ADDIE Planning Worksheet

Andrea Puglisi, Project SET

ANALYSIS

Why does your library/organization/audience need this instruction? How do you know? (Or if you don’t already have anything in mind, how might you find out what type of instruction is needed?)

As outlined in our library’s 3D Printing Report, “3D Printing is a signature project of the Maker Movement, a cultural shift from consumption to creation. The 3D Printing movement has been fueled by an entrepreneurial spirit looking to use interdisciplinary approaches to spur innovation....The movement is about transferring education to empower everyone to think of him/herself as a maker.”

We acquired 3D Printers as a response to community interest and as a means to support innovation in the community with local organizations. In order to make this successful and foster a community of makers, the library will begin offering introductory classes on Computer Aided Design (CAD) and 3D Printing.

We have had success with offering beginner programs on design using apps and .JPG > .STL converters. In response to our very introductory classes on 3D Printers, we will be offering beginners and intermediate level courses on CAD for an audience that would like to develop stronger CAD skills for personal and/or professional projects. This design model will be used for teaching the foundations of Tinkercad, which is the most accessible CAD software available. Tinkercad will be used as a stepping stone into more advanced software such as 123D Design and Blender.

Who is the intended audience for the workshop?

This current class model is for Adults who are looking to get beyond observing and understanding 3D Printing as a concept. This class will have required that our patrons either have taken our “Foundations of 3D Printing” (‘getting to know you’ class) and/or are comfortable with all topics that are discussed in that class.

- **What do they already know?**
  Topics that are covered in our existing Foundations of 3D Printing Class: What is a 3D Printer; How do 3D Printers work?; How to send a job to a printer; discussing .STLs and .GCODE; changing filament; participate in open discussion about 3D Printing and opportunities.

  Handouts are given in this class that defines 3D Printers; justifies the library’s inclusion of 3D Printing (Why 3D Printing); parts of our machines; how to change filament; and provides in 8 steps the process that is used to design and release a job (file “Andrea 3DPrinting Foundations Class” is also uploaded for Project SET to reference).

- **What do they need to know?**
  - Topics covered above in the Foundations of 3D Printing class

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*This workshop is presented and funded by the Massachusetts Library System (MLS).*
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● Comfort using computers and a mastery using mouse and keyboards
● E-mail account log-in credentials as we will create accounts with Tinkercad and Thingiverse
  o Why e-mail account: Tinkercad supports design at home using a web browser and/or can be accessed using any public computer.
  o Why e-mail account: Store design in the cloud
● If patrons do not want to save file in the Cloud, then we can support: saving to a flash drive; e-mail the file to oneself; and/or store in Google Drive, OneDrive, etc
● Willingness/openness to trial and error; patrons must bring with them to class a positive and adventurous spirit!

● How will you incorporate adult learning principles into your workshop?
  ● Change filament—being active and demonstrating existing knowledge (Autonomous & Self directed, Life Experience & Knowledge)
  ● Send prints, find prints, and talk about them—get people to work together (Autonomous & Self directed, Life Experience & Knowledge)
  ● Working towards creating their own design will make the class goal oriented and provide some autonomy from the group. Patrons will have the opportunity to choose something that they want to create and/or self-explore. (Goal Oriented, Relevancy, Knowledge)
  ● Remind patrons that the class is not about producing a perfect object. The goal of the class is to go through the process of prototyping and design; trial and error is important. (Goal Oriented)
  ● Ask if anyone has experience with creating—drawing, design, woodworking, sewing and relate CAD process back to existing experience/knowledge (Life Experience & Knowledge)
  ● By exploring Thingiverse patrons can see what is created and a wider discussion about designs like prosthetics and more useful designs can be had. (Practical & Relevancy Oriented)

What materials are already available?

● Tinkercad has tutorials that can be used for instruction
  o Problem: they don’t catch mistakes/errors, but that might still be okay in class
● Designs available in Thingiverse
● We possess all of the technology equipment for the course (computers, mice, printers, supplies, power cords, tablets and Tinkerplay app)
● Project Ignite has some excellent tutorials

Identify up to 5 learning outcomes for your workshop. (Fewer is fine!) Refer to taxonomies for cognitive (Bloom), affective (Krathwohl), and psychomotor (Harrow) as appropriate.
### ADDIE Planning Worksheet

<table>
<thead>
<tr>
<th>What will the learner be able to do?</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search for and select a design on Thingiverse. Download file from the internet &amp; convert to GCode for printing.</td>
<td>Patrons will be able to explore the possibilities of design and identify shapes that make up a design. This will help frame how individuals approach CAD. By selecting an object that is converted into .GCODE, we will print objects throughout the duration of the series. This capitalizes and reinforces existing skills. This should build confidence and knowledge.</td>
</tr>
<tr>
<td>Identify and design parts of software (Tinkercad):</td>
<td>Navigate the software and know options available to them as part of the design process.</td>
</tr>
<tr>
<td>Geometric &amp; shapes; holes; grouping; saving &amp; exporting files</td>
<td></td>
</tr>
<tr>
<td>Choose a box shape and move it onto the screen. Change size and dimensions of object. Show how to use the hole &amp; grouping function in Tinkercad</td>
<td>Experiment with moving objects in CAD Space and learn how to use mouse to control and create in a 3D workspace.</td>
</tr>
<tr>
<td>Complete “Basic Button” tutorial</td>
<td>Integrate previous lessons and create a final, personalized project. Patrons will have gone through the process of design.</td>
</tr>
<tr>
<td>Release &amp; print a design</td>
<td>Apply existing 3D Printing Skills! This should feel encouraging and rewarding</td>
</tr>
</tbody>
</table>

**DESIGN**

Outline your content and sequence below. (Tip: Use your learning outcomes, though sequence may change.) What you will teach for each outcome?
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Class 1: Searching for and identifying a design on Thingiverse & prepare Thingiverse objects for printing. Begin releasing jobs. Change filament as needed. Releasing jobs helps keep excitement high and serves as a refresh to changing filament and prepping jobs for printing.

Class 2: Identify parts of software; Choose a box & move it onto the screen; changing size & dimensions of object; learn how to use hole and grouping function in Tinkercad.

Continuing Releasing jobs that were selected in Class 1 from Thingiverse. Change filament as needed. Releasing jobs helps keep excitement high and serves as a refresh to changing filament and prepping jobs for printing.

Class 3: Complete a basic tutorial on Tinkercad; easiest Tutorial available is a button.

Continuing Releasing jobs that were selected in Class 1 from Thingiverse. Change filament as needed. Releasing jobs helps keep excitement high and serves as a refresh to changing filament and prepping jobs for printing.

Class 4: Wrap up: Print tutorial design & explore Tinkercad independently. Questions?

Classroom Management Section caused me to think that I may want to be prepared to recycle our “Tiny Signatures” program that we have used in YA programming. Basically, if Tinkercad is too difficult we can use our tablets & apps to make a design (we found that people loved signing their names!). In Classes 3 & 4, be prepared to switch over to this method – library staff will need to sign tablets into email account [patron1@pittsfieldlibrary.org] prior to the start of class, but otherwise should be okay)

Format: Based on your outcomes, do you think your program should be in person, online, or blended (elements of both)?

In person!

There are a number of ways to design any given object; and, the more minds the better when it comes to evaluating the success and failure of a design. Plus! We will be printing tangible goods 😊

What is the shelf life of the content for this instruction? Mark the line below.

2 Years

Format: (More complex format OK) (Consider ease of updating)

If in person:

Max class size 6

Do you need a rover? Yes, please!

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**Which teaching and learning format(s) will you use?**

- ✓ Discussion (third part of class)
- ✓ Presentation (first part of class)
- ✓ Problem-based/hands-on learning (second part of class)

**Which high or low-tech technologies will you use?**

- Computers, mouse, keyboard, 3D Printers! TV which will display instructor’s steps on screen.
- Tablets – iPads and/or Android tablets with Tinkerplay and/or Morphi app installed (this occurred to me in Classroom Management Section)

**If online**

- Max class size N/A
- Do you need a “co-pilot”? Y / N

**Which tool(s) will you use?**

- □ X LibGuides
- □ Twitter
- □ GoToWebinar
- □ Moodle
- □ Jing/Screencast-O-Matic (screenshots or screencasting)
- □ X Videos (Vimeo/YouTube) – Opportunities here!
- □ Video chat
- □ Podcast
- □ PowerPoint
- □ _X Google Slides_

**DEVELOPMENT**

**Note any necessary updates/adaptations to available materials (see “Analysis”).**

We possess all of the materials that we will need for this Series! ☺

**What additional learning materials do you need to create?**

- Google slides that define the parts of Tinkercad
- Google slides that demonstrate how to maneuver and adjust shapes in Tinkercad.

**List others who can help develop learning materials.**
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Members of the 3D Committee and fellow instructors within my department.

Who will you test the materials on?

Staff; both instructors who are new to the technology, and with those who feel more comfortable with the technology.

IMPLEMENTATION

Potential date/time for workshop: Fall 2016; offer the series twice

Possible location(s): Mobile computer lab where we offer our existing technology workshops

How will patrons register?: Online, by phone, or by in-person using event keeper (with staff ready to help!)

How will you market your program?:

Friends of the Library newsletter; post on our website; promote it via social media; word of mouth; inform and/or partner with local entities to promote this new service!

Pre-print models available in Tinkercad tutorials and leave on display (either in a case or at Reference Desk) as a conversation starter. By pre-printing models that are available as part of Tinkercad tutorials, we are showing off objects that participants may decide to create in our class.

List any pre-requisites or required skills:

● Pre-requisite: attend/know and understand topics covered in our Foundations of 3D Printing class which includes: What is a 3D Printer; How do 3D Printers work?; How to send a job to a printer; discussing .STLs and .GCODE; changing filament; participate in open discussion about 3D Printing and opportunities.

● Computer skills: how to use a mouse, keyboard and comfort using internet based tools

Classroom management

List Your Ground Rules

● Ask patrons what they hope to get from the class and identify if anyone has experience with CAD

● Follow along with instructor on the screen before trying independently

● Patrons will have the opportunity to change filament and handle the machines, in addition to creating their own designs. Ask patrons if they want to have a buddy system or not? Then go forward with what the group decides.

● Allow the instructor to finish presenting an idea before asking questions.
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- If patron is unable to attend a class, the patron will be responsible to get up to speed. Patron must understand that patron may will need to do some independent work. Staff can extend a Reserve a Librarian option if scheduling permits. The expectation is that patrons attend classes when they are scheduled as we have limited opportunities for RAL transactions due to coverage.

**How will you manage learners of different abilities?**

With patience, kindness and a responsive approach to their needs!

- **What alternative(s) might you recommend for a patron if this workshop is too advanced?**
  - If patron cannot use computer: can we show the patron how to change filament and maintain the machines?
  - Buddy system?
  - If patron finds design using Tinkercad too difficult: we can show them how to design using Tinkerplay and/or morphi app which is installed on our tablets. We’ve had success with this type of programming with “extreme beginners” and printing tiny signatures.
    - (aha! I’ve just discovered that I want to be prepared to print from a tablet)
  - Are there several people struggling? Is there a way that one staff member form a group of those who are struggling and the other staff member be available to those who are more independent yet still need guidance?
  - 3D Pens!
- **What alternative(s) might you recommend for a patron if this workshop is too basic?**
  - Some of those Tinkercad tutorials are pretty challenging! Make sure that they try some of the more difficult one’s.
  - Can they modify a design that they download from Thingiverse in Tinkercad?
  - Encourage them to design from scratch in Tinkercad.
  - If they are truly masters of Tinkercad: We have 123D Design installed on our machines; it is more complex software that they can explore and design in.
  - If they are truly masters of Tinkercad: Do they want to follow a tutorial for 123D Design? Make them aware that we are designing classes for 123D Design and let them know of ways that they can learn of when the Series will be offered.
  - Have they ever designed using an iPad and/or touch? Tiny signatures are a lot of fun!

**EVALUATION**

**How will you determine if learners liked the instruction?**

Ask!, Anonymous survey at the end of class! Would they like to do more with 3D Printing and the library? (We are looking for volunteers!)
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How will you determine if the instruction met its learning outcomes?

- Were patrons able to change filament without staff assistance?
- Patrons were able to navigate Tinkercad and complete a tutorial (even if it was imperfect!)
- Were patrons able to create their own design?
- Did patrons appear happy?; do they want more?

Patron feedback will be vital in our understanding if our instruction is effective and relevant to our community.

How will you determine if the instruction met your organizational goals?

If patrons were able to develop a new skill and a deeper understanding of 3D Printing and design, then this class is addressing Goal 4, which states: “Patrons will come to know the library as a place where accessible technology resources inspire creativity in exploring and expressing their diverse interests” as outlined in our institution’s Technology Plan.

4.2.5 Provide 3-D Printer & design training to patrons of all ages

FOLLOW-UP

Where might you look for more examples of online instructional materials?

- Lynda.com has some great tutorials on Tinkercad & 123D Design. The instructors communicate these complex ideas very clearly and succinctly.
- Autodesk’s Tinkercad tutorials on YouTube
- Project Ignite
- Warwick University has some great tutorials for 123D Design

Whose teaching might you observe to pick up more tips?

- The instructors for Lynda.com on CAD are excellent examples of how to communicate these complex ideas very clearly and succinctly.
- Educators in the community who offer 3D Printing in their schools (ex: Taconic High School, St Joe’s High School)

FOR MORE INFORMATION:

http://guides.masslibsystem.org/instruction

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