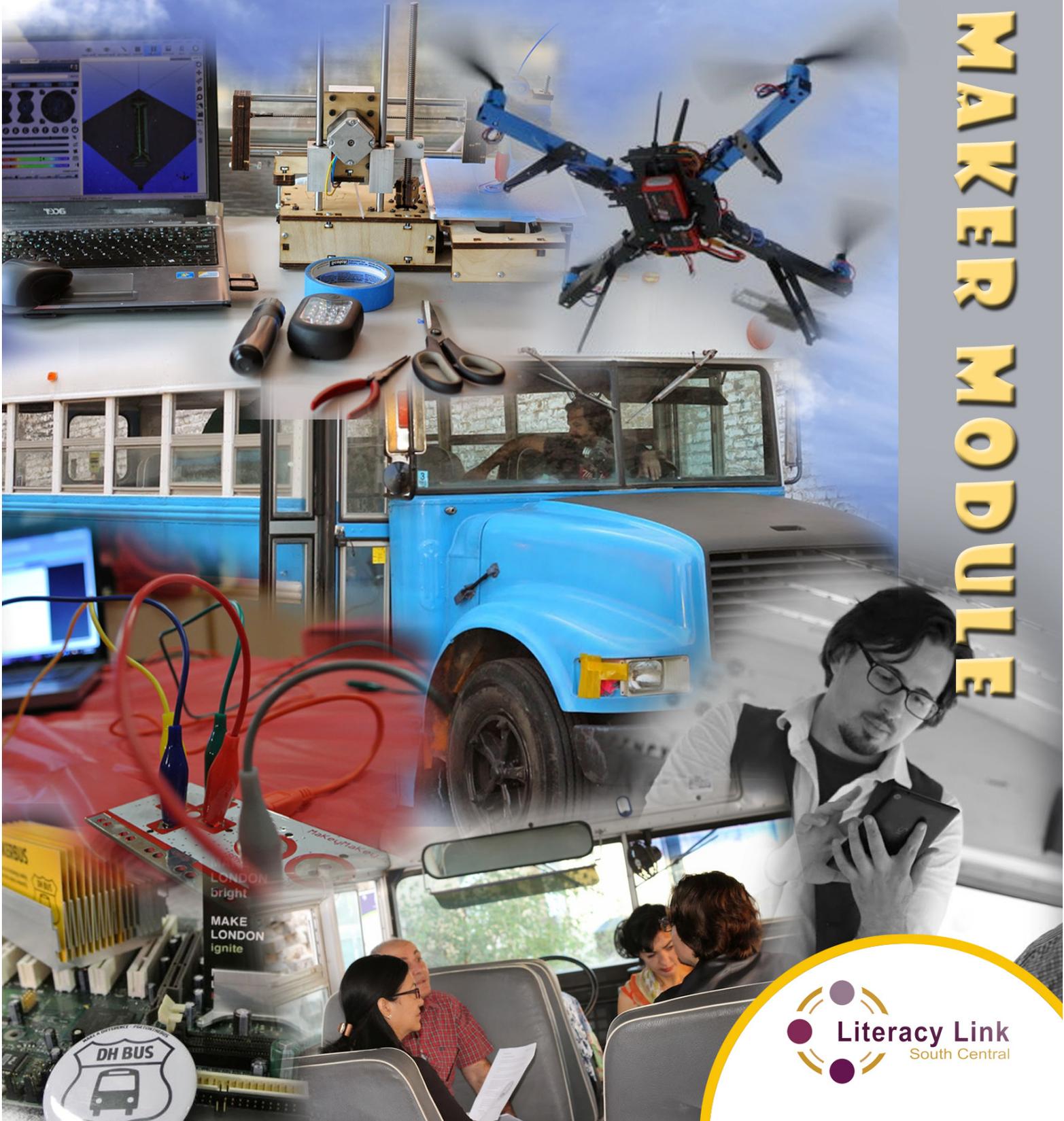




THE WORLD OF 3D

MAKER
MODULE



Acknowledgements

These Maker Modules were prepared for the Literacy Link South Central project “Using Technology to Facilitate Connections between Literacy and the Broader Community” (2014).

Maker Modules available in this series include:

Augmented Reality

Bluetooth

Dropbox

Evernote

Leap Motion

Macrophotography

MaKey MaKey

Portable Podcasting

QR Codes

Tiny Scan

Word Lens

The World of 3D



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Introduction

To successfully complete this MakerBus Module, you will need:

1. Notes to the Literacy Practitioners
2. The World of 3D Pre Visit Activity
 - estimated time is 30 minutes
3. The World of 3D MakerBus Module
 - estimated time is 30 minutes
4. The World of 3D Post Visit Activity
 - estimated time is 15 minutes
5. Evaluation Forms (optional)
 - learners' feedback is submitted immediately following the visit
 - practitioners' feedback to be submitted following the completion of any Post Visit Activities
6. Equipment List:
 - 3D Printer for learners to observe
 - The pre-printed 3D model for learners to examine
 - A computer with speakers
 - The MakerBus Wi-Fi Hotspot and its password



Notes to the MakerBus Facilitator: Due to time constraints, this task is more of a demonstration than it is a chance for the learner to experiment for themselves. If at all possible provide the photos, the 3D model and an actual printed version of the same object for learners to see and “play” with. The undefined activity will hopefully encourage learners to experiment and problem- solve, rather than just follow the steps to complete a task.

Testing the internet connection speed prior to the start of the visit is advised to ensure that the 123D Catch video (Part 3) will play.

All instructional materials are available on the Literacy Link South Central (LLSC) website, should you need additional copies. Please visit: <http://www.llsc.on.ca/>.

Notes to the Literacy Practitioners

Learning Objectives:

1. See how 3D Printers work
2. Understand how the 3D Printer was assembled
3. Learn the steps to create a 3D model, from photos to final product

Notes to Practitioners:

The Pre Visit Activity for this module is strongly recommended. It includes a suggestion for discussion, as well as a learner handout. Together these two activities will provide students with an understanding of, the basics of 3D printing. The Pre Visit is expected to take around 30 minutes. In order to complete this activity you will need a projector, screen, computer, and a way to connect to the Internet and YouTube.

Competencies for the Pre Visit Activity include: A2.2; A3; B1.2 and D1.

The time on the bus will give them a chance to have a more hands on experience to solidify their learning.

While the steps for taking 3D photos are provided, the learners are not expected to complete this step as part of the lesson. During this module, the MakerBus Facilitator will provide previously taken 3D photographs for the students to manipulate while on the bus. Should they wish to take their own 3D photos, the instructions are provided.

This MakerBus module addresses competencies: A2.2; A3; B1.2 and D1.

The Post Visit activity is optional, but is intended to give students an opportunity to discuss and or debate the potential impact of 3D Printing with their peers. It is also estimated to take 15 minutes, but may be shorter or longer depending on how much discussion is generated. Competencies for the Post Visit Activity include B1.2; D1 and F.

The World of 3D Pre Visit Activity

Learner Handout

As a class read and discuss:

1. You have probably been to the movies lately, but were any of those 3D?
2. Did you need to wear 3D glasses in order to feel that you were really “in” the scene? If you didn’t wear them, how was your experience different?
3. Why can’t you just wear 3D glasses to change a regular 2D movie?

What is 3D?

In short, it means three dimensional. Photos and documents are only two dimensional, or flat. Think of a photo of your friend. Imagine instead, a 3D version of your friend or a mini version of them! It might look like a plastic figurine or bobble head. This technology exists and some of it is even free.



Now, think about what that means for printing. Until recently, if you said you were going to “print something” it meant you were going to print a two dimensional (or flat) picture, email or document in ink on a piece of paper. Thanks in part to the Maker Movement, printing is evolving and has moved beyond printing in two dimensions. Now, printing can be done in three dimensions . . . meaning with the right equipment you can print solid 3D objects like cups, machine parts or tools.

Where regular printing puts ink onto a piece of paper in a single layer, 3D printing is done by applying thin layers of a plastic-based material one on top of the other, gradually creating an object that is thicker, taller and three dimensional.

Watch this 3 minute video to see how it is done:

<https://www.youtube.com/watch?v=dnIVrLqrEI8>

Most 3D printers use plastic because of its availability and low cost. But there are printers that can print using metal, ceramic and even food! If you could, what would you create with a 3D printer? List your ideas below:

Scanning in Three Dimensions

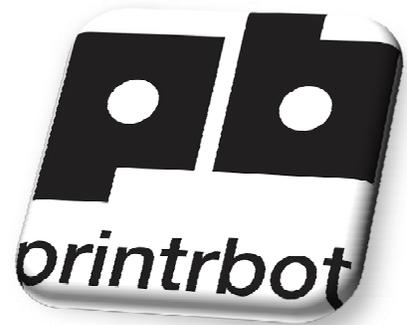
When you were last at the airport, do you remember when you walked through a scanner to clear security? At the dentist, have you ever had a 3D scan of your teeth and jaw? Can you think of any other use of 3D scanning that you may have seen?

Check out the following to see the steps of how to develop your own 3D model:

<http://www.123dapp.com/howto/catch> Scroll down on the same site for tips and tricks to help you through each step of the process. If you are planning on trying to create your own 3D scan, it may be worthwhile to watch these additional videos.

The World of 3D MakerBus Module

Printing is evolving and has moved beyond printing in two dimensions. Now, printing can be done in three dimensions meaning with the right equipment you can print solid 3D objects like cups, machine parts or tools. Watch it in action and have a conversation about 3D printing.



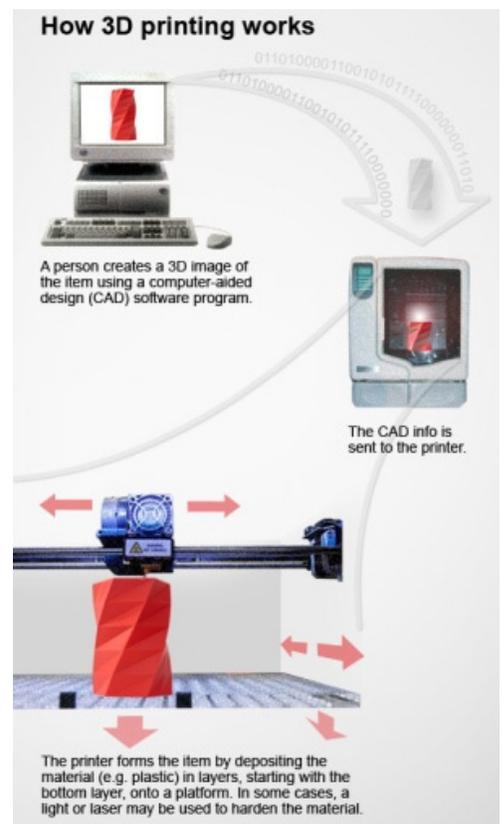
You will learn:

1. how 3D Printers work
2. how the 3D Printer was assembled
3. the steps to create a 3D model, from photos to final product

Part 1: How 3D Printers work

CBC did a great job describing how 3D printers work: “There are several types of 3D printers. They may use different materials, but all involve the same basic approach for "printing" an object: spraying or otherwise transferring a substance in multiple layers onto a building surface, beginning with the bottom layer.

Before the printing can occur, a person must first create a 3D image of the item they want printed using a computer-assisted design software program. That object is then sliced into hundreds or thousands of horizontal layers, which are placed one on top of the other until the completed object emerges.”¹



¹ <http://www.cbc.ca/news/technology/how-exactly-does-3d-printing-work-1.1371800>

What do you think about how 3D printing works?

Part 2: How the 3D Printer was assembled

For this activity, you will be walked through the assembling process of a 3D printer. If you are interested in the step by step instruction, the link is below:

<http://help.printrbot.com/Guide/Printrbot+Jr+1402+Assembly/57>

Side Note: There are over 88 steps in assembling a 3D printer.

Part 3: The steps to create a 3D model, from photos to final product

Autodesk's 123d Catch is free software that will make a three dimensional model from your own photographs. Watch this video to get a better idea of how the software works:

<http://youtu.be/OxsmnDKO7D0>

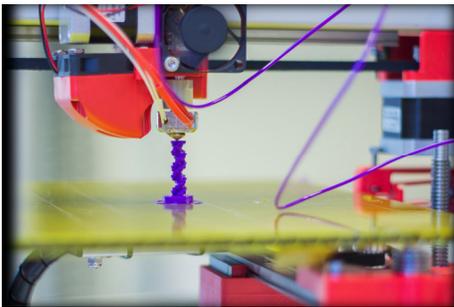
This is how you take photos to final product:

1. Take a series of photographs of your object. (You will need 20-40 images going around the object. These should be roughly from the same distance and height. You may also need another few photos taken from above, or below, to show additional details)
2. When you upload your photos, 123D Catch will "stitch" these images together to make a 3D model.
3. Save this image to Cloud.

4. You will then be able to manipulate the model, turn it, view it from above or below and zoom in to see any details.
5. If you had a 3D printer, you could now print it.

Let's spend some time discussing 3D printing:

1. Share your thought of what you just experienced.
2. How do you see 3D printing's impact to the world?
3. If you could print something 3D, what would it be?



3D PRINTING

World of 3D Post Visit Activity

Learner Handout

1. How do you think this technology could change our world? Will it?

2. What uses can you see for 3D printing?

3. What possible uses are more frightening or potentially negative?

Share your answers with a partner. Did you agree or disagree on the impact and uses of 3D printing?

Extension Activity

If you found the information on 3D printing and its applications interesting, check out the following 7.5 minute video to see how some of the scientists see the possibilities:

<https://www.youtube.com/watch?v=UCI7BgLrk-4>

For other applications see the 4 minute video from the 3D Printshow London 2013

<https://www.youtube.com/watch?v=UADoHv6dBrk>