

Makerspaces in Libraries at U.S. Public Colleges and Universities: A Census

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abstract: Makerspaces continue to grow in popularity in library ecosystems, yet no one has done a census on important data points, such as total active makerspaces, planned makerspaces, and types of makerspaces in public colleges and universities in the United States. The objective of this report is to gather baseline data on makerspaces, the majority of which are in academic libraries. Using an audit of websites, the researchers conducted a census of makerspaces at colleges and universities, collecting such data as makerspace status, location, and departmental affiliation. The researchers identified 284 active makerspaces and 35 planned makerspaces across 214 institutions; of these, 110 were affiliated with their institution's library. This census offers a helpful baseline, but more data collection will provide a fuller representation of makerspaces in the United States.

Introduction

The objective of this report is to collect baseline data on makerspaces in public colleges and universities in the United States. Information professionals gathered these data to determine the number of makerspaces within academic libraries serving public institutions. In this article, *makerspaces* are defined as low- and high-tech communal learning environments where people can create, build, and invent with digital and fabrication tools. These spaces are typically designed for “deepening and applying science and engineering knowledge and practice.”¹

Makerspaces continue to grow in popularity, yet no one has conducted a census to collect important data points, including total active makerspaces, planned makerspaces, and types of makerspaces at U.S. public colleges and universities. Census data provide an environmental scan that might offer critical insight into makerspace trends.

While *makerspace* could be broadly defined, this article situates the term within the context of the mid-2000s social phenomenon known as the maker movement, a trend involving hobbyists, inventors, do-it-yourselfers, tinkerers, and other enthusiasts for making and creating. Typical interests of the maker movement include engineering

projects, such as electronics, robotics, and 3D printing, as well as metalworking, wood-working, and other arts and crafts.

Literature Review

Research about college and university makerspaces has tended to rely primarily on case studies and surveys.² These investigations provide in-depth descriptions of particular makerspaces or self-reported data from respondents whose experiences may not reflect larger trends in the academic maker movement. They provide insight into possible motivations for instituting a makerspace, types of instruction available there, and staffing, locations, availability, and equipment in university makerspaces.

Location

As Vincent Wilczynski, Craig Forest, and Thomas Barrett note, early makerspaces tended to be housed in university engineering departments and were designed to help students

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Academic libraries designed similar spaces to align with their mission to support scholarship and instruction across campus. Libraries also

implemented makerspaces to “promote new literacies, provide open access to new technologies, and foster a cooperative ethos of making” and to maintain the perception of the library “as a leader in technology innovation.”⁴

Instruction

Instruction in academic makerspaces, especially in libraries, tends to take the form of face-to-face workshops and consultations, as well as online tutorials offered on LibGuides and similar platforms.⁵ Samantha Rich and others found that the teaching usually focuses on learning to use the equipment, as opposed to more abstract concepts (such as the ethics of making and creating) or specific content-focused knowledge (such as how to use the space for work in an academic discipline).⁶

Staffing

Staffing in makerspaces varies. Some staff have little or no training in makerspace equipment or practices.⁷ On the other end of the spectrum, Barrett and others found makerspaces staffed by specialists who are experts in the maker movement.⁸ Some makerspaces have dedicated staff, while others employ students as well.⁹

Access

Makerspaces provide an opportunity for users to undertake a variety of endeavors, including coursework, personal projects, collaborative undertakings, and entrepreneurial

efforts.¹⁰ Some makerspaces limit access to students, faculty, and staff from a particular department, but most are open to the entire campus community.¹¹ A few makerspaces at public universities, such as the DCP (College of Design, Construction and Planning) Fabrication Lab at the University of Florida in Gainesville and the GEAR (Graduate Education and Applied Research) Center at the University of South Dakota in Sioux Falls, even welcome members of the community beyond campus. Makerspaces may be housed in libraries or departmental buildings, or they may be mobile and travel to different parts of campus. Some institutions, such as those Anne Wong and Helen Partridge studied, try out the concept with a pop-up makerspace before committing to a more permanent location.¹²

Equipment

Makerspaces offer a variety of equipment, but some of the most common are rapid digital fabrication tools such as 3D printers and laser cutters.¹³ John Burke found that, compared to public or school makerspaces, academic makerspaces focus more on digital manufacturing. They provide equipment for photo editing, Web development, video editing, scanning, 3D modeling, music recording and programming, animation, and the design and development of applications or games.¹⁴

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Methodology

This census focused on makerspaces characteristically aligned with the maker movement. The criteria for inclusion were:

- The primary audience includes university or college students, staff, or faculty, or a combination of those groups.
- The space is open to users from any major or discipline.
- The primary use of the space is not limited to course assignments.
- Users may access the equipment directly (for example, a stand-alone 3D-printing service is not considered a makerspace).
- The space includes conventional “maker” tools and technologies within a communal and collaborative environment.¹⁵

The authors began compiling data by creating a spreadsheet with a list of makerspaces derived from Wikipedia’s roster of state and territorial universities in the United States.¹⁶ The list served as the basis for identifying, tracking, and data collection. The following data points were gathered:

- Institution name
- State
- Makerspace status (active, inactive, or planned)
- Makerspace name
- Location on campus
- Location type (for example, classroom or library)
- Campus affiliation
- Website link
- Contact person and e-mail
- Social media
- Necessity of second level of review and review decision
- Additional notes.

The census was performed through a website audit that included the manual scraping of information. The search terms included a combination of the institution's name, *makerspace*, *3D printer* (among the most commonly purchased technology in a makerspace), and *library* (as many makerspaces are either housed in or affiliated with their library).¹⁷ If the Web results did not yield information on a makerspace, the authors entered the same key terms directly within the search function on the university's website to further investigate. If they were still uncertain about the existence of a makerspace (for example, if the website provided little or no information on who had access to the space), they used the institution's live chat feature to speak to a local information professional. If they came across newsletters or social media posts regarding an upcoming makerspace, they sent e-mails for further clarification regarding the planned facility.

The census underwent two levels of review to ensure accuracy of the information collected. The review process was relatively straightforward, with occasional discussions about whether a makerspace should be included in the list. A graduate student researcher who was new to makerspaces, the maker movement, and maker culture conducted the first review.¹⁸ The second review was carried out by a professor who is closely attuned to the maker movement and had extensive experience launching and running academic makerspaces. The review process was designed to ensure that a researcher could correctly identify a makerspace with the given criteria.

Results

The census began in September 2018 and was completed in April 2019. A full database of census data is available online through the Carolina Digital Repository (https://cdr.lib.unc.edu/concern/data_sets/ng451n854/). The list of U.S. public universities and colleges comprised 784 institutions. Of 784

Of 784 institutions reviewed, 214 or 27.3 percent had at least one makerspace.

institutions reviewed, 214 or 27.3 percent had at least one makerspace. In total, there were 284 active makerspaces across the 214 institutions. The University of Virginia in Charlottesville reported the

most makerspaces, with seven on its campus. Not included in the 214 institutions were colleges or universities that planned to launch a makerspace in the upcoming year; 35 makerspaces were in the planning stages when the census was conducted. Of the 35 colleges and universities preparing to launch a makerspace, the planned space would be the first such facility for 31 of the institutions. See Table 1.

Table 1.
Makerspaces in libraries at U.S. public colleges and universities

Active makerspaces	284
Institutions with active makerspaces	214
Institution with most active makerspaces	University of Virginia, Charlottesville (7)
Planned makerspaces	36
Institutions with planned makerspaces	35
Planned makerspace would be first at institution	31
Number of state universities and colleges	784
Percentage of institutions with either active or planned makerspaces	31%

Two hundred thirty-three administrative affiliations were recorded; 54 makerspaces were associated with multiple partners. Almost half the reported makerspaces were affiliated with their university's library (110 makerspaces). The next largest group was connected with the school or department of engineering (60 makerspaces), and the third largest with the school or department of arts (22 makerspaces). See Table 2.

Almost half the reported makerspaces were affiliated with their university's library

Table 2.
Administrative affiliation of makerspaces at U.S. public colleges and universities

Affiliation	Active makerspaces
Libraries	110
Student organizations	14
Schools or departments	
Engineering	60
Computer science	17
Education	10
Arts	22

Applications and Takeaways

This census aims to enumerate and track makerspaces at U.S. colleges and universities to provide a useful report for information professionals and researchers. There are multiple practical applications for this information, and the intended audience is not only those interested in makerspaces but also those who work in such areas as open access, community outreach, and digital humanities.

The timing of this report was opportune. The researchers collected data in 2019, which provide a snapshot of makerspaces in the United States before the COVID-19 pandemic. As such, this report offers a baseline for information professionals to use

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when gauging the number of operational makerspace before, during, and after the pandemic. Makerspaces invite the sharing of space, tools, and ideas. Therefore, their operations were severely impacted by COVID-19. The importance of this census is heightened as information professionals begin to reenvision their makerspaces with an eye toward a post-pandemic reality. Possible practical applications of this report include:

- *Planning*: Information professionals looking to establish a makerspace could use the report as a starting point for research. They could filter the data to focus on certain makerspace characteristics (for example, rural, local, or research-intensive institutions). Moreover, the report could provide evidence to help justify or highlight the possibilities of starting a makerspace in one's own institution.
- *Collaboration*: The census provides information on a makerspace's website and contact person. Readers looking to work with makerspace specialists can easily locate potential collaborators via the report.
- *Identification of operational makerspaces*: The census report offers information on makerspaces that have already opened along with those slated to begin operations soon. Information professionals can use this report to determine which makerspaces opened or closed before and during the COVID-19 pandemic.
- *Makerspace redesign*: The census report provides website links to each makerspace. This is a valuable data point for information professionals interested in the impacts of the COVID-19 pandemic on makerspace operations, such as the redesign of programming and in-person operations.
- *Looking forward to a post-pandemic reality*: Perusing the makerspaces' websites could offer readers an idea of the next steps for the maker community. What are some lessons learned during the pandemic? What strategies or programming do makerspace information professionals hope to leave behind or continue?

Limitations and Future Work

This census is not all-encompassing. Specifically, it does not account for all makerspace and institution types. For example, museums, private universities, community colleges, and institutions outside the United States are not reflected in this inventory. Moreover,

different models, such as mail-order maker kits, mobile makerspaces, and digital makerspaces, are not covered. While the current census provides a helpful baseline, future work that incorporates more facets of data will offer a fuller representation of makerspaces in the United States.

Discussion and Conclusion

The present study uses a website audit to provide updated data on academic makerspaces in the United States. It looks specifically at the 784 state-funded U.S. universities and colleges, and the database it offers may be useful for future administrators and researchers. The study produced a broader data set than Thomas Barrett and his colleagues' 2015 study of institutions in *U.S. News and World Report's* Best Undergraduate Engineering Programs Rankings¹⁹ as well as Wong and Partridge's audit of 43 universities in Australia.²⁰ Barrett and his team found 35 percent of the 100 institutions they studied had makerspaces, while Wong and Partridge determined that 27.9 percent of 43 Australian universities had them. The current report drew from a larger corpus of publicly funded colleges and universities in the United States yet found a similar rate of 27.3 percent of institutions with at least one makerspace. If, however, the 31 campus makerspaces planned at the time of this census come to fruition, the proportion of institutions with makerspaces would increase to 31 percent, which aligns with the findings of Barrett and his team.

This report confirms that the most common location for makerspaces on campus is within academic libraries, as Barrett's study suggested. The census similarly corroborates prior findings that engineering departments house the greatest number of school or departmental-affiliated makerspaces. This census also identified other popular alliances, including makerspaces associated with art, computer science, or education departments and with student organizations. Acknowledging these additional connections provides a richer representation of makerspaces in U.S. public colleges and universities. This report, and its associated online database, detail a snapshot of academic makerspaces in the United States and provide an opportunity for administrators, faculty, staff, students, and community members to review other makerspaces and inspire new connections.

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Notes

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