipment installed:

- Data/video Projector
- Projection Screen
- VHS Video Playback
- DVD Video Playback
- Smart Sympodium or Document Camera
- Audio Amplifier with Stereo Speakers
- Teaching Station with all Source Equipment
- Teaching Station Mounted Control Panel & Boundary Microphone
- Cable for connecting a Laptop Computer
- Cable for connecting to the Campus Network and Internet (RJ-45)
- Desktop Windows XP Pro Computer with connection to Network
- Intercom to call the McCormack Media Lab for technical assistance


As these classrooms are larger, they are designed to be used as classrooms and to host special events. As a result, the audio visual and information technology infrastructure is enhanced so that it can accommodate for these activities. For example, these rooms include additional AV jacks for microphones and other equipment as well as enhanced sound systems.

Estimated cost of upgrading and renovating a classroom for Level III TEC status: \$55,000

Below please find some web-based estimates on various audiovisual equipment items (please note that these estimates do not reflect quantity or institutional discounts):

- Data/Video Projector - \$2,000
- Projection Screen - \$1,600
- Blu-ray DVD Player - \$400
- Document Camera - \$3000
- Touch screen control panel - \$5,000 [includes programming]
- Speakers - \$300
- Shure Wireless Microphone System - \$1,000
- Accordent Classroom Capture system - \$12,000

Estimated cost of upgrading and renovating a classroom for Level III TEC status: \$55,000



In the previously mentioned Educause publication on learning spaces, the McIntire School of Commerce project was featured. During the technology planning process, the school never lost sight of its goals for teaching and learning. It concentrated on the technology's purpose, how it was to be used, and what was to be accomplished within the technology setting instead of focusing on the specific technologies. The committee recommends that the campus consider the functional use of technology when making purchasing decisions.

12. Conclusion

Through its work, data collection, outreach, and careful review of various studies and information, the committee is led to conclude that as it moves forward with implementation of its Master Plan, UMass Boston has a tremendous opportunity to plan for and design spaces that support and promote the learning, teaching, and research requirements of the campus community. It is hoped that the recommended guidelines and standards outlined in this report will assist and inform the planning and design of new and renovated campus facilities and specifically address the technological needs of classrooms, laboratories, offices, informal study areas, and social spaces throughout the campus. As technology transforms rapidly and the needs of the campus evolve, the committee also recommends that this report is reviewed and updated on a yearly basis.

Appendix A

Eduventures: Emerging Teaching and Learning Technologies (Survey and Findings)



Learning Collaborative for Higher Education
Online Higher Education Program
OHE Membership Q&A
July 2008

Catalog Number 47OHEQA0708

Emerging Teaching and Learning Technologies

Member Question

The inquiring member has commissioned this Q&A to query member institutions about the direction in which they see online learning and teaching technology headed. Specifically, the inquiring member would like to know how schools are preparing for technological evolution, what technologies will be particularly prominent in the online space during the next three to five years and how technological evolution will be accommodated via infrastructure. All responses to will be treated in confidence; no respondent institution will be identified.

Nine OHE-LC member institutions responded to this survey. All responses have been treated in confidence; no institution is identified by name.

Findings

Key Findings:

- Strategizing to keep pace with the emergence of new technologies in teaching, research and learning over the next three to five years appears to be a universal goal that spans across different types of institutions. All nine of the respondents, two (22.2 percent) of which represent for-profit institutions, four institutions (44.4 percent) private, non-profit, and three institutions (33.3 percent) public, non-profit, indicated that they are working to achieve this end with strategies such as collaborating with other units and faculty panels, adding a new position for such focus, and extensive research and piloting in immersive learning environments.
- All of the respondents believe that enhanced discussion boards and virtual lab simulations are technologies that faculty will require during the next three to five years to effectively teach online/blended learning courses. Other technologies that are perceived to play a key role in online/blended instruction include virtual classrooms (eight institutions or 88.9 percent), virtual networking forums (eight institution or 88.9 percent), enhanced webinar tools (seven institutions or 77.8 percent) and enhanced learning management systems/LMS (seven or 77.8 percent). More than 50 percent of respondents believe that all of the categorical technologies as suggested by OHE-LC staff in this survey will be necessary for effective online/blended teaching.
- Top faculty support services perceived by survey takers to be necessary for supporting the use of new technological tools include professional development seminars (eight institutions or 88.9 percent), enhanced training (eight institutions or 88.9 percent),

instructional design and technical support (seven institutions or 77.8 percent) and accessibility to support online (seven institutions or 77.8 percent). Suggestions for enhanced training include utilizing a separate development team and training on accessibility issues.

- Eight (88.9 percent) of the respondents believe that asynchronous discussion boards will be the most popular modes or tools of interaction between students and faculty in the next three to five years, followed by seven respondents (77.8 percent) for email and seven respondents (77.8 percent) for blogs. Only one of the respondents (11.1 percent) perceives teleconference tools to be primary modes of faculty-student communication in the foreseeable future.
- Seven (77.8 percent) of the survey takers view blogs as the most likely mechanism for students to interact with one another for the next three to five years. This is followed by asynchronous discussion boards and social media (e.g. Facebook, MySpace), each selected by five survey takers (55.6 percent). Once again, only one institution (11.1 percent) sees teleconferencing tools as a likely mode of communication between students. Interestingly, only one (and the same) public, non-profit institution chose teleconferencing as an important means of interaction between students and faculty as well as between students.
- In regards to faculty to faculty interaction, eight of the respondents (88.9 percent) find email and asynchronous discussion boards to be most relevant in the next few years. None of the survey takers see SRS (Student Response Systems) or “Clicker technology” as a viable means for intra-faculty communication. Notable, only one (and the same) public, non-profit institution chose avatars in virtual realities and instant messenger as a viable means of intra-faculty interaction.
- All of the survey takers believe that emerging technologies will affect the sharing of research across institutions/units. All nine institutions (100 percent) perceive library tools as a significant means of research over the next three to five years. Eight institutions (88.9 percent) believe that shared research space/collaborative work spaces, such as MS Office Live, Google sites, and Wikis, to be relevant, followed by seven institutions (77.8 percent) who chose Software tools.
- Four respondents (44.4 percent) indicated that their institutions/units are currently planning to construct new buildings and/or classrooms. Of this group whose institutions/units are planning for such new construction, each respondent indicated that technologies to be incorporated include collaborative lab spaces, interactive robotics, wireless systems, and computer systems that are compatible with Second Life. In general, the infrastructure necessary to support emerging learning, as perceived by survey respondents, run the gamut from a learning center for exploration and experimentation with emerging learning technology to increased bandwidth across universities, revamped technology infrastructure and improved IT support.

Part I: Institutional Demographics and Identifiers

1. Please select the choice below which accurately describes your institution.

Response	N	Percent
For-profit	2	22.2%
Private non-profit	3	33.3%
Public non-profit	4	44.4%
Total	9	100%

Part II: Emerging Learning and Teaching Technologies

2. Has your institution/unit begun strategizing about how to keep pace with the emergence of new technologies in teaching, research and learning over the next three to five years?

Response	N	Percent
Yes – Please elaborate on the strategies used. (please explain) [write-in]	9	100%
No	0	0%
Unsure	0	0%
Total	9	100%

‘Yes’ responses:

- 1. Knowledge-base has been created*
- 2. Strategic planning with other units and faculty panels*
- 3. Recently added a new position for such focus and have included topic in strategic planning sessions*
- 4. Just starting discussion*
- 5. Extensive research and piloting in immersive learning environments, virtual worlds ,math and science visualization, emerging technologies. Ongoing environmental scanning, staff allocation, and funding*
- 6. Part of strategic plan*
- 7. Many discussions and ongoing research*

3. In your opinion, what technologies will faculty require during the next three to five years to teach online / blended learning courses effectively? (please select all that apply)

Response	N	Percent
Enhanced webinar tools	7	77.8%
Enhanced chat capabilities	5	55.6%
Enhanced discussion boards	9	100%
Virtual classrooms	8	88.9%
Virtual libraries	7	77.8%
Virtual networking forums	8	88.9%
Virtual labs/simulations	9	100%
Enhanced learning management systems (LMS) (please explain) [write-in]	7	77.8%
Camera and audio equipment for real-time streaming	4	44.4%
Video capturing system and other technologies to make teaching accessible	6	66.7%
Other (please explain) [write-in]	3	33.3%
Unsure (please explain) [write-in]	0	0%

'Enhanced Learning Management Systems (LMS) ' explanations:

1. *Need to use true Portals that link into Student Information Systems and LMS*
2. *Classrooms that integrate many of the tools mentioned in this list*
3. *Adding above technology to improve the experience*

'Other' responses:

1. *Secure exam delivery; Enhanced collaborative tools (e.g. wikis)*
2. *Expertise with Web2.0 tools like blogs and wikis*
3. *We are also working on building more tools to measure learning outcomes and make better use of rubrics.*
4. *Immersive Learning Environments and Graphic 3D virtual worlds*

4. In your opinion, what faculty support services will be required to support the use of new technological tools? (please select all that apply)

Response	N	Percent
Professional development seminars	8	88.9%
Enhanced training (please explain) [write-in]	8	88.9%
Continuously updated equipment (please list what and how often it should be updated) [write-in]	4	44.4%
Additional IT support staff – Instructional Designers	6	66.7%
Instructional design and technical support for faculty – a separate model from students	7	77.8%
Accessibility to support – Online	7	77.8%
Online learning labs	6	66.7%
Unsure (please explain) [write-in]	0	0%
Other (please explain) [write-in]	2	22.2%

'Enhanced training' explanations:

1. *For specific tools (e.g. wikis)*
2. *Hands-on workshops*
3. *In-house professional development*

'Continuously updated equipment' explanations:

1. *2-3 years*
2. *2 to 3 year cycle*
3. *At minimum current laptops with relevant software*

'Other' responses:

1. *Training on accessibility issues*
2. *We use a separate development team. Faculty provide input but do not create online courses.*

5. In your opinion, what modes or tools will students and faculty use most to interact with each other in the

next three to five years? (please select all that apply)

Response	N	Percent
Email	7	77.8%
Synchronous chat rooms – WIMBA	5	55.6%
Avatars in virtual realities – Second Life	4	44.4%
Asynchronous discussion boards	8	88.9%
Synchronous discussion boards	4	44.4%
Instant messenger	3	33.3%
Blogs	7	77.8%
Wikis	6	66.7%
Teleconferencing tools	1	11.1%
Social media – Facebook, MySpace	5	55.6%
Scheduling appointments – E.g. Doodle	2	22.2%
SRS (Student Response Systems) – “Clicker Technology”	2	22.2%
ePortfolio	5	55.6%
Unsure (please explain) [write-in]	1	11.1%
Other (please explain) [write-in]	2	22.2%

‘Other’ responses:

1. *Institutions will eventually create their own "MySpace" sites*
2. *Mobile media – cell phones, texting*

6. In your opinion, what modes or tools will students use most to interact with other students in the next three to five years? (please select all that apply)

Response	N	Percent
E-mail	3	33.3%
Synchronous chat rooms	3	33.3%
Avatars in virtual realities	4	44.4%
Asynchronous discussion boards	5	55.6%
Synchronous discussion boards	3	33.3%
Instant messenger	4	44.4%
SRS (Student Response Systems) – “Clicker technology”	2	22.2%
Blogs	7	77.8%
Wikis	3	33.3%
Teleconferencing tools	1	11.1%
Social media – Facebook, MySpace	5	55.6%
Unsure (please explain) [write-in]	1	11.1%
Other (please explain) [write-in]	2	22.2%

‘Unsure’ response:

1. *They are clever at finding various technologies to communicate, I can't predict what is next.*

‘Other’ responses:

1. *Institutional provided "Social Networking" spaces.*
2. *Mobile media - cell phones, texting*

7. In your opinion, what modes or tools will faculty use most to interact with other faculty and collaborators from other institutions in the next three to five years? (please select all that apply)

Response	N	Percent
Email	8	88.9%
Synchronous chat rooms	3	33.3%
Avatars in virtual realities	1	11.1%
Asynchronous discussion boards	8	88.9%
Synchronous discussion boards	4	44.4%
Instant messenger	1	11.1%
SRS (Student Response Systems) – “Clicker technology”	0	0%
Blogs	4	44.4%
Wikis	3	33.3%
Teleconferencing tools	3	33.3%
Social media – Facebook	3	33.3%
Unsure (please explain) [write-in]	0	0%
Other (please explain) [write-in]	3	33.3%

‘Other’ responses:

1. *Listservs*
2. *Institutional provided spaces. We use a system created from Microsoft SharePoint.*
3. *Mobile media - cell phones, texting*

8. In your opinion, how will faculty conduct and analyze research over the next three to five years and what tools will be required to conduct that research? [write-in]

Response	N	Percent
Library tools	9	100%
Area universities	4	44.4%
Software tools	7	77.8%
Shared research space/Collaborative work spaces – E.g. MS Office Live, Google sites, Wikis	8	88.9%
Other (please specify) [write-in]	1	11.1%

‘Other’ response:

1. *Virtual Worlds*

9. Do you believe that emerging technologies will affect the sharing of research across institutions/units?

Response	N	Percent
Yes (please explain) [write-in]	9	100%
No (please explain) [write-in]	0	0%

‘Yes’ responses:

1. *Some faculty will find it easier to collaborate. We already use these tools for faculty development with other universities.*
2. *Enhanced collaboration techniques will emerge over the next few years.*
3. *It can, if utilized correctly.*
4. *This is already happening --see current collaborations in Second Life, for example. Lots going on there.*
5. *More accessible and less likely to be peer reviewed*
6. *The ability to work unconstrained by location will advance research as much as it has online learning for students*
7. *It makes it easier to collaborate*

10. Is your institution/unit currently planning to construct new buildings and/or classrooms?

Response	N	Percent
Yes (please elaborate on how many buildings and of what type your institution/unit is currently planning to construct) [write-in]	4	44.4%
No	4	44.4%
Unsure (please explain) [write-in]	1	11.1%

'Yes' explanations:

1. *1 or 2*
2. *Another Center for Distance Learning (new one was built only 3 years ago) -- We keep growing exponentially and outgrowing our physical facilities.*
3. *Library, classroom space*
4. *Dorms*

'Unsure' response:

1. *Yes, for traditional campus; Unsure/no for distance education*

Only institutions/units who are planning to construct new buildings and/or classrooms proceeded to Question 11.

11. What technologies are being incorporated into new buildings to support future teaching, learning and research? [write-in or share plan]

Response
"Collaborative lab spaces, interactive robotics, virtual reality room."
"Not enough!!! One improvement is the adoption of standard computer systems that have high end graphics cards and a minimum of 2G of Ram so that they are Second Life Compatible."
"All classrooms are labeled smart classrooms, with Internet access, video equipment interactive screens in some only."
"Wireless systems, work areas."

12. In your opinion, what infrastructure will be required to support new/emerging learning, teaching and research technologies at your institution/unit? [write-in]

Response
"Desktop software, desktop hardware, mobile devices, content management tools, course management tools,

portal software, community building applications.”
“A learning center to explore and plan for emerging learning and technology.”
“Increased bandwidth throughout the university, upgraded computers with better video cards, ubiquitous web cams/video cameras, additional smart classrooms.”
“Not so much an issue of physical infrastructure but how virtual teams will be built. Communicating from a distance but in somewhat of a real time scenario. Delays of no more than a few minutes.”
“Wireless Internet Access and support for the use of laptop computers and mobile technologies (policy prohibits the use of wireless internet). More user friendly security policies and better user control of computer systems. Servers allowing users the storage of larger multimedia and graphical learning units. Presentation media (projector, top of the line PCs) designed into each meeting room.”
“Technology infrastructure, not buildings, needs to be revamped.”
“Better support of IT and instructional design, and leadership to move faculty toward new technologies and teaching approaches.”
“IT technology/support, budget resources and additional staff to ensure customer service levels remain high. Additional staff that can build and maintain the new technology.”

13. How are you addressing flexibility and future adaptability of the building technology infrastructure? Can the space be used for intended and unintended purposes and reconfigured easily and inexpensively? [write-in]

Response
“Student spaces are very flexible, with outdoor learning spaces and interactive surfaces.”
“No. Our flexibility and future adaptability of spaces happens in virtual worlds and learning environments rather than in physical spaces (i.e learning management system and surrounds; a campus in Second Life; etc.).”
“Yes, the classrooms are modular and can be converted as needed.”
“The ability to reconfigure is being built included in design.”

Appendix B

Student Survey Instrument & Survey Results

Design of Learning Spaces

1. Student Survey - Design of Learning Spaces

Dear student:

You are invited to participate in a survey that asks questions about technology and learning spaces. It will take approximately 5 minutes to complete. We are interested in feedback from students and would appreciate your honest and thoughtful responses. Your input will help us as we make recommendations for information technology requirements as they relate to learning and teaching in support of UMass Boston's Master Planning efforts.

We appreciate the time you take to complete the survey. Random-drawing prizes for students who finish the survey in its entirety will be awarded. Thank you in advance for your help in this important initiative!

If you have any questions about the survey, please contact: Apurva Mehta at 617-287-5952 or email at apurva.mehta@umb.edu

1. Personal Information (All completed surveys will be eligible for a drawing. 4 thumb drives and a \$25 iTunes U gift card will be raffled)

Name (Optional):

UMB Email Address:

Email address if you wish to be entered into the drawing

*** 2. Age**

*** 3. Class Year**

*** 4. College**

*** 5. Technology:**

What technology do you carry on you to campus? (Check all that apply)

- ☐ Laptop ☐ Cell Phone ☐ Smart Phone ☐ iPod or other ☐ Thumb drive ☐ None
(eg: iPhone, MP3 players
Blackberry)

Other (please specify)

Design of Learning Spaces

* 6. How do you access a computer on campus? (Please Specify)

	Never	Rarely	Sometimes	Often	Most Often
Use the computer labs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use the computers in the Healey Library - 4th or 5th floor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bring my own laptop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Borrow a laptop from the library reference desk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kiosk@One stop Computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. Computer Labs:

How often do you use the computer labs on campus?

☐ Never ☐ 1-3 times a week ☐ Greater than 3 times a week

* 8. How do you rate the following as it relates to a computer lab? (Please Specify)

	Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Satisfied
Availability of computers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quiet space to work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Easily accessible location	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lighting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Windows - Natural Light	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interact with colleagues easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to print	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to technical support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 9. Group Study:

What spaces on campus do you use for group study?

Design of Learning Spaces

* 10. What do you think will improve Collaborative/Group learning?(Please Specify)

	Least Important	Not That Important	Neutral	Somewhat Important	Very Important
Comfortable furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Furniture that can be moved easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to wireless network and electrical outlets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bright rooms with windows	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to a computer, projector, whiteboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to food/beverage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to technical support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quiet space to work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone free zone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to print easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 11. Individual Study:

What spaces on campus do you use for individual study?

Design of Learning Spaces

* 12. How important are the following for effective/improving individual study? (Please Specify)

	Least Important	Not That Important	Neutral	Somewhat Important	Very Important
Comfortable furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Furniture that can be moved easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to wireless network and electrical outlets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bright rooms with windows	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to a computer, projector, whiteboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to food/beverage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to technical support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quiet space to work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell phone free zone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to print easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Design of Learning Spaces

* 13. Classrooms:

What would you like to see in the new classroom? (Please Specify)

	Least Important	Not That Important	Neutral	Somewhat Important	Very Important
Furniture – comfortable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Furniture – easily moved	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lighting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wireless network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wired network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to recharge laptops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use learning technologies in small work groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Space to present projects – print and multimedia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audio Visual equipment(Projectors etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aesthetics(i.e. representations of art and culture)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acoustics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Whiteboard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lectures captured in large classrooms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal Response System (iClickers)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 14. Social Spaces [Informal collaborative spaces] – not to be confused with group study spaces

Where do you meet socially on campus with your friends or colleagues?

Design of Learning Spaces

* 15. What do you like about the space you mentioned in Q14? (Please Specify)

	Least Important	Not That Important	Neutral	Somewhat Important	Very Important
Comfortable furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Movable furniture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lighting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wireless network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wired network	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recharge laptops/phones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access to Food & Beverage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

16. Is there anything that you had wished we ask but did not? If so, please elaborate here.



17. I prefer to receive communications from the university by:

- ☐ Email to your UMB email address ☐ Voice mail to your cell phone ☐ Text message ☐ Via UMB iTunes - <http://www.itunes.umb.edu/> ☐ Via UMB You Tube Channel - <http://www.youtube.com/umassboston> ☐ Via Blackboard

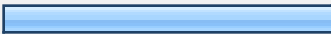
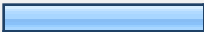


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

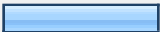
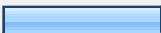
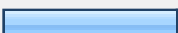
Design of Learning Spaces



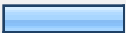


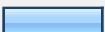


1. Personal Information (All completed surveys will be eligible for a drawing. 4 thumb drives and a \$25 iTunes U gift card will be raffled)


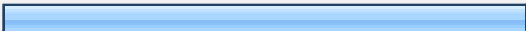
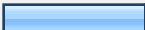



		Response Percent	Response Count
Name (Optional):		59.4%	269
UMB Email Address: Email address if you wish to be entered into the drawing		98.9%	448
		<i>answered question</i>	453
		<i>skipped question</i>	46

2. Age




		Response Percent	Response Count
Under 24		50.3%	251
25-34		30.7%	153
35-44		9.6%	48
45 and over		9.4%	47
		<i>answered question</i>	499
		<i>skipped question</i>	0

3. Class Year			
		Response Percent	Response Count
First Year (0-29 credits)		11.4%	57
Sophomore (30-59 credits)		14.8%	74
Junior (60-89 credits)		23.4%	117
Senior (90 credits and over)		23.8%	119
Graduate		26.5%	132
		answered question	499
		skipped question	0

4. College			
		Response Percent	Response Count
CCDE - Division of Corporate, Continuing and Distance Education		1.6%	8
CLA - College of Liberal Arts		39.1%	195
CM - College of Management		18.2%	91
CNHS - College of Nursing and Health Science		12.8%	64
CPCS - College of Public and Community Service		1.6%	8
CSM - College of Science and Mathematics		14.8%	74
GCE - Graduate College of Education		9.2%	46
MGS - McCormack Graduate School of Policy Studies		2.6%	13
		answered question	499
		skipped question	0

5. Technology: What technology do you carry on you to campus? (Check all that apply)			
		Response Percent	Response Count
Laptop		50.7%	253
Cell Phone		80.8%	403
Smart Phone (eg: iPhone, Blackberry)		21.4%	107
iPod or other MP3 players		56.1%	280
Thumb drive		50.1%	250
None		2.0%	10
Other (please specify)			22
answered question			499
skipped question			0

6. How do you access a computer on campus? (Please Specify)							
	Never	Rarely	Sometimes	Often	Most Often	Rating Average	Response Count
Use the computer labs	20.1% (96)	22.6% (108)	26.6% (127)	18.6% (89)	12.1% (58)	2.80	478
Use the computers in the Healey Library - 4th or 5th floor	26.2% (125)	25.7% (123)	23.6% (113)	14.6% (70)	9.8% (47)	2.56	478
Bring my own laptop	30.3% (143)	19.7% (93)	22.5% (106)	9.3% (44)	18.2% (86)	2.65	472
Borrow a laptop from the library reference desk	79.0% (369)	9.2% (43)	7.3% (34)	2.6% (12)	1.9% (9)	1.39	467
Kiosk@One stop Computer	31.5% (148)	36.6% (172)	21.5% (101)	8.3% (39)	2.1% (10)	2.13	470
answered question							499
skipped question							0

7. Computer Labs: How often do you use the computer labs on campus?			
		Response Percent	Response Count
Never		31.7%	158
1-3 times a week		55.3%	276
Greater than 3 times a week		13.0%	65
answered question			499
skipped question			0

8. How do you rate the following as it relates to a computer lab? (Please Specify)						
	Dissatisfied	Somewhat Dissatisfied	Neutral	Somewhat Satisfied	Satisfied	Response Count
Availability of computers	10.5% (52)	20.4% (101)	30.6% (151)	22.7% (112)	15.8% (78)	494
Quiet space to work	8.7% (43)	16.2% (80)	33.5% (166)	22.0% (109)	19.6% (97)	495
Easily accessible location	13.2% (65)	15.7% (77)	31.9% (157)	21.7% (107)	17.5% (86)	492
Lighting	4.5% (22)	7.3% (36)	35.4% (174)	25.3% (124)	27.5% (135)	491
Windows - Natural Light	18.9% (93)	21.6% (106)	31.4% (154)	14.1% (69)	14.1% (69)	491
Ability to interact with colleagues easily	3.9% (19)	10.5% (52)	47.3% (233)	22.5% (111)	15.8% (78)	493
Ability to print	11.4% (56)	17.1% (84)	26.5% (130)	25.5% (125)	19.4% (95)	490
Access to technical support	5.1% (25)	8.7% (43)	47.4% (234)	23.3% (115)	15.6% (77)	494
Furniture	9.5% (47)	18.6% (92)	39.4% (195)	18.6% (92)	13.9% (69)	495
answered question						499
skipped question						0

9. Group Study: What spaces on campus do you use for group study?		
		Response Count
		499
	<i>answered question</i>	499
	<i>skipped question</i>	0

10. What do you think will improve Collaborative/Group learning?(Please Specify)						
	Least Important	Not That Important	Neutral	Somewhat Important	Very Important	Response Count
Comfortable furniture	1.6% (8)	5.1% (25)	15.4% (76)	46.1% (228)	31.9% (158)	495
Furniture that can be moved easily	2.0% (10)	4.2% (21)	12.3% (61)	46.9% (232)	34.5% (171)	495
Access to wireless network and electrical outlets	0.4% (2)	0.4% (2)	3.4% (17)	18.9% (94)	76.9% (383)	498
Bright rooms with windows	1.2% (6)	3.7% (18)	16.9% (83)	39.7% (195)	38.5% (189)	491
Access to a computer, projector, whiteboard	1.8% (9)	6.3% (31)	21.2% (105)	37.2% (184)	33.5% (166)	495
Access to food/beverage	4.2% (21)	11.1% (55)	29.0% (144)	37.5% (186)	18.1% (90)	496
Access to technical support	2.8% (14)	10.9% (54)	29.4% (145)	38.7% (191)	18.2% (90)	494
Quiet space to work	0.6% (3)	3.0% (15)	11.3% (56)	37.6% (186)	47.5% (235)	495
Cell phone free zone	12.5% (62)	17.0% (84)	30.3% (150)	19.0% (94)	21.2% (105)	495
Ability to print easily	0.6% (3)	1.8% (9)	9.5% (47)	27.9% (138)	60.2% (298)	495
	<i>answered question</i>					499
	<i>skipped question</i>					0

11. Individual Study: What spaces on campus do you use for individual study?		
		Response Count
		499
	<i>answered question</i>	499
	<i>skipped question</i>	0

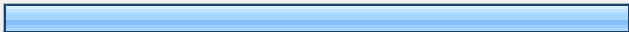

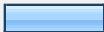



12. How important are the following for effective/improving individual study? (Please Specify)						
	Least Important	Not That Important	Neutral	Somewhat Important	Very Important	Response Count
Comfortable furniture	0.2% (1)	3.2% (16)	11.1% (55)	38.5% (191)	47.0% (233)	496
Furniture that can be moved easily	4.9% (24)	16.9% (83)	28.0% (137)	29.6% (145)	20.6% (101)	490
Access to wireless network and electrical outlets	0.6% (3)	2.6% (13)	8.3% (41)	22.4% (111)	66.1% (328)	496
Bright rooms with windows	0.8% (4)	4.7% (23)	17.6% (86)	35.5% (174)	41.4% (203)	490
Access to a computer, projector, whiteboard	10.1% (50)	16.5% (82)	24.9% (124)	26.8% (133)	21.7% (108)	497
Access to food/beverage	6.9% (34)	11.5% (57)	27.2% (135)	34.5% (171)	20.0% (99)	496
Access to technical support	7.3% (36)	16.4% (81)	29.8% (147)	27.6% (136)	18.9% (93)	493
Quiet space to work	0.4% (2)	3.0% (15)	7.8% (39)	21.3% (106)	67.5% (336)	498
Cell phone free zone	11.6% (57)	13.8% (68)	21.7% (107)	19.9% (98)	32.9% (162)	492
Ability to print easily	0.6% (3)	3.8% (19)	12.5% (62)	25.1% (124)	58.0% (287)	495
	<i>answered question</i>					499
	<i>skipped question</i>					0

13. Classrooms: What would you like to see in the new classroom? (Please Specify)						
	Least Important	Not That Important	Neutral	Somewhat Important	Very Important	Response Count
Furniture – comfortable	1.0% (5)	2.8% (14)	10.6% (52)	37.0% (182)	48.6% (239)	492
Furniture – easily moved	1.4% (7)	6.7% (33)	17.7% (87)	40.0% (197)	34.1% (168)	492
Lighting	1.0% (5)	0.8% (4)	8.6% (42)	32.6% (159)	56.9% (277)	487
Wireless network	0.4% (2)	2.4% (12)	9.3% (46)	26.4% (131)	61.5% (305)	496
Wired network	5.5% (27)	9.4% (46)	23.8% (116)	27.9% (136)	33.3% (162)	487
Ability to recharge laptops	1.4% (7)	2.4% (12)	17.3% (85)	25.5% (125)	53.4% (262)	491
Ability to use learning technologies in small work groups	1.8% (9)	4.9% (24)	23.5% (116)	35.1% (173)	34.7% (171)	493
Size	0.6% (3)	2.2% (11)	17.3% (85)	39.0% (192)	40.9% (201)	492
Space to present projects – print and multimedia	1.2% (6)	4.1% (20)	15.0% (74)	39.1% (193)	40.6% (200)	493
Audio Visual equipment(Projectors etc.)	0.6% (3)	3.8% (19)	14.9% (74)	34.7% (172)	45.9% (227)	495
Aesthetics(i.e. representations of art and culture)	6.9% (34)	10.4% (51)	32.9% (162)	27.8% (137)	22.0% (108)	492
Acoustics	1.8% (9)	5.9% (29)	27.6% (136)	37.6% (185)	27.0% (133)	492
Whiteboard	2.4% (12)	5.5% (27)	18.9% (93)	38.2% (188)	35.0% (172)	492
Lectures captured in large classrooms	4.7% (23)	9.6% (47)	30.3% (149)	29.3% (144)	26.2% (129)	492
Personal Response System (iClickers)	11.0% (54)	13.2% (65)	41.8% (206)	20.9% (103)	13.2% (65)	493
	answered question					499
	skipped question					0

14. Social Spaces [Informal collaborative spaces] – not to be confused with group study spaces Where do you meet socially on campus with your friends or colleagues?		
		Response Count
		499
	<i>answered question</i>	499
	<i>skipped question</i>	0

15. What do you like about the space you mentioned in Q14? (Please Specify)						
	Least Important	Not That Important	Neutral	Somewhat Important	Very Important	Response Count
Comfortable furniture	2.9% (14)	5.7% (28)	25.7% (126)	28.0% (137)	37.8% (185)	490
Movable furniture	4.3% (21)	8.8% (43)	30.3% (149)	31.6% (155)	25.1% (123)	491
Lighting	1.8% (9)	3.9% (19)	27.4% (135)	29.4% (145)	37.5% (185)	493
Wireless network	4.7% (23)	6.4% (31)	25.2% (123)	22.7% (111)	41.0% (200)	488
Wired network	12.4% (60)	12.7% (61)	37.8% (182)	17.2% (83)	19.9% (96)	482
Recharge laptops/phones	4.9% (24)	7.1% (35)	27.7% (136)	25.1% (123)	35.2% (173)	491
Access to Food & Beverage	1.6% (8)	2.4% (12)	18.5% (91)	27.8% (137)	49.7% (245)	493
Other (please specify)						73
	<i>answered question</i>					499
	<i>skipped question</i>					0

16. Is there anything that you had wished we ask but did not? If so, please elaborate here.	
	Response Count
	176
<i>answered question</i>	176
<i>skipped question</i>	323

17. I prefer to receive communications from the university by:			
		Response Percent	Response Count
Email to your UMB email address		98.1%	469
Voice mail to your cell phone		6.7%	32
Text message		15.3%	73
Via UMB iTunes - http://www.itunes.umb.edu/		0.8%	4
Via UMB You Tube Channel - http://www.youtube.com/umassboston		1.5%	7
Via Blackboard		7.3%	35
Other (please specify)			27
		<i>answered question</i>	478
		<i>skipped question</i>	21

Appendix C

Photos

Appendix C – Photos

Classroom Spaces



Figure 1: Herman Miller Website

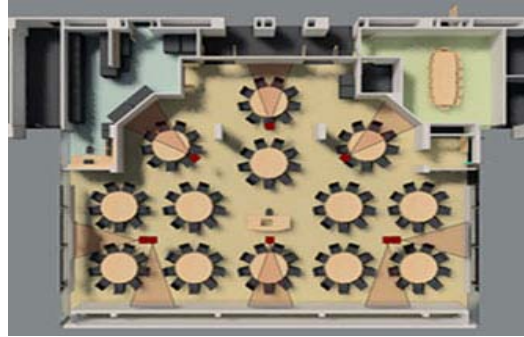


Figure 2: Technology Enabled Active Learning Classroom (MIT)



Figure 3: Technology Enabled Active Learning Classroom (MIT)



Figure 4: Xavier University / Herman Miller Website



Figure 5: Butler Community College/Herman Miller



Figure 6: The George Washington University-Educause Website



Figure 7: St. Mary's University of Minnesota



Figure 8: Consultants + Herman Miller Website



Figure 9: Wharton – University of Pennsylvania



Figure 10: Consultants + Herman Miller Website



Figure 11: Olin College auditorium



Figure 12: Olin College classroom

Computer and Work Stations



Figure 13: University of Leeds – Educause Website



Figure 14: Arkansas Tech University



Figure 15: University of Oklahoma – Educause Website



Figure 16: University of Nevada-Reno – Educause Website

Study spaces



Figure 17: Wharton – Univ. of Pennsylvania



Figure 18: Xavier University / Herman Miller Website



Figure 19: University of Kentucky – Educause Website



Figure 20: Univ. of Wisconsin-La Crosse – Educause Website



Figure 21: Simmons College Library Conference Room



Figure 22: University of Buffalo (Learning Corridor)

Social spaces



Figure 23: Columbia College Chicago / Herman Miller Website



Figure 24: Cabarrus College of Health Sciences / Herman Miller



Figure 25: Consultants + Herman Miller Website



Figure 26: University of Queensland, Australia - Educause



Figure 27: University of Buffalo



Figure 28: University of Buffalo