THE ART AND SCIENCE OF DESIGN EDUCATION

IN A NEW COLLEGE OF ARCHITECTURE

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Abstract

Educating today's design students goes beyond the standard walk and talk of the traditional classroom. Environments that nurture and promote collaboration and integration of technology are becoming a standard, critical for students emerging from the design academy. This paper will discuss the design of a college of architecture at the academy that must promote and foster the concepts of interdisciplinary collaboration, teaming and technology integration. A well conceived facility creates an environment that will generate students that are ready to enter the design industry at a competitive level after graduation.

Summery

The university architecture facility of today should be an interactive, changeable environment that promotes student learning concerning their professional dialog. Creative facility design promotes and enriches inclusive learning in a technologically based educational discipline.

Section 1: Introduction, Statement of Problem

How do you impact student learning in an art and science discipline, and make the learning spaces elevate to a transfer of knowledge? How do you reformate an existing facility that includes a multi floor college of architecture, hosting a student body of over six hundred, utilizing thirty technical spaces? Planning started years in advance incorporating key components into the design such as; integrated learning centers, technology touchdown spaces and distance learning facilities that are incorporated into active classroom environments. Design disciplines like many other university colleges

require collaborative smart classrooms and environments that embrace interactive technology to join students, professors and architectural professionals. Researching the needs of the students indicated the driving design tools and technology needed to facilitate all three forms of learning to include; professor driven, student to student teaming (collaborative learning) and self-learning.

As a college, it was important to decide what requirements were needed to shape teaching initiatives that would advance student understating in all five disciplines housed within the college (Architecture; Interior Design; Landscape Architecture; Regional and City Planning and Construction Science). How could we impact student learning with technology integration in various spaces in the building? Our first steps were to become involved with the building team and integrate changes that would reflect teaching strategies for the profession. We were looking to model technology at every opportunity with in the building. After researching technology and furniture systems for classroom environments, we implemented pilot classrooms located in the college's "swing space", installed in January of 2010. Upon final installation, all faculty were trained using the technology, allowing project monitors to observe. This gave us opportunities to tune our processes to provide a better system for teaching in all five disciplines. Students were also quarried and observed using the spaces which also led to some tweaking of the original designs. Final design decisions were then made after two semesters of use for integration into the new spaces of the building.

Not surprisingly, several design decisions had to be changed due to building adjustments and budgets, but the integrated technology spaces were moved into the new building as scheduled. Once located in the new building, faculty and students

began requesting and using the spaces. The goal was to making as many spaces as possible mobile, flexible and technology rich for ease of collaboration and affording different teaching styles. We wanted the professors to use whatever methods possible to transfer knowledge successfully to students. Mobility and flexibility seemed to be one of the main keys to success in this ideal. Our research to this point, with a year under our belts in beta mode followed by a year as operational in the new spaces, has demonstrated positive evidence of retention and cognitive learning. Observation is showing us that learning for architecture students can be enhanced;

1. In collaborative learning environments
2. Interactive learning environments
3. Flexible learning environments
4. Technology rich learning environments

The anticipated outcome of this extensive building process was to achieve course material retention, learning outcomes and student satisfaction with the education environments that surround them prior to graduation.

Educating the students is primary, so the challenge was to find ways to capture student's interest as well as help them push their thinking of the built environment. We looked at different models of technology and tried to pinpoint those that would be appropriate for the design based disciplines. Our research focused on information concerning classroom design and studio environments for the students. We also concentrated on the overall building space allocations, technology integration and furniture systems. However, little was found concerning technology for design educational spaces, exceptions were only found in the design of computer labs. So, we searched for innovative ways to use technologies that were accessible to the faculty and students. We felt comfortable with several of our choices; interactive white board

technology, projection abilities, computer switching and distance learning. We explored Steelcase Inc. concepts of their Learn Labs™, which encompassed most of the technologies we had planned (Steelcase, 2010). We used this concept as one of our pilot spaces for a lecture style classroom while the building was being remodeled. This gave us the opportunity to better understand the Learn Lab concepts and how to customize them for our purposes. We were engaged to integrate this technology into a student design studio. This is a classroom where students put in long hours of drawing, peer teaming, faculty lecture and personal research. We wanted technology that would enhance this environment and engage the students at a higher level and for longer periods of time. These spaces became the greatest challenge as we had not seen anything that was working for this type classroom. We made the decision to create a technology rich student studio space in the middle of one of our large studio classrooms as a pilot, also in our swing space. The cohesive space which we dubbed the *SuperStudio* combined a large table with duel flat panels mounted above, a smart board, mobile seating for 20 and enclosed the space in modular glass walls for more privacy. After installation and preliminary use, we found this space to be a wonderful complement to the studio environment that surrounded it. Students and faculty could use the space for small meetings, internet exploration, architectural drawing overlays on the smart board and other innovative concepts. After we built the prototype in our temporary swing space we were surprised to see the original ways in which the students used the technology and demountable walls. Not only were they engaged with various ways to use the technology, they were also using the glass walls as drawing surfaces and magnetic pin up spaces. Our prototype spaces allowed us to see if the technology was going to work for our teaching curriculum, while they also gave us the

opportunity to redesign, if needed, before installation in the new building. Overall we were very happy about our choices, not only installation of the prototypes but also to expand on their original concepts.

The new additions and renovations to the building were designed to enhance student learning at every opportunity. The exterior of the building is a study of architectural elements including two outdoor (courtyard) learning spaces. One courtyard has a steel sculpture that helps student understand connection points for steel. There is also an exterior two story arcade that allows students to walk through the building and see in the student display gallery. The interiors are innovative with lots of classrooms, study spaces and student support areas. The ceiling elements have been left exposed to show students how mechanical, electrical and even IT data is routed throughout the building. The renovations and additions took place over a three year timeline. The college wanted to make sure there were opportunities throughout the building for students to learn in various manors. High priority was placed on integrating technology in student areas, not just classrooms, but areas where students worked, studied and basically hung out. Several of our smaller venues house flat panels hung above 48” tables with several chairs for students to collaborate. Larger spaces like classrooms sport movable, nestable and powered furniture. Professors have integrated white board technology, integrated sound, and portable white boards for teaming and presentation in classrooms. The largest lab, called the Integrated Learning Center, is one of the highlight spaces of the building. This lab can house over thirty students. It is designed with no front of the classroom, with tables and chairs arranged for students to group around and collaborate. There are two large wall mounted white boards that have digital scanners that hang over the boards. Students can capture material written on these

boards and print or save to a flash drive or their linked web page for later use. To allow more flexibility, there are also ten portable, double sided white boards with a mobile storage cart. These boards can be used at the table surfaces or hung from two 96 inch long rails that are installed on the walls. The material on the portable boards may also be copied to the scanners web site, student flash drive or printed on the lab printers. The seating is comfortable for extended class periods and are castered for ease of movement within the lab. All of the tables are powered and have video connections for students to be able to switch their laptops to any projector in the lab. The projectors can be switched to show the same or different images, professor laptop or the ceiling camera. There are docks in order to integrate tablets, IPods and smart phones. Overall there are four projector screens and partnering projectors that are triangulated within the space so that students have strong visual angles from anywhere in the room. There is smart board technology so that students can use the board for presentations or digital note taking and screen capture. Each professor has their own smart board pen that is calibrated to their personal laptops. This allows them to move to any of the thirteen smart boards within the building. Two other smaller labs were created as a student and professor critique and teaming space within our largest design studios. These labs were nicknamed the *SuperStudios* by the college. These labs allow students within a large studio environment to have a breakout space without disturbing the classroom activities that surround the labs.

The building also has several smaller technology touchdown spaces for small groups of students to collaborate with their laptops connected to flat panel displays. The college library has computers integrated into the common areas so students can research

information, print and scan findings. The two multi-PC computer labs host almost 85 computers are used for teaching 80 software applications and also for students to work on their projects with digital drafting software, while accessing an in-house “render farm” with one terahertz of on-line graphics processing through distributed computing running across 10 servers with up to 25 additional servers that come on-line with demand. We have a distance learning classroom that enables faculty and students to collaborate with others around the world for competitions, professional juries reviewing and critiquing student projects, as well as off campus courses. The students and faculty feel fortunate to be in the new building and enjoy the opportunities and technologies now available. We are seeing great response to our conceptual design models for the spaces now that they are up and running. One of the largest impacts we initially recognized is the recruitment and retention of architecture students. They are more engaged and receptive to their collegiate spaces than before the building renovations. They are comfortable using the technology and we find that their generation demands it, and we are accommodating them.

The uniqueness of this project has been creating spaces interlaced with collaboration and technology around the building, within the building and as part of the building. Objectively if you immerse students in worthy design environments, their understanding of the built environment that surrounds them becomes a norm. This project was not attached to the building as a random entity; the project was interlaced in the efforts from design concept to delivery. This initiative is unique as it is one of few integrated learning centers and *SuperStudio* concepts in architecture schools across the nation. It could easily become the standard for teaching design students today and into the

future. The technology designed into the building and learning spaces is giving our students the edge they need to accomplish a resume that the professionals will accept. Collaborative opportunities throughout the building allows for student to practice presentation skills. They are comfortable with the diverse environments and allow themselves to move easily from situation to situation without derailment from their objectives. This skill set hopefully will set them up to be proficient at adaptability to obstacles that may present themselves during presentations. This is a skill set that we feel is of high demand and of great benefit to our students.

Architecture students are creative and find ways to make their environments work for them. “We have come to appreciate that students are active interpreters of the classroom reality, as of any social reality, and not simply passive recipients of instruction" (Weinstein, 1989). Building an environment that the students can flourish in, allows them to focus on their educational pursuits and not be distracted by poorly designed environments. A lot of architecture schools that we studied were uninspiring and not designed with the students in mind. Several were buildings that had other uses before they became design schools and did not model what was preferable for a college of architecture. Having a new building set us apart, as we designed it to enhance the student’s education. We also reviewed each of the five division’s requirements for their curriculum and sculpted the spaces and technology for their individual ideals. Although the different disciplines may use the spaces differently when teaching, the students will have the ability to retrofit as needed.

Section II – Methodology

At the campus level, we feel our labs and technology set us apart from other colleges on campus, as not only do we have some of the most advanced technology, but we feel

like we are using it in creative ways to educate our students. Our technology started with the design of the space, with the goals towards impacting the student's educational experiences and achievements. The standard of lecture at the front of the classroom is a thing of the past. Letting our students learn from each other and through self-inquiry, leaving the professors as mentors, is a model we are adopting. "The learning environment should have high expectations and incentives for all students to come to understand the big ideas and answer the essential questions" (Wiggins and McTighe, 2011). Using the technology to push our initiatives is a model that can be followed all over campus. Other colleges on campus are touring our new facility and are very interested in how we are applying the technology to our teaching strategies. Many colleges are also in transitional states and they are changing their models of teaching to incorporate new ideals concerning technology and classroom spaces. Our building affords them the opportunity to see what is possible and what is new in the industry. We like to also think of ourselves as contributing to the body of knowledge of the profession. Professional firms have taken an interest in how we have applied technology into our building. They in turn are looking at ways to apply our concepts to their professional offices as well as uses for their clients. They are also very verbal about skills that they believe that our students should understand when coming out of college. Principles feel that students should have a good grasp on today's technology and its applications in the built environment. Presentation skills while interfacing with technology is also a contributing factor. The campus looks toward architecture and engineering as front runners for what will be expected in teaching environments in the upcoming years.

Section III - Findings

After two years of use, we feel the technological impact of teaching and learning in these lab environments has assisted our college with student retention, student learning and increased enrollment of today's generation of technically savvy, multitasking students. Students demand leaning spaces just like these labs. The concepts that have been implemented in this building can also be transferred to remote classrooms off campus. The technology of distance learning allows us to partner with other colleges, divisions and professors that are remote. Professors wanted to use the spaces while adapting their style of teaching right away. Students take to the technology with ease. Using the designed in flexibility, we can keep things fresh and updated in the future. The next step is to create performance measurements in order to compile qualitative research in support of passing on what we've learned. Building a business case analysis will help our college and other organizations with design budgeting decisions in the future in order to better meet goals for return on the investment. Installing labs of this nature requires strong support from the vender. We have been very pleased with our relationship concerning the venders that helped us make this vision a reality. Being able to rely on the vender after installation for customization is also a strong part of the success of these labs. We chose the products we did based on exploring teaching environments that are conducive to teaching to design students of the future. We felt that the vendors we chose supported our mission concerning technology, furniture and support. Support and installation of the technology was a primary factor. We did not have a campus model, as we were creating the model for our school. These learning labs replaced the typical projector screen and rows of student desks.

Students are pushing the envelope in use of the spaces. They even find new ways to use them we had not thought of. Also, we have helped, Steelcase, to improve their systems the special needs for design schools. We don't see this as a static process – there will be opportunities for continual improvement over the next few years as we use the new spaces in the college of architecture.

Supporting Photographs

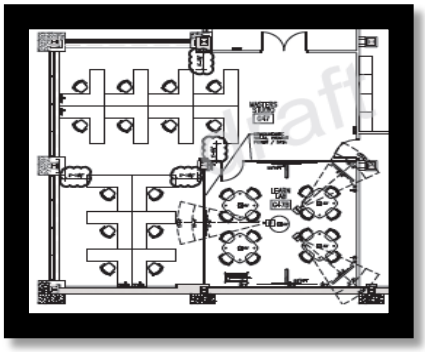

Figure 1

Student Studio Space with Studio Technology Learn Lab - Final Design

Figure 2

Students using final installation of Studio Technology Learn Lab, presenting by connecting to a smart phone

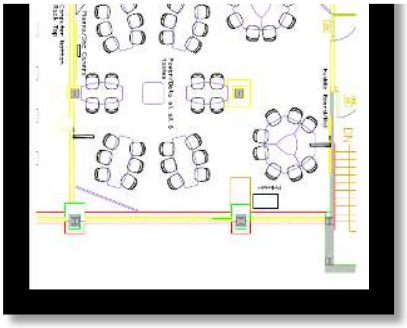

Figure 3

Final Layout for Integrated Technology Lab

Figure 4

Faculty Lecture with interactive comments on the Eno Boards that is shared with students via email

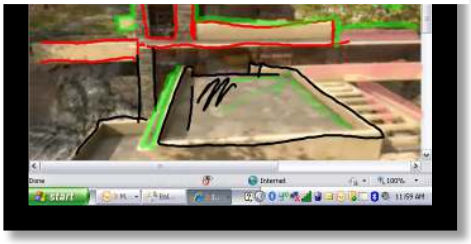

Figure 5

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