



# Using GrabCAD Shop to Streamline 3D Printing Learning in Schools

Matthew Brown is a S2TEM Instructor for Jefferson County Schools located in Golden, Colorado. Brown teaches engineering design at Warren Tech and Lakewood High School, where in 2007 they became the first school in the district to have a 3D printer

At that time they had one printer for six classes, which was easy to manage. Over the years, Jefferson County schools began to offer additive engineering classes to their other programs. As interest increased in these programs, so did printer usage.

Today, they have a number of printers, including Formlabs, The Mark Two, Makerbots, a uPrint SE Plus, an Objet 30 Pro, and a Stratasys F170 and F370.

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Brown quickly realized that he needed a management solution to not only help him organize requests, but also help track where the requests were coming from.

“GrabCAD Shop has been a godsend in terms of classroom and project management,” Brown explains. “It has made things so much easier to manage in the classroom, since we do a lot of 3D printing.”

Before GrabCAD Shop, the submission process involved a combination of tools including email, Google Docs, and flash drives.

“The pains were many,” Brown says. “Uploading files was just a pain. We had one flash drive that everyone would use but there were always issues. It wasn’t very efficient. It was really hard to keep everything straight, and parts would get misplaced or lost and they wouldn’t get printed.”

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Since Brown started using GrabCAD Shop, the workflow has been a lot smoother.

“When classes would do projects, it could take up to a month and a half for that project to be completed -- and that’s if things go smoothly. Now a class will send us a file, we manage the queue, print it out and get the part ready to send back to them in a week.”

Brown explains that many upper-level students manage the queue, which makes keeping track of print jobs even more important.

“We have 10-15 students managing the queue, and as long as they are keeping up with it, things don’t get printed by accident or twice. And they are really good at holding each other accountable.

One particular job request stands out to Brown:

“We did a project for the Drama club where we designed and built a full-scale Wurlitzer Jukebox Box on the Stratasys F370 printer and assembled that.”

## IMPROVED WORKFLOW ACROSS DISTRICT SCHOOLS

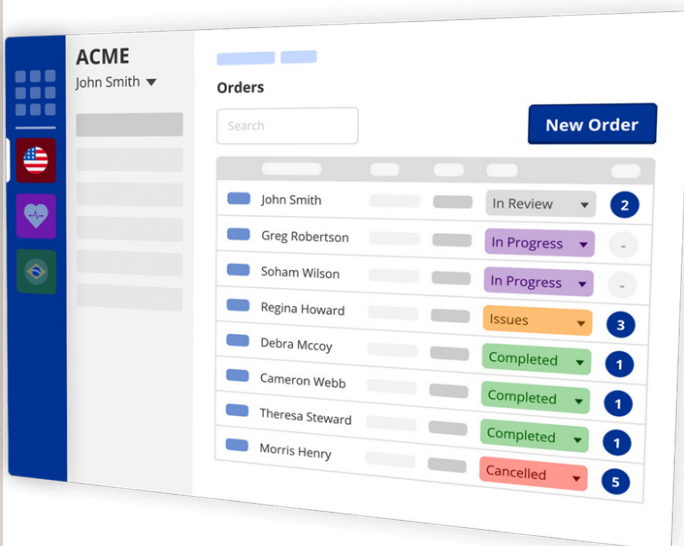
Before GrabCAD Shop, this type of request would have fallen into the queue in the order that it was submitted. But with GrabCAD Shop, Brown’s upper-level students were able to quickly identify the project’s due date -- which was a week away.

“They were able to say ‘OK this is a priority, we need the jukebox next week. We need to bump it up in the queue.’”

The students were also able to see the notes about how the part needed to be orientated, since GrabCAD Shop allows multiple file uploads.

“They were able to get all the information they needed for the job that was high priority and the material requirements,” Brown explains. “And for them to get it processed and out and done the day before the production was great. They were able to use it for the musical!”

“Having the ability to see the jobs coming in a specific order, and then having the classification on the side as you work through the process is great,” Brown continues. “It just streamlines the process of ‘I have something I need to print’ to the point of saying, ‘Wow, now it’s in my hands.’”



## TEACHING STUDENTS THE DESIGN PROCESS

Brown teaches a four-year program, and the first year is an introduction into the design process; how to turn ideas into products. Learning this process encourages students to design a product, test it, and redesign it to be better than before.

Students are then introduced to the tools and software they can expect to work with in the future, such as SOLIDWORKS.

According to Brown, teaching students the design process prepares them for what they can expect in a real business setting -- and GrabCAD Shop is an important part of that process.

"It helps students eliminate possibilities that wouldn't work earlier," Brown explains. "It's also helpful for the students who are learning and aren't as familiar with the printers."

In the past, if a student submitted a job that wasn't completely spec'd out, it was likely that it would get pushed back in the queue -- or lost completely. Now, students can work with the upper-level students who control the queue to get their projects complete.

"It was very user-friendly from the start," Brown says. "I just showed them how things were and they just ran with it."

## PREPARING STUDENTS FOR THE INDUSTRY

Brown's upper-level students who have been in the program for two years are the "lab operators," the personnel in charge of managing the request queue. This experience gives them the opportunity to understand what it's like to manage a real 3D printing lab.

"They see this as something that's valuable to them for their future," Brown explains. "Being able to take this experience when they start applying for jobs or even when they're looking at engineering schools, they can say things like 'I've managed a print lab, I can come in and manage your lab.'"

This experience not only makes students feel good, but prepares them for real-world settings when they need to be accountable for managing projects.

"It gives them that lab management mentality. Students have the opportunity to work in a setting that is as close to a business setting without actually being in a business," Brown says.

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# In Conclusion

Since using GrabCAD Shop, Brown has seen an improvement in the 3D printing workflow across the additive manufacturing program -- not to mention cost savings.

"It helps us print more efficiently, but in regards to saving money, it saves us because we don't have as much double printing because we can see when a job is done," he explains. "Everyone is seeing the same queue and the kids do a good job of managing it."

More importantly, GrabCAD Shop is proving to be an essential tool for students eager to make their way in the additive manufacturing industry.

"It allows you to monitor what's happening in your lab at all times, and gives the students the ability to learn," he adds. "And I think it's kind of creating a best practices mindset in their heads before they even get out of school."



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