MAKING IN THE LIBRARY TOOLKIT

Makerspace Resources Task Force

The 2014 Makerspace Resources Task Force members are: Chair, Erica Compton, Idaho Commission for Libraries, Boise, Idaho; Amy Boese, Ramsey County Library, Maplewood, Minn.; Jaina Lewis, Westport (Conn.) Library; Steve Teeri, Royal Oak, Mich., and Shauna Yusko, Evergreen Middle School, Redmond, Va.

Making in the Library Toolkit

List of Contents

Overview

The purpose of this toolkit is to provide library workers who work with and for tweens and teens with materials and resources for professional development, outreach, collections, and programs to successfully integrate the Maker mindset into programs and services.

Whether you are looking to explore Maker programming or start a Makerspace, this toolkit is a great starting point. But what is a Makerspace? What defines "making?" What is the difference between "making" and crafting? The movement is still evolving, and no doubt concepts and definitions will continue to be developed and refined. However, putting forth a working definition can help us begin to understand some of the core components of making, DIY and crafting. The chart below is an attempt to capture where these concepts are at this moment in time. Making in particular emphasizes learning-through-doing in a social environment. Additionally, making often emphasizes new and unique applications of technologies and encourages innovation and invention. These things set it apart from the DIY and craft movements, as well as the idea that making is often used a means to inspiring young people to pursue STEM focused careers.

Activity	Hands-on	Social	Technology-infused	Innovation-driven	Leisure pursuit	Project-based learning
Making	always	always	always	yes	sometimes	always
DIY	always	sometimes	sometimes	sometimes	sometimes	sometimes
Crafting	always	sometimes	rarely	rarely	always	rarely

As indicated by the above chart, making, DIY and crafting are all hands-on, but the focus of making is to learn and ultimately innovate through doing and to leverage technologies to achieve that. DIY and crafting can involve academic learning, and certainly offer hands-on activities; however, their purpose or outcome is often different from making, because there is less of an emphasis on experiential learning or innovation. DIY and crafting often tend to be more about creating for recreation or as a means to self-reliance. Making focuses more on providing a social environment where students can develop new knowledge and skills that often can contribute to academic achievement or career preparation.

Technology is not exclusive to making, however. It can be infused into crafting. For example, incorporating LED's in a sewing or knitting project, using a 3D printer to design jewelry, or

making a board game using a MaKey MaKey (http://www.makeymakey.com/).

The reality for most libraries is that we don't have a dedicated space in which to make stuff. But we do have the capability to encourage making at our libraries. Making means learning through trial and error, through practical application, and through hands-on experience in a social environment. Making means giving access to communities to grow and create something better.

According to Stephen Abram's article "**Makerspaces** in Libraries, Education, and Beyond," Makerspaces exist to:

- Provide access to a wide variety of tools and technology;
- Facilitate group interaction, knowledge, and resource sharing;
- Supply access to physical space for individual project development;
- Provide an open environment for expression of creativity and innovation;
- Access to equipment for prototyping project ideas for companies.
  Abram, Stephen. Internet@Schools. Mar/Apr2013, Vol. 20 Issue 2, p18-20. 3p.

Teaching Librarian also recently published a great article which discusses Makerspaces as an idea in librarianship that is being adopted so quickly, it may be a new library model: "A Makerspace is an evolutionary step in library facilities' design and programming." Incorporating a whole host of activities like robotics, engineering, sewing, coding, carpentry, cooking, electronics, rockets, furniture making, anything that sparks curiosity and engages critical thinking can be part of the maker movement.

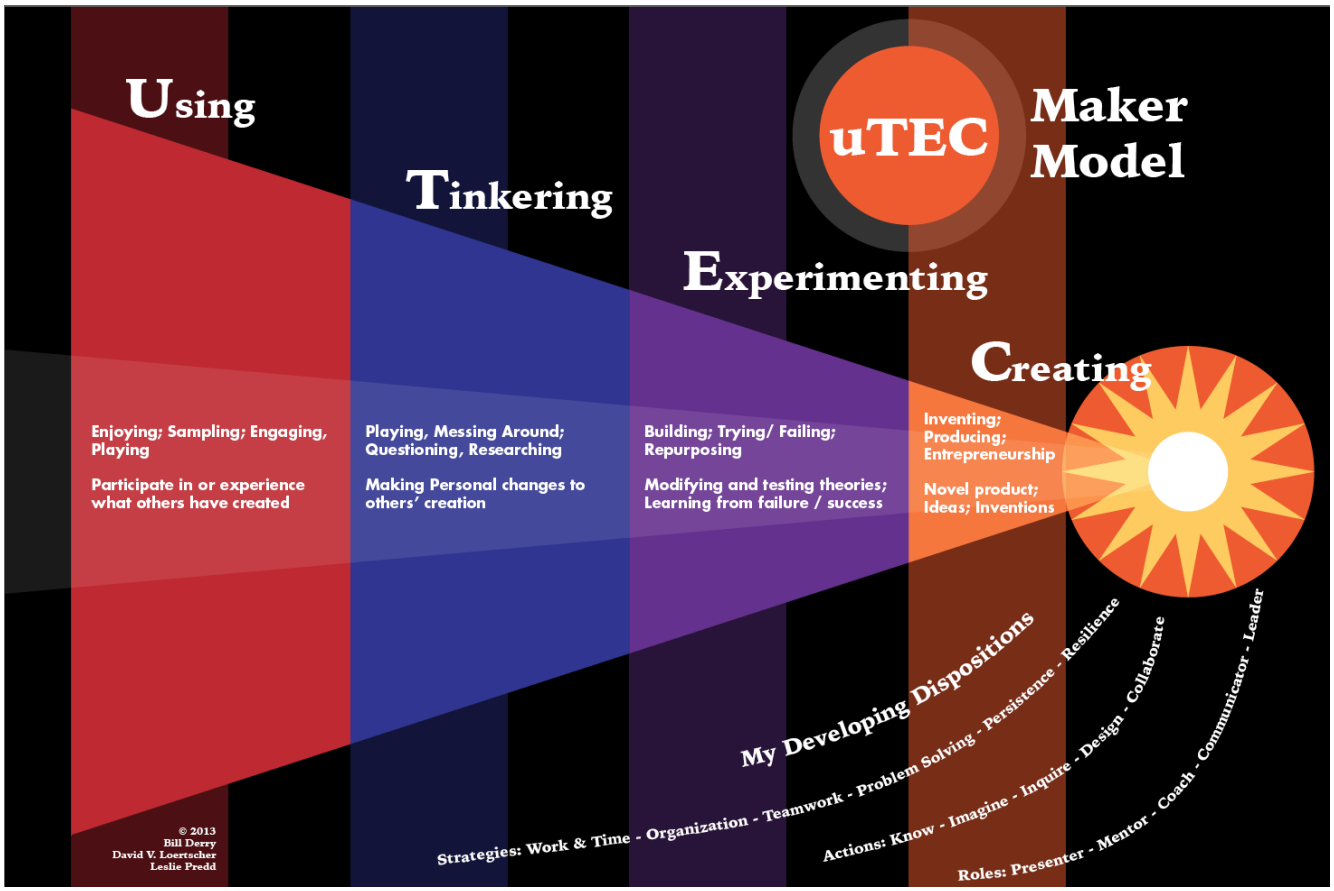
Neither is a makerspace necessarily a specific physical location, but " ... a place to reinvent old ideas with new conceptual frameworks, utilize advancements in thinking and doing, and investigate and construct a hybrid of fine arts, sciences, crafts, industrial technologies, foods, inventions, textiles, hobbies, service learning, digital media, upcycling, STEM/ STEAM, and DIY (do it yourself) and DIT (do it together) concepts." (Loerstcher, Preddy, and Derry. Teaching Librarian. December 2013, Vol 40 Issue 1, p48-51. via https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnx1dGVjbWFrZXJtb2RlbHxneDo3YTdjYThlYjI4ODY4N2U1)

Makerspaces come in all shapes and sizes. Some are fixed rooms or structures, and some are temporary. Whether a Makerspace contains thousands of dollars worth of equipment, or is simply a cart full of tools, the goal of a Makerspace is to facilitate making. The reality for most libraries is that we don't have a dedicated space in which to make stuff. But we do have the capability to encourage making at our libraries.

Making means learning through trial and error, through practical application, and through hands-on experience in a social environment. Making means giving access to communities to grow and create something better.

As Vicki Rakowski, Assistant Director of Youth Services, Lisle Library District, and co-creator of www.makeitatyourlibrary.org said in a blog post last fall: "Empowering our communities to use the library to create things is another way to build the library's relevancy. Creating opportunities for library users to make something that didn't exist before strengthens the importance of the old "third space" concept."

Elaborating on their excellent article defining makerspace for libraries, Loerstcher, Preddy, and Derry have created the uTEC model, which incorporates the ideas behind making:



Using this chart as a guideline, we hope the practical advice in the rest of this toolkit will allow your library to think deeply and move forward with incorporating making into your library services and programs.

History of Making

To be a "maker" is to embrace a culture of experimentation and innovation. Makers are garage inventors, hackers, and collaborators. As Anand Giridharadas states in his 2011 *New York Times Magazine* article "The Kitchen-Table Industrialists:"

> "...the American romance with making actual things is going through a resurgence. In recent years, a nationwide movement of do-it-yourself aficionados has embraced the self-made object. Within this group is a quixotic band of soldering, laser-cutting, software-

> programming types who, defying all economic logic, contend that they can reverse America's manufacturing slump. America will make things again, they say, because *Americans* will make things — not just in factories but also in their own homes, and not because it's artisanal or faddish but because it's easier, better for the environment and more fun."

The idea of "making" has certainly been around for a long time, but the term "maker" as we understand it now wasn't really used until the existence of *MAKE* Magazine. *MAKE* Magazine launched in 2005. The publication is devoted to people and projects that bring the DIY mindset to the technology movement. In 2006, the first Maker Faire was born. According to the Maker Faire website, Maker Faires are "...primarily designed to be forward-looking, showcasing makers who are exploring new forms and new technologies. But it's not just for the novel in technical fields; Maker Faire features innovation and experimentation across the spectrum of science, engineering, art, performance and craft." Maker Faires invite Makers to showcase innovative projects, and invite participants to learn and experiment with different hands-on activities. Maker Faires are now held annually in the Bay Area and New York City, and Mini Maker Faires are held all over the world.

Why Should Libraries Embrace Making?

The number one question you'll answer as a proponent of a Makerspace or making activities in the library is "WHY libraries?" Get your elevator speech ready.

Libraries still struggle with the outmoded public perception that we exist primarily to provide access to information. Additionally, the traditional concept of literacy is no longer adequate, which has implications for libraries in terms of what community members need from us. As stated by Scott in "Making the Case for Public Library Makerspace, "One of the traditional roles of the public library in society is facilitating the creation of knowledge in our communities. Promoting literacy through instruction has long been a part of the librarian's job. Today, the concept of literacy encompasses much more than just reading and writing; it has evolved into "transliteracy," commonly defined as the ability to read, write and interact across a range of platforms and tool." (Scott, Sarah. Public Libraries Online. Public Library Association, Nov. 11, 2012. Online. February 14, 2014.) Additionally, there is a growing concern in the U.S. that young people today are not gaining the skills they need to be successful in a 21st century workforce. Making has been shown to be an effective tool to help young people build 21st century skills and inspire them to consider STEM-focused careers. By embracing the maker movement, libraries can increase their relevance to the community by becoming a place that helps provide youth with the skills they will need to succeed in the workforce.

In YALSA's recent report "The Future of Library Services for and with Teens: A Call to Action," (www.ala.org/yaforum/project-report) several findings support the need for expanded and rich experiences for teens in the library. The executive summary states the following as some of the things that teens need from libraries:

- Bridge the growing digital and knowledge divide
- Leverage teens' motivation to learn
- Provide workforce development training
- Serve as the connector between teens and other community agencies.

Makerspaces and making help address each of the above areas. Libraries can provide access not only to information, but also the hands on use and experience necessary to be a citizen in a digital world. By providing time and space allowing teens to experiment with tools they might not have anywhere else, we are bridging the digital divide, as well as helping teens build the skills they need to be successful in life and careers. A crucial piece of this is: libraries give those less represented in contemporary digital citizenship a step up through access.

How can we use our excellent partnerships to help? As "third space" we serve as the bridge between those that want to explore new ideas and those that want to share their expertise.

Think about the local connections you have, and use them. Know someone already familiar with CAD? Have them teach the 3D design course. Call up your local computer tech squad and ask if they do site visits - they can teach "how to build a computer." Have a local Radio Shack? Ask them to donate supplies for a basic circuits class. We already call up zoos and fire stations for storytime, think about how we can build on that to create maker programs and spaces.

Libraries also have the potential to tap into resources within their own communities. We are a part of the communities we serve, after all. Start with your adult programming. Can it be tailored for teens? Then look to your peers. Is your co worker a professional or amateur photographer? Own the local hardware store? Just got back from a class on web design? A DJ on the weekends? We have the opportunity to think about community not just as the part that libraries play but also how our individual strengths can benefit the whole community.

Do you want to read more about makerspaces in libraries? Check out the appendix for links to many articles and resources.

Planning

Careful planning is one of the most important steps you can take to insure that your project is a success. However, this step is often missed or not given the attention it deserves. The planning stage is where you can delve into every aspect of your project, from marketing to evaluation, and think through exactly what you will need to create a viable program where makers can create, collaborate, and have fun! Outlining measurable outcomes and objectives as part of the planning stage will help drive the process and make it easier to measure success and demonstrate impact to your community.

There are several resources which have already been created and can be valuable tools in getting you started. Refer to the planning section in the Appendix for a variety of links to help you get started.

Planning Workshops

Engage with your community members and to find what activities interest them. Reach out to community organizations to find out what needs they have. Is the local Chamber of Commerce concerned about teens being prepared for the workforce? Is law enforcement worried about the online safety of young people? Common workshops include electronics, robotics, graphic design, music, bicycle repair, filmmaking, fashion design and more. Schedule workshops when your various patron groups are available. Consider holding a couple workshops on a Saturday or Sunday, depending on the days and times your library is open. See how the times workshops are scheduled for work out, and make adjustments as necessary to maximize participation of your various patron age groups.

Safety

Safety should be paramount in maker activities. Work areas should be ventilated, fire-resistant (if need be), well-lit, and conceived in a fashion that allows groups of patrons to work together safely on projects. While most activities carry a low risk of danger, there are some activities that present more possibility for risk. Speak with your administration and possibly your facilities management and insurer, to gauge their comfort level with the activities that you are considering. A release form to be signed by participants can also be utilized, to confirm they are aware and consent to any possible hazards encountered in your making programs.

Informal Learning Environments

Making offers a hands-on counterpoint to traditional learning environments. One complaint in hosting traditional classroom based learning at the library is that it is too much like school. Young adults and kids, particularly, have most likely spent their day in a traditional classroom environment prior to coming to the library. A relaxed atmosphere offers the chance for patrons to continue learning, without the rigid structure often associated with classrooms.

Makerspaces do not have to be a designated area. Making can happen anywhere depending on your time, financial considerations, and space.

If you have the great fortune to have a room or area devoted specifically to making, create a space that is organized, with equipment and materials that are stored neatly. Label everything for easy identification, and store frequently used materials where they are easily accessible. This will invite patrons to come and explore what making has to offer.

If you don't have plenty of room to dedicate to making, you may need to use a more temporary approach. You may have heard of Pop-Up Makerspaces, or Mobile Making: this is programming

that gets packed and unpacked as needed. Libraries are excellent at moving thing from one place to another on book carts, and space you use regularly for programming is perfect for this. Reserve your room or teen space as a makerspace once a month or once a week, and advertise as you would any program. Set the room up from your cart full of equipment before the program begins with whatever project you're going to be working on as the main focus, but create stations with one or more other options. Be consistent with your monthly or weekly time to generate a following. As with a more formal space, be organized, make tools accessible, and label everything.

In both of these examples, modularity is a good thing. Use tables and chairs that can be organized in different configurations to allow different sized groups of makers to work together. Have a focus to teach for the day, but allow your makers to decide what they'd like to work on. Some will always be ready for a new challenge; some will want to continue with previous projects until they are perfect. Try to include both a screen focused project as well as something more hands-on.
Post a "Makerspace" sign (ideally something you've made) and explain what you think makerspace means when teens ask about it. This will generate buy-in for the idea, and discussion about what to offer for future projects.

If a monthly or weekly program won't work for you and your library, try making as a passive or "stealth" program. Reserve a table or desk, set out a project that can be done in one setting with detailed directions and let teens experiment on their own. This method works best with projects that require fewer tools and have clear instructions. Make sure to change the project out on a regular basis to keep teens returning.

Whatever your organization decides, the key point is to get started making and see what directions it takes you.

Getting Buy-In
Showing your administration why maker activities belong in the library may take some work. There are a number of articles that have been published, and more research is being done all the time on the benefits of making and makerspaces. You can also try hosting community events such as "Open Hack Nights," to let your community know the library is interested in maker activities. Invite local makers to come and exhibit and give patrons a chance to learn about making. Use photos and statistics from these events to make the case for expanded maker activities at your library.

Making in the library is actually not that new of a concept. Craft activities have been hosted at libraries for a very long time. This new push for maker activities and the maker movement in general, has been facilitated by a number of factors. Tools and equipment have been come cheaper. Communities online have grown around making. What better place to host these

activities than a trusted community organization such as the library?

Partnerships

Partnerships allow us to explore in directions in which we don't have current expertise, give us built-in audiences through our partner organizations, and builds on alternate strengths. We don't have to be brilliant at everything, just at recognizing when we need partners. Many of the established makerspace programs were founded with the help and support of fabulous national and community partners.

Best Practices for Working with a Partner
There are a number of smart steps to take to lay the groundwork before contacting a potential library partner. The California Library Association has compiled a great checklist of steps that are worth reviewing.

Start out by looking up your local makerspaces. Who else in your library community is doing this work? Who else in the community at large is making? If there are not any other established makers, then turn to local businesses, organizations, and professional groups to see if they are interested in joining forces.

- http://hackerspace.meetup.com/

Think about other events and projects that you'd like to host/encourage. Is there a local robotics club in your middle and high schools? Is there an adult robotics club nearby that would be able to do demonstrations for your teens?
http://www.roborealm.com/clubs/states.php

What are your local schools doing? Here is your chance to go talk to some kids who might not already by using the library. Target after-school clubs, such as AV, filmmaking, graphic arts, engineering, and music.

Host a program in conjunction with local community education providers. Community education is always looking for new and innovative programming to bring people together, the library is looking for ways to serve their community. Being able to offer classes at no cost is a win for the community and targeting a new audience through community education channels helps library outreach. Who else would like to get into this symbiotic relationship? Try local parks and recreation, city funding and community centers.

Who has a focus on STEAM (Science, Technology, Engineering, Arts, Math) in your community? Science museums, engineering and manufacturing organizations, technology giants, local arts and other museums are all great sources. These places are great resources for programming, for inspiration, for equipment, for funding and for general back up when you get stuck.

Finally, don't overlook the partners within your organization. Your IT crew, the tech savvy librarians or staff around you are your greatest allies. If it is help making your 3D printer to print, rebooting the wireless network or just creating the double-sided print job needed to make Minecraft paper art, your colleagues are your closest emergency relief.

Tools and Materials

Tools and materials will be determined by the activities chosen for your making. Utilize the knowledge of your community and partners in determining what tools and materials are best for you. When possible, try to support local businesses by purchasing their equipment, or ordering through them. The materials listed below are generalized and will allow readers to find tools and materials for a making no matter where they are located.

Large pieces of equipment such as 3D printers and laser cutters can be really useful depending on the type of making and desired outcomes, but are not required. If your budget does not permit purchasing such items, don't worry about it at all. Lots of great making can take place with just basic technology. Jeff Sturges of the Mt. Elliott Makerspace in Detroit, MI likes to say that small is big and slow is fast. Don't be afraid to start where is comfortable and grow from there at your own pace.

Donated and recycled tools and materials are a good way to stock your making. Look for partners in your community that are potential sources for free things. After getting your initial collection of tools and materials, make sure to forecast and budget for replenishment in the future.

CRAFTING

Sewing/Wearables

A couple of used sewing machines are just fine to get you on the way to sewing programs. Recycled clothes or remnant fabrics are fine for use in workshops, and will save money. Thread, pins, measuring tape, and dressmakers pencils are also necessary to have on hand. Additional items such as interfacing, embellishments, and our friend glitter are recommended. Finally get a good iron and ironing board for finishing your projects. Sewing is a common craft, so it usually not difficult to find people with both expertise and materials to contribute.

Crafts

Crafting can be a cost effective type of making program. Programs such as papercraft only require cardstock paper and scissors. Knitting workshops can be hosted with a variety of knitting needles, yarn, and place makers, which can be found at stores such as Michael's and Jo Ann. Hot glue and found objects can be used to create fun crafts without affecting the budget greatly. Adding in LEDs and conductive thread is a natural next step and moves teens along the

continuum of making.

DIY

Bicycle Repair

Park Tools is a good vendor of bicycle repair equipment. There you can purchase a bicycle repair tool kit, patch kits, inner tubes, and replacement brake pads. Additionally, bicycle repair stands can be purchased that will hold the bicycles in midair while repairs are being made. Reflective tape and small LED blinky lights can be purchased to run illumination workshops to help riders be safe in the evening and nighttime.

MAKING

Computer Programming

Free and opensource software for computer programming can be downloaded, avoiding the cost of expensive software packages. Scratch by MIT is a good program to introduce programming to a novice audience, and is also useful for creating video games. Processing is a free software programming environment, which supports the creation of visual displays. The Raspberry Pi Linux computer is also a nice option for libraries. The computer is about the size of a credit card, and has a large user community established for it. The Arduino microcontroller is also a cost effective and tinkering friendly way to get customers into computer programming.

Electronics

Soldering irons, solder, tip cleaners, wire strippers, wire snips, and helping hands are required tools for running successful soldering workshops. If you are concerned about the use of soldering in your library, there are safer solderless workshops available. These safer workshops use breadboards and wire that is inserted to the breadboard to make electrical circuits. Microcontrollers such as the Arduino are affordable ways to add programming. For kids littleBits are snappable electronics which make electronics available to any age.

Robotics

The LEGO® Mindstorms series of robotics kits are a good way to introduce robotics concepts, with an easy to use graphical programming environment. Arduino microcontrollers paired with Parallax robotics parts combine to make a highly configurable robotics platform. Premade robots such as the Hexapod line can be used to demonstrate how robots work, and even customized with a bit of tinkering.

Engineering

Kids of all ages love to build machines and see how they work. You can use found and recycled materials to accomplish these building tasks, or if you have funding add in more complex tools like FischerTechnik®, LEGO®, and K'NEX®. These tools offer extensive opportunities to explore construction and learn how to motorize simple machines. Think catapult challenges, races to determine the fastest car, crane that can lift the most weight, and more!

Selected Vendors

- Inventables (tools and materials)- https://www.inventables.com/
- Adafruit Industries (electronics and various projects)- http://www.adafruit.com/
- SparkFun Electronics (electronics and various projects)- https://www.sparkfun.com/
- Parallax (robotics) - http://www.parallax.com
- Marlin P. Jones and Associates (electronics)- http://www.mpja.com/
- MakerShed (wide range of tools and projects)- http://www.makershed.com/
- MakerBot (3D printing and scanning) - http://makerbot.com/
- IFixIt - (tools)http:///www.ifixit.com
- GoldieBlox (making for kids) - http://http://www.goldieblox.com/
- PCS Edventures! (engineering, robotics, electronics, and more! Includes extensive curriculum options.) www.edventures.com

Selected Tools and Material Ideas

All-In-One Tool Sets

- 54 Bit Screw Driver Kit - http://www.ifixit.com/Store/Tools/54-Bit-Driver-Kit/IF145-022
- Pro Tech Toolkit - http://www.ifixit.com/Store/Tools/Pro-Tech-Toolkit/IF145-072
- Ladyada's Electronics Kit - http://www.adafruit.com/products/136
- Getting Started with Soldering Kit - http://www.makershed.com/Make_Getting_Started_with_Soldering_Kit_p/msgsws.htm
- SparkFun Tool-Kit Deluxe - https://www.sparkfun.com/products/11100

Electronics/Robotics Packs

- Adafruit Budget Pack for Arduino - http://www.adafruit.com/products/193
- Adafruit Flora Starter Pack (electronic wearables) - http://www.adafruit.com/products/1405
- Raspberry Pi Starter Pack - https://www.adafruit.com/products/1014
- Robotics Kit for Arduino - http://www.parallax.com/product/130-35000
- Lego MindStorms EV3 - http://www.lego.com/en-us/mindstorms/products/ev3/31313-mindstorms-ev3/

Collection Development

Now that you've stocked up on supplies for programming, think about how you can enhance your library's collection to support your new Maker initiatives. Start a collection of Maker books, such as user guides for Arduino, Raspberry Pi, and soldering. Enhance your sewing collection with techie craft books, such as *Fashion Geek* by Diana Eng and *Fashioning Technology* by Syuzi Pakhchyan. *MAKE* Magazine has also launched a new line of books, including *Zero to Maker* by David Lang and the *Makerspace Workbench* by Adam Kemp.

Also think about how you can make your Makerspace extend beyond your building. Some

libraries circulate tools and small household appliances and some circulate Arduino and Raspberry Pi kits. Give people an opportunity to take what they have learned at a Maker workshop and practice at home. You can check out how one library in Idaho is circulating their "Make It Take It" kits at http://mld.libguides.com/makeittakeit. Other examples of innovative lending of "making materials" can be seen at The Kitchen Library in Toronto (http://www.torontolife.com/daily-dish/random-stuff-dish/2013/10/21/the-kitchen-library-lends-kitchen-appliances/) and Oakland's tool lending library (http://www.oaklandlibrary.org/locations/tool-lending-library).

Making in School

Making in school? Sure! Maker activities provide hands-on, creative ways to encourage students to design, experiment, build and invent as they deeply engage in science, engineering, math, and tinkering.

A great way to get started is to talk with your teachers about making and how it can tie into the core curriculum. Help them to determine their needs and desires and imagine what projects they might initiate with their students. Ideally a science, math, technology and/or art teacher would lead or participate in the brainstorming. However, don't discount the needs of special services. Making may be a gateway to explore alternate careers for students in a jobs class or participating in an alternate studies program.

The Makerspace Playbook is a helpful guide to envisioning the projects and activities that could happen in the makerspace. The new book *Invent to Learn* is a great resource for making, tinkering and engineering project ideas.

#MakerED is a hashtag used by educators interested in integrated making into the classroom. Follow conversations on Twitter to see what the latest news and developments are.

Diversity and cross-pollination of activities are critical to the design, making, and exploration process. Schools will be particularly interested to be able to tie activities to one or more particular area of learning.

A possible range of activities might include:

- Cardboard construction
- Prototyping
- Woodworking
- Electronics
- Robotics
- Digital fabrication

- Building bicycles and kinetic machines
- Textiles and sewing

Jennifer Cooper wrote a comprehensive article on creating actual makerspaces in schools that has many valuable ideas and tips. So if you are looking to start a more dedicated program and space, be sure to read this interesting piece. http://www.edutopia.org/blog/designing-a-school-makerspace-jennifer-cooper)

Marketing, Promotion, and Branding

Expenditures of money and time will mean nothing if no one makes use of the tools you have available or shows up for the programs you plan. We must target the audience we intend to serve and work to insure that our message is delivered.

Makerspaces are getting a lot of press lately so it is likely that some in your community will be super excited when they hear their local library is joining the maker movement and offering maker programs. However, not everyone will know what a making is and it is important to take the time to educate and inform staff, Board, trustees, and community members to ensure your project gets the attention and use you hope for.

When planning maker programs include ample time to publicize both before and after your program, using your library's publicity protocol. Below are some tips from successful makerspaces on how you can get started.

- Create a "brand" for your makerspace using a logo, consistent colors or themes.
- Enlist the support of existing partners to spread the word about your new programs
- Utilize social media to advertise your programs and share your successes
- List programs on MeetUp
- Educate all staff members about "making". It is important that all staff are familiar with what you are doing, and are able to talk with patrons about the new activities.
- Make sure that your Board is aware of what you are doing. Ask them to share information within their network.

As with any programming or publicity, consider how to incorporate young adults into the process. Teens who are engaged in the planning and publicity process can be your best advertisers-if they feel invested in the program they are likely to tell their friends and encourage other people to come. If you have a teen advisory group or volunteer corps, think about how you can include them in your marketing efforts.

Evaluating Your Program

You planned a dynamic maker program, secured funding, created community partnerships, promoted widely and thoughtfully, and you had a room-full of teens having a great time with making. So you are done, right? Not so fast! Remember that planning phase? You thought about desired outcomes, objectives AND a way to see if they were met, right? Be sure to remember to implement the evaluation step of your program. It might include a short survey for teens as well as a tool that allows you to be reflective about the program and the process.

Surveys and Polls

Getting participants to complete a quick survey on their way out the door is a great way to get in-the-moment feedback, as well as contact information to invite the teens back for the next round of amazing making! They are easy to create and implement. They can, however, provide limited types of information so use other tools when you can to gather more substantive data.

Sending surveys to parents is a great way to receive feedback as well, especially if you are working with younger teens. Parents are often the ones responsible for signing students up for programs and for driving them around. Providing educational Maker programs can allow parents to view the library as an after-school activity.

A more formal tool to measure growth and learning is a skills ladder evaluation. A series of brief questions are asked before the activity and after the activity to measure the change in teens' understanding of a particular subject or concept. For example you might be holding a program all about trebuchets. You might ask teens to share their level of understanding about simple machines, catapults, or levers in general. Ask them if they know how a trebuchet works, or what their level of interest is in STEAM. Then after you have hosted your dynamic program where the teens created their own trebuchets, you ask the same set of questions and then note the change in scores. We suggest you poll the group instead of having teens have to "fill out a form" to keep it as informal and easy on them as possible. You also don't want this to feel too much like school and polling as a group can help. Having a second staff available to help count the responses and make notes is helpful.

Another creative and easy way to get feedback is to create charts with a series of questions that teens can answer anytime during the program. You might have a chart on the wall with questions like: Did you learn something new about _____ today? Did you collaborate with another teen today on your project? Do you feel like you have a better understanding of the ____concept? Would you attend another program similar to this one? Next to the chart you place a stack of sticky notes and pens so that they can write down their answers and ideas and stick them on the chart.

If you want to check out what these tools might look like, check out the Evaluation section in the Appendix to see examples.

Informal Evaluation Tools

It is important to keep your eyes and ears open during your program so you can "catch" the teens sharing great stories or ideas. You might hear them talk about how the program relates to school work they are doing, or how it has made them think about a career related to making activities. When you hear teens sharing information like this, ask a follow up question or two and be sure to jot down some notes. How a program affects a teen's life is another powerful way to evaluate the results of your program. Collect transformational stories to share with your community. These can help demonstrate the value of what you are doing and make a wonderful presentation to the library board or to trustees wondering what impact the library has on the community. Remember to take pictures too. (Be sure to follow your library's policies regarding releases, of course.) One picture really is worth a thousand words!

Keep an eye on your attendance as well. Are you seeing repeat visits to your Maker programs? Are teens requesting more Maker programs? Providing Maker programming is a great way of attracting a new audience of teens to the library. Attracting a following of teens excited to attend Maker programming is a great sign of success.

Mimi Ito, a professor in Anthropology at UC Irvine coined the term "HOMAGO," which stands for "hanging out, messing around, and geeking out." This best describes the goal of Maker Programming. If you're designing a strict lesson plan, you are not doing HOMAGO. Create an environment where teens can socialize and set their own pace. If teens leave your program with a new skill and a smile on their face, that's a great indicator of success and another way to evaluate your programming.

Sharing Your Story & Demonstrating Impact

It is important to take the step to demonstrate to the community the value that your library is providing by offering maker-focused learning activities to teens. A great way to share projects is to let your participants sell their own excitement. Video intros are a great way to share the work done and advertise for the coming year. Video also makes a great sharing tool for your partners to use to talk to their boards and share what they are (hopefully) pouring resources into. Ask your makers to do it themselves: film and edit their own reactions with guidelines from you about what they found interesting about the day or the week.

Snap all kinds of pictures! You never know what will be your "go to" shot for the next year. LED sculpture? Papermache masks? The photo of three girls sitting on one chair to design something while in the glow of the Makerbot? Priceless.

Take the opportunity to show what your teens are working on at school visits and at other labs. Make a slideshow of teens from your library working on actual projects and run it while talking

about library services. Teens will recognize their friends and be intrigued.

Now take that same slide show to your library board, management team meeting or peer group. Give people the content to ask questions about and you'll be rewarded by internal support for your programs. Make sure you've brushed up on advocacy for Making in the library (get advocacy resources at www.ala.org/yalsa/advocacy). Be prepared to ask to lead making for other ages.

Displaying projects is a great way to share your story and gain support for making in the library. You can do this in several ways:

- Rotating exhibits in the library entry
- Open houses with makers of all ages sharing their work
- Online through Social Media such as Facebook, Flickr, and Twitter
- Outreach and events
- Maker Faires, TEDx etc...

Don't forget to reach out to local press regarding your maker activities. Many of the projects you implement will make great news stories! The press are always looking for stories that tie into education, STEAM, kids, and technology. Send out press releases ahead of a project or call up a local reporter to see if they can come down and watch the "Build the Tallest Tower" challenge you are hosting. Maybe your local news reporter can be a judge for a competition you have planned! Sometimes all that is needed is for you to make that call or send that priceless picture of a teen figuring out how to make his robot negotiate a maze to get your story out into the news.

Another great idea is to capitalize on the unique and innovative nature of making to support your advocacy efforts. Invite local politicians, VIPs, or celebrities down to see what "their" teens are doing at the library. Highlight the learning that is happening during the event. Have your teens take some time to talk about the impact that these programs are having on their lives. These personal stories are so key to getting support and buy-in from your community.

Sample Maker Programs

Are you looking for great making activities to implement with your tweens and teens right away? Not every great project comes with a giant price tag attached to it. Once you find out thekinds of maker activities your community's teens are looking for, Check these low cost, hands-on ideas to see if they're a good fit for your teens' needs.

CRAFTING

Cardboard Book

Cost: $0-5/person
Audience: All
Time: 1 hour
Outcomes:

Teens will learn basics of bookbinding and papercraft.
Teens will expand their understanding of library materials.
Community will participate in adding content to books, extending the project beyond the original program.

Make a book, make a bunch of books. Now have people check them out, write in them, and add them to the library collection. These instructions show a very basic book out of cardboard and blank paper, but you can see from Rochester Public Library's example that these can be make much nicer.

Materials:
Two pieces of cardboard
Paper roughly the same size
Hole punch (double)
Scissors
Duct tape
Pen
String (waxed)
http://www.instructables.com/id/Cardboard-Book/
http://www.rochesterpubliclibrary.org/makerspace.html

Mosaics
Cost: $5/person
Audience: All
Time: 1 hour
Outcomes:
HOMAGO: Creating content that expresses individuality while sharing ideas with the group.
Teens will learn the basics of adhesion and filler, components of home repair and civil engineering.

What makes stuff stick to your tile? Cement? Glue?
Materials:
Bits of glass, broken pottery, shells, keyboard keys, legos, mirrors
Tileboard (Purchased and cut at a hardware store)
Gorilla Glue/Tacky Glue
Alternate: Tile Grout

Basic:
http://www.instructables.com/id/Mosaic-glass-ceramic-Gorilla-Glue/
With Grout:
http://www.instructables.com/id/Recycle-ceramics-into-awesome-Mosaic-stepping-ston/step10/Assemble-everything-to-grout/

MAKING

Cup Catapult (or, The Frankenstein Fling)

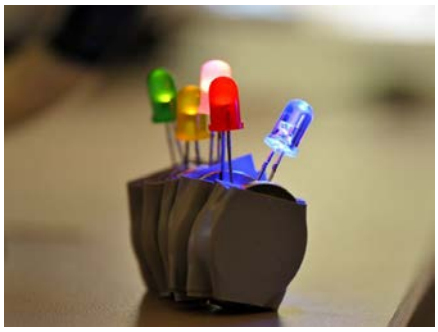
Cost: $.01 /person
Audience: All
Time: 30 minutes
Outcomes:
Teens will learn basic properties of physics, including the simple mechanics behind the catapult and force.
HOMAGO: students will do a small project at their own pace while interacting with their peers.

Using a paper coffee cup, a stir stick and a Sharpie Marker, draw Frankenstein's face on the cup. Where the bolt holes go in his neck, carefully cut two slits for the stir stick to fit through. Balance the penny on one end of the stir stick, and flick the other end. Can you get the penny in the cup?

Materials:
Paper coffee cup
Wooden stir stick
Sharpie markers
Penny
Scissors

This idea came directly from this book:
http://www.barnesandnoble.com/w/made-by-dad-scott-bedford/1115393962?ean=9780761171478

LED Throwie
Cost: $5/person
Audience: All
Time: 5 min
Outcomes:
Students will learn very basic electronic skills (attaching LED's to a battery using proper positive/negative sides).
HOMAGO: students will do a small project at their own pace while interacting with their peers.



Easy to make, but so much fun! These LEDs stay lit until you take them apart. The magnet attachment makes them easy to stick to stuff, which is a huge attraction to teens, but easy to remove for the rest of us.

Materials:
2.8 V LED
3V watch battery
Duct tape
Magnet
http://www.wikihow.com/Make-LED-Throwies

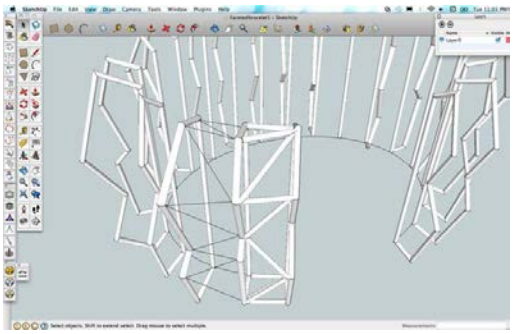
Glow Doodle
Cost: $0/person
Audience: All
Time: 1 hr+
Outcomes:
Teens will learn photo editing skills and the ways digital media can be altered and changed.
HOMAGO: teens will learn a new software at their own pace while interacting with peers.
Students will express themselves creatively

A great accompaniment to an LED Throwie program. Glow Doodle is free computer software designed by MIT that allows users to "paint" with light.

Materials:
LED Throwies or anything that lights-up
Computers with webcam access and Glow Doodle software

A dark room

3D Design
Cost: $0
Audience: All
Time: 1+ hours
Outcomes:
Teens will learn the basics of CAD design.
Teens will create a unique design.
Teens will begin to understand jobs tasks related to engineering and architecture.



Whether you have a 3D printer or not, you can design prototypes to print. SketchUp is a free, downloadable software that is similar to CAD design software and creates a file that can be converted to print on a 3D printer.

Look around your community to partner with a local makerspace or school already printing to create your masterpieces off site!

Materials:
SketchUp software download
computers or laptops
basic instruction packet

Download SketchUp Make (FREE download at sketchup.com for basic 3D design)
Basic Tutorial on Sketchup can be found here:
http://rclteen.weebly.com/uploads/1/8/6/4/18641920/sketchup.pdf

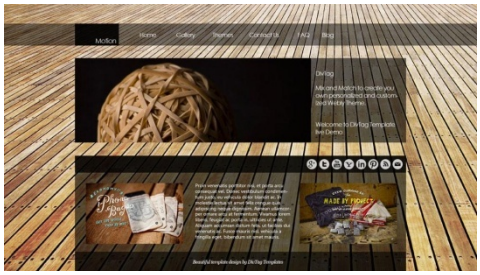
Augmented Reality
Cost: $0
Audience: All
Time: 1 hour
Outcomes:
Teens will experiment with photo editing and the ways digital media can be altered and changed.

HOMAGO: students will learn a new app at their own pace with their peers.
Students will create unique “Auras”.

Augmented reality allows users to enhance real-world images with computer-generated videos, gifs, and sounds. Provide students with a variety of printed images to get the hang of the app, then turn them loose in the library to let them take their own images.

Materials:
Students should bring a smartphone or tablet with the free Aurasma app installed
A collection of printed images (can easily find things on Google Image Search)

Website Design
Cost: $0
Audience: All
Time: 1+ hour
Outcomes:
Students will learn the basics of web design.
Students will create their own website.



Designing a website is a great way to reinforce internet safety guidelines .It is as easy as pie to design your own website.

Materials:
Sign up for a free Weebly account

computers or laptops
basic instructions

Weebly (Free to sign up at www.weebly.com)
Training videos can be found here: http://kb.weebly.com/training-videos.html

Garageband
Cost: $0 download (additional costs for more instruments)
Audience: All
Time: 1+ hour
Outcomes:
Students will learn Garageband basics and basic music mixing skills.
HOMAGO: students will learn at their own pace while interacting with their peers.

Garageband lets teens experiment in three different ways: by using pre-recorded tracks to layer into songs, by using electronic instruments to create tracks, or by allowing users to input actual musical instruments using the recording feature. Easy to learn, but with lots of features to keep things interesting, Garageband makes the simplest recordings sounds masterful. The best part of Garageband is that recordings can be downloaded as mp3 files for sharing through Soundcloud, Facebook or YouTube.

The main drawback to Garageband is that it is primarily used on Apple products. If you have an iPad lab, it works great there, and can also be downloaded on to iPods and iPhones.

Materials:
iPad lab
Garageband download
Headphones
Soundcloud, YouTube or Facebook account

Download Garageband here:
http://www.apple.com/search/?q=garageband&section=ipad&geo=us

Minecraft
Cost: $0 for free download, $25 for a Minecraft login, $49 for Xbox game
Audience: All
Time: 1+ hours
Outcomes:
This is the ultimate HOMAGO program: students will hang out and have fun playing Minecraft together.

Yeah, they're already playing it, but it is a thing of beauty how playing in the same room can make your teens share ideas while they do it. There are two ways to play at this time. If your firewall supports it, download the free software on laptops or iPads and let the kids find places to connect, on your world or their own.

If your library has a firewall that won't allow wireless connection between players, then consider the Xbox360 as a great collaboration tool for Minecraft. Played with an HDMI cord connection, four players can play on the same world using the Xbox360.

Some libraries have even set up their own servers. Check out the Fairfield County Minecraft server: http://westportlibrary.org/teens/minecraft

Are you ready for a bigger challenge? Have some money to spend? Then take a look at this idea for incorporating robotics into the library.

Beginning Robotics
Cost: Varies according to tools chosen
Time: 1.5 – 2 hours
Audience: Older tweens and teens
Outcomes and Objectives:
- Students will build teamwork skills by working together to construct beginner robots
- Students will learn the basics of robotic programming
- HOMAGO!

Materials:
- Lego Mindstorms Robotics Kits* (1 per four students)
- Instructions for a beginner robot found on the Lego Mindstorms website (students can work on different robots or can all build the same)

- Optional: a robotics volunteer. Many high schools have robotics clubs. Recruiting a robotics student to help is a great way to bring a mentor into this program.

Set-up:
The students will work in small groups of four. Each group will be issued a Lego Mindstorms kit and an instruction booklet. This program works best if each group has its own table and chairs.

Lesson plan:
1. Introduction (10 minutes)

- Split students into groups of four. Explain loose instructions for program: groups will work together to build a robot based off instructions provided.

2. Group build (1-1.5 hrs)

- Hang out, mess around, geek out! This is non-structured work time. Students will move through the projects at their own pace.

3. Show and Tell (15 minutes)

- Bring the group together. Have students share what they have built, and talk about what they have learned.

Extending the Program: Lego Robotics Club
Organize a weekly or monthly meetup. Encourage students to experiment with their own designs. Create challenges.

*Please note that Mindstorms kits average around $350/each. Think about this when looking for ways to fund this program.

The Unique Position of Libraries
These days, many schools have robotics teams. For example, the First Lego League is a competitive robotics program designed for students in grades 4-8. But what happens to students who want to tinker with robotics, but not necessarily compete? Or students who can't make the time commitment to a team? Or students who aren't confident enough in their technology skills to plunge right into a program?

This is where the library can play a role. Libraries can be a place where students learn about robotics in a casual, non-competitive environment. This HOMAGO-based environment may inspire students to join robotics programs at their school in the future, or may even inspire young inventors or future engineers.

Need More Program Ideas?

1. Make booktrailers with Flip cameras, Animotos, Blabbers, or other technology.
2. Start a coding club or host a LAN party.

3. Offer a class on basic computer programming using Scratch. "Scratch is a graphical programming language for kids that was designed at the MIT Media Lab. To write a program in Scratch, you connect colored code blocks together." --Mark Frauenfelder of BoingBoing.com. He recommends the book *Super Scratch Programming Adventure* (ISBN 978-1593274092) as a training tool.
4. Invite local robotics or LEGO teams to demonstrate and share their experiences. Girl Scouts offer a FIRST LEGO League--partner with your local council for an after-school program.
5. Have an Intro to Hackasaurus class. This site has extensive resources in a kit format complete with everything someone needs to host an event.
6. Partner with a local cable channel to have a basic class at the library. Brainstorm, storyboard and film a movie in the library. Often kids will be able to check out equipment for a year after receiving training.
7. If you're in an area with a local rockets group, or know a rocket fanatic, find out if they will come host a rocket building session with you. Launching will be off site but building can be anywhere.
8. Take apart a computer. if you have one or ten computers no longer in use, get a phillips screwdriver and have your teens take it apart! Now, have them put it back together and see if it still turns on. Some really detailed instruction can be found here: http://lifehacker.com/5828747/how-to-build-a-computer-from-scratch-the-complete-guide
9. Make some cat ears! These are the easiest instructions, especially if you only use glue. http://www.instructables.com/id/Sparkly-Kitty-Ear-Barrettes/

Stealth Programming

While it's great to have a makerspace that is always open and available to your patrons, this is not always realistic. If you are the only teen services librarian, or you have other duties as well, it can be hard to carve out time dedicated to running a makerspace. Not only are librarians and library workers busy, but so are teens. Between afterschool activities, jobs, and homework, choosing a time that works for your teens can be almost impossible. For those times when there just isn't enough time, why not try some stealth programming?

What is stealth programming? It's a great way to get teens (or anyone!) involved in the library asynchronously. It's a great way to promote the resources you have available. It's a great way to keep those teens busy while they are hanging out. Stealth programming is something that is set out for teens to do whenever they happen to be in the library. It could be a craft, an activity, a puzzle, a trivia question, or anything you can think of that teens can do on their own. It's a perfect way to use some of your makerspace materials. There are a lot of things that teens can do in makerspaces with limited to no supervision, such as creating videos, podcasts, or altered photos. You can offer prizes for participation or correct answers. Prizes do not need to be

expensive or elaborate. Small candy bars, decals for cell phones and mp3 players, cell phone charms, or cheap ear buds will all appeal to teens.

Stealth Programming Ideas

Book Hedgehogs

Cost: Low to None
Audience: All
Time: 30 - 60 minutes
Outcomes: HOMAGO: students will do a small project at their own pace while interacting with their peers.

Set out a selection of books pulled from circulation or from the local thrift store.
Create a sign like the one above, encouraging patrons to stop and make.
Provide a few examples of how pages can be folded to create the right shape.
Let them play, create, and have fun!

Want to take it a step further?

- Encourage them to invent their own designs.
- Tether a digital camera to the desk and ask them to take pictures of their creations to be entered into a competition. (leave blank paper for them to write their name on and have them include that in the picture they take.)

Origami

Cost: Low
Audience: All
Time: Flexible
Outcomes: HOMAGO: students will learn at their own pace while interacting with their peers and learning about papercraft.

Set out books or printed instructions for several different origami designs
Add paper cut to size
Encourage makers of all ages to try their hand at this ancient art form.

LEGO Braille
Cost: Low to None (if you already have LEGOs)
Audience: All
Time: 5-30 minutes
Outcomes:HOMAGO: students will learn at their own pace and learn the basics of the braille alphabet.

Set out a book on braille, a bin of LEGOs, and baseplates.
Ask patrons to create their name in braille.

Want to take it further?

- Have them write a message using braille and leave for someone to decode

Wrapping It Up

Our guess is that you are already making - and having fun doing it! Making has been in libraries for a long time in the form of craft programs and other activities. Now we are just taking it to another level.

You are making in your library when you work with teen patrons to create birdfeeders out of juice bottles and wooden spoons after reading John Corey Whaley's "Where Things Come Back" in book club. You're making when you build the tallest structure possible out of spaghetti and marshmallows because your Teen Advisory Board thinks the atrium looks empty. You're making when you teach your Anime Club how to sew cat ears, and hopefully, one day, how to program their cat ears to rotate and twitch. You're making when you design an update of the TARDIS and print it out in neon blue on the 3D printer. You're making when your weekly 2-hour Makerspace consists of a plastic tub and a hot glue gun on a cart.

Remember, the best things made in library makerspaces are not the physical ones. They are the learning, friendships, confidence and sense of accomplishment achieved by the participants.

In the future, you may get to design a new facility with a million dollar grant and a full staff of teen liaisons who can build that chair-stacking robot, but for now, embrace the concept and adapt what you can for your library! See the future of libraries and the future of our communities is in exploration, collaboration and sharing of creativity.

Appendix

Articles and Resources for Making and Makerspaces

- Sixteen resources about makerspaces to get you up to speed as a librarian. http://oedb.org/ilibrarian/a-librarians-guide-to-makerspaces/
- American Libraries magazine overview of makerspaces. http://www.americanlibrariesmagazine.org/article/manufacturing-makerspaces
- How to plan for creating a physical makerspace within your school or building. http://www.edutopia.org/blog/designing-a-school-makerspace-jennifer-cooper
- YALSA has several resources that will help you get started:
    - STEM Toolkit: http://www.ala.org/yalsa/sites/ala.org.yalsa/files/content/STEMtoolkit_Final_2013.docx
    - STEM Wiki: http://wikis.ala.org/yalsa/index.php/STEM_Resources
    - Maker & DIY Wiki: http://wikis.ala.org/yalsa/index.php/Maker_%26_DIY_Programs
- Library Journal/School Library Journal highlight the need for experiential learning and not just information consumption.
    - http://www.thedigitalshift.com/2012/10/public-services/the-makings-of-maker-spaces-part-1-space-for-creation-not-just-consumption/

- **Several blogs to follow to keep up with current events and new ideas.**
    - http://makerspace.com/blog
    - http://www.hackerspacenews.com/
    - http://hackerspace.lifehacker.com/

  So many resources on making, pinned for your perusal!
    - http://www.pinterest.com/cari_young/library-makerspaces/

Specific Resources for Making

- Make it @ your library provides resources for making nicely organized by cost, time, and audience, especially for libraries. http://makeitatyourlibrary.org/
- Instructables is the site Make it @ your library pulls from. These programs are not as nicely organized for library use, but contain many more options. www.instructables.com
- Digital media resources from KQED, PBS and NPR. http://blogs.kqed.org/education/media-making-toolkit/
- Everything anyone has ever made on a 3D printer, free downloadable files for printing. http://www.thingiverse.com/

Planning

- The Makerspace Playbook can be found at : http://makerspace.com/
- A series from Make Magazine on starting a Makerspace has many helpful tips: http://makezine.com/2013/05/23/making-makerspaces-acquiring-insurance/
- How To Start A Hackerspace provides you with many ideas: http://learn.adafruit.com/how-to-start-a-hackerspace-the-list/the-list
- and there is a flow chart or questionnaire to help you make decisions on needs, space, budget, time, and staff at: http://kidsmakethingsbetter.com/wp-content/uploads/2013/11/What-is-your-level-of-makerspace-readiness.pdf
- Apply for an IMLS grant for funding a big makerspace project. http://www.imls.gov/applicants/detail.aspx?GrantId=19

School Makerspaces and Making

- High School Makerspace Tools and Materials: http://makerspace.com/wp-content/uploads/2012/04/hsmakerspacetoolsmaterials-201204.pdf

Evaluation Examples

Skills Ladder Poll

Below you will find a blank poll and then an example of one that has been filled out for an imaginary Trebuchet Challenge program.

Page One

Teen Program Evaluation Tool

Program Name_____

Date/Time: _____ **Total # of Attendees:** _____

Use this tool to poll attendees before and after your program. You just need to add in your specific areas of focus in the parentheses below. These will be directly related to the desired outcomes of your program. You could always add another question to this, but try to keep it short and easy to administer to teens!

You can poll in a group or ask the questions individually. If you poll as a group, make sure to capture the number of each response in order to collect accurate data. You can then total the responses and divide by the number of participants to get an average "score" for each area and see growth from before to after (we hope!) See the sample evaluation provided for an example of what this might look like.

Two thumbs up is the highest response or a 5, one thumbs-up a 4, a side-ways thumb is right in the middle or a 3, one thumbs down a 2, and two thumbs down is the lowest score or a 1.

Use the back of this sheet to record anecdotal data. Things you hear the teens say that capture the success of the program, or help you see areas you can improve are all valuable. Make notes on things you see the teens doing as well. These all add to the picture of your program's impact on the teens.

BEFORE the program (1 is low and 5 is high)		**AFTER the program (1 is low and 5 is high)**		**Average Scores Before/After**
1. My overall understanding of (topic here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		1. My overall understanding of (topic here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		
2. How confident are you with (tools/software here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		2. How confident are you with (tools/software here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		
3. My ability to build/make/create (project here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		3. My ability to build/make/create (project here) (low) 1 - 2 - 3 - 4 - 5 (high) # of each		
4. My interest in STEAM topics or areas: (low) 1 - 2 - 3 - 4 - 5 (high) # of each		4. My interest in STEAM topics or areas: (low) 1 - 2 - 3 - 4 - 5 (high) # of each		

5. How likely are you to come to another program similar to this one? Average score:
(low) 1 - 2 - 3 - 4 - 5 (high)
# of each

Page Two

Anecdotal Data
(Things I Heard, Things I Saw…)

Project Staff: _____

Example Poll Filled Out

Teen Program Evaluation Tool

Program Name: Trebuchet Challenge – Marshmallow Toss!

Date/Time: March 16: 4:00-5:30 Total # of Attendees: 8

Use this tool to poll attendees before and after your program. You just need to add in your specific areas of focus in the parentheses below. These will be directly related to the desired outcomes of your program. You could always add another question to this, but try to keep it short and easy to administer to teens!

You can poll in a group or ask the questions individually. If you poll as a group, make sure to capture the number of each response in order to collect accurate data. You can then total the responses and divide by the number of participants to get an average "score" for each area and see growth from before to after (we hope!) See the sample evaluation provided for an example of what this might look like.

Two thumbs up is the highest response or a 5, one thumbs-up a 4, a side-ways thumb is right in the middle or a 3, one thumbs down a 2, and two thumbs down is the lowest score or a 1.

Use the back of this sheet to record anecdotal data. Things you hear the teens say that capture the success of the program, or help you see areas you can improve are all valuable. Make notes on things you see the teens doing as well. These all add to the picture of your program's impact on the teens.

BEFORE the program (1 is low and 5 is high)	**AFTER the program (1 is low and 5 is high)**	**Average Scores Before/After**
1. My overall understanding of how trebuchets work: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 4 3 1	1. My overall understanding of how trebuchets work: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 2 4 2	(4+6+3=13/8=1.625) (6+16+10=32/8=4) **1.625/4**
2. How confident are you with FischerTechnik materials? (low) 1 - 2 - 3 - 4 - 5 (high) # of each 7 1	2. How confident are you with FischerTechnik materials? (low) 1 - 2 - 3 - 4 - 5 (high) # of each 5 3	(7+2=11/8=1.365) (10+9=19/8=2.375) **1.365/2.375**
3. My ability to build a working trebuchet: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 7 1	3. My ability to build a working trebuchet: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 2 7 1	(7+2=11/8=1.365) (6+28+5=39/8=4.875) **1.365/4.875**
4. My interest in STEAM topics or areas: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 4 3 1	4. My interest in STEAM topics or areas: (low) 1 - 2 - 3 - 4 - 5 (high) # of each 1 4 2 1	(8+9+4=21/8=2.625 (2+12+8+5=27/8=3.375) **2.625/3.375**

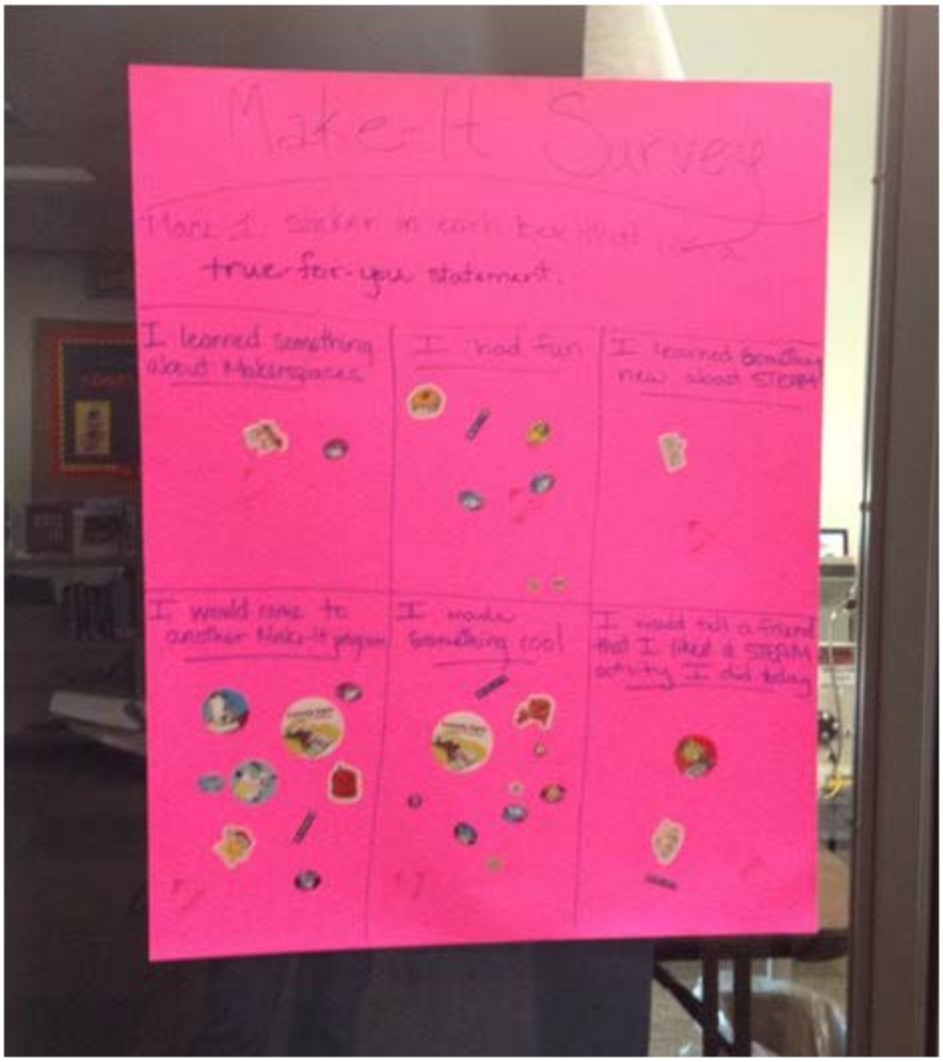
5. How likely are you to come to another program similar to this one?
(low) 1 - 2 - 3 - 4 - 5 (high)
# of each 4 2 2

Average score:

(12+8+10=30/8=3.75)

Informal Survey Chart Idea

Below is an example of how one library collected information from teens on their maker program. This is an easy way for teens to anonymously share valuable information on attitudes, learning, and whether they would attend similar programs. This could be customized in several different ways to address different types of programs.



Examples of Successful Makerspaces

Interested in seeing what other libraries are doing across the country and world? Check out some of these to get inspired and learn more.

- Directory of makerspaces: http://makerspace.com/makerspace-directory
- Directory of Mobile Makerspaces: http://mobilemakerspace.com/
- Makerspaces around the World
    - A Kenyan Makerspace: http://whiteafrican.com/2013/09/09/launching-gearbox-a-kenyan-makerspace/
    - 8 Hackerspaces Changing the Arab World: http://www.wamda.com/2013/04/9-hackerspaces-changing-the-arab-world
- Library Makerspaces
    - Westport Library MakerSpace - http://westportlibrary.org/services/maker-space
    - Fayetteville Free Library Fab Lab - https://www.fflib.org/make
    - Detroit Public Library HYPE Makerspace - http://www.detroitpubliclibrary.org/hype
    - Idaho Commission for Libraries: Make It at the Library project-

http://libraries.idaho.gov/make-it-at-the-library
- Chattanooga Public Library 4th Floor - http://chattlibrary.org/4th-floor
- Chicago Public Library Maker Lab - http://cplmakerlab.wordpress.com/
- Allen County Public Library Tekventure Maker Station - http://tekventure.org/maker-station/
- Anythink Libraries The Studio - http://www.anythinklibraries.org/thestudio