

Team-Based Ingenuity Supporting 21st Century Learners

Sarah Hutton (shutton@library.umass.edu)
University of Massachusetts

Robert C. Davis (rcdavis@oit.umass.edu)
University of Massachusetts

Carol Will (cwill@library.umass.edu)
University of Massachusetts

Abstract

Supporting the active learning process of the 21st century student is one of the main goals of the Learning Commons at the University of Massachusetts Amherst. Building and maintaining effective student learning spaces and academic services requires proactive assessment of University climate, pedagogical direction, and curriculum development. Increasingly instructors are using active, group, and participatory teaching methods and are offering students opportunities to opt in to more creative assignments requiring the use of advanced technologies in support of multimedia projects. The UMass Libraries aim to anticipate the needs of instructors and students by tailoring student spaces to support teaching and learning goals. Collaboration with campus partners is essential in providing a holistic approach to meeting student need; the Office of Information Technologies (OIT) is one of the strongest partners in this collaboration, helping to form the teams that work to research, implement, and assess new academic projects.

Author keywords: Team-based learning; 21st century learning; Information technology

Introduction

Supporting the paradigm shift from teaching to learning requires creative approaches to learners and learning environments, both formal and informal, physical and virtual. There are many moving parts of the learning process, and the development of student learning spaces requires the combined expertise of many stakeholders in the support community. In addressing these issues, the Library and Office of Information Technologies (OIT) staff members have sought to emulate key aspects of the pedagogy of team-based learning in our collaborative efforts. Michaelson states that "... the tremendous power of team-based learning is derived from a single factor: the high level of cohesiveness that can be developed within student learning

groups." [1] The success of the projects that follow relies heavily on that sense of cohesiveness we have created within our Library/OIT team.

Defining the 21st Century Learner

Given the dynamic nature and fast-paced change of today's teaching and learning environments, any attempt to define the 21st century learner is subject to potential obsolescence before it is posted. Nevertheless, there are certain attributes of today's learner that can assist educators in preparing curricula, facilities, technology, and support structures to not only meet but also anticipate the ever-changing needs of the 21st century learner.

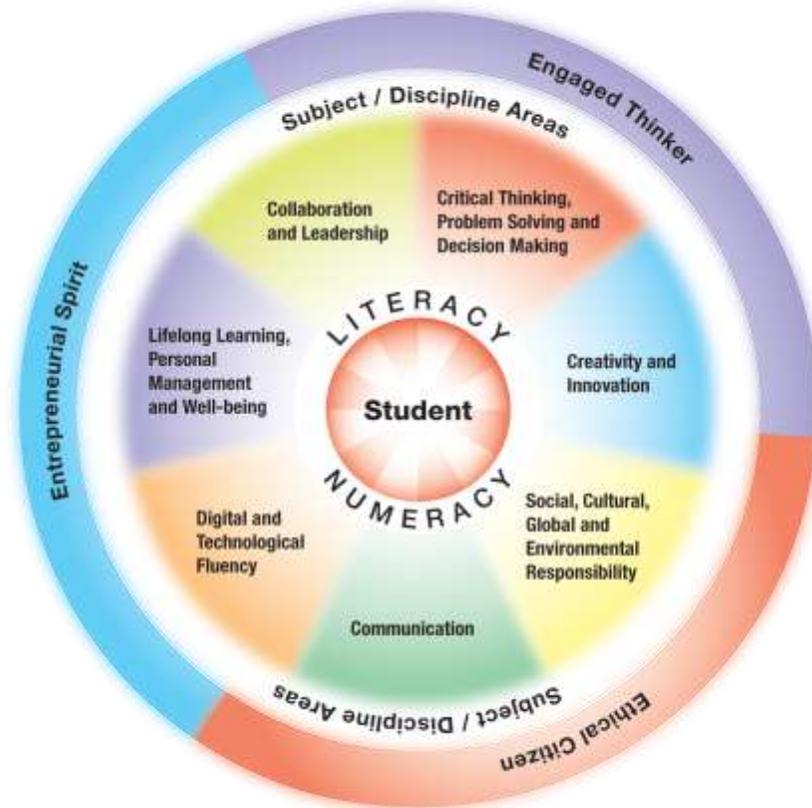


Figure 1. Image from the Framework of Student Learning, Government of Alberta:
<http://education.alberta.ca/admin/aisi/themes/21-century.aspx>

The above graphic from a discussion paper in an aptly entitled series *Inspiring Action on Education* issued by the Government of Alberta, captures as well as any both the multifaceted educational challenges facing the 21st century learner and the educational support community as well as the desired results for the learner. Significantly, these outcomes match the “Intellectual and Practical Skills” cited in *Liberal Education Outcomes: The Learning Every Student Needs* [2] published by the Association of American Colleges and Universities:

- Written and oral communication
- Inquiry, critical and creative thinking
- Information literacy
- Teamwork
- Integration of learning

In order to meet these challenges facing the 21st century learner, the Provost’s Office at the University of Massachusetts charged the Center for Teaching and Faculty Development during the summer of 2011, to develop a program to train a group of pilot faculty in the pedagogy of team-based learning. This experimental program was but one aspect of the Team-based Learning (TBL) pilot which included the creation of two technology-rich TBL classrooms, W.E.B. Du Bois 25 and Goodell 608, to test the facilities, technology, and support structures in anticipation of building five additional TBL classrooms in the New Academic Classrooms Building scheduled for completion in spring 2014. The Office of Information Technologies was assigned the task of supporting the computer and audio visual components in the classrooms and assisting faculty with integrating the technological potential of these rooms into their classroom practice.



Figure 2. Team-Based Learning (TBL) Classroom in W.E.B. Du Bois Library.

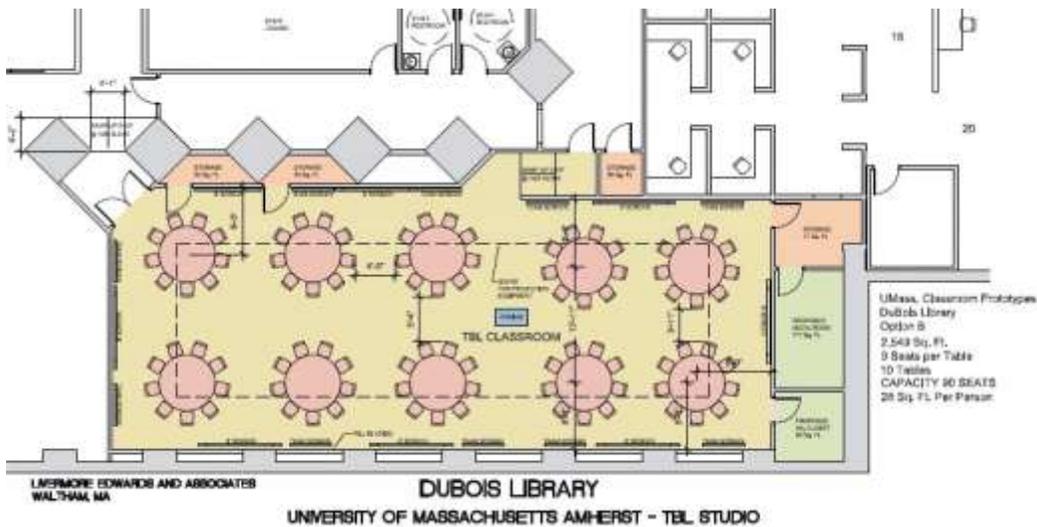


Figure 3. TBL Classroom floor plan, W.E.B. Du Bois Library Rm 25; 10 9-seat tables (Goodell 608 classroom not pictured; six 9-seat tables)

Integration of Technology and Pedagogy

One primary pedagogical goal in initiating the TBL pilot at UMass was finding ways to energize courses owing to their sheer size alone traditionally taught in lecture format. The Team-Based Learning concept seeks to reverse the tradition and ‘flip the classroom’ where, instead of lecturing in class and assigning problems or

exercises for homework, the instructor would assign posted lecture materials or captured lectures as homework in preparation for completing exercises actively in teams during class time.

The physical challenge became creating classroom configurations and integrating technologies to support the next generation of

learners in team-based active learning. While our room design borrowed facets from MIT's Technology-Enhanced Active Learning (TEAL) Rooms, UMass has emphasized the TBL approach across the curriculum; in the pilot we supported courses including Latin, German History, Resource Economics, Anthropology, Astronomy, Political Science, and Physics, among others.

The floor plan (see figure 3) reveals a space that is designed to allow for the instructor and T.A.s to 'rove' amongst the tables rather than stay rooted to the instructor station.



Figure 4. Student workstation/technology hub, TBL classroom.

The individual student tables form the technological hub of active student learning. (See figure 4.) Each table has three laptops (in the 90-seat Du Bois classroom, 30 Lenovo T520s with Windows 7, in the 54-seat Goodell classroom 18 MacBook Pros running Mac OS 10.7 and Windows 7 {dual boot}), a flat screen wall monitor and a whiteboard with camera to capture and project their work. Students in triads at each table can negotiate and decide whose work should be displayed on "their" screen. A "last button pushed" design allows for student autonomy in these decisions but also requires student discipline at the tables. Under each wall screen and whiteboard there are buttons that allow the instructor or student at the wall to choose to project any image either

alternately to half or to all screens in the room. The option to broadcast to half of the screens allows for another source from another table to be broadcast to complement or contrast the first image.

Increasing Learner Expectations

Students in Professor Glenn Caffery's Resource Economics course were asked in a survey to comment on the elements of the new classroom they most preferred. (See Figure 5.)

Significantly, the first four items refer to student resources with only the fifth mentioning the instructor's input. Team ownership and control of team tables, screens, and boards proved most important to the majority. In this same course, students were asked to define the ideal teammate. Pre-course results showed the ideal teammate had to be intelligent and experienced but post-course survey results provided a much different profile of the ideal teammate: it appears that reliability and communication are far more valuable to the team than just intelligence and experience.

Student Support Beyond the Classroom

As students leave the TBL classroom ready to continue their team projects, where do they go and what are they looking for? Ideally students join peers in the immediately adjacent Learning Commons (LC) in order to continue their collaborative academic work in a space designed for group study and in close proximity to supportive academic student and library services. (See figure 6.)

The LC consists of varying types of physical study areas, most of which allow for dynamic and active group work. Twenty-five glass-walled study rooms allow for students to work together on laptops and desktop computers as well as several other work areas designed to accommodate single study or group configurations. A combination of study areas allows students to choose the most convenient study space for their particular needs at the time. (See figures 7 and 8.)

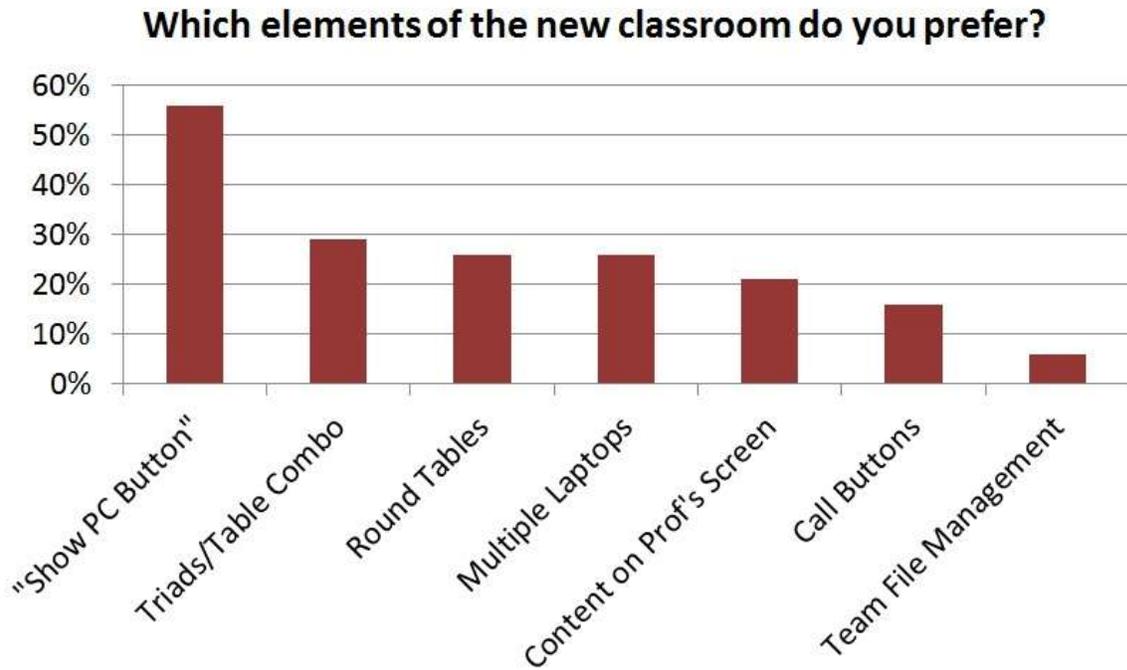


Figure 5. Feedback from Resource Economics students on which classroom elements are preferred in the TBL classroom.



Figure 6. Organic working group formation in the Learning Commons, W.E.B. Du Bois Library.



Figure 7. Informal student study tables, overview, Learning Commons.



Figure 8. Collaborative group study room in the Learning Commons.

Technical as well as academic support of students is a part of the LC model at UMass Amherst. Students have immediate access to the Learning Commons and Technical Support Desk (LC/Tech Desk) managed by a collaborative group of Library and OIT staff. This collaborative design allows for a seamless means of addressing student technical needs while using the LC computers and equipment. Students can choose from a total of 221 desktops (Macs and PCs), or use a laptop anywhere throughout the building. Questions ranging from “How do I print?” to “I can’t remember my email password; what can I do?” can be swiftly answered by the staff and student employees at the LC/Tech Desk. Students registered with Disability Services are provided the use of assistive hardware and software in the state-of-the-art Assistive Technology Center (ATC). Open “24/5,” staff at the LC/Tech Desk can also assist with basic reference questions as well as make referrals to other supportive student services. Students who don’t want to forego their studies can avail themselves of the snack



Figure 9. "Procrastination Station" café in W.E.B. Du Bois Library.

and drink offerings at the Procrastination Station Café which is open 24/5 as well. (See figure 9.)

The Writing Center, located within eyesight of the Reference and Research Desk, assists students in honing their writing skills and allows for referrals to the Subject Liaison Librarians at the Reference and Research Desk. The Academic Advising Link is open evening hours in the LC for students needing assistance with their majors and course registration. International Programs Office (IPO), open at the same hours and located next to the Academic Advising Link, assists students interested in studying abroad and offers guidance to international students. The Learning Resource Center, located on the 10th floor of the Du Bois Library, is a place where students can get peer tutoring in many courses and subjects as well as find opportunities for doing professional level research projects through the Office of Undergraduate Research and Studies (OURS) Program.

Assessment Then and Now

As Oblinger argued [3], a challenge remains to know exactly what students are doing within university spaces designated as a Learning Commons. While our hope is that students are using the LC and Library resources in the pursuit of academic learning and success, it cannot be assumed they truly are doing so. Also, a further development and redesign of the LC should not be pursued without some sort of analysis of previously gathered data as well as new types of data [4].

Observation allows us to see that some students are using the LC software and equipment for writing papers, accessing the internet, printing, copying, and poster printing, yet new research needs to be done in order to better understand student LC activities. Performed at least two times each semester, headcounts confirm quantitatively that students are using the LC. Years of headcounts provide us with the ability to ascertain trends in the flow of student traffic as well as usage of the varied study space.

However the numbers do not inform us as to student motivation and behaviors behind their use of the LC space. An in-depth study by Crook and Mitchell showed that space in their library intended for group study was actually being used as individual study space the majority of the time. Qualitative data gathered through the LibQual Survey in 2007 and LibQual Lite in 2011 [5] at UMass provide some information regarding user attitudes yet fail to give enough insight into student studying habits such as that found by Crook and Mitchell [6].

Our plans are to move from strictly quantitative data toward a qualitative and ethnographic approach similar to that of the study by Foster and Gibbons [7] by engaging an experienced ethnographer. We are using this approach to see if learners are actually behaving in the ways and spaces that we think they are. Ideally, combining the headcount data with an ethnographic approach to studying student behaviors in the LC would give us ideas about how to update the space and resources. The overriding question is, "How does the Learning Commons support student learning?" In order to begin to answer this question it is imperative that we find out what exactly students are doing in the LC.

We have begun a collaborative project with Arthur Keene, a UMass Amherst Professor of Anthropology; whose undergraduate field study course will be making the Learning Commons their case study point of focus during the Fall 2012 semester.

This collaboration serves two purposes, one of which is for anthropology students to learn and engage with genuine field research methods, and two, to assist the libraries in gaining insight into the behaviors of undergraduate student activities within the LC. This peer-to-peer interaction will provide information that librarians themselves might not be able to obtain on their own. We look forward to seeing and then utilizing the research findings from this anthropology class.

Along with actively planning for more in depth ethnographic study of the users of the Learning

Commons, we continue to make changes based on observation, research and trend-spotting within the University and the national education system. During the time that EDUCAUSE was reporting the resurgence of Grassroots Video in the curriculum as a trend-to-adopt within the year [9], a task force at the Du Bois Library compiled a report recommending a response to the increasing local trend of video and multimedia production in the classroom. This internal working document recommended a phased implementation of multimedia recording equipment, and multimedia editing desktops, in the Learning Commons (LC) in 2009, with the intent to expand the pilot into a separate, specialized space. As a recognized and heavily utilized locus of undergraduate student support, the LC was a natural fit for piloting the eight multimedia editing stations, digital video cameras and audio recording devices, all of which have been heavily utilized by students since their installation three years ago. (See figure 10.)

However, we found that the current resources were no longer meeting the demand for support. Through a combination of assessment methods that will be discussed, we have been able to piece together a framework for the development of an entirely new space in the library, dedicated solely to the student production of multimedia projects.

Anticipating Needs and Identifying Emerging Trends

As students are being encouraged by certain curriculum requirements, their expectations for support beyond the classroom are increasingly on the rise. There comes a critical point in student support: when rising student expectations are no longer met. It becomes the onus of the service provider to anticipate needs before this critical point in the student's decision making process is reached. Understanding that institutional support services are an expected product for the cost of higher education and are a large part of the student retention equation [9], the University Libraries are actively working to partner with University faculty and student services to address student need for support.



Figure 10.

In agreement with several other groups on campus, the Libraries are turning their focus to multimedia as the next critical area of need for support on the Amherst campus.

Multimedia as a Medium for Research Conceptualization

The conceptualization of research and developing a critical thinking process has long been coveted by teaching faculty as the holy grail of instruction; intelligent inquiry and authentic engagement in research, while one of the most desirable learning outcomes, can be one of the most difficult to measure in its potential success [10]. Meanwhile, the 21st century has seen an insurgence of attention-capturing media, where news is delivered electronically and used as social currency in this new media ecosystem [11]. The relationship of media consumption to identity-formation has been defined by theorists as an essential component of the meaning-making process, by which media consumers define their daily

actions and personal lives. Media consumers have strong emotional responses and attachment to the media that they consume, as it is, in many ways, selected as representation of self. Translating this engagement and connectedness with media to research can be accomplished through the production of media, as opposed to more traditional forms of understanding [12] [13].

Though multimedia's definition amongst faculty may vary, multimedia will be rudimentarily defined as a composition of different content forms, including digital imagery, video and/or audio, and text. While many instructional faculty are lamenting the shift from consumption of material through reading to media viewing, some forward-thinking faculty have embraced multimedia projects as a means for transitioning students from this position of professional consumerism to the role of author and producer.



Figure 11. Multimedia 'pod' in Learning Commons, W.E.B. Du Bois Library.

Increasing Multimedia Projects: Increasing Demand for Support

Instructors at UMass are increasingly using active, group, and participatory teaching methods and are offering students opportunities to opt in to more creative multimedia assignments. Traditionally, video projects would be expected from students in Film Studies, Journalism and Communications; the insurgence of this type of multimedia project has come to subjects from Anthropology to History, and the incoming required Freshman Writing course (ENG112), now has a built-in unit which specifically invites writing and research in a variety of technological mediums outside of the traditional research paper [14] [15].

With this shift in the type of work and projects being assigned to students, the demand on equipment and recording space has increased (figure 11); a growing concern has been expressed by faculty that their students, while being professional media consumers, are amateur (at best) media producers, and more training and skills development is necessary. While students in programs such as Film Studies and Communications may receive media production training as a part of their required program credit load, multimedia production in more general curriculum, such as Freshman Writing, will fall to students who not only do

not have the skills, but also lack the direction of knowledgeable production-oriented faculty. In addition to a lack of understanding of the production process, many faculty members do not wish to dedicate class time to the study and/or review of the multimedia production process.

Outside of the classroom, multimedia production skills training and support on the UMass campus for the general student population is limited. UMass Amherst faculty have specialized facilities such as the Instructional Media Lab (IML) (figure 12), Digital Humanities Initiative (DHI) Lab and the Teaching Commons, where access to equipment, skills training and support staff are available to assist in the integration of technology into the curriculum, including the planning process for the assignment of multimedia projects to students. While there are a few specialized media production labs for students located on campus, they are reserved for use only by students in programs focusing on media production and are not open to the general student population. To help address this gap in training, the OIT has offered companion workshops to specific courses in the past, though attendance has been slim and the lack of a shared production space for the student body at large indicates a visible lack of centralized



Figure 12. Recording room in Instructional Media Lab (IML), for faculty support only, UMass Amherst campus.

support for students in multimedia project creation. Taking into consideration this remarkable trend, the University Libraries are working with OIT on a collaborative solution to a shared problem.

The Next Frontier: Multimedia Production Center

Following the implementation of the multimedia editing stations pilot in the Learning Commons, reports from faculty looking to include multimedia projects in their courses spiked; as mentioned, the Freshman Writing Course (ENG112), which enrolls some 4,000 undergraduates annually, began their inquiry of available technologies and support for new media projects. Collecting similar reports throughout the year, at the end of 2010, the libraries created a group whose charge would be to aggressively move forward on plans to create a new multimedia production center in the Du Bois Library. This team, composed of members from both the libraries and OIT, recognized in order to build a shared multimedia production space, more data was needed. A combination of

site visits, faculty testimonials, survey and focus group results were used by the group to determine the optimal combination of space, equipment and services to meet student needs. (See figure 13.)

Needs Assessment: What We Learned

Focus groups were held for three separate constituencies: students, faculty, and faculty support staff, all of whom were asked for their specific understanding and uses of multimedia and new media technology in and outside of the classroom setting. The focus groups had participation from departments and programs ranging from Film Studies to Accounting and History, and the results provided a well-rounded perspective on general undergraduate student need. Overwhelmingly, there was a shared response by group participants that the definition of “multimedia” varies broadly, and that the self-perceived expertise in multimedia production is similarly capricious. Shared themes amongst all responding participants included a considerable concern for the training and support of multimedia project production.

Questions for Focus Groups: Listed by Constituency

Student Focus Group Questions

1. What kind of media-based assignments have you been given by teachers?
2. What kind of media-based assignments do you WISH you could be given for a class?
3. What are some obstacles that are keeping you from being assigned your ideal multimedia project?
4. What kind of training or assistance would you need to produce multimedia?
5. What do you see as the greatest obstacles to student multimedia production?
6. The GOAL: What do you value most about being able to create multimedia projects in your classes?
7. What time of day would you most likely work on multimedia projects?

Faculty Focus Group Questions (also used for faculty support staff group)

1. How do you define multimedia?
2. What kind of media-based assignments do you currently have your students do?
3. What kind of media-based assignments do you wish you could give your students?
4. What are some obstacles that are keeping you from assigning your ideal multimedia project?
5. What kind of training would your students need to produce multimedia?
6. What do you see as the greatest pitfalls in student multimedia production?
7. THE GOAL: What do you value most about having your students work with multimedia?
8. Would you consider allowing students to create multimedia projects in lieu of another assignment?

Questions for Faculty Pulse Survey (OIT): to be distributed Fall 2012

1. What type(s) of media-based projects would you be interested in assigning your students (ex: digital stories, video narratives, animations, text/graphics, etc)?
2. What types of spaces/equipment/resources would your students need to complete these assignments?
3. How would you like to see multimedia production training/support integrated into your courses?

Figure 13. Focus group questions, listed by constituency.

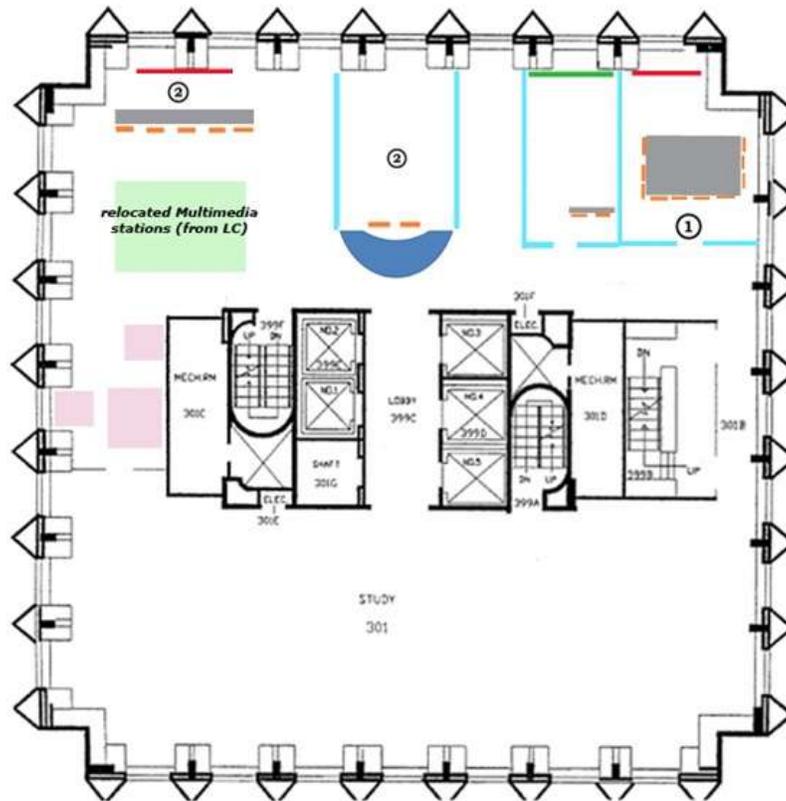
With a strong desire to create multimedia projects beyond their current skillset, participants understood that while projects such as digital storytelling provided rich content, the lack of understanding of the production process so greatly hindered the original conceptualization of research that the time investment simply wasn't worth it. With these concerns in

mind, the ongoing development of the multimedia center at UMass maintains a strong focus on facilities and programming that will strive to not have technology get in the way of research conceptualization and the learning outcomes of the curriculum.

What are the most prominent/pressing components necessary to provide in Phase I?

- green screen ■
- soundproof/dampened audio recording areas ■
- presentation practice/project review area(s) ①
- service desk for provision of support ■
- support staff, including instruction and office space ②

- Building Elements**
- glass wall partition ■
 - tables ■
 - chairs ■
 - projection screen ■



3. How would you like to see multimedia production training/support integrated into your courses?

Figure 14. Preliminary floor plan recommended by library/OIT group for multimedia production center in W.E.B. Du Bois Library.

Building a Multimedia Production Center at UMass

In the development of a Multimedia Production Center in the Du Bois Library, the planning team recommended a phased implementation, including recommendations for facilities, staffing, services, policies and the management of the space. (See figure 14.) Major inhibiting factors to this process included the library's electrical configuration and noise abatement; retrofitting a building constructed in 1974 to accommodate advanced technology support majorly impacts the ongoing process of this project. After thoroughly reviewing what student support on campus was currently

lacking, the essential elements to include in Phase I were: a main support desk; small instruction space; presentation practice room; video recording area (including green screen and lighting kit); and sound proofed rooms for audio recording. The space indicated for the location of this first phase was already occupied by service points and materials; several concurrently running projects to prepare this space also hindered the progress of the multimedia center's timeline. Given these physical limitations, the planning group recommended a partial or pilot implementation

Workshop	Learner Outcome(s)/Goal: <i>As a result of the workshop, the student will be able to:</i>	Technology Requirements	Timeline
Planning a Multimedia Project	<ul style="list-style-type: none"> ▪ Select a multimedia project topic ▪ Storyboard a multimedia project ▪ Script a multimedia project 	<ul style="list-style-type: none"> ▪ Projector/screen ▪ Table/desktop for instructor ▪ Tables/chairs for students 	To be offered early in Fall 2012 semester
Multimedia File Organization, storage, and sharing	<ul style="list-style-type: none"> ▪ Store large file size video and audio footage ▪ Share large files for collaborative projects/multi-location editing ▪ Navigate platform conformity issues 	<ul style="list-style-type: none"> ▪ Projector/screen ▪ Table/desktop for instructor ▪ Tables/chairs and desktop computers for students ▪ External hard drive/storage device for file sharing 	To be offered prior to midterms, Fall 2012 semester
Getting the Shot	<ul style="list-style-type: none"> ▪ Record high quality video ▪ Record high quality audio ▪ Understand the importance of quality input for desired output 	<ul style="list-style-type: none"> ▪ Projector/screen ▪ Table/desktop for instructor ▪ Tables/chairs and desktop computers for students ▪ External hard drive/storage device for file sharing ▪ Digital video and audio capturing devices,¹ lighting kit, green screen/backdrop, sound dampened/proofed audio recording space 	To be offered prior to midterms, Fall 2012 semester

Figure 15. Multimedia workshops offered in Fall 2012: Each workshop capped at 12 students.

of Phase I, to ensure that the greatest need was met in the Fall 2012 semester: student training.

By establishing a small instruction area where the future Multimedia Production Center is to be developed, students will begin identifying the space as one of resources and support, even prior to its full completion in 2013. Within this instruction space, workshops were facilitated during the Fall 2012 semester by instructors from OIT, with the intent to train student teachers into a peer-to-peer instruction model. Each of the three intended workshops touch on the most basic necessities of multimedia production training, with progressive technological requirements of the space (figure 15), therefore, keeping within the timeline of construction over the Fall 2012 semester. The completion of project Phase I will ensure that students are being supported in their scholastic efforts, even as the medium of academic expression changes.

Other images can be found in figure 16.

Conclusion

Tracking pedagogical changes and curricular trends in the larger institution before the student demand for support outside of the classroom reaches a critical point would be impossible without collaboration outside of the library. Cohesiveness and accountability within the library/OIT team enables transparency in communication, allowing for rapid movement in the project planning process. The library/OIT team mentality and focus on a shared goal continues the cooperative learning [16] process, even over the bumps in the road of project implementation. We continue to learn from our students and benefit from shifts in learning methodology, as we adopt techniques that have proven effective in the classroom and as we apply them to our working lives.

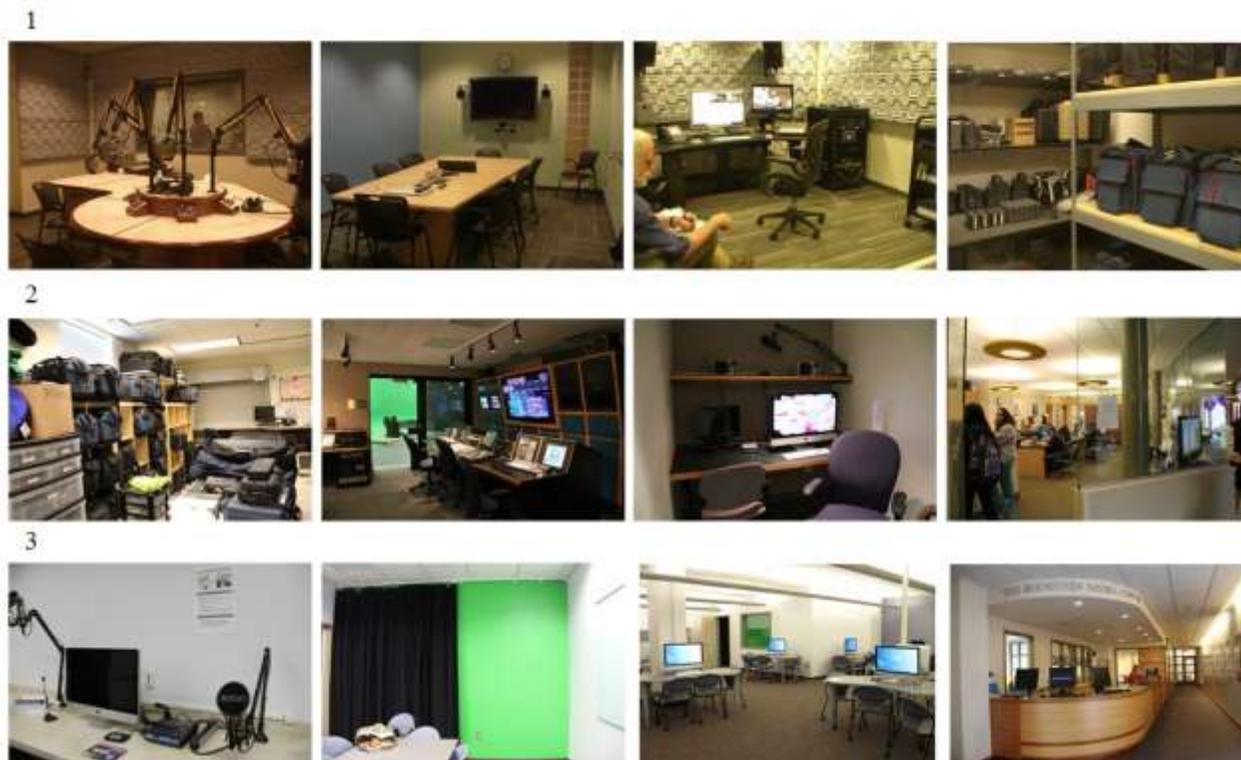


Figure 16. Regional site visits conducted to determine best/adoptable practices.

1: Yale Broadcast & Media Center: <http://broadcast.yale.edu/>

From left: audio recording studio, conference and presentation practice space, project editing station, circulating equipment storage

2: Quinnipiac University McMahon Mass Communications Center:

<http://www.quinnipiac.edu/academics/colleges-schools-and-departments/school-ofcommunications/our-facilities>

From left: Circulating equipment storage (McMahon), broadcasting newsroom (McMahon), personal sound recording and editing booth (McMahon), Media Center (Arnold Bernhard Library)

3: Tufts University Digital Design Studio, Tisch Library

<http://www.library.tufts.edu/tisch/dds.html>

From left: Audio recording and editing station, green screen/conference room, editing station, Bernstein Media Center service desk

Endnotes

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