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Launching a 3D Printing Program for Students: Recommendations and Best Practices for Libraries

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FEATURED ARTICLE

Launching a 3D Printing Program for Students: Recommendations and Best Practices for Libraries

By Wilhelmina Randtke and Lee Bareford

In July 2022, the Georgia Southern University Libraries formally launched a 3D printing service for use by the student body. Georgia Southern has three campuses: Savannah, Statesboro, and Hinesville. Prior to the launch of the University Libraries' program, 3D printing services were available to students through various departments and through a FabLab operated by Georgia Southern's Business Innovation Group. However, existing programs required either a monthly fee or limited use to specific majors. The University Libraries' 3D printing initiative is unique because all students can participate regardless of their major. This allows students in any field, including the arts and humanities, or those who are simply curious about 3D printing, to access 3D printing services with few entry barriers and to connect with University Libraries employees who have 3D printing skills and experience.

3D printing area at the Learning Commons on Georgia Southern's Armstrong Campus

How the 3D Printing Program Works

3D printing through the University Libraries is only available at the Statesboro and Armstrong campuses. 3D printing is not currently available at the Hinesville campus due to the lack of appropriate space and staffing.

To request 3D printing, students fill out a LibWizard request form which is available on our 3D Printing LibGuide. The LibGuide provides information about how to find 3D models, 3D modeling software, and 3D printing policies. Students choose the campus where they would like their model printed when filling out the request form. Once the form has been

3D printers at Henderson Library in Statesboro are located at a highly visible library technology service desk

completed, students are asked to save their 3D print file to a USB drive and bring it to their chosen location.

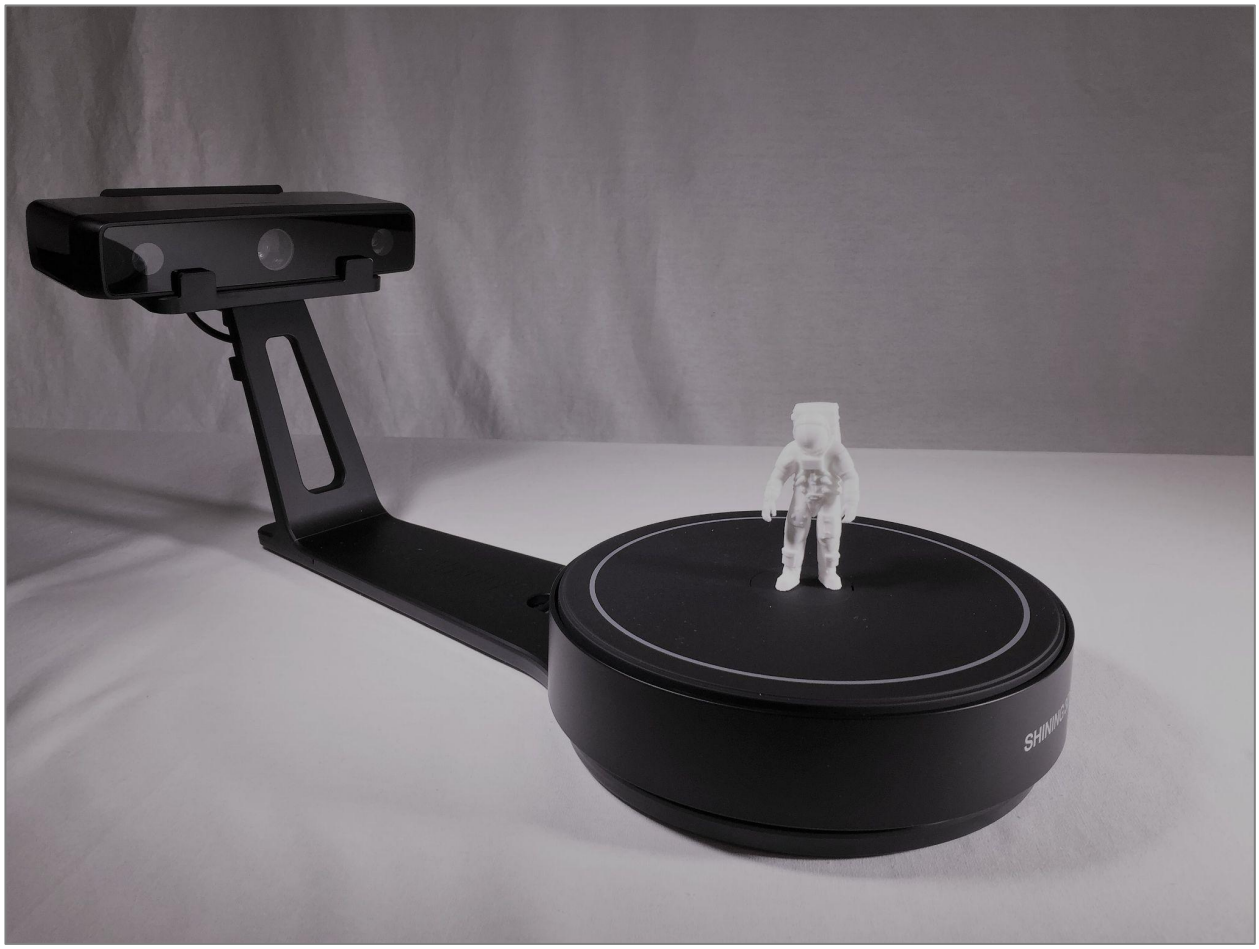
The University Libraries do not charge for 3D printing. Most 3D printing programs—including other 3D printing services located in Statesboro, Savannah, and at other academic libraries—fund 3D printing through a chargeback process. Due to administrative overhead, implementing a chargeback process was not feasible. Instead, the University Libraries connected with Virginia Tech Libraries, which also provide cost-free 3D printing to students. We modeled our policies after Virginia Tech's, including language prioritizing coursework and class projects over personal projects. As our program increases in popularity, we anticipate that we may have to restrict personal nonacademic 3D print requests in order to have the capacity to continue to print designs related to academic projects.

Unique Opportunities for Libraries in 3D Printing

3D printing is no longer new to universities or libraries, with many programs over 10 years old (Colegrove, 2014). However, new 3D printing programs can still bring value and reach new audiences. While building our program, we made several discoveries worth sharing.

First, 3D printing programs have hidden costs. Our prelaunch research found that many established programs had to retrofit costly ventilation into their 3D printing facilities to control potentially harmful fumes produced as filament melts and to meet environmental health and safety guidelines. As a result, the University Libraries worked to establish policies which allow safe printing in existing facilities. For example, only allowing the use of polylactic acid (PLA) filament resulted in a huge safety increase at a low cost, due to the affordability of the filament and the fact that laboratory tests have demonstrated that PLA emits a level of volatile organic compounds and ultrafine particles that is well within the parameters of industry safety standards. Before launching our program, we also had Georgia Southern's department of environmental health and safety measure the air changes per hour our HVAC systems produce in the locations we planned to house the printers to ensure that any filament emissions were regularly and reliably cycled out of occupied areas (Randtke et al., 2022). By researching and applying concrete limitations that allowed low-cost 3D printing to flourish, the University Libraries helped to make launching a 3D printing program a more realistic effort, particularly for libraries with limited resources.

Second, some 3D printing services may be unique to your location. In our case, not charging



The EinScan-SE 3D Scanner, currently only available at the Henderson Library in Statesboro

for our services was unique in the geographical area and campuses. Georgia Southern has at least three other 3D printing labs that have restrictions or fees: the FabLab, which requires a monthly membership fee and charges per ounce for materials; a facility at the Paulson College of Engineering limited to specific majors (Johnson, 2020); and another at the College of Education's Innovation Studio limited to that program's students. The Statesboro Regional Public Libraries also charge for 3D printing, and it appears that the Live Oak Libraries in Savannah ceased advertising free of charge 3D printing programs by 2020. The University Libraries, however, offer all students a 3D printing service with a low entry barrier and no fees.

The University Libraries are also unique in offering 3D scanning services. 3D scanning services are currently offered only at the Statesboro campus so costs can be assessed and interest gauged before offering it in Savannah. Our first 3D scanning patrons were engineering majors who made 3D scans at Henderson Library and brought them back to the college of engineering for printing. At this time, we believe that the University Libraries offer the only 3D scanning services on campus. We hope to explore possibilities for acquiring other 3D scanning systems and additional printers for the Statesboro and Savannah campuses in the near future.

Costs of the 3D Printing Program

3D printers and supplies are relatively low-cost. The Georgia Southern University Libraries own and operate Creality Ender 3 Pro 3D printers, which were purchased for about $250 each. We have three of them: two on the

3D printed objects ranging from decorative objects to science models to useful tools

Statesboro campus and one on the Armstrong campus. During fiscal year 2022, the University Libraries spent approximately $700 on parts and PLA filament. Our Einscan SE 3D scanner cost us about $1,000. These expenditures occurred before we officially launched our 3D printing program, when both locations were printing regularly to increase our familiarity with the printers and gain enough skill to launch the program smoothly. We anticipate that printing continuously at both locations would cost less than $2,000 annually for parts and filament.

The University Libraries' highest expense is payroll for the time our employees spend using, troubleshooting, and training others how to operate the 3D printers. Across both locations, nine full-time employees and up to 14 part-time work study students are trained to operate the 3D printers. However, the 3D printing process can get finicky. We have found that full-time employees need to learn the 3D printing process thoroughly, including calibrating equipment and working with various filaments, to effectively manage the process. Students are generally able to run the basic printing process, but need help troubleshooting misprints, fixing mechanical issues, replacing parts, and changing filament. Costs of a 3D printing program are best calculated by reaching out to existing programs to find out how much they spend on equipment, materials, and payroll.

Conclusion

Libraries interested in launching 3D printing as a service will need to consider multiple factors before committing to a program. They must consider: the safety of the materials used for 3D printing; if the ventilation is adequate at the printer's prospective location; whether the costs of printer operation, maintenance and materials are sustainable; if patrons will be charged for 3D printing and at what rate; and how to mitigate a potentially high volume of requests. Based on the experiences at the Georgia Southern University Libraries, it is possible to offer a low-cost or free-to-user 3D printing service to significantly reduce access barriers experienced by patrons. Conducting research into what types of 3D printing services are offered within the surrounding area may help libraries decide if a 3D printing service would fulfill a need or meet the interests of the community. As an educational hobby or a potential entry point to an education and future career in industrial fabrication, offering 3D printing as a service is still an appealing area for libraries of all types to explore.

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