

3-D printing in your libraries and classrooms

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Abstract:

3-D printing creates physical items or objects from digital data. This type of printing starts with an electronic file and turns it into a physical item through the use of a 3-D printer, making the imagined real--or, at least, real via built-up layers of plastic (Kaur 2012). Multiple 3-D printer brands are available, but the most popular among schools and libraries is the MakerBot Replicator 2, mainly because of its ease of use, size, and overall print capabilities. If you wonder what 3-D printers can do, the answer is just about anything. If a student, librarian, or teacher can design it, the 3-D printer can make it. The printer may be limited by size or scale, but 3-D printers allow users to print the physical world that surrounds us (Kaur 2012). 3~D printers can play a large role in the lives of our students' research and education by creating models of thoughts and ideas as well as supporting invention (Kurt and Colegrove 2012). In this Technology Quest column I focus on two educators, an art teacher and a middle/high school librarian, who have recently introduced 3-D printers into their learning spaces.

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Article:

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Ashley Sullivan: Art Teacher, Reidsville Middle School, Reidsville, NC

Ashley Sullivan received her MakerBot in December 2013, and already, as I write this in May 2014, the students are mesmerized by it. If it weren't for all of the snow days this year students would be using the printer much more, but the bad weather has interrupted design time. Not to worry, she has lots of plans for this technology in her art class.

Using mostly Tinkercad and Thingiverse, MakerBot's design and download sites, Ashley's students have already made some fun designs using the 3-D printer. At this time they have created key chains, nametags, and other designs such as small houses. In the future she plans to have students create Chinese calligraphy seals in an Asian art lesson, as well as stop-motion puppets similar to those seen in the movies ParaNorman and Coraline, which were inspirations for her 3-D printer project and grant.

Ashley got her 3-D printer using DonorsChoose.org funds, specifically with backing from the NASCAR Foundation. DonorsChoose.org is a site where educators from across the United States can request funds for their classrooms and donors can choose the projects they wish to support. In 2013 MakerBot partnered with DonorsChoose.org to create opportunities to place 3-D printers in schools.

Sarah Justice: Librarian, Rosman Middle and High School, Rosman, NC

Sarah Justice received her MakerBot in February 2014. She took it out of the box, hooked it up, and it was ready to go. In her school library she is in the process of creating a makerspace with a sewing machine, large-screen television, old typewriter, and more. The 3-D printer will be a part of this new learning space, but at the moment this technology is on a rolling cart near a plug for easy access. Like Ashley, Sarah got her MakerBot with DonorsChoose.org funds, and, as she told me in our interview, "The students are absolutely amazed by it."

In the short time that she has had the printer, Sarah has already collaborated with the art teacher in doing a steampunk sculpture project. She worked with her peer educator and pulled literature and made a display and a bulletin board about the project. She printed gears and steampunk-style goggles along with windup keys and other items relating to that genre. She also had the opportunity to help a student prepare for the prom. When a student was designing a bow tie for his tux he decided he wanted to use glow-in-the-dark filament (raw material used by the printer). Sarah ordered some, but when it arrived she found the hole in the spool was too small for the current filament spool holder. Using her new 3-D printing design skills, she went online, found a smaller spool holder, printed it, and hung the spool.

She is planning a Teen Tech Week and will open the school library for makerspace projects using the 3-D printer. As part of her tech focus, she also plans an area for reading magazines on recently received Kindles. Other projects are in the works to be featured during this special tech-based week.

FIGURE 1 IS OMITTED FROM THIS FORMATTED DOCUMENT

Figure 1. Examples of items "printed" in the Rosman school library.

Why Implement This Technology?

When I asked these two educators why they decided to use this technology in their libraries they both had very interesting responses. Ashley Sullivan said, "Because it gets kids thinking about technology and their future. And I think it gets them excited about design." When I posed the same query to Sarah Justice she shared this response:

It's what our kids need. The idea of the traditional library and the books -- and basically that's it -- is going out. Another thing, and it's a little bit more selfish, our school has gone 1:1 with netbooks; we are almost three years into that. Ever since that happened the library has become very quiet because I don't have anything that they don't have in their classroom -- obviously, books and all that but not the technologySo if I can offer something here that they don't have in their classrooms, then I can start bringing them back.

Challenges

While both these school librarians have had early success with their printers, there can always be challenges to implementing new technologies in a classroom or library. Neither of these librarians had any training with a 3-D printer. Bringing a 3-D printer into a school library or classroom takes a sense of adventure and a spirit of exploration. For advice and information, both used social media, YouTube, and their peers in the field. For instance, in her school system Sarah Justice had a peer teacher who had received a MakerBot earlier in the school year and was, therefore, a local source of useful information.

Other challenges can include issues of funding for items such as space and 3-D printing filament. Once the printer has been received, the printing filament may last a while. However, just like toner for a laser printer, the filament supply eventually runs out and more must be purchased. A challenge for Ashley Sullivan was getting access to computers. Reidsville Middle School has a shared computer lab and a rolling cart of Chromebooks, but her students have no full-time access to computers on which to design. Training, funding, and lack of technology infrastructure can also be challenges when working with this new and exciting type of printer.

New Technology

While 3-D printing may be new(ish) to us, it has been in existence for close to ten years; the first 3-D outputs were held together with cornstarch and glue, similar to Play-Doh modeling compound. The durability of the output of this type of printing has come a long way, and its accessibility and price have become much more manageable. Its existence in a classroom or school library speaks loudly to patrons and students about "the [library program's] continuing support of combining new with traditional technologies in support of the depth of learning that could not otherwise be obtained" (Kurt and Colegrove 2012).

When considering 3-D printing, realize this may or may not be a type of technology appropriate for your library, students, or teachers. As with all technology integration, instructional value and where the innovation can fit into your teaching should be the factors guiding your decision.

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Heather Moorefield-Lang is an assistant professor for the School of Library and Information Science at the University of South Carolina. She is the chair of the AASL Best Websites for Teaching and Learning Committee. The focus of her research is technology in libraries and schools with a current emphasis on 3-D printers and makerspaces in libraries. To learn more about her work, follow her on Twitter @actinginthelib, hmoorefeld@gmail.com