WHAT do the arts, literature, cooking, 3D printing, LEGO, libraries, and education have to do with each other? They can all be supported and encouraged by makerspaces aligned with library collections, programs, and services.

Makerspaces are very hot right now. They evolved from hackerspaces, and, as with any innovation, we can find a marvelous range of applications to education and libraries with a simple Google search. Indeed, we have dozens of examples in libraries, with leadership from Fayetteville Free Library’s Fab Lab in New York state, Chicago Public Library’s YOUniform, or the makerspace at Carnegie Library of Pittsburgh. School library initiatives, such as the Lighthouse Charter School, are just starting, and they also include some innovative partnerships with public libraries.

The early-stage imagination and creativity of the maker movement makes exact definition of a “makerspace” difficult. So far the emphasis has been on creating, usually with some kind of technology. STEM education (science, technology, engineering, and math) is a very logical first step in prioritizing activities for experimentation and development, but makerspaces can also support creative work such as cooking, writing, filming, art, hobbies, and sculpture. Indeed, most libraries already have collections aligned with these activities. The New Jersey Makerspace Association defines them as follows:

Makerspaces (also known as Hackerspaces, Creative Spaces, Fab Labs, Makealabs and in California—Makerhoods), according to Wikipedia, are open community labs where members with common interests (e.g., engineering, computer programming, gaming, inventing, graphic design, etc.) gather to share resources, knowledge, career networking and build new devices. Generally, makerspaces are designed to meet the following needs:

- 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.

I like the Makerspace.com mission: “Building a resource for Educators and Makers working to inspire young people to make projects in art, craft, engineering, green design, math, music, science, technology, and more.” Makerspace.com has also tracked some research studies on making and learning too (makerspace.com/repost/research-roundup-some-studies-on-making-and-learning).

Libraries are gathering, meeting, and collaborating in spaces within the context of shared community and shared learning resources, which aligns well with library collection, staff, and space strengths and competencies … and with the makerspace concept. It is perfectly aligned with the library’s role in neighborhood and educational settings. Adding makerspace tools such as software and 3D printers is really a transformational and incremental activity to library programs as an extension of traditional activities rather than a whole new service niche. And the opportunity to inspire young learners and creators is amazing.

NEW MAKERS’ TOOLS

I’ve talked about my daughter in this column before. Her strengths are as an athlete, an artist, a designer, and a musician—a creator of original work. She completed her B.F.A. and is now working on a 3-year college program in jewelry design. She looks to books, the world, and nature for inspiration, but her tools are not very traditional. Her projects involve design software, digital photography, scanners, 3D printing, and more to accomplish tasks in a modern way—along with the traditional goggles, benches, and tools. I’ve avidly watched her develop as an artist, and I have recognized that she needed greater awareness at an earlier age of the work environment she was targeting. It needed to be community-based as well as embedded in her educational setting, and not just in her classroom curriculum. She now frequents cooperative workshops, where she discovers new and emerging tools that support the creative process of tinkering, exploration, and innovation.

Play and exploration can be underrated and underdeveloped in learning strategies that focus on testing, skill installation, and
critical thinking. Sometimes, imagination and creativity are left to chance or are lower priorities. This is a shame given that so much real employment opportunity is in the creative world. Makerspaces in the library can partially address this issue as well as create an educational context for partnerships with public libraries and after-school programs and clubs around design thinking. Design thinking, tinkering and exploring, designing, and creating are the essence of the many makerspaces popping up in cities across the country. These spaces aren't just for kids; they support adults, college learners, artists, entrepreneurs, and more.

A SAMPLING OF MAKERSpaces AND MORE

In a Nov. 6, 2012, Edutopia article titled “Creating Makerspaces in Schools,” Mary Beth Hertz writes the following:

We are constantly bombarded with the idea that the U.S. is “behind” the rest of the world in STEM education, that our students need to be able to think critically, problem-solve and collaborate in order to succeed in the future they will inhabit. … Makerspaces provide creative time and, well, space for people of all ages to build prototypes, explore questions, fail and retry, bounce ideas off one another and build something together. These spaces don’t always include technology, since some prototypes and designs can be built out of anything or may include various stages of design that move from analog to digital and back again, but many do include technology …

So the big question is: how do we bring these kinds of workspaces into schools so that every child has access to a safe, creative space for exploration?

There are a few different kinds of attempts being made at various schools. Some are creating ad hoc spaces by transforming existing spaces into after-school makerspaces through the use of tubs and other storage containers. This way, materials can be stored away during the school day.

Other schools are integrating aspects of design thinking and playfulness into the curriculum, providing time during the day or during a unit for this kind of free exploration.

Some are bringing makerspaces inside the school walls by creating electives or other special classes dedicated to creative exploration.

Many schools and community groups have used grant money and/or community support to fund the technology, tools and materials used in their makerspaces. Often, local businesses and tech companies are more than happy to contribute to what they consider the engagement and training of future employees.

Back in my neighborhood, I wasn’t aware of Maker Kids, a not-for-profit center storefront that is just blocks from my home. Celebrity author Cory Doctorow was in Toronto visiting family with his daughter and was drawn to Maker Kids, which, he writes, is, “a makerspace for children that does after-school and summer programs for kids who want to hack toys, use the woodshop, learn Arduino and electronics, use Minecraft to produce Printcraft 3D prints on the Makerbot Replicator, and more. Andy Forest, the space’s co-founder, was gracious enough to show us around and to get Poesy started on hacking a robot, and to get her cousin Jaxon working on disassembling a Wall-E robot and changing its arms and such.”

The kids loved it. Doctorow passed on a short snippet of what happens there on an open day, as reported by Forest:

My daughter Zhen figured out how to make candy flowers, and kept us well fed with sugar.

Next to arrive, Alex brought with him a huge box of speakers. He loves taking things apart, so he brought the parts in to see what he could make. He ended up making a speaker box out of wood and wiring it up to our stereo!

Audrey arrived with her brother Wilder and a plan—she didn’t want to slip on the ice any more! So after designing some strap-on ice cleats on the whiteboard, she got right
the pipeline
to work. Next, she moved to the wood shop. She mastered
the jigsaw to cut out some ply-
wood soles and drilled holes in it for the ice-cleat screws.
She’s coming back next week
to finish it off.

First time visitor Arbor pro-
duced a huge list of crazy
ideas and narrowed down to
making a light-up head. She
learned to solder and wired
up LEDs, batteries, resistors
and switches like a champ!

We also had a maker kid cre-
ating a video game with the
Alice software. I peered over
his shoulder and it looked
interesting!

Maker Kids (makerkids.ca) is an or-
ganization that “enables kids to build their
ideas with real tools and materials.” Its goal
is to inspire and empower kids to think, de-
sign, experiment, and create through work-
shops, seminars, and after-school programs
at its makerspace in the Toronto area.

Forest estimates that the maker move-
ment has grown worldwide from 124 col-
collective workshops in 2009 to more than 500
in 2011. Maker Kids started small in 2010
with a summer program and school events.
In 2011, it obtained a permanent space and
renovated it extensively. The organization’s
makerspace, he reports, has “areas and tools
for woodworking, electronics, mechanical
creations, 3D printing, programming, art,
sewing, and all kinds of other crafting and
making. It is a centre for ideas, inspiration
and implementation—a resource centre for
our community. Our program relies on a
strong volunteer base and mentorship by
kids themselves. Our adult collaborators are
facilitators for the kids, and also encourage
them to seek out resources to learn on their
own, and to teach each other. Teenage col-
laborators help the younger kids as a part of
their high school volunteer hours, as well as
work on their own projects.”

A MAKER’S DREAM TOOL:
3D PRINTING

This still blows me away. Being able to
design and physically print 3D models of
things quickly and inexpensively is just
magic. You can print anything from art ob-
jects from the Smithsonian Institution
through human tissue to dollhouse furni-
ture. 3D printing has been around for a few
years but it is now so affordable that some
grade schools have kids using them. The
printers can use gels, polymers, powders,
sugar, mashed potatoes, or whatever to
make 3D objects of many sizes. There are
now production models and homemade,
open source, and inexpensive printers.

They can make prototypes and are even be-
ting tested for making circuit boards and
human body replacement parts. And yes,
you can print edible food. As I said, this
blows me away. What was that machine
that made food on Star Trek called?

For inspiration, check out this tweener’s
amazing presentation to the Ignite confer-
ence: “Why I Love My 3D Printer” by
Schuyler St. Leger (youtube.com/watch?v=
=oyZsxd-Jsk).

And for more quick information on 3D
printing, take a look at these sites and videos:
- 3D Printing (Wikipedia; en.wiki
  pedia.org/wiki/3D_printing)
- MakerBot 3D Printer and
  Thingiverse 2010 (videos.webpro
  news.com/2010/02/10/build-any
  thing-with-makerbot-3d-printer)
- MakerBot 3D Printer Demo—CES
  2011 (youtube.com/watch?v=yE
  ZYfpa75Q)
- 3D Printing Potatoes With the
  RapMan (fabbaloo.com/blog/
  2011/2/26/3d-printing-potatoes-
  with-the-rapman.html; I love the
  versions that run on sugar—edible
  candy voxel dolls!)

LEG0 AND LIBRARIES

OK, maker enthusiasts, I also love
LEG0. Recently, I’ve seen quite a few li-
brary initiatives involving LEGO, and it got
me to thinking. LEGO is a perfect fit for all
ages at the library. It’s not just for kids any-
more. It is scaffolded so that a person at any
age can play with some form of LEGO. For
little kids, there is DUPLO, which can help
develop motor skills such as building and
stacking; help with recognition of shapes,
colors, letters, and numbers; and help with
ideas and creativity.

Creative play builds active minds. Cre-
vativity brings imagination to life and teach-
es children critical thinking and problem
solving skills. With regular LEGO and
enough blocks and pieces, you can build
nearly anything you can imagine.

Then there are the kits to build every-
thing from houses through pirates and Star
Wars models. These develop reading be-
haviors through following instruction sets
carefully and successfully. I feel a sense of
accomplishment when my kids and I built the
big kits. And since they’re 3D, we liked them
better than flat puzzles as cooperative play.

I am particularly enthralled with the
LEGO robotics kits, MINDSTORMS,
and the ability to create cool things that align
with STEM education goals while attract-
ing tweens and teens. I’ve recently become
aware of team sport using LEGO at Fayet-
ville Public Library, where they had so
many volunteers for their team that they
had to create three teams!

Want more on LEG0? Check out Mark
Frauenfelder’s Boing Boing posting/video of
examples using the “Unofficial LEGO
Technic Builder’s Guide” (boingboing.net/
2012/10/26/unofficial-lego-technic-buildi
ge.html?utm_source=feedburner&utm_med
ium=feed&utm_campaign=Feed%3A+boin
goingboin%2FiBag+%28Boing+Boing%29).

LEG0 leagues can be set up for inter-
national competitions (firstlegoleague.org/
challenge/teamresources), and I wouldn’t
be surprised to see a site for elderly seniors
in nursing facilities to maintain dexterity.
Check out the LEGO Education site, or just
search for LEGO and education while us-
ing Google or Bing (education.lego.com/
default.aspx?domainredir=www.legoe
ducation.com).

There are loads of tools, lesson plans,
and programs.

MAKERSPACE AND EDUCATION

Aaron Vanderwerff at Lighthouse Com-
community Charter School in Oakland, Calif.,
has published a helpful guide for teachers
and librarians about the learning outcomes
from makerspaces (makerspace.com/pro-
jects/getting-started-on-an-independent-
project). Broadly, this is based on creating
independent projects with a 6-month time
frame, requiring the learning of new skills
and innovating in some way, with an out-
come of “Bringing an idea to life!”

Makerspaces! How can you dislike any-
thing that works for any age, promotes
reading and education, draws kids into the
library for cooperative play and learning,
and is fun?

Contact Stephen at stephen.afram@gmail.com.