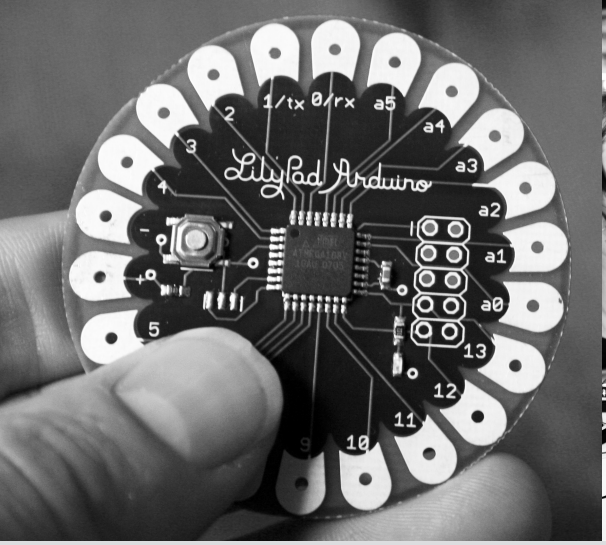

#the makerspace_ librarian's sourcebook {

// edited by **ellyssa kroski**

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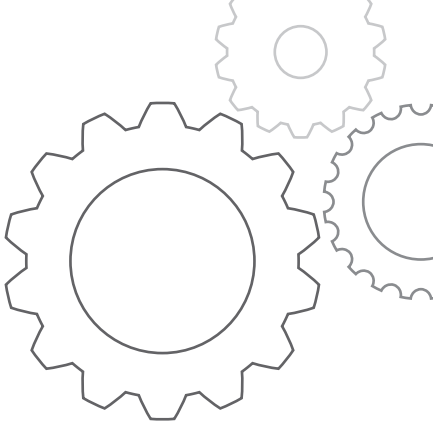

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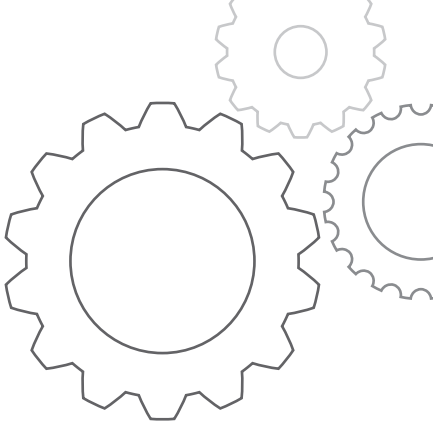

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Figures

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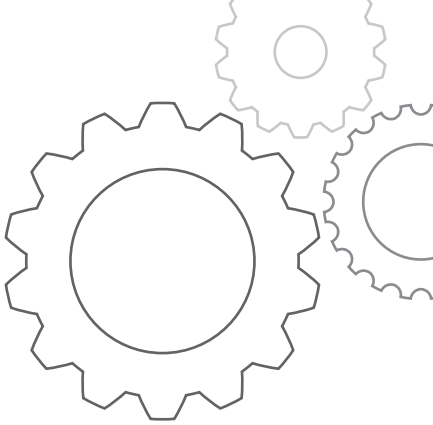


preface

The *Makerspace Librarian's Sourcebook* is an essential all-in-one guidebook to the maker realm written specifically for librarians. This practical volume is an invaluable resource for librarians seeking to learn about the major topics, tools, and technologies relevant to makerspaces today. Jam-packed with instruction and advice from the field's most tech-savvy innovators, this one-stop handbook will inspire readers through practical projects that they can implement in their libraries right now.

Part I leads librarians through how to start their own makerspaces from the ground up, reviewing strategic planning, funding sources, starter equipment lists, space design, and safety guidelines. It also discusses the transformative teaching and learning opportunities that makerspaces offer, as well as how to empower and encourage a diverse maker culture within the library.

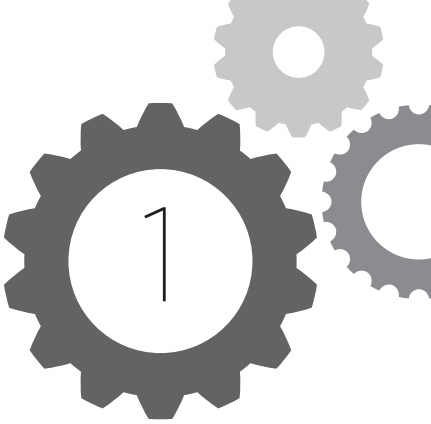
Part II provides hands-on, practical discussions of the eleven essential technologies and tools that are most commonly found in makerspaces of all types. This section serves as a primer on all the major maker tools and technologies ranging from 3D printers, Raspberry Pi, Arduino, wearable electronics, to CNC, Legos, drones, and circuitry kits. It covers what they are, how to use them, how different libraries are using them, and offers project suggestions that are specifically geared toward libraries.

Part III looks ahead to topics such as making your makerspace mobile, sustaining your makerspace once initial grants and funding sources are gone, and the future of makerspaces in libraries.

Authored by knowledgeable maker librarians, this comprehensive resource will guide librarians through all they need to know to make the most of their library makerspace.

—**ELLYSSA KROSKI**
The New York Law Institute

Part I
Creating the Library Makerspace



How to Start a Library Makerspace

CHERIE BRONKAR

What Is a Makerspace?

You may have heard the term "makerspace" and wondered what it meant. Makerspaces are, simply put, places where people gather to make things. Although that may sound like a simplistic definition, the things that can be created in a makerspace vary a great deal. Makerspaces can be high tech, low tech, and everything in between. A makerspace's offerings revolve around the needs of the community it serves, but the one thing all have in common is that they bring people together to share ideas.

Typically, the first thing that comes to mind when thinking about makerspaces is 3D printing, but when it comes to what's going on in makerspaces around the world, that's just the tip of the iceberg. Makers create things, ideas, and concepts. Makers work in metal, wood, plastic, fabric, paper, and digital forms. From robotics to crocheting, there are no limits to your makerspace. Let your imagination run wild.

Cherie Bronkar is Director-Regional Library at Kent State University Tuscarawas.

In this chapter, we'll provide the information and ideas to get your makerspaces up and running based on your unique populations and budgets. You'll find a myriad of ways to create your makerspace. You'll also discover ways to ensure your makerspace is fun and functional.

Know Your Makerspace Culture

Makerspace culture developed from hackathons, which were rooted in software and brought together groups with an interest in creating new apps and software. Such ventures nourished the makerspace culture.

The makerspace culture brings together multiple groups with multiple interests, sometimes putting together unlikely pairings to encourage new ways to think and create. What the members of these groups have in common is a love of tinkering, building, and sharing ideas. The makerspace provides space, resources, training, and technology that all enhance the culture.

Because it isn't limited by age or experience, makerspace culture is unique. Often, groups are comprised of those who just have an interest in creating new products and information. The focus is on sharing and learning in a synergetic environment. The key is that whether these groups are solving a problem or simply creating a fun piece of 3D art, they are doing it in a collaborative environment where makers can bounce their ideas off others with similar interests.

How does the maker culture fit a library? Makers create information as well as physical objects. In the past, the librarian's traditional role was to house information. Libraries now take an active part in the production process as well as in developing new information, all the while passing along valuable STEM skills to library patrons through instruction and by providing the tools of production such as 3D printers, 3D modeling software, and more. The maker culture has found a new home in our libraries. We need makers and they need us.

Discover the Major Types of Makerspaces

Makerspaces come in many forms, from low tech to high tech. Each library approaches its vision of a makerspace in its own unique way, often relying on the interests of the local community and potential users. Any library, including specialty libraries, can operate a successful makerspace, but they are more commonly seen in public, academic, and K–12 libraries. Makerspaces offer opportunities for collaboration in our communities and institutions. Offerings and key players vary greatly depending on the type and the size of the library.

Public Libraries

Public libraries offer amazing opportunities to create makerspaces of all kinds. Where else do you get the chance to use fun activities to bring together so many diverse groups? Public libraries come in many shapes and sizes that allow for an array of creative makerspaces. Public libraries are on the forefront of the makerspace movement. They have a broader spectrum of users and an ability to create spaces that meet the needs of their communities. These spaces range from large to small, from high tech to low tech and all provide training to the public. This includes both one-on-one training and public workshops.

The Charlotte Mecklenburg Public Library's Idea Box is a great example of what a larger public library can achieve. The Idea Box (www.cmlibrary.org/idea-box) features 3D printers, laser engravers, vinyl cutters, sewing machines, Raspberry Pi, and more. It offers programs on everything from circuitry to sewing to meditation. The facility is a fully staffed space that's open at specific hours during the week, and it offers programs based not only on technology and available equipment, but also includes an array of creative and crafty pursuits.

Public libraries large and small throughout the United States are eager to embrace the maker explosion. Smaller libraries can easily incorporate fun and exciting programming. Crafting with recycled materials to make jewelry, duct tape crafts, Legos and erector set competitions, and small electronics projects with littleBits, Makey Makey, and Raspberry Pi are filling our libraries with eager learners.

Academic Libraries

Academic libraries operate a bit differently than public libraries. In an academic library makerspace, much of the equipment will be aligned so that it can be applied to the curriculum. Although academic libraries are typically available to enrolled students, some are also open to the public. Training is provided in much the same way as in a public library, but academic libraries also work closely with faculty to develop project-based training.

A typical academic makerspace would include 3D printers, programmable electronics, digital microscopes, video equipment, large format printers, and other items that add to the institution's curriculum.

Case Western Reserve University's Think Box (http://thinkbox.case.edu/home) is an amazing space with many resources. Its equipment is extensive and includes items such as a vacuum chamber, miter saws, digital multimeters, band saws, and milling machines. Its projects range from brain scans turned into 3D

puzzles to a human-powered cell phone charger. A space like this gives students endless possibilities to put their education into practice.

Kent State University at Tuscarawas (http://libguides.tusc.kent.edu/makerspace) is a regional campus that's turned a section of its Academic Learning Commons into a makerspace featuring 3D printers, an Oculus Rift station, a digital microscope, and LEGO MINDSTORMS to excite and inspire students. Its focus is on problem-solving projects, and it's used its makerspace to solve a problem in its science labs by creating a clip that allows students to attach any type of cell phone to a microscope and take photos and video of their findings. It's also used 3D printers to create prosthetics for animals in conjunction with the Veterinary Technology program.

K–12 Libraries

Much like the academic library, the K–12 library is geared towards curriculum and exploration. The K–12 makerspace provides an environment for students to experience technology and its applications. Training in these libraries is provided to specific classes, often as project-based learning. These spaces are generally not open to the public and are closely monitored.

Equipment in these spaces is often tied to STEM initiatives and includes items like 3D printers (notice a theme here?), littleBits, Makey Makeys, and electronics-based learning materials. (See the chapters in part II on specific tools for more ideas.) K–12 makerspaces also make good use of apps and software to keep their students in touch with technology. 3D-compatible software such as Tinkercad, Google SketchUp, FreeCAD, and MeshLAB are just some of the options. Apps can be downloaded to school computers and made available to students for use. Some popular apps are Motion Café, Garage Band, iMovie, Kodable, ScratchJr, Stop Motion, and Easy Studio, to name just a few. There's literally an app for everything, so look around for one that will amaze students.

The staff of school library makerspace may find they have limited amounts of time to work with students. As a response to little time during the school day, Theodore Robinson Intermediate School established an after-school Maker Club, which takes on projects that experiment with stop-motion animation software and art bots.[1]

Mobile Makerspaces

Your makerspace need not be stationary. Some innovative libraries are creating mobile makerspaces which, much like bookmobiles, deliver materials to remote

locations. Mobile makerspaces take the maker movement wherever it is needed. These spaces offer opportunities for collaboration between schools, public, and academic libraries.

Featuring the ever-popular 3D printer, the mobile makerspace offers many pieces of equipment that can travel, such as laser cutters, craft supplies, and even hammers and nails. Much like our bookmobiles, traveling makerspaces like the STEAM Truck (http://community-guilds.org/) bring makerspace innovations to communities that might not otherwise have access to them. What an amazing way to reduce the technology gap for those areas that do not have makerspaces in their libraries or their schools!

Membership Based

Increasingly, makerspaces receive support from membership fees. These makerspaces can be for-profit or nonprofit. For a fee, members are offered access to equipment, training, and the space. This model has also been adopted by a few academic libraries to allow their spaces to be shared by the public.

The focus of membership-based makerspaces varies greatly. From the arts-inspired Artisan's Asylum's (http://artisansasylum.com/), with its huge creative spaces where artists can collaborate, to the TechShop's (www.techshop.ws/) multiple locations and tech focus, there's a wave of membership-based centers sweeping the country. The membership-based makerspace is supported by membership fees, and often funded by grants that support specific programs for youth.

Determine Your Makerspace Focus

As librarians, we all know the importance of narrowing your focus to make information manageable. The same is true with makerspaces. As you research makerspaces, focus on those with populations that best match your demographics and budget. Ask what works for them and consider mirroring an approach that has already proven successful.

Budget, staffing, and community will be major influences on the focus of your makerspace. Costs can run high if your focus is technology-driven. If you have a low budget for starting your space, consider a mixture of a few higher-dollar items augmented with other low-cost but creative ideas.

The maker movement is not solely based in technology. Yes, it's a great way to bring technology to those who might not consider using it, but being a maker is about creativity, collaboration, and producing new ideas. Makers exist regardless of budget, so keep that in mind and develop spaces that your library can support and staff.

Your space doesn't even need to be a space. It can be a series of programs, if that's what fits your library. When funds are unavailable, the focus can be on creative workshops featuring low-cost materials and big ideas. Once you decide what resources you can commit, look for ways to develop programming that fits the demographics of your users.

There are so many directions you can take with your makerspace. A technology-based space is a big draw. Spaces with 3D printing, laser engravers, robotics, and electronics are very popular. These are the typical spaces libraries envision when planning a makerspace.

Crafting and art makerspaces can be created with a little less funding. These spaces can include sewing, quilting, knitting, painting, writing groups, and anything you think will be appealing to your users. Another plus with this type of makerspace is that it can be set up for users of all ages.

Media spaces include video and audio recording studios and go very well with libraries that lend musical instruments. These spaces are becoming more popular, but much like the technology spaces, they require a great deal of staffing, training, and funding.

The focus for your makerspace should reflect your users' interests and your library's ability to staff and fund the space. As with any large project, starting with a focus allows you to ensure you've covered all the bases. It is very easy for your makerspace vision to branch in multiple directions. Keeping a focus will prevent that from happening and allow you to design the best possible space.

Once your space is up and running and you know what you've gotten yourself into, you'll have a better idea of what you might need to add. Makerspaces are spaces of continuous change. Additions will be constant, but starting with a single focus will allow you to face changes and additions without becoming overwhelmed.

Establish Funding

A major component to any new endeavor is funding, and a makerspace is no different. In fact, because of the potentially huge costs, funding them can be even more of a concern. Whether you are funding the space with your current budget or applying for grants, it's important to factor in everything you will need to make your space a success.

A makerspace requires a great deal of planning. Using the information from this book will help you lay out a solid plan, but, as with any large project, there will be things that you never saw coming. To start with, plan for the costs of equipment, repairs, maintenance contracts, supplies, staffing, training, and construction, and then add a contingency to be safe.

Once you've done that, you can determine if you'll need outside help to fund your space. Luckily, makerspaces are appealing to grantors, so the time to apply for grants is now.

How to Win a Grant

Larger libraries and institutions will often have a person on staff to guide you through the grant process. Your grant officer knows what grants are available, and their requirements. This is often the case with schools and universities as well. Institutions that already receive federal funding may have restrictions on what grants they can pursue. Be sure to check with your administration before you seek funding.

Grants come in many sizes from many places. Some are highly competitive, some are not. Use your networking skills and talk to people. Talk to people in public office and your state library, and seek out information from others who've been successful in obtaining grants. Talk to other makerspace librarians, and ask them if they applied for grants and which ones they received.

Federal grants can be very competitive, but this is not always the case. Federal grants offer big rewards, but require detailed paperwork, stipulations, and reporting. When you're seeking grants, research past recipients. This will give you a better idea of what grantors want to fund. Federal grants require a great deal of paperwork, so be ready to have your ducks in a row if applying for a federal grant. The Institute of Museum and Library Services (IMLS) is the largest source of federal funding. IMLS grants serve initiatives outlined in the Library Science and Technology Act (LSTA) and are offered throughout all fifty states, with over 2,500 grants available.[2]

Local grants can be found at the state, county, and community level. These grants can be less competitive than federal grants. They also tend to be more specific and offer less funding. Local grants come from an array of sources, from trust fund distributions to local businesses.

Edutopia.org lists multiple funding sources, including company funding from PG&E Bright Ideas, Botball Robotics, ING Unsung Heroes, and Lowes' Toolbox for Education.[3] Another source for finding grants for libraries and schools is Scholastic's Activities and Programs web page (www.scholastic.com/librarians/programs/grants.htm), which features information on grants and their requirements from an array of sources, including the Paul G. Allen Family Foundation, the MBNA Foundation, RGK Foundation, the National Endowment for the Humanities, and the W. K. Kellogg Foundation.[4]

Crowdfunding is being used to raise money for everything under the sun, so why not for your makerspace? There are many options for setting up crowdfunding; some are open to anything you want to fund and others are specific to education. Give crowdfunding a try. GoFundMe, Kickstarter, Indiegogo, Patreon, and Crowdrise are just a few examples. Educators have found success using DonorsChoose.org, a crowdfunding source that is set up to allow donors to choose educational projects to fund. Some libraries simply share their makerspace-focused Amazon Wish List with patrons and businesses in their local communities.[5] There are many options available today that weren't available just a few years ago. Try them all out and see what sticks.

Grantors love to see collaborations. Makerspaces are perfect for collaborative ventures among schools, universities, businesses, and small-business development agencies. Seek out local agencies to build partnerships that benefit the community, schools, or local businesses.

Your makerspace is in a prime position to promote technology, small-business creation, and job growth. These are all selling points.

Get Started without Funding

We'd love to think every makerspace will receive unlimited funding, but sad to say that will not always be the case. So, what do you do when you desperately want to start a makerspace but don't have the funds? You do what makers are meant to do: get creative.

You can have an inviting and appealing makerspace on a shoestring. There are many ideas out there for items that don't cost an arm and a leg (many of which are discussed in this book). Paper crafts are extremely cost-efficient. From origami to book art (using withdrawn books) to creating apps, you can make it happen on the smallest budget.

The makerspace movement does not rely solely on high-priced technology. Making through shared interests has always been a part of our libraries. We've done this through much of the programming we've always offered. With some adjustment, this same technique can be applied to your budget makerspace.

Making can be as simple as featuring a building contest with Legos or hosting something more technical like a hackathon. Your makerspace does not always have to provide equipment and materials; you can bring together groups to share what they've done and learn from each other.

If you work at a school library, consider hosting a space where students can make and display dioramas, science projects, crafts, and jewelry (something

along the line of friendship bracelets). After all, what you want is for students to come to your library and collaborate in fun ways with fellow students. These kinds of activities in your makerspace would also be a great way to get faculty and librarians working together.

Most of us have computers in our libraries. There are many free design websites. Host some training to help your students create videos on their phones and upload them to free video editing apps, run a contest for the best Vine, create a school YouTube site, encourage the English faculty to have students supplement their literature studies with things like funny video spoofs of a book their class has read.

A public library can offer many of the same activities, and with its larger demographic there are even more low-cost options. Public libraries can host local artists in their spaces. Offer a "bring your own supplies" art project that introduces your users to other budding artists who can continue to meet at your library. Crocheting, knitting, graphic design using free software downloads—there is no end to what you can offer on a no-cost or low budget.

Ask for the things you need. Donated items are a great way to build your makerspace. Let your users know what you need; they may have that item to donate. Conduct a tool drive in your community.[6] Local companies are a good place to look for donations of small machinery and used technology.

If you have a small budget, all the better. You can still build a great space. The most important part of your space is simply that it encourages collaboration. If you can include a few tools and inexpensive equipment and suggest project ideas, you have a makerspace. The tools and equipment do not need to be expensive. Equipment for jewelry-making and scrapbooking are inexpensive, yet are fun and creative ways to interest your users.

You can still add an electronics component to your space without incurring huge costs. Edutopia has featured many ideas for what it refers to as "unmaking."[7] Who hasn't wanted to take apart a piece of electronic equipment to discover what's inside? Unmaking uses recycled electronics to allow users to learn about electronics by taking them apart and putting them back together.[8]

Evaluate Your Space Design

There are many aspects to take into consideration when designing your makerspace. The equipment you install in your makerspace will be very different from what's found in a traditional library. The way this space is used will be different than any other library space. The library of the past was based around quiet study.

Although we still need quiet spaces, the makerspace will be noisy. Even if you don't have noisy equipment, a successful space is a collaborative space, and collaboration means people must talk to each other. Excited users are not quiet; nor should they be. Locate your space in an area where talking won't be disruptive to quiet study areas.

Some libraries will be repurposing a current space to house a makerspace. Be prepared to call the electrician. The maxim "you can't have too many outlets" has never been more true than it will be in your makerspace. Because many pieces of equipment will be required to support technology and computers, data ports have become the new electrical outlets. Add more than you need, and then add a couple more.

Some equipment will need proper ventilation, which is a bit easier to address in a new space. If you are repurposing an older space, you'll need to check with an architect to see if ventilation is possible. Heat and moisture can wreak havoc on technology and even some of your supplies. 3D printer filament is temperamental once opened, so a moisture-proof container is a must. Equipment can easily overheat in any environment. Electronics fans are usually inexpensive and can save costly repairs due to overheating.

Supplies can take up much more space than anticipated. If your tools break, you'll need more tools to fix them. These things quickly collect; and having a space already planned for all the extras will ensure you have a clean area and your supplies are organized for easy access.

Dealing with makerspace waste material is sometimes an afterthought. Much of your makerspace waste is recyclable. Having a place to store recyclable materials is a must. In addition to scraps from filament, paper projects, and metal, you may have waste from batteries or that requires specific disposal and recycling precautions. Research your local outlets to learn where you can safely recycle or dispose of these materials.

If it's possible to add plumbing to your space, this can be a real plus. Although not essential, a sink in your space can be quite helpful. Makers make messes too, and a convenient way to clean up is quite handy.

Whether your space is large or small, creating a diagram of the way you will lay out your equipment, work areas, electrical outlets, and data ports is essential. Take measurements of equipment before you order it and allow enough space for the equipment to be used properly. For instance, a large-format poster printer takes up more space than a regular printer. Posters need to be laid flat, and professional large-poster cutters need to be mounted to a table, which can take up a huge amount of space. Although you can easily determine how big the printer

will be and plan for its footprint, the space needed to create with printing posters and banners may be a surprise. Legos, Erector Sets, and electronics kits can easily be stored in small areas, but do you have a space designated for users to spread out and use them? If not just improvise, as Diana Rendina did for her Lego Wall at Stewart Middle Magnet School in Tampa, Florida. Diana created space on a wall for building with Legos to optimize her small space.[9]

Computers will take up a lot of space if you are using equipment that needs specific software to operate. 3D printers, vinyl cutters, and data-driven equipment will need space for the computers that support them.

When planning your space, there are many considerations that won't come to mind. Besides planning for electrical, bandwidth, and the size and layout of your equipment, you will need to envision and design a plan that includes space for all the extras. Keep in mind that workspace and supplies storage will be just as essential to your space as the equipment.

Although there are many considerations when creating your makerspace, the main thing is to create a space that fits the needs of your community. Once you determine what kind of makerspace you want to establish, look at the budget you have available and make a plan. Don't be deterred by the cost—there are always ways to create an effective makerspace on any budget.

Getting Started—Equipment Lists

Here are some sample starter equipment lists for you to consider, depending on the type of makerspace you'll be building as well as your library's budget.

Technology-Focused Makerspace Starter Kit

(Estimated Cost $3,300)[10]

- Makey Makey ($50)
- Squishy Circuits ($25)
- Minecraft EDU ($25)
- LEDs ($30)
- LED batteries ($14)
- copper tape ($20)
- Scratch (free)
- Tackk (Free documentation website)
- paper/vinyl cutter ($350)
- 3D printer ($2,500)
- Arduino Adventures parts kit ($60)
- Raspberry Pi kit ($90)
- Legos ($50)
- Snap Circuits kit ($60)

Bigger Budget Technology-Focused Makerspace Starter Kit

(Estimated Cost $21,000)[11]

- OWI Robotic Arm Edge robot arm ($50)
- LEGO MINDSTORMS Education NXT Base Set ($500)
- GCC Expert 24 Vinyl Cutting Plotter with stand and heat transfer vinyl pack ($820)
- 3Doodler pen ($99)
- Anthrotab 20SSPW multi-charging unit ($614)
- Zotac ZBOX-ID90-P Intel Core i7 3770T,4GB RAM,500G HDD, Intel HD4000 Graphics integrated by CPU, Mini PC, and 55-inch GVision large format touch screen display (for presentation room) ($595)
- Logitech MK550 Black USB RF Wireless Ergonomic Wave Combo ($80)
- Erector Set ($81)
- Architect Lego set ($160)
- FlipBooKit Moto ($99)
- EL-Wire starter kit, 25 feet ($40)
- Starter Pack for Arduino (includes Arduino Uno R3) ($65)
- Flip video camera—White, 30 minutes ($80)
- Parallax BOEBot Robot for Arduino Kit ($124)
- Ultimaker PLA filament spools (assorted colors) ($65 per spool)
- Microsoft Surface 2, 64 GB ($449)
- Microsoft Surface Power Cover ($199)
- Wakom Intuos Pro Pen & Touch Special Edition ($379)
- Accucut Original Mark IV Super Starter Set—Early Childhood ($1,999)
- Xyron 2500 Machine ($1,480)
- Ultimaker 2 3D printer ($2,500)
- LulzBot TAZ ($2,200)
- Canon imagePROGRAF iPF750 36-inch large format printer ($3,495)
- digital cameras ($259 each)
- green screen and lighting kit ($179)
- Cricut Scrapbooking vinyl/leather/paper cutting machine ($250)
- Sprout 3D scanner/printer ($3,000)
- Adobe Photoshop ($179)

Media—Video-Focused Makerspace Starter Kit

(Estimated Cost $7,200)[12]

Hardware

- Canon PowerShot A2300 digital camera ($211)
- Canon Eos Rebel T3i digital camera ($250)
- Sonny Bloggie camcorder ($175)
- Panasonic camcorder ($500)
- Kodak Play Touch video camera ($200)
- flash drives, SD cards, and readers ($5 each)
- HP Photosmart 5510 color scanner/printer ($385)
- Digital Concepts tripod ($20)
- 85-watt photo light ($15)
- 10 x 9-foot green screen wall ($75)
- two Shure SM28 microphones with stands ($99 each)
- HP Compaq 6200 Pro SFF computer ($215)
- HP Compaq 4000 Pro SFF computer ($109)
- 27-inch iMac computer ($2,000)

Software

- Adobe CS 6 Production Premium—Photoshop, Illustrator, Premiere Pro, and more ($2,600)
- iLife Suite—Garage Band, iMovie, and iPhoto ($45)
- Audacity—for audio recording (free)
- Cyberlink Power Director 8—movie-making software ($25)
- Microsoft Office ($90)

Media—Sound-Focused Makerspace Starter Kit

(Estimated Cost $7,500)[13]

- ProTools ($299)
- Sibelius ($280)
- Audacity (free)
- Garage Band ($45)

Video

- Final Cut Pro ($300)
- Adobe Creative Suite ($1,500)
- iMovie. ($15)

Audio

- iMac with software and 27-inch monitor ($1,763)
- Eleven Rack guitar rack ($699)
- Scarlett 2i4 USB audio interface ($169)
- Novation LaunchKey 49 MIDI board with drum pads ($150)
- Shure SM57 dynamic microphone ($99)
- Blue Yeti Pro USB condenser microphone ($150)
- condenser shotgun microphone ($80)
- Sennheiser headphones ($90)
- handheld boom poles ($125)

Video/Film

- Canon XA10 HD camcorder ($800)
- camera tripod with revolving head ($25)
- three stand-up lights with softbox/diffuser kits ($175)
- green room (green walls/floor) ($100)
- portable green screen ($75)
- Canon Rebel T5i ($600)

Low Budget, Elementary School-Focused Makerspace Starter Kit (Estimated Cost $500–$1,000)[14]

- sewing supplies (needles, thread, scissors, fabric) ($100)
- ribbon, yarn, string ($30)
- Legos, K'NEX, building blocks ($50)
- all types of paper (wrapping paper, card stock, construction paper, printer paper, scrapbook) ($200)
- Post-it Notes ($50)
- markers, pens, crayons, etc. ($50)
- cardboard of any kind, from food packaging to large appliances (free; flattened please)
- cardboard tubes from wrapping paper, toilet paper, paper towel, etc. (free)
- Play-Doh ($20)
- circuitry kits (can be purchased online) ($20–100)
- craft supplies (cotton balls, popsicle sticks, paint, tape, low temperature hot glue gun, glue gun sticks, glue and glue sticks, toothpicks) ($100)
- canvas, art supplies ($100 and up)
- cameras, photography equipment ($50 and up)

- things to take apart, such as old or broken electronics and small devices (donations)
- hammers, screwdrivers, pliers ($100)
- nails, screws, bolts ($50)
- storage containers—tubs, baskets ($50)
- dominos, marbles ($50)
- playing cards (used for building items) ($20)
- batteries (various sizes) ($50)

Dream Budget—Milling/Power Equipment Focused Makerspace Equipment List (Estimated Cost $30,000—$50,000)[15]

- large Matsuura RA-1F Vertical CNC milling station (Red Dragon) ($2,000)
- tabletop gear lathe (Central Machinery) ($4,000)
- drill press (Speedway) ($100)
- metal lathe (South Bend Lathe Works) ($4,000)
- bandsaw, vertical (Do-All) ($2,000)
- drill presses and table (Rockwell) ($600)
- hydraulic press ($300)
- disc sander ($200)
- bench grinder (Farm & Fleet) ($40)
- cut-off/chop saw (Milwaukee) ($200)
- 7 x 12-inch bandsaw, vertical/horizontal with coolant tank (Wilton) ($2,000)
- bench top lathe (Delta) ($500)
- hand grinder (Skil) ($50)
- drill bits, taps, etc. ($50)
- nuts, bolts, etc. ($50)
- large vise ($30)
- forge ($1,265)
- casting furnace ($55)
- centrifugal spin caster ($500)
- anvil ($100)
- post vise ($1.600)
- forging hammers ($200)
- electric arc welder (Lincoln) ($450)
- ESAB PCM-1125 plasma cutter ($679)
- compound miter saw (Dewalt) ($399)
- CNC router ($2,000)

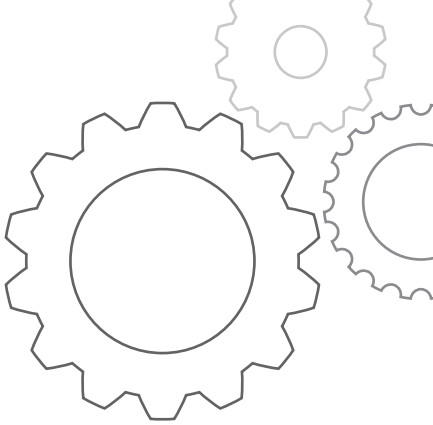
- router table (Craftsman) ($200)
- scroll saw (Delta) ($45)
- lathe tools ($75)
- combination disc/belt sander (Craftsman) ($89)
- laser cutter ($3,499)
- MakerBot Replicator ($2,500)

Identify Your New Roles

Librarians are no strangers to adapting to new technology and new environments. However, the pace at which we need to adapt is increasing. Librarians who embrace this world of constant change have easily moved into new roles, including the makerspace. Managers of makerspaces and technology-driven spaces must set clear expectations and provide professional development to adequately prepare staff for their new roles. We do a huge disservice to our users and our staff when we roll out new equipment without first providing the training needed to operate and troubleshoot the equipment.

Determine Expectations

We all have lofty expectations for librarians who operate makerspaces. Realistically, we won't necessarily find a librarian who knows everything there is to know about each piece of equipment. In this case, as with any position in the library, we're looking for more than one specific skill set. Ideally, we'd love to fill these positions with librarians who've been trained in engineering and information technology, but that's not very realistic. As with any library position, we look for approachability, creativity, and the drive to be a lifelong learner. These qualities are essential for the makerspace librarian. There will always be users who need friendly, knowledgeable assistance to help them find opportunities to use makerspaces creatively. I've found that users relate well to librarians who've started as novices and learned through trial and error. It seems to introduce a certain comfort level, especially for curious new users who might be intimidated by the equipment.



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