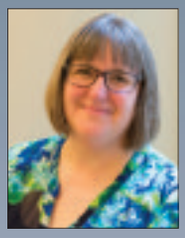
Sustaining a Makerspace



"Sustainable makerspaces are created by those who know how to articulate their vision for the future and their purpose for having a makerspace."

KRISTIN FONTICHIARO

Have you ever run out of maker materials before the activity even began? Exhausted yourself because you took on too much? Panicked because your students are blowing through the semester's new tools and toys . . . and it's only February?

If that's the case, then you might have a sustainability problem. Thinking differently about makerspace sustainability—about the long-term vision, budget, activities, human power, and goals of the program—can help in making more robust choices, conserving energy and budget, and forging valuable partnerships. I've been making these decisions for 4 years as the lead for the Michigan Makers project, which partners graduate student mentors with middle-grade makers, and Making in Michigan Libraries, which positions libraries as hubs for maker conversations in rural and underserved communities. In this article, we look at strategies to help you create sustainable maker culture and projects.

PLAN YOUR WORK, WORK YOUR PLAN

I engage in many conversations and professional development sessions with librarians and educators interested in developing makerspaces. My team and I love to do this—we are passionate about making and eager for others to avoid the pitfalls of novice maker mentorship. But there's one question that always makes our conversations go silent: "What do you want your makerspace to accomplish?"

Social media floods us with photos of excited kids making things light up, move, and blink. It's easy to see that enthusiasm and jump in right away. But before you reach for your buy button, ask yourself that question. There are many right answers, including STEM growth during the school day, stimulation of creative thinking, after-school relaxation, keeping kids out of after-school trouble, and social and collaborative development. Being clear will help you gain support and avoid misunderstandings. (If your primary goal is fun, then keep in mind that entertainment is more the purview of public libraries, not a school library obligated to support student learning.)

Sustainable makerspaces are created by those who know how to articulate their vision for the future and their purpose for having a makerspace. Such statements—known by some as *manifestos*, *charters*, *missions*, or the "spine" behind your makerspace (Fontichiaro, 2014)—help unify staff and students behind a single purpose. Similarly, you can use your charter statement as an elevator speech to communicate to funders, community partners, and potential maker mentors. Once you have a vision, it becomes much easier to think about planning norms, making purchases, and allocating materials.

A good starting point is Mark Hatch's (2014) book *The Maker Manifesto*. Hatch, CEO of the TechShop chain of membership-based makerspaces, has posted Chapter 1 online and invites you to hack his statement. Similarly, consider using a template such as Figure 1.

CHOOSE REUSABLE, EXTENSIBLE EQUIPMENT THAT SCALES

The maker movement did not begin in schools or libraries. It bubbled from the ground up, maker by maker, with makers paying from their own pockets. Many of the cool and exciting kits out there are designed and priced for individuals, not groups. Not all of them scale well for schools and libraries, where materials are usually provided at no cost to makers. For example, consider Drawdio, a nifty tool that electrifies your pencil and lets you make electronic sound with pencil lead. Cool . . . but at $17 per kit, it can only be constructed once and is outside the budget of many groups. By com-

parison, consider a $50 box of LEGOs—endlessly reusable and flexible, whether your students are creating new worlds, responding to design challenges, or prototyping ideas for inventions.

Similarly, think carefully before purchasing tools that can only be used by a single person at a time. 3D printers are hypnotizingly cool, and they signal, "We're a makerspace!," but they print slowly. A Snickers-sized job can take an hour or more. Sometimes only one project can print at once. Multiply that by 20 students, and suddenly you're on nonstop print-monitoring duty. Additionally, given that many 3D projects take multiple tries before they print accurately, how is it that the librarian went from being the head of the recycling committee to throwing bad plastic prints in the trash?

Consider balancing single-use or single-user wonders against flexible, reusable tools such as LEGO, Tinkertoys, Lincoln Logs, K'Nex, the $25 Tech Box Tricks microcontrollers, programming languages, Snap Circuits, and Arduino microcontrollers with breadboards. These tools aren't just reusable; they're extensible, or "extendable," too. They offer features, challenges, or options that grow as students do. Students remain interested in them for longer periods, revisiting them repeatedly as they ramp up their skills. From a long-term financial position, that means that your single purchase has a stronger return on investment, and from an energy standpoint, you aren't panicking each week wondering what new gizmo to buy next. Besides the tools listed above, others that grow alongside students include sewing machines, LEGO Mindstorm robotics kits, and Dash and Dot robots that preschoolers can control with the remote control app and with which middle schoolers can program in challenges. Writers of code, poetry, comics, and prose need only screens or paper to make their work, so once the initial investments are made, they grow for free. At every conference you'll see the temptations of wondrous, new STEM toys for your library. Ask yourself, how flexible is this tool? Will my students use it once and abandon it? Or can this intrigue and occupy their thinking over weeks and months?

When hosting make-and-take events, set a per-participant budget limit. We have public library colleagues who budget $2 per person per event, enough for a few LED bulbs, a battery, and a handful of wires and components. It is also enough to cover a half-yard of low-price fabric, a handful of balloons and straws to make balloon-driven cars, some basic cooking ingredients or knitting supplies, Shrinky Dinks film, and much more.

ASK FOR DONATIONS OF TIME, EXPERTISE, AND MATERIALS SO YOU CAN DIVERSIFY

Donations provide an easy way to shore up and extend your program's viability. Many crafters hold onto a far larger stash of fabric and materials than they will ever use. They are often willing to part with supplies if they know students can use them creatively. Put the word out in newsletters and list the kinds of things you are looking for. Michigan Makers happily accepts old cameras, desktop computers' CPUs, and VHS players because all are interesting things for a take apart or appliance autopsy activity. (We decline computer monitors because they contain potentially dangerous chemicals.) We are still using up the fabric, yarn, and thread donated two years ago, and it's no longer unusual for me to find a bag of fleece, old T-shirts, or a discarded video game console outside my office door.

Figure 1. Makerspace Statement

Based on ____, I see that our students need opportunities to _____. Therefore, we'd like to launch a library-based maker program that will give them the chance to _____. In this program, we will prioritize _____. We will know that we are successful if _____.

Volunteer expertise will shore up your program as well. Healthy maker culture recognizes that the movement grows when makers share their expertise. Behind every successful makerspace is a network of relationships. Consider reaching out to local makerspaces and hackerspaces; local unions for plumbers, electricians, carpenters, and stage employees; members of the parent community; student groups at local universities from a variety of departments; public library colleagues; the local maker faire or mini maker faire groups; and other community creativity groups like potters' guilds, quilting groups, woodworking groups, and coding clubs. Many people passionate about their own creativity are willing to contribute a few hours' time to support you and your students, so ask for a few volunteer sessions instead of a long-term commitment up front. Some districts do require background checks for volunteers, so check district policy. Put a call out for those with these and other skills, and you might find that you can double the number of adults in the room . . . and the number of activities!

More donations and more hands mean that you can expand your offerings. If your initiative is only reaching a niche sub-segment of your population,

then it may fall short of inspiring and developing the skills of a wider swath of students. To increase impact, consider diversifying beyond these engineering or circuit tools. One of the ways Michigan Makers has diversified beyond STEM has been to introduce needle activities. A sewing machine can be bought for as little as $100 and yield dozens of potential projects, from pillows to puppets to Halloween costumes (and, remember, these extra activities can often be accomplished with donated materials). The Michigan Makers team watches for local thrift store sales and picks up denim jackets, button-downs, T-shirts, and fleece for $1 apiece. These can be cut up, refashioned, painted with stencils printed on our Silhouette Cameo and Portrait machines, and otherwise customized. Donated yarn plus low-cost knitting or crochet needles, coupled with a passionate mentor, once turned reluctant urban boys into enthusiastic crochet artists. Whereas an earlier generation might have said fashion was for girls and electronics for boys, we don't find this in our work today. And who knows? Maybe today's tailor, working with today's circuit enthusiast, will create the next generation of smart wearables! For ideas, browse an extensive list at http://fontichiaro.com/uploads/2015/makerspace-list.pdf.

DEVELOP AN IN-DISTRICT ROTATING COLLECTION

One cost-effective way to get district-wide making off the ground is to pool finances and materials. Assemble a team of fellow librarians to brainstorm a list of common starter activities and the per-library budget. Each library chooses one item off the list to purchase. Each month, the libraries send the kit they have been using on to the next library on the list. By the end of the year, the library has exposed students to eight to ten new tools, has built some buzz, and has a better sense of the kinds of tools and activities that are just right for their library and can make better purchases next year.

Imagine, for example, that each of eight elementary libraries were to invest $150. That is enough to buy one Dash robot (if you already have a newer model Android or iPad, which you need to run Dash), a healthy batch of LEGOs and other construction kits, a new sewing machine (or a few secondhand ones), six kits of Tech Box Tricks starter microcontrollers, three Ozobot robots, a LittleBits kit, several Snap Circuits kits, or an on-sale Silhouette Portrait digital cutting tool. That's a big return on investment! Partner your rotating tool of the month with freebie activities like Scratch programming (http://scratch.mit.edu), origami made of discarded newspapers or phone books, and a junk box whose contents can be repurposed into fanciful original creations, and you're well on your way to having a robust, interesting making and exploration. Of course, keep your mission in mind!

DOCUMENT SUCCESS . . . YOU'LL NEED IT TO SEEK FURTHER FUNDING

When you have figured out your purpose, tools, goals, and budget, things can really take off. Now the time comes to document success. Keep your smartphone handy to capture videos of your students' catapults, audio recordings of their prototype pitches, and photos showing your mission in action. See if a maker or volunteer can help you share these accomplishments (with parent permission) via a blog, Flickr, Instagram, or Twitter. Capturing this learning-in-progress will give you data, insights, and images to communicate needs and successes to parents, administrators, and future funders. Reviewing documentation over time helps you reflect on next steps.

CONCLUSION

Taking time to think and plan can help you create a makerspace that is inclusive, set up for long-term success, embraced by the community and funders, and captivating to student makers without maxing out your energy or budget. As the saying goes, "To go quickly, go alone. To go far, go together."

REFERENCES

Fontichiaro, K. (2014). A charter for your school makerspace? Active Learning blog. Retrieved from http://www.fontichiaro.com/activelearning/2014/09/04/a-charter-for-your-school-makerspace/

Hatch, M. (2014). Sample Chapter. In *Maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers* (pp. 1-29). Retrieved from http://www.techshop.ws/images/0071821139 Maker Movement Manifesto Sample Chapter.pdf

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Kristin Fontichiaro, clinical assistant professor at the University of Michigan School of Information, runs the Michigan Makers (http://michiganmakers.si.umich.edu) and Making in Michigan Libraries project (http://makinglibraries.si.umich.edu), made possible in part by the Institute of Museum and Library Services RE-05-15-0021-15. Additionally, she is series editor for the acclaimed Makers as Innovators series for Cherry Lake Publishing. Email: font@umich.edu