

3D Printing: Basic Features Workshop
March 9 & 10 12 p.m. – 1 p.m.
COE Sandbox, HH 210
Presenters: Duane Smith & Debbie Fuller

Goals

3D Printing Basics Demonstration

- preparing a file
- preparing the printer

Where to find files to print?

How to create/design my own project?

Why use 3D printing in the classroom?

Young children and 3D concepts

Why students need to learn about 3D printing for the future

3D Printing

A 3D printer “prints” a design of an object by adding layer upon layer of filament.

We use PLA (polylactide) thermal plastic filament with a melting point of 302 to 320 degree F.

PLA is bio-degradable, plant-based (a green plastic).

View 2 videos created by Instructional Design students in our ECTL Dept.

- [3D Printing Tutorial \(Video\) Created by Christopher Mueck, Instructional Technology Graduate Student.](#) Describes the actual 3D printing process
- [An Introduction to 3D Printing Technology \(Video\)](#) Explores the develop of 3D printing

3D Printing Basics – Demonstration

Download a file to print: Thingiverse.com

Convert: CURA (or your preferred conversion/rendering software) to prepare the file

File Types: STL/Gcode

Exporting: SD/USB/Cloud based

Filament: PLA, PEX, PETG, ABS

Loading Filament

Cleaning the build plate

Calibrating the build plate

"Good" Printing Feed

Thingiverse <https://www.thingiverse.com/education>

A design community to share 3D files. Users are encouraged to be licenses under a [Creative Commons license](#), meaning that anyone can use or alter any design.

Upload the file to Thingiverse and SHARE

Discover over a million and a half models that have been contributed by users.

How are 3D files created? Design Software for Beginners

One example is Tinkercad <https://www.tinkercad.com/learn>

-a free online 3D modeling software to develop models from a set of basic shapes.

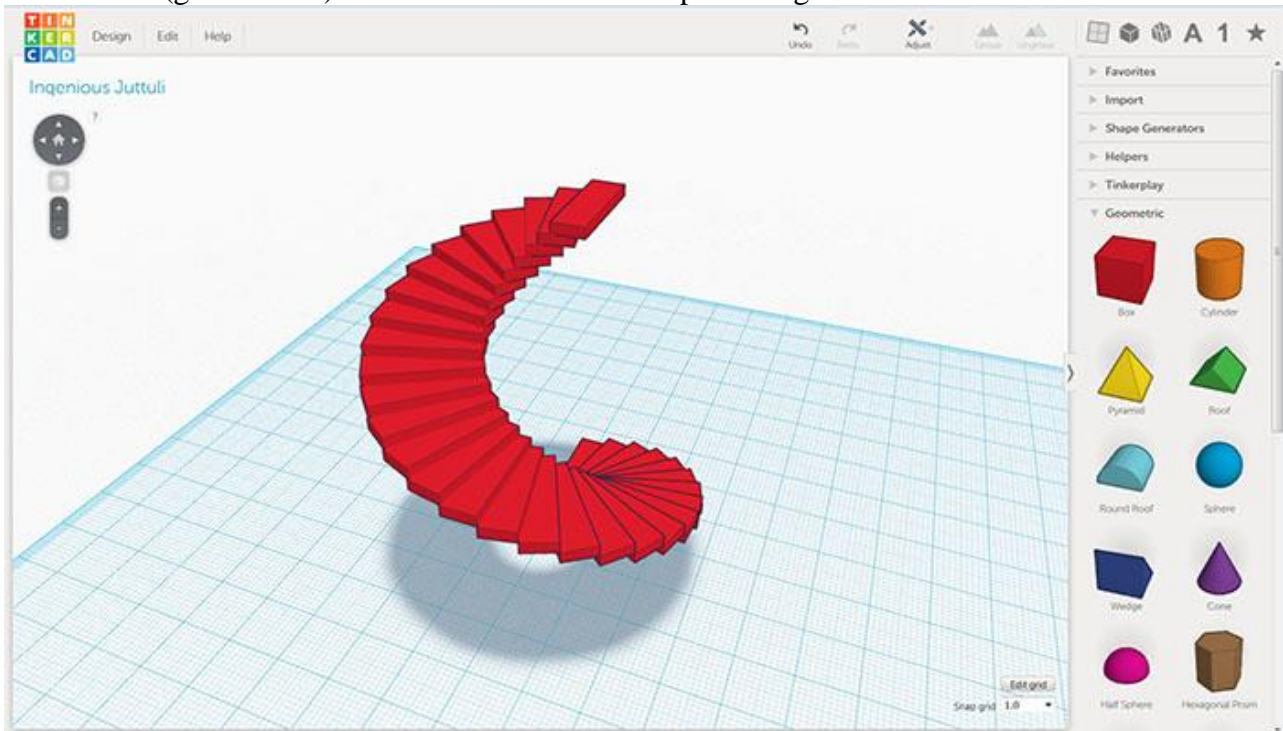
- it has a library of files that users can use to find and manipulate shapes

Tinkercad is: <https://www.tinkercad.com/teach>

3D Design (grades 3-8) Students can create design with a simple drag and drop of shapes.

Electronics (grades 5-12) Teach simple circuits to programming an Arduino board.

Codeblocks (grades 3-12) Students learn code while producing their own 3D models



Why 3D printing in the classroom?

<https://www.3dnatives.com/en/3d-printing-in-education-290820184/>

- 3D printing can be incorporated into a wide variety of school subjects to simplify theoretical concepts and help students understand concepts

- prepare students for the future; acquire knowledge about new technologies

How can you use 3D printers in your classroom?

1. Create interactive maps. ...
2. Create decorations. ...
3. Recreate real-life structures. ...
4. Get musical. ...
5. Consider the tools for a job. ...
6. Bring back the dinosaurs. ...
7. Create a human skeleton and/or internal organs
8. Build math experiments

- **Create interactive maps.** 3D printers can be used to design and build interactive maps. These can be of real-life modern cities, maps setting out what pupils think the city of the future will look like, historical locations (e.g. a Roman settlement), or even fictional places from books students are reading.
- **Create decorations.** Younger children can use 3D printing to create their own seasonal decorations.
- **Recreate real-life structures.** Create models of world-famous buildings such as the Empire State Building or the Taj Mahal. You can also recreate historical ruins such as the Colosseum in all its former glory.
- **Get musical.** Ask a class to design and create a new musical instrument.
- **Consider the tools for a job.** For example, you could ask pupils to print out what they think an astronaut needs in space.
- **Bring back the dinosaurs.** Use a 3D printer to create a sculpture of a T-Rex or other dinosaur.
- **Create a human skeleton and/or internal organs.** Create anatomical models to teach pupils about the human body.

Build maths experiments. Design larger experiences to facilitate mathematical thinking. [Here are some real-life examples of how 3D printing is being used in maths education](#)

Young Children and 3D Concepts

3Doodler. Child-Safe 3D Pen, ages 6-12– STEM Learning – plan, design, spatial and 3 dimensional understanding. -Offers a simple way to integrate 3D printing in schools.



Why Students Need to Learn 3D Printing

-students learn to think logically, creatively solve problems, work in a group.

-future technologies, 3D printing in industry; additive manufacturing

<https://www.3dnatives.com/en/3d-technologies/> (enabling businesses to cut costs, reduce time to market, produce stronger and lighter parts, solve challenges)

Jobs that are expected to be created or get a boost from 3D printing include:

<https://tryengineeringinstitute.ieee.org/why-students-need-to-learn-3d-printing-now/>

1. **3D Design:** 3D printing relies heavily on designers who can take a product idea and translate it into something that can feasibly be brought to life.
2. **3D Computer-aided Design (CAD) Modeling:** CAD experts have the skills and expertise to convert product designs into digital blueprints that 3D printers need.
3. **Research and Development (R&D):** Jobs will open up for forward-thinking R&D professionals who understand the intersection of tech and consumer products while keeping an eye on the bottom line.
4. **Biological and Scientific Modeling:** More engineers, designers and modelers with biomedical or scientific backgrounds will be needed to further innovate and produce highly advanced 3D-printed products.
5. **Architecture/Construction Modeling:** In the construction industry, 3D modelers may replace current 2D construction planning solutions.
6. **Education:** Schools are developing 3D printing programs at all grade levels, which will open up jobs for educators with a background in the 3D printing industry who can teach the technical and business aspects of this technology.
7. **Lawyers and Legal Professionals:** As a creative field, the 3D printing industry is wide open to legal issues, prompting a need for more lawyers and legal professionals who specialize in intellectual property (IP) rights.
8. **Business Opportunities:** As 3D printing technologies advance and become readily accessible for in-home use, new business opportunities will increase for those offering on-site and remote 3D printing services, new product and industrial designers, and computer-aided design specialists.
9. **Franchise Opportunities:** 3D-printing-as-a-service vendors can bring this technology to the masses by providing franchises to local businesses and entrepreneurs who'd like to provide personalized, in-person 3D printing services to local customers.
10. **Operations and Administrative Positions:** As the industry grows, new and established 3D printing companies will need people to keep the business running smoothly, including operations and administrative staff, analysts, finance and sales professionals, and retail employees.

-----References:

Why Use 3D Printers in the Classroom?

<https://resourced.prometheanworld.com/use-3d-printers-classroom/>

Get ideas from Instructables.com 101 Useful, Practical, Functional 3d Prints

<https://www.instructables.com/id/101-useful-practical-functional-3d-prints/>

Ways Teachers Can Use 3D Printing to Teach Math and Science

<https://www.weareteachers.com/3d-printing-math-science/>

A list of 12 design software programs for beginners:

<https://www.3dnatives.com/en/3d-software-beginners100420174/>