Who We Are

Kristi Sadowski, M.L.S.
Co-Director & Head of Teen Services
Booth & Dimock Memorial Library

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Information Services Assistant/
Makerspace Supervisor
Booth & Dimock Memorial Library

Assistant Librarian
Wilbraham & Monson Academy
Who Are You?

• Who has used a 3D Printer?
• Who has been to a Makerspace?
• Who has a Makerspace in their Library?
• Who is going to create a Makerspace in their Library?
• What are you hoping to learn?
Why 3D Printing Matters to You

• Community Response & Support
• Library Perception & Science Fiction
• Innovation & Imagination
• STEM/STEAM/STREAM
• Publicity
• Funding & Sustainability
3D Printing Isn’t Scary!

All you need is:

– A Willingness to Learn
– Excitement to Try
– Failing ≠ Failure
But What About...

- Money?
- Space?
- Staffing?
- Experience?
The Booth & Dimock Memorial Library
Makerspace:
# Fundraising

<table>
<thead>
<tr>
<th>Fundraising</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Used Book Sale</td>
<td>PrintrBot Printer + 4 Spools of Filament</td>
</tr>
<tr>
<td>Other Donations</td>
<td>Other Misc. Supplies</td>
</tr>
<tr>
<td>Matching Donation</td>
<td>Total Spent*</td>
</tr>
<tr>
<td>Total Raised</td>
<td>$1,200.00</td>
</tr>
<tr>
<td></td>
<td>$500.00</td>
</tr>
<tr>
<td></td>
<td>$1,190.00</td>
</tr>
<tr>
<td></td>
<td>$100.00</td>
</tr>
<tr>
<td></td>
<td>$100.00</td>
</tr>
<tr>
<td></td>
<td>$1,290.00</td>
</tr>
</tbody>
</table>

*at time of instillation
The Booth & Dimock Memorial Library Makerspace

Excitement 10/25/2013
Fundraising 11/20/2013
Reality 12/12/13
First Print Feb. 2014
How Did We Move This Fast?

• Buzzwords
• Publicity
• Passion
• Facts

http://www.wili-am.com/guests.htm?guest=n6b8ga3b
How We Picked Our Printer

Our Printer!
What We Were Looking For

- Reliability
- Customization Potential
- Affordability
- Quality

For the tech-savvy, Printrbot offers expandability, speed and acceptable prints at a reasonable price.

THE PRINTRBOT IS A RELATIVE NEWCOMER to the field of consumer-grade 3D printers and is touted by its creator, Brook Drumm, as “your first 3D printer.” After a wildly successful Kickstarter campaign in December 2011, where they received over $800,000 in funding, Printrbot has been working to develop low-cost printers that can maintain quality while increasing portability. They’ve produced a few different models to suit a variety of user needs, from the Printrbot Plus with its 8”×8”×8” print volume, to the compactable Printrbot Jr.

http://makezine.com/review/make-ultimate-guide-to-3d-printing/printrbot-lc/
PrintrBot Reviews 2014

The Best From Our Tests
See the full reviews in the MAKE Ultimate Guide to 3D Printing 2014, on newsstands now!

MIDDLE OF THE ROAD
Not standouts in our testing, but deserving consideration. We were unable to dial these in satisfactorily during testing but look forward to their continued improvement.

BEST VALUE
PrintrBot Simple
Runner-Up: Ditto+

Printrbot Plus
Bukobot 8 v2
Lulzbot TAZ

3Dprinter4U Builder
Airwolf 3D
Leapfrog Creatr
Type A 2013 Series 1

Starting Our Makerspace
What is in the Makerspace:

• Printer
• Computer that will run needed freeware
• PLA & ABS filament
• Printer plates
• Tools
  – Screwdrivers, scissors, tweezers, hex key, wire cutters, tape, hairspray
Finessing and Set Up
General Maintenance

- Bed leveling
- Cleaning extruder
- Cleaning stepper motor
- Weekly down time for maintenance: +/- 30 minutes
Modifications!
Our Makerspace Now:
## Printer Use and Costs

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most small print jobs take 20-45 minutes.</td>
<td>Like printing or photocopying, charge for the materials</td>
</tr>
<tr>
<td>Some can take 3+ hours.</td>
<td>Filament is approx. $30.00 for a 35oz or $1.17 per oz.</td>
</tr>
<tr>
<td>Account for time to set up print job and to for the printer head to reach temperature.</td>
<td>We charge $1.00 per oz.</td>
</tr>
</tbody>
</table>
Plastic!

<table>
<thead>
<tr>
<th>ABS</th>
<th>PLA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrude at ~225°C</td>
<td>Extrude at ~180-200°C</td>
</tr>
<tr>
<td>Requires heated bed</td>
<td>Benefits from heated bed</td>
</tr>
<tr>
<td>Works reasonably well without cooling</td>
<td>Benefits greatly from cooling while printing</td>
</tr>
<tr>
<td>Adheres best to polyimide tape</td>
<td>Adheres well to a variety of surfaces</td>
</tr>
<tr>
<td>Filament tolerances are usually tighter</td>
<td>Finer feature detail possible on a well calibrated machine</td>
</tr>
<tr>
<td>Prone to cracking, delamination, and warping</td>
<td>Prone to curling of corners and overhangs</td>
</tr>
<tr>
<td>More flexible</td>
<td>More brittle</td>
</tr>
<tr>
<td>Can be bonded using adhesives or solvents (Acetone or MEK)</td>
<td>Can be bonded using adhesives</td>
</tr>
<tr>
<td>Fumes are unpleasant in enclosed areas</td>
<td>More pleasant smell when extruded</td>
</tr>
<tr>
<td>Oil Based</td>
<td>Plant Based</td>
</tr>
</tbody>
</table>

Software: Repetier-Host + Slic3r

- Easy to learn
  - Learning curve
- Easy to use
- Relatively foolproof
- Redundant controls

- G-code generator
- Steeper learning curve
- Setup multiple settings for multiple prints
3D Design Software

- Tinkercad
- Google Sketch Up
- Auto Desk 123D Design
- Blender
- MeshLab

Look for File Export Format

- .stl
- .obj
- .3ds
- .wrl
Cubify Draw
Cubify Draw (cont’d)
Blockify

Model then 3D print your creations, from Castles to Spaceships!
3D Scanning

iSense
3D Scanning
iSense
What We Have Done

• Collaborative Programming
  – Class Visits
  – Boy Scouts
  – Socially At Risk Youth

• Individual Training

• Demonstrations

• Print on Demand

• Maker Morning/Camp & Other Maker Programs

• Design Items and Print Prototypes

http://makeitatyourlibrary.org/play-technology/makescribbling-machine#.VD6kyvIdV8E
Robot Project

- Cooperative Programing with Town Youth Services Department and Dean of Students at Middle School
- They wanted an afterschool project for socially at risk boys.
- Robot project was chosen because it taught: circuitry, soldering, programming and incorporated 3D printing.
Pinball
Training & Demonstrations

- On demand individual or small group sessions
- Lots of teens and families
- Create new relationships and empowered members of community
- Enable persons to work the printer themselves and some to teach others
What Others Have Done

• Replace parts from favorite games
• Make pieces for school dioramas and projects
• Design and print your own creation
• Print a second, third or fourth printer
• Print a hand or other prosthesis

http://www.3ders.org/articles/20140206-teen-uses-3d-printer-to-make-a-robohand-for-third-grade-boy.html
What Do You Really Need?

“The amount or quality of space is not important, nor is the level of technology and expensive equipment that the library provides. What matters most in the world of making is the spirit of DIY creation and discovery.”

-Dale Dougherty of Make Media in The Digital Shift
What Do You Want From Your Makerspace?

- Patrons/Volunteers run Makerspace
  - and/or
  - Patrons use tools with minimal supervision and training

- Makerspace tools are only for library programs
  - and/or
  - Dedicated staff to continuously monitor patron use and tools
Legal Issues

- Safety for Patrons
- Safety of Equipment
- Copyright
- Printing Weapons
- What Else?

Booth & Dimock Memorial Library
Maker Space User Agreement

By using and working in the Booth & Dimock Maker Space I agree to the following:

- To respect and protect other people’s work
- To help one another do better—be open, inclusive and encouraging
- To pick-up after yourself and leave the Maker Space clean for the next user. This includes:
  - Returning all tools to where they came from
  - Placing your trash and waste into appropriate receptacles
- To not bring food or drink into the Maker Space
- The Maker Space may be booked for individual or group use by contacting the library. When available it will be on a first-come, first-serve basis. Time limits may apply.
- Material fees may apply and current costs will be posted in the Maker Space.
- Safety is the top priority and the facilities, tools and materials must be used in a safe and appropriate manner
- If a tool requires training, it will not be used until training has been provided by library staff
- To not make items that will be used as or fit the definition of weapon as deemed by library staff
- To comply with the Internet Acceptable Use Agreement and Patron Behavior Policy which states:
  - Disruptive, destructive, dangerous, or illegal behavior will not be tolerated
  - Children under the age of 15 will be accompanied by and supervised by an adult

The Booth & Dimock Memorial Library is not liable or responsible for any loss, damage or injury caused by the Maker Space or its users.

It’s all right if you fail, as long as you use it as an opportunity to learn and to make something better

By signing you acknowledge that you have read this agreement and understand the rules and regulations expected of Makers in the Booth & Dimock Memorial Library. Failure to comply can result in suspension or termination of access to the Maker Space.

Name: ____________________ Library Barcode Number: ____________________

Signature: __________________ Date: __________________

I agree to the terms of this agreement on behalf of my child(ren), and give them permission to use the Booth & Dimock Memorial Library Maker Space.

Name: ____________________ Library Barcode Number: ____________________

Name: ____________________ Library Barcode Number: ____________________

Name: ____________________ Library Barcode Number: ____________________

Name: ____________________ Library Barcode Number: ____________________

January 2014
Crafting an Agreement

Connected Learning Manifesto

We believe in messy learning within a culture of collaboration. Through non-linear, non-directed, self-initiated learning, collectively we find and solve problems within our networks, classrooms, communities, and the world.

Be a learner first, educator second. Never stop learning.

Connections make our thoughts stronger.

Connections increase serendipitous learning. Bring your passion. Selflessly share what you know.

Be collaborative. Own it. Share with others. There’s nothing powerful about more technology. Real power rests in the hearts and minds of those I learn with online. To question is the answer.

Embrace failure as a learning strategy. You are teaching when you are transparently sharing. You are leveraging your passion to help others understand.

Community is built through the co-construction of knowledge. I believe that the collective WE is always smarter than ME. Connected learning is wide open learning.

Connections enhance individual reflection. Connected learners are never lonely. Think, share, and then act collectively.

Embrace failure as a learning strategy. You are teaching when you are transparently sharing. You are leveraging your passion to help others understand.

Resources:
Makerspaces in Libraries: Legal Considerations
An Infopeople webinar from 7/2014
Slides and Handouts Avaliable

https://infopeople.org/civicrm/event/info?id=416&reset=1

Some of Our Other Gadgets

- Sphero
- Brushbots
- 3Doodler
- Makey Makey
- Soldering Irons
- Snap Circuits
- Arduino
- Scribble Bot
- RobotiKits
http://www.coventrypl.org/cen61015.html

ksadowski@coventryct.org  ccarney@coventryct.org