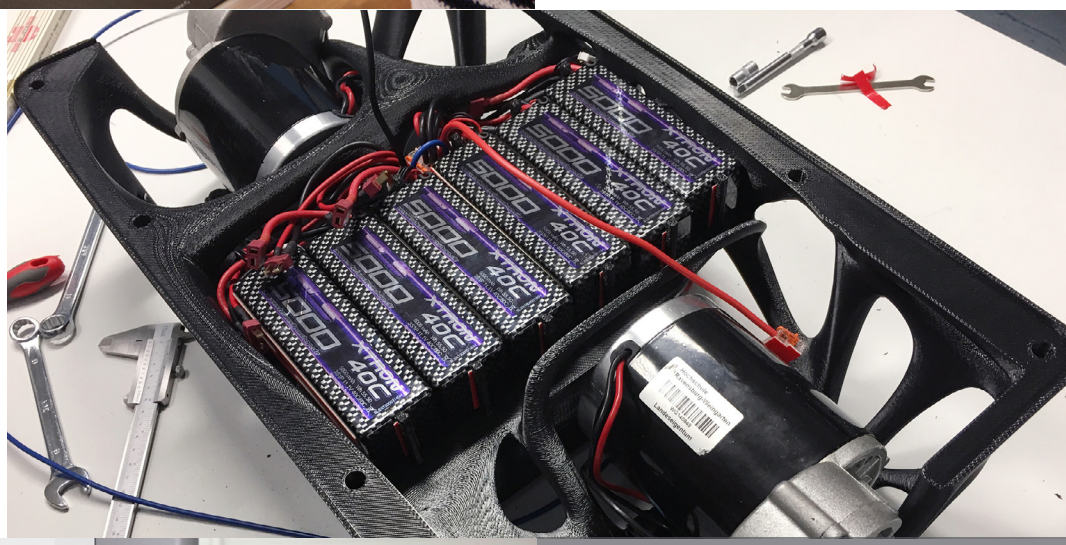
2018

Top Tactics to Secure Funding for your 3D Printer

Refining your mission, telling a good story that meshes with funding goals and reaching out to the community spell success when you're seeking grants to cover the costs.

stratasys



White Paper

Top Tactics to Secure Funding for your 3D Printer

Eighth graders get a demonstration of 3D printing.

Now is a prime time for educators to seriously consider 3D printing for their classrooms. On the device front, printer prices are coming down and the technology has advanced so far as to make the machines relatively easy for students to use. On the learning front, 3D printing segues seamlessly into the increased emphasis on STEM subjects. And in an era of growing parental impatience with new learning standards and assessments, there's something about the 3D design and production process that is captivating and engaging.

The biggest hurdle to procuring a 3D printer is always funding the equipment, materials and required professional development. A 2014 Onvia study found the average size of 3D printing contracts issued in K-12 was $38,981.

Those who have successfully integrated 3D printing and related activities into their districts have learned how to tap the power of grant funding to cover the expenses and extend their programs in new and innovative ways. This report will provide advice for making your own "grant grab" to bring the benefits of 3D printing to your students.

Hone Your Mission

As with any educational technology, a 3D printer serves as a means to an end. Defining your purpose for bringing 3D printing into your school is an essential first step for developing your grant applications. Evaluators who are selecting grant winners know precisely what their goals are in distributing funding. The closer your mission fits theirs, the greater your chance of success.

While you may want the 3D printers for a specific project, make your vision bigger and broader, advises Jesse Roitenberg, national education manager at 3D printing solutions company Stratasys. "It's a significant investment," he says. "You can't just buy what you need now. You have to think about what you're going to need down the road."

The worst thing you can do, he says, is to limit your thinking. He suggests starting the grant process with the intent of adopting 3D printing as a "cross-curricular" tool that reaches across classrooms, grades, even buildings. He suggests,= for example, "having [equipment] at the high school and giving a middle school access to it is key." Tying the printer to a STEM—science, technology, engineering and math—and STEAM (STEM with the addition of the arts) curriculum is also key.

In a 2013 State of the Union address, the White House proposed funding innovative high schools that would help students graduate with skills they needed to gain full employment in a high-tech economy. Later that same year, the U.S. Departments of Labor and Education teamed up to make $107 million available for "Youth Career Connect" grants. The funding came from fees paid by American companies to line up foreign worker visas.

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These grants were designed to help schools connect academics with career-focused learning. Funds were awarded to local education agencies, public or non-profit workforce agencies and non-profits with education reform experience. The key to winning a grant was proof of a "strong public/private partnership" that incorporated four entities—a school system, a college or university, a local workforce investment system and an employer. The grant recipient also needed to provide a hefty partial match of funding. Independent School District 196 in Rosemount, MN, won a four-year $2.99 million award in that competition for E3 STEM, a program that blends "exploration, education and employment."

How did the district's goals mesh with those of the funding agency? The goal of E3 STEM, as promised in the grant proposal, was to provide "1,000 participants in grades 11-14 with exposure to and education and credentialing in the high-growth H-1B STEM industry." In other words, local companies hiring people from outside the country to fill high-demand jobs could instead turn to trained candidates within the country. That mission resonated with the Department of Labor.

Tell A Good Story

A big part of obtaining funding is telling a cohesive story. The federal grant application put together by Minnesota's District 196 consortium specifically tied the state's demand for H-1B Visa STEM workers—foreign workers—to the skills and credentials it would develop through its Apple Valley High E3 STEM program. The intent was to produce a local workforce capable of doing the same jobs. The application clearly laid out the entire pathway students would follow from grade 11 through grade 14 (via post-secondary credits earned during high school), including the role played by new technologies such as those in the school's Fab Lab.

Target Optimal Grant Sources

There's an abundance of grant sources. Refining your mission will also help you sift through funding opportunities to identify the ones that are the best fit for your program. Where do you go from there? Depending on the scale you hope to achieve, the spectrum runs from the federal level to the most local of grant programs.

The Office of Career, Technical and Adult Education within the U.S. Department of Education funds multiple programs, including high school education. Their emphasis is on helping young people prepare for college and careers, particularly through STEM programs.

The National Science Foundation is also a ready source for grant funding. You can sign up to receive e-mails about "active funding opportunities" from NSF to be notified when a new award is launched, such as the recent STEM+Computing Partnerships program. Federal agencies frequently work through state and non-government organizations to handle the heavy lifting of specific programs. For example, the STELAR Center is funded by the National Science Foundation, but run by two other entities. They issue grants for STEM workforce endeavors. Professional associations can also be a source for both grants and grant opportunities relevant to their members. For example, the National Science Teachers Association maintains a database of grant opportunities from multiple sources.

Name a major company and you can bet it has a charitable arm to benefit the communities in which it operates. The Motorola Solutions Foundation, for example, issues "Innovation

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District 196 education leaders and Minnesota legislators learn about the fabrication lab at Apple Valley High.

Generation" grants of between $10,000 and $50,000 for programs that increase students' STEM skills and get them interested in STEM careers. You'll find similar programs at Chevron, American Honda, Samsung and Verizon, among others.

Online funding sites, such as AdoptAClassroom, Classwish, Digital Wish and DonorsChoose, help facilitate classroom fundraising by letting teachers describe their specific needs and the amount they're trying to raise. Then they help facilitate individual donations. Finally, many counties or districts have foundations that focus on projects being undertaken by their own teachers. These types of grants may run from a few hundred to several hundred thousand dollars.

Team Up With Higher Education

It can be a big help to ride along with a college. Colleges and universities often receive relevant grants for which they need to team up with local education agencies, such as districts or schools, as part of their outreach mission. For example, GoSTEM is a collaboration of Georgia Tech and Gwinnett County Public Schools to strengthen the educational experiences of Latino students within the state. Its aim is to push them toward STEM fields through mentoring, workshops and other activities. As part of GoSTEM, the program has distributed 3D printers and related curriculum to middle and high schools to help students become fluent in engineering lingo. Funding for GoSTEM comes from several departments at Georgia Tech and a $5 million grant from Atlanta-based Goizueta Foundation.

Cultivate an Advisory Board

When it launched E3 STEM, District 196 recruited James Lynch to come on board as program manager. Lynch had started out as a science teacher, then moved into a technology training position and eventually took on coaching for the FIRST Robotics teams. He was a prime candidate for the position, he says, because he had "gained quite a bit of experience interacting with businesses and garnering support." That experience came from his work with FIRST, which has corporate support requirements. That would turn out to be an important part of his work.

To develop the framework for E3, the school system had an advisory board made up of members from six companies with local operations, including Delta Air Lines, Lockheed Martin and Thomson Reuters. Lynch inherited that advisory board and set about cultivating those relationships along with the job of setting up a fabrication lab within one of the district's high schools.

The Apple Valley Fab Lab opened in November 2015 and now runs two laser engravers, a card printer, two CNC mini milling machines, and a machine for molding styrene plastic sheets. Perhaps the most compelling feature is the Fab Lab's "3D printing wall." This features eight MakerBot Replicators and one Stratasys Fortus 250mc. (MakerBot is also owned by Stratasys.) A glass wall separates the maker equipment

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from a collaborative design space with modular tables and an ample supply of wall monitors for teacher and students to share their computing device screens.

Lynch estimates the redesign and remodel of the space was about $90,000 and the equipment in the Fab Lab was another $90,000. The district is on the line to produce $2.3 million in "matching grants" as a stipulation of its federal grant for the purpose of program sustainability, so a big part of Lynch's job is to build relationships with company partners. He explains the match isn't necessarily monetary. It could be based on in-kind value, whether equipment or material donations or volunteer staff time.

For example, District 196 struck a partnership with Stratasys. In return for Stratasys donating machines and materials for the Fab Lab's 3D printing wall, as well as 3D printers for STEM elementary and middle schools in the district, the school system would work with the company to develop K-12 curriculum that could be shared elsewhere. It would also make teachers available to represent the company at education events locally and nationally to provide the "teacher perspective." Now Lynch hopes to parlay that donation into an annual giving event to cover the cost of 3D production materials.

Why are companies interested in working with schools? It can be great publicity. Whenever the district speaks about E3 STEM to local business groups, such as the chamber of commerce or the Rotary Club, it makes a point of publicly thanking its sponsors. Banners also show up on Web sites for the various company donors.

There's a "keep-up-with-the-Joneses mentality out there. 'If they're doing it, we should be doing it,'" says Lynch. "That's beneficial for the grant programming. I've also found that it's easier to ask for funding from companies if there are already companies on board doing it."

Growing local companies also see the E3 STEM program as a hiring pipeline for skilled candidates. That's how the district wooed sponsor Uponor, which makes plumbing and related systems.

"They need to make young people aware those jobs exist and that they're really quite well paying," says Lynch. "Not a lot of young people go into manufacturing if they have a vision of it being dirty. So they've got a vested interest in working with us, and they've been great partners."

Get The Ball Rolling

Contacts beget other contacts. Although attracting your first big sponsor may be a challenge, Lynch reports it gets easier after that. The Stratasys relationship at District 196 led to a partnership with UTC Aerospace Systems. Because UTC was a sponsor, a parent volunteer convinced his employer, General Dynamics Mission Systems, to ante up as well. So they also wrote a sponsor check.

Track Evidence of Outcomes

It's not easy to highlight an entirely new educational technology and state incontrovertibly that it alone can lead to better student learning. Some school districts introduced 3D printing along with other activities, such as new types of professional development for teachers and new pedagogies, such as project-based learning or career-path training. Accepting a grant also means accepting responsibility for reporting on program success and learnings.

Even when you can't immediately point to higher assessment scores or graduation rates, there are other ways to prove the value of the grant

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investment. District 196 keeps a count of how many students the program has touched in some way. It tracks the number of students vying to get into its E3 STEM program and those who attend events where it plays a role. The district also maintains a running tally of student activities. These are documented through photographs posted on its Facebook and Twitter accounts and Web site.

There's also the invaluable goodwill the district generates within its own community. The Hour of Code event, an international endeavor to introduce coding to K-12 for at least an hour in schools every December, brought about 30 volunteers into District 196's schools. "They interact with our kids. They find out how fun that is. And they get the teaching bug because they've influenced young people," says Lynch. "I think that's pretty powerful."

Another event brought high school girls together for a hands-on STEM-related breakfast, sponsored by a district corporate partner. The volunteers served as panelists and acted as "table hosts" to run hands-on activities, all designed to get conversations going about what STEM careers are like. "When you have adult professionals interacting with kids; that sells the adults."

The best outcomes ultimately can't be quantified because they take a different form. "Teaching kids to create, helping them understand that everything they do in school and in life is not going to be dictated by lines that teachers create, is a critical 'A ha' moment that will inspire literally millions of students," says Dave Benoit, director of business development for global education at Stratasys.

Grants may help you put 3D printers into the classroom, Benoit says. After that, you need to see them not just "as a tool to address a specific set of science and math skills, but rather as a way to introduce a new approach to learning that puts the student in the driver's seat to build their own understanding." And that can help keep the grant funding flowing.

Get Students Involved

Involve the students. With his background in FIRST Robotics, Lynch knew the students would be invaluable spokespeople to communicate the value of the programs they were attending. When he arrived at Apple Valley High, he helped get a new robotics team started that just happened to be all girls—the team name was The Iron Maidens. "They have been an unbelievable engine for promoting STEM out there in our community," he says. "They've done massive amounts of outreach to students in elementary and middle schools. They've testified in our state senate and house of representatives on STEM bills." While the girls were freshmen when they started, they're now sophomores and most have joined the grant-funded program. Not only are they attracting more business to sponsor their robotics efforts, but they've helped start two more teams, which are now doing outreach as well.

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About Stratasys

Every day, our customers find simpler, smarter approaches to stubborn design problems — and greater confidence to confront towering human and technological challenges. By providing the shortest possible path from idea to solid object, Stratasys empowers them to untangle complexity, tackle tough problems, uncover new solutions — and to do it all with the urgency our accelerating world demands.

We've been at the forefront of 3D printing innovation for more than 25 years. We are fueling the next generation of innovation through our work in aerospace, automotive and education. We're trusted worldwide by leading manufacturers and groundbreaking designers, makers, thinkers and doers.

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