

Additive Manufacturing Resources for Educators

Computer Aided Design (CAD) Libraries:

Thingiverse

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

MyMiniFactory

<https://www.myminifactory.com/category/education>

These are two big libraries of CAD files that are all free, the benefit to these sites being their education sections. MyMiniFactory & Thingiverse have educational projects broken down by age group and subject, so if you're a history teacher, you can have your students print out the head of their favorite president, or if you're a shop teacher, students can print and assemble an engine to see how all the components work.

PinShape

<https://pinshape.com/>

Cults3D

<https://cults3d.com/>

These three are all huge libraries of CAD files, all free to download and print yourself. If you are looking for something specific you would like to print, these can be a great resource. If you need some inspiration to get you started 3D printing, or just to get the cobwebs out of that old MakerBot, they are great for that as well. While these do have education sections, you'll find Thingiverse & MyMiniFactory superior in that respect.

3D KitBash

<https://3dkitbash.com/>

Here we have yet another CAD library. The thing that sets this one apart from the others is being able to order the 3D printed components instead of printing them yourself. This is a great resource to incorporate additive manufacturing in your classroom if you don't have access to your own 3D printer.



3D Printing Services:

3D Hubs

<https://www.3dhubs.com/3d-printing/>

ShapeWays

<https://www.shapeways.com/>

These are cool sites for uploading CAD files and having them 3D printed for you. The advantage these have over 3D kit bash is that you don't need to choose from an online library to have your part 3D printed, you simply upload your file that you created, it instantly generates a quote, and if you're satisfied, you can order your part which will be delivered within a few days to a week.

Online CAD Resources:

Tinkercad

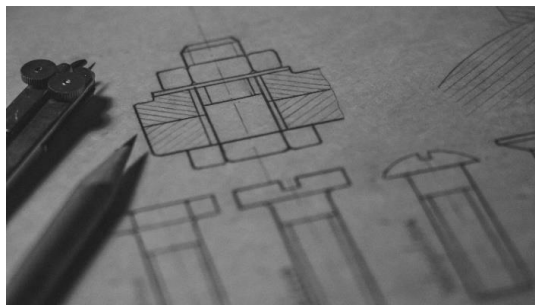
<https://tinkercad.com/> **Tutorials:** <https://www.tinkercad.com/learn>

Tinkercad is a great way to get students started using CAD for the first time. It has premade shapes that you drag and drop onto your work surface and manipulate from there. This intuitive platform helps students get their feet wet with 3D modeling, but it is surprisingly capable for making more complex designs as well. The best parts of Tinkercad are the tutorials that are available as soon as you log in, as well as the fact that it is totally free to use your existing google account and start creating parts. It's made by Autodesk, the same company that makes Inventor, Fusion360 and AutoCAD, so jumping to one of those software packages after mastering Tinkercad should be a breeze.

OnShape

<https://www.onshape.com/> **Tutorials:** <https://learn.onshape.com/>

OnShape has been described by many as "the google docs of CAD". This cloud-based design environment looks and handles very similarly to industry leaders like Solidworks, AutoCAD or NX, but it is entirely browser based. Being browser based, it allows for multiple users to collaborate on the same part at the same time on any computer, tablet or even smart phone. If students become proficient in OnShape, making the jump to any one of the other software packages should only take a day or two. OnShape for commercial use is substantially less expensive than any other software with similar capabilities, however education licenses are available free of charge, contain the exact same features and functionality as the paid version and can be obtained simply by providing a valid email address.



Slicers:

20 Excellent Slicers

<https://all3dp.com/1/best-3d-slicer-software-3d-printer/>

Slicers are what allow us to take a 3D model and actually have the 3D printer create it. Slicers take a 3D CAD model of an object and generate the code that instructs the 3D printer to create it. Most 3D printers come with a copy of a slicer you can put on your computer. That being said, not all slicers are created equal. This list includes the 20 best slicers of 2020, most of which are totally free. So, try some out and find one that yields good results! Cura, MakerBot Print and OctoPrint are all personal favorites (and they're all free!).

Troubleshooting:

3DBenchy

<http://www.3dbenchy.com/>

Prints not coming out the way you'd like? Have no idea what's going wrong with them? Look no further than these 3 parts! These three files can help you figure out the cause of any issues you may be having with your printer.

First, 3D Benchy is a cute little boat that you can print that looks unassuming but is an incredible test of your printer's capabilities. Simply download the file, print it according to the instructions on the site, and then measure the results. The issues that show up in the finished part can all be matched to different issues with your printer and the site walks you through the steps it takes to remedy them.



Bed Test Leveler

<https://www.thingiverse.com/thing:4110946>

Second is a simple file that helps in the print bed leveling process. Many times, it is apparent that the bed is not level, but it is not apparent where. This print will show you exactly which parts of the print bed are too high, and which are too low, letting you fix it accordingly.

All in One 3D Printer Test

<https://www.thingiverse.com/thing:2656594>

Finally, we have another great benchmark tool for your printer. Though not as cute as 3D Benchy, it is just as torturous and can highlight several issues that Benchy may not. Issues such as stringing, overhang performance and small hole definition can all be found using this part.

Further Resources:

MakerBot

<https://www.makerbot.com/education/>

Stratasys

<https://www.stratasys.com/education>

Ultimaker

<https://ultimaker.com/applications/education>

Looking for more? Chances are, your 3D printer manufacturer's website has educational resources for you to use! Most have articles, tutorials and online communities, all of which can be tremendous resources for utilizing these incredible pieces of technology effectively in the classroom.

All 3DP

<https://all3dp.com/>

All 3DP is a website entirely dedicated to 3D printing. There you can find buyers guides, reviews, tutorials and news articles all related to 3D printing. There are recommendations of all kinds, here you can find out which products, software and file libraries are right for you.

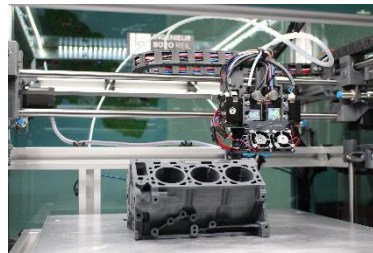
Maker Share

<https://makershare.com/>

Need inspiration for what to do with all that extra filament you have lying around? Maker Share, run by Make Magazine, showcases thousands of different projects, all made by individuals like yourself. With projects ranging from pure fun, to functional only, you can be sure to find an idea or two here.

Contact Us:

If you feel like you need further resources, or have a specific question you would like answered, feel free to reach out to the CCAT Education team at education@ccat.us. We also welcome any feedback or suggestions for additional resources to include on this list.



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