Librarians as leaders: Expanding 3D printing into the agricultural classroom

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Introduction
The George A. Smathers Libraries implemented 3D printing in 2013 and now produces over 1,000 models per year. UF agricultural science student usage is underrepresented compared to students of other colleges (Fig 1). Meanwhile, 3D printing technology is rapidly expanding in agricultural industries.

In order to provide experiential learning experiences and better prepare students for careers in agriculture, librarians at Marston Science Library promoted 3D services to the College of Agriculture & Life Sciences (CALS).

Outreach to expand 3D printing usage occurred in two ways:
1) Transport portable 3D printers to CALS events for decreased barriers to technology
2) Work with individual faculty to integrate 3D printing into agricultural science education

Results
3D printing in agricultural classes can be used to make the microscopic visible, engineer and build prototype parts or products, substitute for live samples, produce affordable replicas of rare fossils, create instructional manipulatives, and serve as an interdisciplinary bridge between arts, sciences and engineering (samples below).

Conclusion
With 3D services, librarians at land grant institutions can enhance the technological skills of the next generation of agriculturalists through experiential learning.

Portable 3D Printers
MakerBot Replicator 2 is our most reliable printer
Portable PrintrBot Simple Metal is great for outreach

3D Printing Service Steps
- Patrons bring or email .stl or .obj files to the library
- Staff slice and review printing options
- Payment is accepted (credit card or P.O.)
- Print job is added to queue, average printing time 3-5 hrs
- Staff emails patron when job is completed; patron picks up model from Circulation Desk

3D Printing Facility

Costs:
- Equipment funded by Student Technology Fee Grant
- 3D Printers price range $400-$4,500
- Job fees: $0.15 / gm with $3 min
- A start-up 3D lab can be developed for $1,500

Space:
- Two study rooms transformed into 3D Printing & Scanning Labs
- Highly visible, secure, & ventilated
- 3D Service Desk incorporated into Reference Desk

Personnel:
- Training for service & maintenance
- Staff 3D Service Desk 9am – 4 pm

Next Steps
- Continue outreach of 3D services to CALS
- Use CT scanner to create new models for instruction
- Assess impact of outreach efforts

What can 3D printing in agriculture education be used for?

Make the microscopic visible:
Pollen grains of sunflower, spruce, cattail and evening primrose from University of Illinois Pollen Power Camp.
Prototype parts: Drone body and supports designed and printed on 3D printer
Affordable replicas of rare equine teeth fossils
Create manipulatives for nutrition education. Modelling by A. Marcelles.
Models build a bridge between art and science. UF Insect Art Trail. Art model design P. Nichols for Moreau Lab.

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