

That whole "3D Printing" thing?

[Learn how 3D Printing is Impacting the World - A Digital Story by Andrea Arias](#)

What is 3D Printing?

The following article describes the 3D printing or additive manufacturing process: [The rise of additive manufacturing](#)

A brief history of 3D printing

Maxey has created a comprehensive info graphic that describes the [History of 3D Printing](#)

Multiple means of representation – 3D printing applications

- 3D-printed human organs: <http://www.3ders.org/articles/20140129-3d-printing-human-organs-may-be-regulated-or-banned-by-2016.html>
- 3D Rex: <http://www.3ders.org/articles/20130704-3d-rex-a-3d-printed-tyrannosaurus-rex-sculpture-on-kickstarter.html>
- 3D-custom game controllers for the disabled: <http://www.3ders.org/articles/20130621-building-custom-game-controllers-for-the-disabled.html>

How 3D Printing Actually Works

- The following video created by ZCorp's illustrates how 3D printing actually works: <http://youtu.be/YAN-fj77HXc>
- INFOGRAPHIC: How 3D Printing Works <http://www.businessinsider.com/how-3d-printing-works-2012-7>

Applications of 3D Printing in Schools, Colleges and Universities

- 3D printing in education: <http://www.youtube.com/playlist?list=PLJS5otZ3bry7oWx1Qgu5uljTcmpO49H7t>
- [10 Ways 3D Printing Can Be Used In Education \[Infographic\]](#)
- [Educational program for 3D printing](#)

Learning Activity

The following activity has been designed by Andrea Arias as a learning activity based on 3D printing:

Goals:

1. Students will gain a basic understanding of the 3D printing process
2. Students will demonstrate their understanding of the 3D printing process
3. Student will demonstrate that 3D printing can be used for teaching, learning, and research

Materials:

1. Discussion
2. Paper to draw or write
3. Free Computer Applications: "[Tinkercad](#)", "[Let's Create Pottery](#)", "[Sculpteo](#)".
4. 3D objects

Methods:

1. Engage students in a discussion regarding what they know about 3D printing and how they can use this technology.
2. Ask students to think about an object that they would like to print. Explain that they have options to draw or describe the model on a paper sheet.
3. Explain that they are going to choose one of the 3D modeling applications provided to learn how to create a 3D model that is ready to be 3D printed into a physical object.
APPLICATIONS: "[Tinkercad](#)", "[Let's Create Pottery](#)", or "[Sculpteo](#)".
4. Use the computer in order to show a video that demonstrates how 3D printing works:
<https://www.youtube.com/watch?v=WTYfzfvWT4Y>
5. Ask students to read the article corresponding to the video at:
http://business.financialpost.com/2012/10/03/bringing-3d-printers-to-the-masses/?_lsa=e090-34e5
6. Pass around examples of 3-D printed objects.

7. Explain to the class that they will be working in small groups to describe some examples of these 3-D printed objects and enumerate or write down at least three application of 3D printing in their teaching, learning, or research.
8. Wrap-Up: Pull the whole class back together, and discuss significant learnings from today's activities.

Assessment: Formative/Ongoing Assessment

As students explore the 3-D printed objects, be available to answer any question that they might have. During the lesson wrap-up, provide a website where they can find more information about 3D printing. Also, provide contact email for future questions.

Curriculum: MakerBot Education

The creators of the MakerBot 3D printer have developed lesson plans to engage students in the world around 3D printing and to inspire more young people to pursue STEM careers.

<http://curriculum.makerbot.com/>

The future of 3D printing

Richard A. D'Aveni, a professor of Strategy at Dartmouth's Tuck School of Business, describes some of the implications of 3D printing [here](#)

Scholarly Literature

Lipson H. (2007) "Printable 3D Models for Customized Hands-on Education", Proceedings of Mass Customization and Personalization (MCPC) 2007, Cambridge, MA, October 2007.

Retrieved from http://creativemachines.cornell.edu/papers/MCPC07_Lipson.pdf

Brief overview

Lipson (2007) exposed the benefits of using rapid prototyping (3D printing) to make physical models and facilitate hands-on active learning. Lipson found that as a result of logistical issues, such as, accessibility, cost, and shipping, 3D visualizations have replaced physic models.

However, Lipson argues that physical models are fundamental educational tools because they help students visualize and understand abstracts. He states that physical models provide concrete

rather than abstract learning experiences, which foster knowledge retention by 90%. Lipson concludes his study by stating that rapid prototyping (3D printing) can bring the physical model trend to life. He also proposes an online library of printable teaching models. According to Lipson, this library could facilitate hands-on active learning by providing accessible and customized physical models that meet specific needs.