

The Basics of

3D Printing

LTC

What is 3D Printing?

3D printing is a manufacturing process where successive layers of material are laid down on top of each other in an additive process.

In this way, nearly anything, from simple objects and tools to whole houses and human organs, can be created with near-perfect precision.

Although 3D printing is often thought of as a new technology, it has actually been around for over 35 years. Patents related to 3D printing began expiring about 10 years ago and since then, 3D printing has opened up to everyone from hobbyists to industry professionals.

How does 3D Printing work?

Fused Deposition Modeling (FDM)



Design

Create a digital model using CAD software (such as Tinkercad) and save it as a .stl file or find a pre-made model file online.



Slice

Run your .stl file through slicing software (such as Prusaslicer). This converts your 3D model into layers that your printer can read and interpret (also called G-code).



Print

Using Wi-Fi, USB, or SD card, load your G-code into your 3D printer and begin the production process. Your printer will begin stacking filament layers until the full model is complete, which can take from minutes to hours.

Creating a 3D Printing Workspace

3D printers are versatile and can be used almost anywhere in the classroom. Consider these placement options, as each workspace can impact student access as well as the printer's performance.



Makerspace Setup:

Students work side-by-side with their printers and peers for enhanced collaborative learning.

General Printing Area:

Offers students a dedicated space to house communal printers in a classroom.

Instructor's Printer:

Students follow detailed instructions to prepare their model while an instructor carries out the process.

Curriculum Integration

MATHEMATICS



Geometric models and models of equations can be 3D printed to help students visualize and interact with math concepts.

GEOGRAPHY



2D topography maps and geographic features can be recreated using a 3D printer - such as 1:50,000 scale contour model of Mount Everest.

HISTORY



Help students understand what it was like to live in various eras by 3D printing replica artifacts and statues.

SCIENCE



Explore density, mass, gravity, and more by encouraging students to design objects like balloon-powered boats, rockets, and rubber band powered cars.

WOODWORKING



Combine traditional woodworking with 3D printing to create modern projects that take advantage of both material's unique properties.

ART



Practice form and scale by encouraging students to modify elements of a standard model and describe how their medium impacts how each model can be changed.

ENGINEERING



Prototyping is a huge part of any engineering process. With 3D printing, students can bring their ideas to life and create several iterations of their designs to achieve the best functional result.

FOOD TECHNOLOGY



Food molds and cookie cutters are a great way to engage student's culinary creativity. Food-specific printers have also started entering the market, making for a unique discussion point on the future of food production.

Classroom Tips

1

Let Students Handle the 3D Printers

There's no better way to learn than to get hands-on. Always make sure students have supervised access to the printers, allowing them to tinker and fix technical problems themselves.

2

Collaborate with Students

Don't be afraid to admit to your students that you don't know everything about 3D printing. Work together with them in solving problems and keep your lessons open-ended.

3

Be Flexible & Open to Change

As is always the case in the classroom, sometimes your best 3D printing plans will require changes on the fly. Keep a flexible mindset and always help students see unexpected outcomes as an opportunity to learn and grow more proficient.

Discover More **3D Printing** Resources

www.ltcillinois.org/resources/3dprinting

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