Making Your Makerspace Work

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Weekly Lectures

These are abridged transcripts of a paid ALSC workshop I taught online several times from 2017-2018. My contract allows me to provide all of the content here for free (as of Spring 2020).

Money: Selling the Makerspace to Leadership, Producing a Budget, and Making the First Purchases

Welcome to the first week of Making Your Makerspace Work! My goal this week is to discuss the location of a makerspace, what kinds of resources might be a good fit, and how to sell the idea to leadership and decision makers if there are any hold outs - which is a real possibility.

This is not a requirement for this class, but I do encourage you to explore other makerspaces at some point throughout and share your findings. If you are close to one, it can be helpful to schedule a visit. If you aren't close to one, take a look at some web sites or possibly conduct some brief phone interviews with similar institutions.

Seeing what others are doing in their spaces will be valuable as you develop ideas for your own. As you research other makerspaces,keep some of these questions in mind.

First, just observe the space without thinking about the logistics of staffing or programming. What is the layout of the space and how does it flow? What equipment do you see and where is it located? Are there designated work areas or is there a big workspace for tools to be moved to as needed?

Each makerspace will have its own culture and "feel." Does the space have a dedicated staff or not? What is the staff doing? Are students or

patrons currently using the space? Do they have specific projects or are they just experimenting with equipment? Do the activities look structured or more free-form? There are not right or wrong answers to these questions. Just observe and think about any insights you glean from the experience.

Seeing what works and what doesn't work at other spaces will help you develop your action plan. Also just because something works at one makerspace, doesn't mean that it will work at yours.

For example, at my last library, with the exception of items for library-sponsored events, we charged for 3d printing by weight. The printing program was successful and we were constantly running our machines. At Xavier, we started charging for prints and students stopped using the printers. Why? It's a different audience - an audience who is more interested in experimenting with printing than just having an object, no matter how practical, to sit on their desk. We stopped charging for printing, and usage skyrocketed. We made it free for students to fail, which went a long way in encouraging their learning.

Your makerpsace will evolve. This is to be expected and is a wonderful sign when it does! Your expectation may not align with the end result. In fact, it probably won't as you discover users you didn't expect or popular projects that you didn't even think of initially. For the past couple years, my local public library has had a makerspace on a cart that is moves from branch to branch. As it grew in demand, a compelling case was made to build a dedicated makersapce - which opens later this year (Kenton County Public Library in Kentucky if you are interested). I expected the makerspace at Xavier to attract mostly Computer Science students - but I was completely wrong! Although we do get a few CS students, most of our traffic has come from Education and Occupational Therapy.

The best way to sell making to leadership is to give them concrete examples of it having a positive outcome on your community. It is one thing to talk about how libraries are using 3d printers, but it is another to show them adaptive devices that students printed for their friend who has difficulty holding a standard pencil. It's one thing to talk about the Hour of Code and how computer programming is the future of the workforce, but it another to see a room full of children enjoying computer programming for the first time - to produce something unexpected that they would not have done without your guidance. Showing the positive effects of making does not require a lot of money or resources - it requires your vision and patience to see it through. Start small. Use LEDs and watch batteries to make LED throwies. Use

ceramic tiles and sharpies to make coasters. Use Ellison dies to make customized bookmarks. Document everything - photos, videos, whatever your policies allow. Show your boss, show the board, show your patrons, show the people who make purchasing decisions.

Finally, I would like you to research 5 potential items for your makerspace. These can be high tech or low tech. Choose what you think would be best for your users. Do a bit of research about what is out there, provide estimated prices, and justification for your choices. The justification should include the learning outcomes you expect your students to achieve when using the item(s). There is no length requirement, so whether you use pages or sentences per item is completely up to you.

Launching: Staffing, Training, and Policies

Last week we discussed about selling the idea of a makerspace to leadership and various places to find inspiration for your own spaces. This week I want to briefly discuss launching your makerspace which includes staffing, training, and developing policies and procedures for your users.

Let's start with staffing - even if you are not ready to hire any employees, it's good to at least start thinking about it. Maybe it's just you or a few select staff at your organization who have already been chosen for the task - great! You don't have to worry about external interviews. Still, stay tuned because I think some of the following will still be helpful. Again, every organization is different and will handle hiring differently, but these are some helpful tips that I have developed over the years.

Hire for customer service, not technical skills. I wholeheartedly believe that tech can be taught, but customer service cannot. Employees either have good customer service skills or they do not. I wish more IT help desks followed the service-over-tech philosophy. This is usually simple to spot in a candidate just by how they interact with you. Are they pleasant and personable? Empathetic?

Keep the interview questions open ended and ask for specific examples. Here are a few of my interview questions - so act surprised if I ever interview you for a position:

- Tell me about a time you dealt with an irate customer? What happened and what was the outcome?

- Tell me about a time when you had to make a difficult decision at work and there was no one else, manager or otherwise, to consult. What happened and what was the result?

Not all of your questions have to follow this structure, of course. There are plenty of other practical questions. Why do you want to work at the library? This position includes weekends - do you anticipate any conflicts?

Now that you have hired your dream team, let's talk a bit about training them. Again, I hire for customer service, which can potentially require a bit more employee training up front, but I think the payoff is worth it. If quality customer service is not present in the makerspace, the students won't come back - or they will, at best, avoid the space until a teacher requires they use it. In order to build a culture of making, we need to encourage students to explore the space freely while we provide the support they need. Most students will not use the space on their own - it's intimidating. We'll talk more about a culture of making and the intimidation factor in another session.

Every makerspace team member will have their own strengths and weaknesses. There is no getting around this, but you can use this to your advantage. Some might be better at 3d printing, others might be experts at wordworking. Try to identify these strengths quickly and encourage your employees to continually improve skills in areas they are most interested in. The more they are interested in a topic, the more willing they will be to learn more about it. You can figure these out informally through observation (or by asking), or more formally by using an interest survey or similar tool to gather data. It is part of your role as a manager to encourage your employees to improve. I only succeed when my employees succeed. That said, not everyone can only do the tasks that they enjoy - we all have to put the gloves on or stock golf pencils sometimes.

That's why it is important that each of my employees can deliver the same basic levels of service - even outside of their strong areas. For sake of consistency, I require each of my employees to go through a 3 month training process that consists of 3 tiers. After one month, employees are required to independently do A, B, and C. After 2 months, they can do these more advanced things. After 3 months, they can competently operate every piece of equipment in the makerspace. In the spirit of making, I make the training self-guided. Although I am always open to questions, I encourage employees to work together to prepare for the monthly assessments. I schedule an

hour with an employee for each tier, print out the checklist of requirements, and have them demonstrate each item. I do not offer assistance during the assessment.

You have hired and trained your staff - and you are almost ready for prime time! The last step of preparation is determining the policies that you will use to make sure your space is not only safe for use, but also appropriately aligned with your mission statement or institutional policies. Some policies will only become policies after something happens. For example, I had a student covertly using our 3d printers to start a fidget spinner business. Although I applaud his business sense, once discovered, we had to start charging him for printing filament that he uses to print his inventory. This policy is now reflected on our web site. There is no way we could have planned for this, but we adapted appropriately.

Other policies are more straightforward. If you charge for materials, how much do you charge? Do you have adequate insurance coverage? Do you impose a time limit on some of the equipment to maximize the number of people who use it? Do we require students to wear headphones when listening to music? Are snacks allowed? There are plenty of other considerations, but whatever you decided, make policies easy for students to understand and easy to enforce.

Cultivating a Culture of Making: Marketing and Relationships, Accessibility, "Intimidation Factor"

This week we will talk about "cultivating a culture of making" which really just means "how we get people to use the makerspace and how we encourage students to take the lessons they learn and apply them elsewhere."

Before we get into the specifics, let's revisit some of the points that came up in a previous lecture. We discussed how expectations of a makerspace may evolve as we solidify who are users are and how they naturally respond to the space. As we talk about making your space accessible, think about how your ultimate vision - do you want your space to be more of a production shop where learners get what they need for projects? Or do you want the space to be a more self-guided place where students can experiment with different materials? Possibly a combination? This is an important question to consider, as it will guide you as you promote your space with patrons and students. It will also determine how you market your space to your

community. Again, it's perfectly fine if your vision changes throughout the creation process and beyond, but these questions will help keep you grounded.

We've talked about how each makerspace is different and has its own unique culture. I'm going to discuss my experiences here. What has worked and some things that have not, but you will forge your own path. Hopefully my experience helps you of course, but what works for me may not work for you. You will have successes, you will have failures. Take it all in stride and have a good time doing it. Growing your knowledge through the act of developing your own space is worth more than any anecdotes I can tell you over the internet.

In order for a makerspace to be successful, we have to have people using it right? So how does one create a welcoming makerspace? It starts with people - typical customer service best practices apply here. Smile and greet everyone who enters the space, offer to assist with their projects as needed, keep an eye on who is on the space and offer support if anyone starts to look frustrated or bewildered.

The layout of the space also plays a role. Is the space bright and open? Is it easy for users to quickly identify where everything is? I keep a label maker on hand for this very purpose. As soon as I get a new item, the shelf or cabinet it ends up on gets the corresponding label. Is the space clean and free of leftover debris? Is the equipment located in places that make sense? Loud equipment in separate places or behind doors, for example. Or potent smelling resources away from larger tables and workspaces? Some of these things may be out of our hands due to physical limitations of the space. Again, we have to do the best we can with what we have. Possibly most important - is the space safe? Clearly visible first aid kits, fire extinguishers, safety goggles and masks, sinks or eye wash stations. Each space will have different safety needs, but over prepare here. It's better to have an extra extinguisher and never need it than the alternative.

Build relationships with departments and community groups. We are our own PR in many ways. This can be due to staff size, but it's also due to people not understanding exactly what a makerspace is and what potential it has. It's our job to help others figure that out. Make those phone calls, print those fliers, grab the cart and go to local events. Tweet.

Be mindful of timing. What do I mean by that? I had a class visit last fall very early in the school year - their goal was to create an object using makerspace resources. I gave them the tour and put them to work - and they had no idea what to do. They liked what we offered, but had no context.

They got their projects done, but it took them longer than it should have and they were initially frustrated. We learned our lesson - the next class, we introduced them to the makerspace later into their project and the results were much more positive. The goal in cases like these, where users need to create something for a class or similar, it to get them after they have developed the context for the project - not before. They should have an idea of what their deliverable will be before they are introduced to makerspace resources, otherwise they will try to cram their project into something that doesn't make sense. 3d printing is great, but it's not the best for every project.

I talk a lot about what I call the "intimidation factor" with people. Factors like the above certainly play into that, but also it's difficult for people to use potentially dangerous or expensive equipment. It's a big hurdle to get over. There is no magic answer to the question, but we need to continually encourage people to use everything that we have and guide them along the way. Things will break, warranties will be voided, and people will occasionally cut themselves. Stay positive, keep you and your staff trained and current, and communicate to users that it's ok to fail. It's a necessary part of learning and a valuable lesson that can be applied elsewhere in life, too.

Facilitating Events

This week, I want to talk about programming - not in the computer sense, but events that we facilitate for our users. I'll break these down into 3 categories and briefly share my thoughts about each. There may be some expected crossover among categories, but I think it's helpful to take these distinct approaches to programs. Of course your mileage may vary - so do what works best for your space and your users.

Programming

Passive, drop in, take it and make it - whatever you call it, these are events that you plan out in advance that patrons can just pop in and do quickly on their own time. These can be themed around certain holidays or events, or they can be around a specific activity. At Xavier, we have the alliterative "Maker Monday" (which is hardly a unique title, but it gets the idea across). Each Monday, we set out all the materials needed for students to complete

an activity either between classes or on their lunch break. We plan each week for the semester in advance for our sanity, but feel free to just have materials at hand that you can bring out when you feel like it. Maybe for the after school crowd, or for story times. Our most successful Maker Monday by far has been ceramic Sharpie coasters. It takes about 10 minutes from beginning to end and patrons have something practical that they can use in their daily lives. Keep these activities quick, fun, and accessible. If it takes too long to complete an activity, patrons will lose interest and move on to something else. Save the more advanced or complex tasks for the next category - which brings us to:

Workshops and Events

Scheduled events take a lot more planning. These often include purchasing special equipment or materials. Depending on your situation, it may also require participants to register in advance. Your policies may require all events to be free - keep this in mind when purchasing materials and shop around. Amazon does not always have the lowest prices. If you charge for events that require special equipment, most people who register will show up as they have already made an investment.

Have the same event at least twice - even if you have zero participants the first time. Oftentimes, people will only hear about an event after the fact so it is important to give them other opportunities to attend. This is a good way to build buzz in your community. Make people feel bad that they missed something awesome, and they will make sure not to miss it again.

If your event requires setup, prepare well in advance. Move the furniture, test the projector, gather the materials, test the electrical outlets or software your patrons will be using. Always have a backup plan. Web sites will go down when you need them, computers will crash, power will go out, 3d printers will fail.

Promote the heck out of these. Social media, your PR department, local newspapers, word of mouth. Contribute a blog post for your organization's blog.

Schedule consistently. It's fine to experiment with different times, but when you find something that works, stick to it. I have had a lot of success with children's or whole family events on Saturday mornings. Adult events, mid-week evenings. If your area has a large home-schooling population, mid-week mornings or afternoons generally do well. Again, every community is

different - see what works and don't be afraid to experiment with times. Even after-hours or late night events can be successful as it gives the participants and sense of ownership of the space.

If you require registration, only open registration a week to a month prior to the event. Any longer than that, and people will forget they registered and not show up. It's usually fine to overbook for an event - if I can support 20 participants, I take registration for 25+ a wait list.

On the Road - School Visits and Maker Faires

Outreach of all types is vital to what we do - sometimes we have to go on the road. These trips are always a pleasant change of pace and they show others that we are active participants in our communities. Make connections with teachers at other schools - even schools that don't have makerspaces. Talk to other library systems. Do regional events like maker faires, book shows, or county fairs.

Have a few planned, canned events that you can facilitate at any time with minimal preparation. Have them pre-packaged with detailed instructions should someone else ever need to facilitate in your absence. If you work in a larger library system, it can be helpful to ask for coverage while you are out and about. Be actively involved in community planning groups and STEM organizations. Think outside of the box and go to events that don't necessarily fit under the traditional umbrella of schools and libraries. You will be surprised who you meet and what relationships you cultivate.

Most importantly - have fun doing it.

Weekly Makes

You are to design, plan, and create an item/project of your choice using all or some materials that fall under the theme for the week. You are not limited to only items on the list. Explore books, web sites, or other makerspaces for inspiration - or come up with an original project. In your post, describe what you made and how you made it. Include photos or videos when possible (use "Choose Files" to attach photos. Paste links to YouTube, Instagram, Twitter or other sites that support video sharing).

1. Markers, crayons, clay

2. Duct tape, yarn, string
3. Sticks, dowels, toothpicks, popsicle sticks
4. All things shapes - cubes, spheres, cylinders, hexagonal prisms

Weekly Discussion Prompts

1. I want to know who you are! Introduce yourself and briefly describe what you hope to get out of this class (I like to customize portions of the class based on what you want instead of what I think you want). What experience do you have with makerspaces or making culture? Are you currently planning or working with a makerspace? What would you like us to know about you?
2. Let's talk policies! Those of you who have makerspaces (or facilitate makerspace-like activities), what policies do you have in place? How do you manage staffing? What do you do when something breaks or if there is an injury? Are there equipment-specific policies you use? Those of you who are still planning - what concerns do you have? Has leadership provided any direction or friction? What ideas have this week's readings triggered? I will chime in with some of the things that have worked (and not) in my space after I give you a chance to contribute.
3. How can we make a safe and inviting space for our students and patrons? How can we encourage learners to try new things hands-on while giving them the freedom to fail? What other thoughts do you have about the lecture and readings this week?
4. What kinds of making events have you tried or plan to try in the near future? What best practices can you offer the rest of us? What kinds of partnerships have you made with community members, other branches, and patrons? How has this positively (or negatively) impacted your activities?
5. How do we know when we are successful? How can we assess the popularity, learning outcomes, and community value of our making programs? How do we know when to adjust our approach and what are some strategies we can use?

Final Project

You are to write a lesson plan for a making class or workshop that uses resources and equipment from your makerspace (or imagined space) as its teaching tool. The lesson plan has no page requirement, so it can be as verbose or terse as required as long as all of the components are included. The content of the class or workshop should be sufficient to cover at least two hours of instruction time (it can be more, or can cover a series of sessions). Please submit your lesson plan in either doc, docx, or rtf format.

Your lesson plan must include the following:

- Learning objective(s)
- At least 2 connections to standards (either Common Core or your local equivalent). List the standards
- Materials/software/hardware required
- Estimated time required for instruction, indicate if single session or series
- Outline of activities that students will complete
- Assessment to be used
- Self-evaluation (can be left blank to be completed after your you facilitate)
- Your lesson plan is due the last day of class by 11:55PM. Each lesson plan will be compiled by your instructor and distributed for your use at your respective institutions - therefore your lesson plans will be distributed under a Creative Commons license (attribution/non-commercial/share-alike).