

Design-Model-Build: Leveraging a Library Remodeling Project to Engage Students and Promote Sustainability on Campus

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Introduction

Design-Model-Build is a collaborative project at the University of Utah between the Marriott Library's art and architecture librarian and a faculty member at the university's School of Architecture. The collaboration, which began in Fall 2014, provides architecture students with a hands-on learning experience while providing the library with innovative designs for an internal remodeling project. Working together with library clients, professional architects, fabricators, and landscape designers; the architecture students are exposed to every aspect of the planning, designing, and building process. Additionally, students have been continuously exposed to library resources including books, journals, design software, 3-d printing, and the library's new materials collection.

The remodeling project itself will give purpose to a currently unused patio and courtyard that is adjacent to the Marriott Library's K.W. Dumke Fine Art and Architecture Library. The plans call for the space to serve as a sustainable study area and sculpture garden, allowing patrons to enjoy the outdoors while still working within the confines of the library. The multi-level space is located below ground level in a lightwell that is enclosed within the library structure (see figures 1 and 2). The subterranean aspect of the project adds an interesting design challenge for the students,

requiring them to consider visitor sightlines and seasonal lighting differently than they would for traditional outdoor areas.

Currently in the midst of the second phase of the project, Design-Model-Build has three primary goals: providing an excellent and unique learning experience for our students, developing designs that are functional as well as aesthetically pleasing, and incorporating sustainable materials and green walls into the existing plans.

This paper will explore the current academic environment in the US and at the University of Utah that encourages collaborations like ours to take place. The paper will also describe the project in depth and share some of the lessons that have been learned along the way.

The Creative Campus and "Signature Experiences"

For years there have been discussions amongst university administrators, faculty, and students about the advantages of a "creative campus."¹ While no formal definition seems to exist, these campus initiatives encourage programs to incorporate creativity into their teaching, outcomes, and assessments. According to Lingo and Tepper, universities are tapping into recent research suggesting that creative thinking can be

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FIGURE 1
Photograph of Northern End of Unused Patio



FIGURE 2
Photograph of Patio and Lower Courtyard



taught and is not simply an inherent ability possessed by a few blessed individuals. “Idea generation, improvisation, metaphorical and analogical reasoning, divergent thinking” and other skills can be encouraged in the classroom and harnessed to prepare students for careers that demand creative people.²

Colleges and universities have recognized the trend around the country and incorporated creativity into their curricula and into the culture of their campuses. They have developed interdisciplinary programs, creativity centers, and campus-wide events to show their support. Even when these types of initiatives are not present, students are finding ways to subvert or overcome the traditional paradigm. For example, Pitt and Tepper, in a multi-year study on how students choose their majors, have found that students will often double major to gain an alternative way of thinking and deepen their creative skill-set.³

The University of Utah has not been immune to this trend and, in fact, has recently developed several programs to embrace it. The Multi-Disciplinary Design program, started in 2011, combines instructors from design, engineering, business, and psychology to “ethically respond to the needs of people and the environment using a creative process based approach.”⁴ Experiential learning courses like the new BlockU program teams together faculty from different disciplines to teach around themes like “Art and Science” or “Water and Sustainability.” These courses develop “learning communities” to provide students a look at how varying disciplines approach the same topic, theoretically encouraging them to tackle problems from a variety of angles.⁵ Additionally, new centers and living communities are being built around campus. A notable example of this is the soon-to-be Lassonde Center, advertised as the new “home for student entrepreneurs and innovators” to “Live.Create.Launch.”⁶

Many of our new initiatives, centers, and programs address a promise made by the university’s president, David Pershing, that every undergraduate will have a “signature experience” before graduating.⁷ This could mean they will do research in the lab of a

scientist, take part in a student dance performance, design a new piece of hospital equipment, or help build a new house for a family in need. Students are encouraged to apply their education in real-life situations and take advantage of all the opportunity that is at their fingertips. The University of Utah is responding to the demands of students and faculty to push beyond traditional pedagogical practice and is working to develop more sophisticated and nuanced learning environments.

With all these changes, librarians and libraries are also confronted with the same ultimatum facing the larger university: change or become irrelevant. How do librarians address and encourage creative thinking and active learning while still maintaining core values (e.g. building/maintaining collections, freedom of information, service, etc.)? Fortunately, many of us have not been caught unaware by these changes and have been discussing and experimenting along the way. In fact, academic libraries are well suited to embrace a movement toward flexible, collaborative spaces. Makerspaces, visualization studios, and gaming labs have been established in many university libraries around the country with great success.⁸ The discipline-agnostic nature of the library allows a diverse set of users into these spaces to create and experiment with technologies that would have otherwise been sequestered away in departments.

The Marriott Library has kept ahead of the curve on many of these issues. 3d printing services are accessible to all patrons of the library, small and large study rooms have been built to encourage serendipitous collaboration, and new software and hardware is continually being evaluated and purchased for patron use. Additionally, the library houses a fully functional sound and video studio and uses the equipment to disseminate sponsored talks and conferences that are held in the building.

However, providing space to collaborate and hardware to experiment with is not the only way librarians at the Marriott Library have found to foster student creativity and ingenuity.

The Need

Like many university libraries, the Marriott Library is frequently undergoing small to medium-sized facility changes to accommodate new demands from students and faculty. Collections are rearranged, new rooms are built or remodeled, and spaces are repurposed when the need arises. In 2012, serious consideration was directed at an unused patio space attached to the fine art and architecture library. This small library is located on the second level of the larger facility and houses a small subset of the art, architecture, and music books along with student workstations, a reference collection, and current magazines. The attached patio, located in an internal lightwell, has been closed off to patron and library staff since the building was remodeled in 2009. Concerns about damage to collections and a campus restriction on increasing the building footprint/occupancy led the library administration to keep the area off limits. However, now the campus has loosened its restrictions and the fear that patrons might easily steal or damage our books in an outdoor venue has waned. The time seems right to open the doors and create another unique venue for study and collaboration.

However, it is never as easy as simply opening the doors and buying a few chairs and tables from Ikea. From the beginning it was clear that at least some remodeling needed to be done. Doors needed to be replaced, bird droppings needed to be cleaned (no small task), floors needed to be grinded and refinished, electrical outlets needed to be installed, etc. To accomplish this, we needed to hire an architect and set aside a budget. We also needed to have a clear vision for the space and a plan in place to make sure our goals were met.

The Vision

We developed the current vision for the space over the course of many months but the heart of the project remains much the same as it was when we began discussions in 2012. We wanted a space that:

1. Encouraged practicing artists and architects to visit and feel connected.

2. Embraced sustainability and green building practices.
3. Supported the overall mission of the library and the university.

Art and architecture librarians have long struggled to entice studio artists and architects to use library resources and spaces.⁹ The explanations for this are many, but one of the basic reasons may be that their academic output is not well represented in library collections. We have books and databases that show examples of artistic works, but the objects themselves are often displayed in galleries, museums, and classrooms. Therefore, one goal of this space was to give artists an area to display their academic work. Specifically, we wanted the ability to exhibit three-dimensional objects, projections, and performance pieces. The Marriott Library already has extensive wall space for hanging two-dimensional pieces and the addition of an area dedicated to sculpture and performance provides a more complete set of venues for our students.

In addition to exhibition spaces, we focused on the concept of sustainability for this project. The space itself is a natural-light area with furnishings to be built with sustainable materials. We wanted to seek out materials like beetle-kill wood and recycled steel from which to fabricate, and this is where we began to see an opportunity to partner with our architecture students and faculty. The university's School of Architecture has successfully embraced a hands-on approach to instruction called design-build starting with a program called DesignBluffBuild.¹⁰ DesignBluffBuild sends graduate students into the Navajo community in southern Utah to design and build structures in collaboration with the residents. The students and faculty involved have produced unique designs, often with recycled or repurposed materials like those we were interested in.

Design-build programs, including DesignBluffBuild, have proven popular with students and yielded many innovative designs and projects around the US.¹¹ We wanted to include the innovative thinking and enthusiasm of our students in our project and

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knew that it could be done based on the success of other design-build initiatives. We also knew that many of our students and faculty had strong interest in sustainable design and could act as advisors and advocates along the way. Finally, we saw this as a way the library could support and be a part of President Pershing's pledge to provide "signature experiences" to our undergraduates.

To accomplish our goals, we partnered with Erin Carraher, an exceptional faculty member in the school of architecture, and tasked her first-year architecture studio class with the design, modeling, and fabrication of furnishings for the new study and art-exhibition space. Furnishings included tables and chairs for study, permanent and moveable pedestals for public art, and moveable "living walls" for lowlight plants.

With the inclusion of the architecture program into our process, we extended the sustainability of the project beyond materials and into manpower. We were "locally sourcing" our talent and investing in our students by inviting them to be partners in our vision.

Design-Build

The first weeks of our design process included working with a professional architecture firm on the overall design for the space while at the same time working with the students on their designs for the furniture, art displays, and green walls. In those first days of the project we did not have funding for anything but design, nor any promise that money would come in the future. The library administration was incredibly supportive but internal funding was not a possibility. We needed to fundraise if the remodel were to ever actually occur.

Despite lack of funding for the overall project, we decided to proceed with the students and even have them build full-scale prototypes for the space. We assumed that money would eventually come and we could store the built furniture even if the patio wasn't open after fabrication. We pitched the idea to the students, hired 2 fabricators as consultants to them, and developed the following plan for the course of the Fall 2014 semester:

1. **Design Research:** Students will study from print and digital library resources provided by the fine art and architecture library. The resources will focus on sustainable design, public art display, institutional design, and furniture design.
2. **Design Concept:** Students will design using Rhinoceros 3d software already purchased by the Marriott Library.
 - a. Designs to be evaluated by the instructor and the librarian. Several will be selected to move to Phase 3.
3. **Design Development:** Student groups will develop and build full-scale prototypes for their proposals in consultation with professional fabricators. Fabricators have already been selected and hired based on previous experience with museum installations and product fabrication.
 - a. *Mid review:* designs will be evaluated by the fabricator for feasibility, by architecture jurors for design intent, and by the library professionals for client needs.
 - b. *Final review:* a formal review to give students feedback regarding designs. Selected designs to move on to Phase 4.
4. **Design Documentation:** Selected designs will be printed in the 3d printer and combined with presentation boards for display.
 - a. Models will be used by the library selection group for approval of final designs.
5. **Fabrication and Evaluation:** Approved designs will go to the fabricator under instructor and student supervision.
 - a. Completed designs will be evaluated through a student satisfaction survey.

While we stuck to this plan as closely as we could, circumstances did force us to make some significant changes midway through. For example, the transition from Design Development to Design Documentation did not include us selecting just a few designs to proceed as originally planned. From the beginning the class had been divided into eight groups all work-

ing on their own solutions to the design problem. We decided to allow all eight to continue refining their designs through to the end of the project. Additionally, only a few groups found it useful to use our 3d printer to build their models. Most built out of wood and metal to more closely replicate the forms the final products would eventually take.

While the students were working on their end of the project, we were attempting to find funding from multiple sources. We applied for grants from LSTA and the university as well as worked with our development director to find donors who might be interested in sponsoring us. Eventually, the University of Utah awarded us a small grant to help proceed with fabrication and a private donor agreed to pay for the larger remodel. It was, in large part, our work on Design-Model-Build that secured for us the funding we would need. In fact, because of the financial windfall and the interest of our donor, we were able to expand our vision of the space to include the lower-level courtyard as well as a plan to partially enclose the upper-level patio to make it usable year round.

Throughout the students' designing process we remained heavily engaged. There were three design reviews throughout the course of the semester and a group from the library attended them all as clients. The library group consisted of two art librarians, our director of facilities, and our Associate Dean of Research and Learning. Through those meetings we were able to give specific feedback to the student groups, allowing them to better understand what we needed and expected from them. The change in quality and sophistication that happened over the course of the semester was staggering. Students developed incredible ways to program the space using design elements like plug-and-play green walls, customized furniture, and innovative flooring and canopy systems. They derived concepts from precedents found using library materials with guidance from the librarian and teaching faculty. By the end of the process the students had shown us entirely new ways to think about the project and made it clear we would build something truly remarkable.

Assessment

We chose to evaluate the success of this program by administering anonymous course surveys at the beginning and end of the first semester (See appendices A and B). Using a 1-5 Likert Scale, we asked students to rate their confidence in multiple areas including use of 3d modeling software, use of 3d printing technologies, use of Marriott Library resources, and understanding and meeting the needs of real-world customers. For all these measures the students reported improvement with the exception of feeling confident they could meet the needs of real-world customers. This exception could be an artifact of a smaller response rate in the second survey, or could represent a true feeling of unease on the students' part. They were exposed to a difficult architectural problem very early in their academic career and then were asked to make compromises and changes that they didn't expect. With such a complex architectural project to work on, the students were forced to face the limitation of their knowledge and expertise.

We posed open-ended questions as well as those using the Likert scale. For example, we asked what they hoped to learn in the beginning and then what they actually learned at the end. The results were, again, overwhelmingly positive. Answers like this were the norm: "I've learned about what all is needed and required to meet real project standards. Such as budgeting for materials, learning new programs, meeting the needs of a space through creative design, and how to be interactive with your client."¹²

Next Steps

Since the project had grown in scope since we first discussed the idea with our students, many of the designs ended up no longer fitting the needs of the space. The plan to partially enclose the patio would, in particular, interfere with many of the student concepts. We therefore decided not to proceed with full fabrication and instead developed a second phase for the project to include the new building plans.

For the second phase we have hand selected a group of students to continue with us to create the fi-

nal designs for furniture, art displays, and green walls. Over the course of the 2015 Spring semester, these eight students will work with us, the architects, and campus planning to bring their ideas to fruition. They are all being paid for their work and have been asked, again, to focus on sustainability for the duration. This effort is being aided by our recent acquisition of a materials collection via the company Material ConneXion. Through this collection students have access to an extensive online database of materials to inform their decisions and meet cost expectations. This acquisition was made possible through the same donation that is funding the remodel.

Now nearing the end of Spring semester, the students have gained additional mastery over the skills of their profession, they have made important contacts and had productive interaction with professionals in their field, and have directly influenced the design of our new space. The students that worked with us through this next phase have expressed a strong desire to have a lasting impact on their library and university. Through this project they are well on their way to reaching their goal.

Conclusion

Design-Model-Build has enabled us to fully realize our sustainable sculpture garden and study space.

It has brought us full funding and stunning designs for our project while helping to form new professional relationships across departments. We have provided our students with a unique learning experience that they can carry forward into their professional career. The library will have a space that embraces our ideals of sustainability and innovative design inspired directly by our patrons. Administrations from around campus have been impressed with the work that has been accomplished and the passion it has inspired.

This collaboration will hopefully open new doors for students at the University of Utah. Professor Carraher and I have created a precedent on our campus that could make it easier for future students to take an active role in the university's building projects. This was the final goal of Design-Model-Build. The university campus, much like the library, is constantly changing and updating according to the demands of the community. Up to this point, our architects in training have not been exposed to the university's design process nor have they been tapped as a source for new ideas. My hope is that with this example the Marriott Library and the University of Utah will fully embrace the "creative campus" ideal and begin to view the entire campus as a sandbox for student innovation and experimentation.

Appendix A. Course survey administered at the beginning of Fall 2014 semester

ArchSurvey1_Spring2014

This is an anonymous survey. Please answer the questions as honestly as possible.

* Required

1. I am familiar with the Marriott Library and how to find resources related to my research. *

Mark only one oval.

	1	2	3	4	5	
Not at all familiar	<input type="radio"/>	Very familiar				

2. I am confident in my ability to apply my training in design to meet the real-world demands of customers. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

3. I am confident in the use of 3d modeling software like Rhinoceros 3d. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

4. I am familiar with the use of 3d printing technology to aid in design work *

Mark only one oval.

	1	2	3	4	5	
Not at all familiar	<input type="radio"/>	Very familiar				

5. I am confident in my ability to produce digital models that meet fabricator requirements. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

6. What do you hope to learn from this project? *

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Appendix B. Course survey administered at the end of Fall 2014 semester

ArchSurvey2_Spring2014

This is an anonymous survey. Please answer the questions as honestly as possible.

* Required

1. I am familiar with the Marriott Library and how to find resources related to my research. *

Mark only one oval.

	1	2	3	4	5	
Not at all familiar	<input type="radio"/>	Very familiar				

2. I am confident in my ability to apply my training in design to meet the real-world demands of customers. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

3. I am confident in the use of 3d modeling software like Rhinoceros 3d. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

4. I am familiar with the use of 3d printing technology to aid in design work *

Mark only one oval.

	1	2	3	4	5	
Not at all familiar	<input type="radio"/>	Very familiar				

5. I am confident in my ability to produce digital models that meet fabricator requirements. *

Mark only one oval.

	1	2	3	4	5	
Not at all confident	<input type="radio"/>	Very confident				

6. What have you learned from this project? *

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7. What would you recommend for students doing a similar project next year?

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Notes

1. For an excellent summary and commentary on creative campuses see Elizabeth Lingo and Steven Tepper, "The Creative Campus: Time for a "C" Change," *The Chronicle of Higher Education*, last modified October 10, 2010, accessed February 14, 2015, <http://chronicle.com/article/The-Creative-Campus-Time-for/124860/>.
2. Ibid.
3. Richard Pitt and Steven Tepper, *Double Majors: Influences, Identities, & Impacts*, Curb Center Report (Nashville, TN: Vanderbilt University, 2012), 39.
4. "Multi-Disciplinary Design Homepage," University of Utah, accessed February 15, 2015, <http://design.utah.edu/>.
5. "BlockU Homepage," University of Utah, accessed February 13, 2015, <http://ugs.utah.edu/blocku/>.
6. "Lassonde Center Homepage," University of Utah, accessed February 15, 2015, <http://lassonde.utah.edu/>.
7. David Pershing, "President Pershing's Agenda for the U: The Inaugural Address," audio file, University of Utah, 2012, accessed February 14, 2015, http://admin.utah.edu/office_of_the_president/inauguration-recap.
8. For more information and examples of makerspaces in libraries see Tod Colegrove, "Editorial Board Thoughts: Libraries as Makerspace?," *Information Technology & Libraries* 32, no. 1 (March 2013) and Josh Boyer, "Visualizing and Making at NC State's Hunt Library," speech presented at The Freedman Center for Digital Scholarship Colloquium: Pedagogy and Practices, Kelvin Smith Library, Cleveland, OH, November 6, 2014, video file, YouTube, accessed February 14, 2015, <http://youtu.be/ef4k8h9ZR2A>.
9. For excellent summaries of the literature and further explorations on this subject see Hannah Bennett, "Bringing the Studio into the Library: Addressing the Research Needs of Studio Art and Architecture Students," *Art Documentation: Journal of the Art Libraries Society of North America* 25, no. 1 (2006) and Kasia Leousis, "Outreach to Artists: Supporting the Development of a Research Culture for Master of Fine Arts Students," *Art Documentation: Journal of the Art Libraries Society of North America* 32, no. 1 (2013).
10. To see examples of real-world DesignBuild projects from the perspective of the instructors who started them, including Hank Louis' DesignBluffBuild, see Steve Badanes, Thomas Dutton, David Lewis, and Hank Louis, "Teaching by Example," interview by David Sokol, *Architectural Record* 186, no. 10 (October 2008).
11. See V. B. Canizaro, "Design-Build in Architectural Education: Motivations, Practices, Challenges, Successes and Failures," *Archnet-IJAR: International Journal of Architectural Research* 6, no. 3 (2012) and Jonathan Foote, "Design-Build :: Build-Design," *Journal of Architectural Education* 65, no. 2 (2012).
12. Anonymous Student, "Course Evaluation" (unpublished raw data, University of Utah, 2014).

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