

Makerspace or Waste of Space:

Charting a Course for Successful Academic Library Makerspaces

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In an effort to support and encourage campus creativity, many academic libraries are exploring the addition of makerspaces to their buildings. According to the 2015 Horizon Report Library Edition, makerspaces are “community-oriented workshops where tech enthusiasts meet regularly to share and explore electronic hardware, manufacturing and mechanical tools, and programming techniques” (p. 36). What constitutes a makerspace is somewhat fluid, reflecting the needs of the community, but in academic settings the trend is to support 3D printing, photo and video editing, and other multimedia creation (Burke, 2015).

While investigating makerspace options for our own library, we discovered there was little research on academic makerspaces. Because the idea of makerspaces is rather new for academic libraries, the existing literature is mostly case studies of early adopters. John Burke’s 2013 survey is one of the few research-based works, and it included information from all types of libraries, not just academics. Burke’s report collected and aggregated data about funding sources, technologies offered, and staffing provided. It paints a good picture of the makerspace landscape, but did not address the level needed in each area for a makerspace to succeed.

In this research study, we used Brinkerhoff’s Success Case Method to identify specific factors that contribute to effective makerspaces. Originally designed to evaluate the impact of actions on business goals, the Success Case Method (SCM) has researchers 1) identify the type of program being evaluated 2) survey existing programs to identify success and nonsuccess 3) interview success cases and 4) create recommendations based on common factors among the success cases. It is known for being simple to employ and conduct in a short timeframe. According to Brinkerhoff (2005), “Above all, the SCM is intended to help all stakeholders learn what worked, what did not, what worthwhile results have been achieved, and most important, what can be done to better results from future efforts” (p.90).

SCM has been used by the business world, particularly in training (“The Success Case Method,” 2010); education (Olson, Shershneva, and Brownstein, 2011); and non-profits (Coryn, 2009). We found the Coryn article to be very relevant since, like libraries, non-profits may measure success outside the financial realm. Of course, the challenge of how instead to define success must be tackled.

How does one define success for makerspaces? Stumped, we decided to survey current makerspaces and ask them! Following the SCM model, we would follow the survey with in-depth interviews with success cases, isolating factors that contributed to their success.

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We began by identifying academic library makerspaces in the United States through Internet searches. We then contacted the 64 libraries by email, inviting them to complete a survey (see Appendix).

Survey Analysis

The survey had a response rate of 40%. Twenty-five individuals completed the survey. In addition, a 26th individual partially completed it. His or her responses were tabulated when relevant.

Success Assessment

Due to the absence of previous research in this area, the question designed to directly assess makerspace success, question 20 “Would you consider your makerspace a success?” was created as an open-text qualitative question with the objective of collecting as much data possible in order to identify trends. In terms of quantifying the responses purely based on yes or no responses, the majority of respondents, 21 out of 25, considered their makerspaces to be successes. However, analysis of the text indicated that there were widely varying degrees of perceived success. In some cases, more than one variable was listed with some rated as successful and others not. In others, respondents indicated that their original goals were partially met, so they were deemed a success, but respondents hoped to see growth in these areas. Additional research in this area would benefit from the inclusion of a quantitative rating scale on the level of perceived success.

The most cited reasons for perceived makerspace success included high usage and great feedback (6 respondents) and supplementation of curriculum, courses and training (5 respondents). Two indicated they valued partnerships with faculty and staff and another 2 indicated that they were introducing new concepts to the campus. Other reasons listed included outreach, particularly to perspective students, fostering student & faculty engagement (2 respondents), providing access to cutting edge technology and an expanded view of library beyond an information repository to a new role as a creation space. Some participants only indicated affirmative responses without providing rationale for their answers or included responses such as “it’s sort of doing what we intended and we are still working on it” which did not allow us to categorize them. Three who view their makerspaces as successful would like them to grow. If an additional survey were to be designed that authors would include quantifiable rating scales for perceived success in each of the categories listed above.

The authors designed Question 2 “What are the goals of your makerspace” with the objective of correlating perception of success with makerspace goals. However, responses such as “To provide open access to emerging technologies for all students, faculty & staff,” and “The goal of the Makerspace is to provide alternative outlets for creative expression” made such correlations unrealizable.

In addition, two other indicators of success were assessed. These were usage and support. The makerspaces could be deemed successful by both indicators. 25 respondents answered both of these questions. The majority, 17, indicated that their makerspace received as much traffic as they thought it would. In terms of internal and external support for the makerspace, out of a total of 25 responses, 21 felt that there is support for the makerspace from within and outside the library. Of the other four, 2 indicated that they did not feel that there was support, and a final 2 gave ambivalent responses.

Success rates also need to consider longevity. Libraries that have had makerspaces for less than a year and a half may not yet have enough data to determine if they are success stories. Of the 26 respondents 18 libraries have had their makerspaces for a period of 1–3 years, 3 for 3 or more years and another 3 for 6 months to 1 year. Two have had theirs for less than 6 months.

Other Factors

The authors included additional quantifiable questions which the authors thought might correspond to respondents' reasons for success. Data analysis did not note any such correlations. As this data may be of interest to anyone considering the formulation of his/her own makerspaces this data has been included here.

Space

Out of 25 responses the majority, 18, indicated that their makerspace has a dedicated room, 7 that it is part of a larger space in the library, and 1 respondent selected "other" and added the comment that their library has a mobile makerspace which moves throughout the library. In addition, 22 repurposed a current space for the makerspace and 4 built a new space.

Funding

The question regarding funding sources for makerspaces had four possible answers: grant, university, state government or other. Only one of these multiple choice options could be selected by each survey participant. Out of 24 respondents 7 indicated they received funding for their makerspaces from the university, this figure rises to 8 if factoring in one respondent who chose "other" and indicated her/his institution received a grant from university. An additional 5 respondents who selected "other" indicated that their makerspaces were partially funded by state funding. 4 of these respondents indicated that funding was provided through combination of university and grant funding and 1 indicated it was funded via a combination of university and state funds.

Eight indicated grants either fully or partially funded their makerspaces. Although no one checked the box stating funding was provided by the state, one respondent who selected "other" wrote state and university funds were combined to provide funding. 58% chose "other", with 7 indicating funding was a combination of two of the multiple choice options. Five said library funding covered the costs. Three gave additional funding options.

Disciplines & Majors

Twenty-five individuals chose to respond to the question "What major(s) on campus makes the most use of your makerspace?" The two top majors listed were art and engineering, each with 12 listings. When aggregating the data, the engineering major was counted only once per respondent, hence if a respondent listed multiple types of engineering degrees, such as civil or electrical engineering, it was counted once. In addition, if a respondent used the term "art" to describe a major, such as "art", "art majors" or "creative arts," it was tallied in the art category. Majors that might or might not be classified as art, but weren't listed specifically as art, such as graphic design or theatre, were not included in this category and instead were tabulated in the general category Arts & Humanities.

Computer science and biology tied for second place with 5 listings, followed by chemistry and business with 4 each and architecture, education and health sciences with 3 each. Majors with 2 or less listings were tallied into STEM, Arts & Humanities or Social Sciences general categories. In addition, general listings such as "STEM majors" were tallied in these categories. These tallies did not include majors listed separately above. STEM had 3 listings, Arts and Humanities 12 and Social Sciences had 6. In addition there were 2 listings for interdisciplinary majors.

In response to the questions: "Is your makerspace more focused on certain discipline-related projects? (Was it created with certain majors in mind?)" 8 indicated yes, 17 indicated no. Two that indicated yes and listed the majors it had been designed for also indicated they have seen usage from other majors.

In response to the question “Do classes frequently meet in your makerspace?” respondents were fairly equally split with a slight majority of 56% indicating no and 44% indicating yes out of 24 respondents.

Technologies

The break-down of makerspace technologies out of 25 respondents is as follows:

- 3D printing – 22
- Computer workstations— 19
- Photo editing – 14
- Scanners – 14
- Video recording/editing – 9
- Audio recording/editing – 9
- Creating websites – 8
- Animation – 6
- Creating apps – 4
- Other—17
- Usage Stats

In terms of keeping usage statistics for Makerspaces our of 24 responses 7 do less than hourly usage counts, 4 (do hourly usage counts and 1 or (4%) do not collect usage statistics, Slightly more than half of the respondents, 12, replied “other” to this question. There were no trends noted in comments listed for those who selected “other”.

Identifying Success Cases

We were surprised and a bit caught off-guard that the majority of respondents (21 out of 25) considered their makerspaces successes. We had thought that fewer people would self-identify as a success, making our pool of interviews more selective. In hindsight, it’s easy to see that expectation was naïve; people who complete surveys often skew towards the positive or negative of the surveyed experience.

We decided to focus our interviews on 1) those makerspaces that self-identified as successes and had been around for the longest time and 2) makerspaces that others identified as successes. We invited 8 representatives from makerspaces for interviews; 7 graciously agreed. In exchange, we promised confidentiality of remarks.

Interview Summary

Several strong themes emerged from the seven interviews as contributing factors to a makerspace’s success. While some had to do with campus climate and were out of makerspace’s hands, like support from administration, a healthy budget, and student enthusiasm, there were common actions successful makerspaces tended to take that could influence how the space was planned and run. The following describes common actions successful makerspaces tend to take in strategizing, developing, and executing their spaces.

It should be noted that the interviews conducted were largely unstructured so as to provoke responses that were unclouded by the interviewers’ preconceived notions of what successful makerspaces look like. Participants therefore volunteered the information they personally found most important in their own case. As respondents did not all address identical factors, some things may be true of their makerspace but were not brought up in the interview. For instance, while four of the seven interviews indicated partnerships with faculty as a factor of success, the remaining three makerspaces don’t necessarily have poor relationships with faculty but merely did not report such partnerships in their interview. This summary is a report on the key factors participants expressly volunteered as instrumental for their makerspace’s success.

Have a Vision and Purpose for the Space

Whether centering on teaching and learning, engineering, or equitable access to creative technology, the interviewed success cases tended to have an intentional and articulated mission. Leaders who could clearly envision and communicate the purpose of a library makerspace were noted as a factor of success in five of the seven interviews. Developing a vision for the space ensures that it meets a goal and contributes something concrete to the workings of the library and university. By knowing the space is meant to accomplish something concrete, libraries can avoid the mistake of building a makerspace simply for the sake of building a makerspace, only to realize there isn't a plan for what to do with it once it has been built. Library makerspaces built around a guiding mission have something to keep their spaces accountable for staying on track as they work to accomplish a specific goal.

Staff who can articulate their makerspace's purpose were thought to be more successful in "selling" their space and services to stakeholders and potential users. One interviewee spoke of a colleague who works in partnership with his university's Friends of the Library organization to procure funding from donors. He attributed his colleague's success in gaining donations to his clear vision for what the library's makerspace can accomplish, which his library's Friends are able to take to contacts outside of the library with whom his message may resonate. Beyond garnering financial support, developing a mission that speaks to others can be instrumental in generating crucial buy-in from university and library administration, faculty, and staff as well. Potential users and partners are more likely to be drawn in when they know not only that the technology exists, but what it exists for.

Develop the Space around Need

Participants commonly brought up the importance of determining the needs of their users before making further plans and purchases for their makerspaces. Conducting needs assessments was indicated in six of the seven interviews as a crucial continual process from conception to execution of a makerspace. Though "what kind of equipment do I need to get?" may be librarians' first question to ask when considering building a makerspace, as one interviewee noted, taking a step back to consider how the space can fill a need may be a more valuable starting point.

Budget constraints were mentioned as the primary motivation for determining user needs within a makerspace. In the case of one participant, restricted budgets necessitate justifying demonstrable need for any new purchases. Though other interviewees did not indicate budgets that were quite so tight, securing funding was mentioned by all as an ongoing challenge. The tendency for interviewees' makerspaces to be funded at least partially by grants (four of seven) was also a factor in performing assessments to demonstrate that funding would be well spent.

Furthermore, taking the time to determine what users are most in need of was noted as crucial for responding to trends in technology use and creating the most valuable opportunities for users. A commonality of every interviewed success cases was a modest start. Lending out low-cost portable technologies such as Arduinos and Raspberry Pi were most participants' first forays into makerspaces. Starting small allowed each of these libraries to pilot their maker programs, determining the receptiveness of their campuses before taking the plunge and potentially wasting time, money, and staffing. Piloting their programs also permitted further growth of their spaces to be organic and directly driven by usage and user need. Starting small enables makerspaces to invest in the equipment that users are most interested in and refrain from making unnecessary purchases, ensuring the most valuable collection of equipment and services for the specific needs of their campus. This mentality persisted even after years of participants' running their makerspace successfully—when asked about plans for future changes, interviewees tended to discuss expanding upon what users were already using successfully rather than buying into the latest gadget.

Have a Supportive Staffing Model

An issue brought up throughout the interviews was how to maintain a library makerspace's success, particularly

when staff have responsibilities in addition to running the space. The risk of burnout was mentioned in the interviews; working in a new and relatively niche aspect of librarianship can mean high user demand with little additional support. However, sustainable staffing models were mentioned in five of the interviews to alleviate this problem as much as possible. Hiring student workers to lighten the workload is a common practice in many academic library departments, but interviewees noted that being able to hire student staff who were genuinely interested in makerspace work was beneficial for furthering the aims of their spaces without full-time staff having to take on the entire load. Enthusiastic, self-motivated student staff were noted as being able to pick up training quickly, introduce new ideas, and act as ambassadors between the library and the student community. One librarian remarked how he and some of his student staff have become such partners that he will frequently be taught new things from them. Participants often noted how these sorts of partnerships would be more difficult with work-study hires who may not have any interest in working in makerspaces. The ideal student staff appeared to be those who want to do the work and see their job as a valuable learning experience.

Six of the interviewed makerspaces had at least one full-time staff member who was solely dedicated to the space's operations. To several of those interviewed, hiring a full-time staff member demarcated the project's development into a "real" makerspace. Having a dedicated staff meant for many makerspaces that there would be continuity, vision, and accountability, boosting the space's potential. A staff member who doesn't have to balance makerspace work with other responsibilities can stay focused and avoid the burnout that comes along with juggling too much at once. At the same time, successful makerspaces acknowledge that even with one or two full-time staff there will be limitations of what can realistically be done. One interviewee mentioned knowing of library makerspaces with few full-time staff who are expected to hold time-intensive consultations with users, and how that can quickly lead to staff exhaustion. The solution for his space was to figure out a stable staffing model and empower staff to work within their limits.

Trust their Users and Give Them Creative Autonomy

A trend noted throughout the interviews of success cases was how students were treated in their use of the makerspaces. Training users on makerspace technology was a service unanimously offered by interview participants, and in most cases trained students were left to work unsupervised (unless, of course, assistance was asked for). While four interviewees spoke of this model as deliberate, in order to increase the "democratization of technology use" as one put it, for the remaining three it seemed a less conscious decision. Whether intentional or not, demonstrating such a level of trust to students appeared to produce clear benefits for all makerspaces interviewed. Experimentation and learning, for instance, was said to be enhanced when students are encouraged to work autonomously. Giving users freedom to make what they want, even items described as "tchotchkes," generated student excitement and brought more users to the makerspace. As students were allowed to make of the space what they wanted, one interviewee noted, a sense of ownership seemed to develop within the student body, creating a community around the makerspace.

Develop the Space with and Around Community

As mentioned previously, relationships play an important role in successful makerspaces. Forming partnerships was brought up in each of the seven interviews as a factor of their makerspaces' success. Two of the makerspaces attributed some of the success of their spaces explicitly to a core community of enthusiastic users. One interviewee spoke of the growth his library's makerspace experienced after forming a partnership with a student-led group. This relationship created an instant user base which was leveraged into greater opportunities for programming and equipment. While such opportunities may not be guaranteed for all academic libraries, considering the makeup of the student body and delivering services and equipment based on results from needs

assessments were mentioned by five participants as paths toward generating interest. Interviewees tended to believe that having any students who will act as champions for the makerspace is invaluable for bringing new users in and spreading awareness of the space through word-of-mouth.

Partnering with faculty also was a common practice among interviewees, with five of the seven attributing faculty partnership to their success. The level of faculty participation ran the gamut. For one campus, the interviewee mentioned generating buy-in from faculty by offering to print posters for student presentations. Speaking with faculty about the makerspace and what it can do for students allowed them to understand the space's purpose and encourage their students to use it. On other campuses, faculty who already buy into the makerspace have partnered with the library to write grants for new equipment that can further their work and that of their students. Academic library makerspaces have also been able to support course curricula; some interviewees mentioned faculty from a diverse range of studies bringing their students in for class projects.

Three of the interviewees also noted that librarians interested in developing makerspaces shouldn't forget about the larger maker community. Networking with other makerspaces allowed interview participants to get candid equipment reviews, stay up-to-date on latest developments and trends in makerspaces, and learn from the successes and pitfalls of others. While academic library makerspaces tend to target student users, reaching out to non-student makerspaces and maker communities was viewed as a valuable exercise.

Conclusions

In some ways, the factors that contribute to success for makerspaces are the same for almost any project: administrative support; a stable staffing model; patron demand; sufficient budgeting. But through our survey and interviews, we were able to dive a bit deeper and locate components that might not be so obvious. Setting goals can be instrumental in keeping a makerspace on track and drawing in new users. Keeping user need as the engine of makerspace development allows the allocation of makerspace resources to be done wisely so innovation can thrive without unnecessary waste. Staffing models that provide workers with support, while not asking them to overburden themselves, enable makerspaces to meet these needs without sacrificing staff well-being. The way users are treated was a surprising commonality of successful makerspaces; showing investment and trust in makerspace patrons seemed to improve users' attitudes of the space. When students are welcome to stop by the space at any time to work on their own or get help from a staff member, relationships can be forged between staff and students and among students with similar interests. Opportunities for partnerships abound for academic library makerspaces; leveraging relationships can be crucial for their continued success.

Above all, a passion and enthusiasm for the making culture, and a deep and abiding commitment to community outreach, are two characteristics we noted in all of our interviews. We look forward to sharing our research results with our campus stakeholders, and hope others find the data useful.

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Appendix. Academic Library Makerspace Questionnaire— To Identify Why (or Why Not) Success Occurred

1. About you
 - a. Name:
 - b. Title:
 - c. Library:
 - d. University:
2. What are the goals of the makerspace?
3. Why was your academic library chosen as the location for your makerspace?
4. Do you feel that there is support for the makerspace from within and outside the library? Explain.
5. Does your makerspace have a dedicated room or it is part of a larger area in the library?
 - a. Dedicated room
 - b. Part of a larger space in the library
 - c. Other:
6. Did you build a new space for your makerspace or did you repurpose a current space?
7. What is your involvement with your library's makerspace?
8. How long has your makerspace been in place?
 - a. Less than 6 months
 - b. 6 months to 1 year
 - c. 1–3 years
 - d. 3 or more years
9. What major(s) on-campus makes the most use of your makerspace?
10. Is your makerspace more focused in certain discipline-related projects? (Was it created with certain majors in mind?)
 - a. Yes
 - b. No
 - c. Comment?
11. How is your makerspace being utilized?
12. How do you keep usage statistics for your makerspace?
 - a. Hourly usage count
 - b. Less than hourly usage count
 - c. Do not collect usage statistics
13. Is your makerspace receiving as much traffic as you thought it would?
 - a. Yes
 - b. No
 - c. Comment?
14. What types of making technologies does your makerspace offer? (multi-select)
 - a. Computer workstations
 - b. Photo editing
 - c. 3D printing

- d. Video recording/editing
 - e. Audio recording/editing
 - f. Scanners
 - g. Animation
 - h. Creating websites
 - i. Creating apps
 - j. Other:
15. How did you receive funding for your makerspace?
- a. Grant
 - b. From the university
 - c. From state government
 - d. Other:
16. Was finding funding a challenge? Was it one-time or is it ongoing?
17. Do you have dedicated staff for the makerspace?
- a. Yes
 - b. No
- If not, how often does library staff check the space?
- a. Once an hour
 - b. Every few hours
 - c. Twice a day
 - d. Other:
18. Can your makerspace be reserved by faculty/staff/students or is it used on a first come, first served basis?
- a. Reserved
 - b. First come, first served
 - c. Other:
19. Do classes frequently meet in your makerspace?
- a. Yes
 - b. No
20. Would you consider your makerspace a success? Why or why not? (This survey will remain completely confidential. Your responses will not be quoted with identifying features.)
21. What other academic library makerspaces would you recommend as a success?