Making Space for a Makerspace

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INTRODUCTION

A makerspace is "…a physical location where people gather to share resources and knowledge, work on projects, network, and build" (1). Makerspaces provide equipment, tools, and space in a community environment to foster collaboration for creative endeavors, hands-on learning, rapid prototyping, and

invention. With roots in engineering and the "maker culture" technology, makerspaces have evolved in academia as cross-disciplinary cooperative workshop areas that include tools and equipment that are too expensive or specialized for most people to have in their homes, and to provide a gathering place for like-minded people to create and collaborate. The focus of makerspaces is on the creation of new knowledge, as opposed to the consumption and reorganization of information and knowledge.

The first modern library makerspace appeared in the Fayetteville Free Library in upstate New York in about 2011, and began with offering a 3D printer in the library for public use (2). 3D printers have now become one of the most commonly found types of equipment in library makerspaces. Small electronics, such as Raspberry Pi or 3D scanners, and/or robotics are also commonly offered. Over time, makerspaces have also evolved into "innovation spaces," incorporating services beyond production of physical objects such as data visualization arrays, computer modeling, presentation studios and even virtual or mixed reality rooms. The most basic services include collaborative areas where users are free to explore their ideas and projects with the tools, equipment, or support they bring to the table.

BACKGROUND

The Robert B. Greenblatt, M.D. Library at Augusta University was allocated funding by the Georgia State Legislature to undertake a remodeling project beginning in 2016. The Director of University Libraries envisioned creating a makerspace as part of the renovation, and named a committee composed of the three authors of this column to explore potential resources and services that could be provided. The Director specifically wanted the committee to investigate 3D printing as one of the services, but encouraged them to recommend other reasonable options as well. The committee drafted a report of their findings (3). This column will describe the phases of planning for and implementation of the Greenblatt Library's makerspace.

EXPLORING CAMPUS RESOURCES

The initial charge of the Makerspace Committee was to perform an environmental scan focusing on 3D printing services that were currently available on both campuses of Augusta University. This task was necessary to learn what makerspace services already existed and what was available to the university community. The results of that survey revealed several limited-access 3D printers across both campuses, including the College of Education, the Medical Illustration Department, and the Dental College of Georgia. The use and access of these was limited to a handful of students and faculty and there were no open resources of the Medical College of Georgia, the College of Allied Health Sciences, or the College of Nursing to utilize or explore 3D printing. With encouragement from the Assistant Director of Research Operations at Augusta University, the Makerspace Committee sent an email to department chairs in the basic sciences, as well as other campus stakeholders, to get feedback about the possible implementation of the makerspace and 3D printing services. One respondent stated:

> "*I think this sounds like a great idea. Many libraries are transforming into 'media centers' these days. Having 3-D printers, visualization tools, etc. would be outstanding for our students, especially, as well as for our staff and faculty. And, the relative porosity (read: public access) makes the library an especially good location for such resources…I'd focus initially on having several 3-D printers. That would produce a very visible 'win' early on."*

This response highlights an important point: The library is an ideal location for a collaborative innovation space due to the fact that it is not tied to a specific department, but is open to all members of the campus community.

LOOKING BEYOND CAMPUS

In addition to investigating local campus resources, the Greenblatt Library Makerspace Committee wanted to see what was available in the Augusta community as well as what other universities and health sciences libraries were offering in similar spaces on their campuses. Committee members learned

of a community organization called theClubhou.se, a non-profit “innovation hub” that is dedicated to growing a culture of innovation and collaboration (4). The Clubhou.se includes a 3D printing club, members of which the Greenblatt Library Makerspace Committee spoke to about the 3D printers they use and services they provide.

Beyond Augusta, committee members also became aware of Georgia State University Library’s Collaborative University Research and Visualization Environment (CURVE) facility. Georgia State University describes CURVE as “a technology-rich discovery space and digital scholarship center” (5). The mission of the CURVE facility is …”to enhance research and visualizations by providing technology and spaces that promote interdisciplinary engagement, collaborative investigation, and innovative inquiry” (5). While the Georgia State University Library provides 3D scanning and modeling services, the CURVE space is more dedicated to providing data and image visualization spaces through a variety of forms of media displays. CURVE features the InteractWall, a large-scale (24 x 4.5 feet) touch-enabled video wall where users can readily interact with images and data. The InteractWall allows for multiple users at once. Members of the Greenblatt Library Makerspace committee visited the CURVE facility to learn about their visualization services, as this was another service being considered for Greenblatt Library’s makerspace area. With increasing creation and use of “big data,” students and researchers are working with powerful computers and high-definition monitors to display and manipulate large detailed images in order to create graphical ways to display and navigate large sets of data. Data visualization displays allow for collaborative visual and data-rich research projects.

The last part of the Makerspace Committee’s research into makerspaces involved performing online searches and exploring health sciences libraries that had already implemented makerspaces and/or similar innovation hubs. The committee reviewed a makerspace task force report created by librarians at the University of Maryland Health Sciences and Human Services Library (HS/HSL) that included an appendix of academic library makerspaces (6). The Greenblatt Library Makerspace

Committee investigated four health sciences libraries on university campuses that had established makerspaces or innovation labs: the University of Maryland Health Sciences and Human Sciences Library (HS/HSL), NOVA Southeastern University Health Professions Division Library, the University of Florida Health Sciences Library, and the University of Texas Health Sciences Center. Each of these makerspaces included 3D printing, and all but the University of Texas included 3D scanning as well. The University of Texas Makercloset website included plans for 3d scanning in its expansion. The University of Maryland HS/HSL Innovation Space provided the highest variety of tools for its users including, but not limited to, a large-scale DNA model, virtual reality goggles, and a poster printer.

MAKING A RECOMMENDATION

After performing the environmental scan and additional researach, the Makerspace Committee was prepared to determine what services could be provided at the Greenblatt Library and to make a recommendation to the Director of University Libraries, including equipment and supplies. In order to keep within a reasonable budget range and taking the size of the proposed space into consideration, the committee decided to focus initial recommendations to two primary services: 3D printing and scanning as well as data visualization. Due to the nature of anatomical images, the committee recommended purchase of 3D printers that would allow for the creation of negative spaces, such as chambers of the heart, for example. In order to accomplish this, the 3D printers needed to use two types of material, both solid and soluble. Additionally, after observing the 3D scanning at Georgia State's CURVE facility, committee members chose to recommend a similar scanner for the Greenblatt Library. The scanner allows for rendering 3D images and models for printing as well as for visualization. Lastly, for the data visualization display, the committee suggested a single large touch-enabled high definition screen that would fit comfortably in the space. Figure 1 below lists the initial equipment purchased for the makerspace.

3D printers:

Stratasys Mojo: A model level printer that uses hard plastic and soluble materials

Stratasys uPrint SE Plus: A prototype level printer that uses hard plastic and soluble materials

Stratasys WaveWash Support Cleaning System: A cleaning system that makes it easy to remove soluble support material from 3D printed objects

3D Scanner:

EinScan SE: This scanner uses a fixed position auto-rotating light scan to capture the shape of an object and convert it into a 3D image

Computer:

Dell Optiplex 7050 MT XCTO and 24" monitor

Figure 1: Initial Equipment purchased for makerspace startup

MAKING THE MAKERSPACE

The Greenblatt Library's Makerspace Committee prepared their report with recommendations and a projected budget to the Director of University Libraries, and the Director approved going forward with the committee's recommendations. In order to acquire some startup funding, the committee applied for a Technology Improvement Award from the National Network of Libraries of Medicine, Southeast Atlantic Region, and was awarded funds that covered the purchase of one of the 3D printers and the associated wave wash system and supplies, the 3D scanner, and a dedicated computer and monitor to host the 3D printer software. In addition, the Access Services Librarian was successful in securing student activities fees to help pay for filament and other supplies. The printers and 3D scanner were purchased, but the library renovation was still underway and the room designated for the makerspace was not ready yet. In order to allow for library staff to become familiar and proficient with use of the equipment, it was housed temporarily in another department. A representative from the vendor from

which the equipment was purchased came to the library and offered in-person training on the use and maintenance of the printers.

Beyond equipment and supplies, the Makerspace Committee developed a suggested layout for the floor plan and associated furnishings for the makerspace room. The purchase of the furnishings was included as part of the library's renovation costs. The Makerspace Committee recommended that the Access Services department of the library serve as the overseeing unit for the makerspace. This was due in part to the location of the space, which is adjacent to the Access Services department, as well as to the fact that the Access Services department is staffed continuously during the library's open hours, so there would always be support for users interested in the makerspace services. Additionally, it was determined that 3D printing would be a mediated service, so users would need to submit print requests and have the jobs performed by library staff. Other issues that were decided during this time period were how to process job requests, a pricing structure for 3D printed objects, and determining a tracking system for print jobs. Once the library renovation was complete and the room was ready, the 3D printers and scanner were moved into the new space. The next step was to market the new space and the services that were available.

NAMING AND BRANDING THE MAKERSPACE

The Makerspace Committee wanted the space to have a unique identity within the library. The first step was to determine what the name of the makerspace should be. After considering several options, the committee proposed Creative Technology Lab. The Director of University Libraries approved of the name, so the next step was to create a logo and associated marketing materials. The Access Services Librarian created the logo and had posters and bookmarks printed (See Figure 2). While waiting for the space to be completed, the Access Services Librarian worked with her staff to create an online portal with information about the resources and services available through the makerspace, a 3D print job

request form, as well as links to repositories of 3D images, freely available software for creating and editing 3D images, and online tutorials (6).

Figure 2: Creative Technology Lab Bookmark

In addition to the printed marketing materials and the online portal, a large colorful decal with the Creative Technology Lab logo was placed above the entrance to the space. Later, a complementary colorful banner was installed across a large wall of the room to create a more pleasant environment.

EARLY SUCCESSES

Word spread across camps that the Greenblatt Library had 3D printing and scanning capabilities, and the library was approached with its first request for services when the equipment was still in its temporary location. The library was approached by a medical illustrator about scanning a medical instrument so that the 3D image could be integrated into some curriculum materials for the Medical College of Georgia. Another request came in from an orthopedic surgeon who was inquiring about converting CT scan images of his patients' scapulae into 3D prints. He wanted to use the printed scapulae for two purposes: to have a real-life image for reference to plan for an upcoming surgery and to use for patient education to explain the health condition and the upcoming procedure to the patient. The library collaborated with the Medical Illustration Department and utilized open-source software exclusively and was able to accomplish this to the satisfaction of the physician, leading to several more projects and ideas. Another significant project resulted from a request from a dental school student who had broken a dental model that was required for her coursework, and asked if she could scan her classmate's mold

and print it as a temporary replacement. Lastly, a medical student requested to print a mold of the human brain to create brains using gelatin. The gelatin brains were used for surgery training and simulation.

OPEN HOUSE AND BEYOND

In August 2018 the Greenblatt Library hosted an open house for the Creative Technology Lab. Members of both campus communities attended and heard from the newly named Associate Vice President for Research who is also the Chair of the Art Department. He expressed enthusiasm about the possibilities for collaboration in the Creative Technology Lab. Attendees were able to see 3D printed objects, hear from the orthopedic surgeon about his scapula project, and learn about the other services available. To date, about 250 3D objects have been printed in the Creative Technology Lab. Other equipment has also been purchased including a Cricut cutting machine, a laminating machine, and some small circuitry kits. Several faculty members across both campuses have brought classes in to get an overview of the Creative Technology Lab's resources and services. A local elementary school class has also visited and had a presentation about 3D printing.

There was a delay in getting the data visualization screen ordered and installed, but as of this writing it is now in place and marketing efforts are underway to promote its availability. The library is hosting a Data Management Symposium in mid-March of this year, and one of the speakers will give a presentation about data visualization. It is hoped that the speaker can give a demonstration in the Creative Technology Lab using the media display as well.

CONCLUSION

The Greenblatt Library experience demonstrates that thoughtful preliminary planning can pay off when looking to implement a makerspace in a health sciences library, including hospital libraries. Perhaps one of the most important lessons in this project is related to the adaptability of makerspaces in health

sciences libraries. There is no standardization of makerspaces in terms of equipment, tools, or computer programs; the space and equipment are determined by the needs of the users and the available designated space. Having support from upper administration is essential for success, as is marketing and promotion. It's important to think innovatively about potential collaborators and partners.

The Greenblatt Library considers this project a tremendous success. The Creative Technology Lab brought new users into the library and encourages innovation across campus. Since the initial environmental scan and other initial research was performed for the Creative Technology Lab, several other health sciences libraries have created makerspaces, or have queried Greenblatt librarians about the process as they are considering implementing something similar. The library has begun exploring the possibility of having the Creative Technology Lab become a Core Research Facility on campus, which would make it visible to researchers and make it possible for them to write use of the Creative Technology Lab's resources into grant proposals. The potential for collaborations across disciplines is encouraging, and the Greenblatt Library expects that demand will continue to grow for use of the Creative Technology Lab.

REFERENCES

1. EDUCAUSE Learning Initiative (ELI). 7 Things You Should Know About Makerspaces. [Internet]. Louisville, CO: EDUCAUSE; 2013 Apr [cited 2019 Feb 22]. Available from: https://library.educause.edu/~/media/files/library/2013/4/eli7095-pdf.pdf.
2. Fallows, D. How libraries are becoming modern makerspaces. [Internet]. Washington, DC: The Atlantic Monthly; 2016 Mar 11 [cited 2019 Feb 22]. Available from: http://www.theatlantic.com/technology/archive/2016/03/everyone-is-a-maker/473286/.

3. Mears, K., Logue, N., & Kouame, G. University Libraries Makerspace Proposal. [Internet] Augusta, GA: Augusta University Libraries; 2017 Jan [cited 2019 Mar 5]. Available from: http://augusta.openrepository.com/augusta/handle/10675.2/621436.
4. theClubhou.se. theClubhouse | Augusta's Innovation Hub. [Internet]. Augusta, GA; 2014 [cited 2019 Feb 22]. Available from: https://theclubhou.se/.
5. Georgia State University Library. CURVE (Collaborative University Research & Visualization Environment). [Internet]. Atlanta, GA; 2017 [cited 2019 Feb 22]. Available from: http://sites.gsu.edu/curve/.
6. Kim, B., Brown, E., Bodycomb, A. & Pinho, T. Makerspace Task Force Report. [Internet]. Baltimore, MD: University of Maryland, Baltimore, Health Sciences and Human Services Library; 2014 Jul [cited 2019 Feb 22]. Available from: http://hdl.handle.net/10713/4634.
7. Augusta University Libraries. Creative Technology Lab. [Internet]. Augusta, GA: Augusta University Libraries; 2018 [cited 2019 Feb 22]. Available from: http://guides.augusta.edu/creativetechnologylab.