

Abstract

With the increased availability of three-dimensional (3D) printing technologies on the consumer market, educational settings have begun to explore their use within the traditional curriculum.

As part of a longitudinal study, our research team is conducting weekly 3D modeling and printing workshops at a Baltimore school. The workshops are part of an after-school education program designed to support at most 20 students in third and fourth grade who may be at-risk.

Since the school is located in an underserved area, we are able to observe the reactions and perceptions of 3D printing among students who may not be regularly exposed to the latest technologies.

By observing and recording the students' reactions, collaborations, and frustrations while learning 3D modeling and printing in this setting, we are able to observe benefits and repercussions of 3D modeling and printing in an educational setting.

Methods

- ≡ Taught about 20 third and fourth grade students how to use 3D modeling software.

- ≡ Worked with students to participate in a design and fabrication competition conducted by a Baltimore City organization to solve a problem in the City using their 3D printed design.
- ≡ Conducted weekly progress blog for students to write their reflections on the process of designing and fabricating a solution to a problem in Baltimore City.

Results

The students we taught also had pre-conceived ideas of a 3D printer and what it could be used for in their classroom

- ≡ Some wanted to solve problems using 3D modeling and printing such as producing a cellular phone case to replace a broken case for someone in their lives or for themselves (Fig. 1)
- ≡ Other students preferred to produce new supplies to efficiently store their classroom materials (Fig. 2)

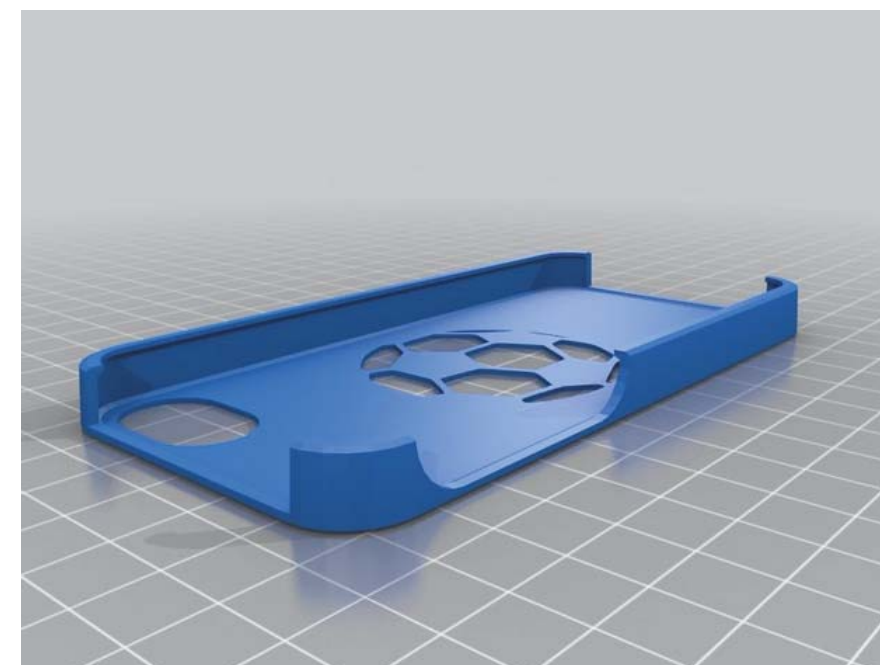


Figure 1: iPhone case model from Thingiverse.com

Our research team was also faced with the limitation of time, after-school restlessness, and inconsistent attendance, which leads us to exploring the possibilities for future work.

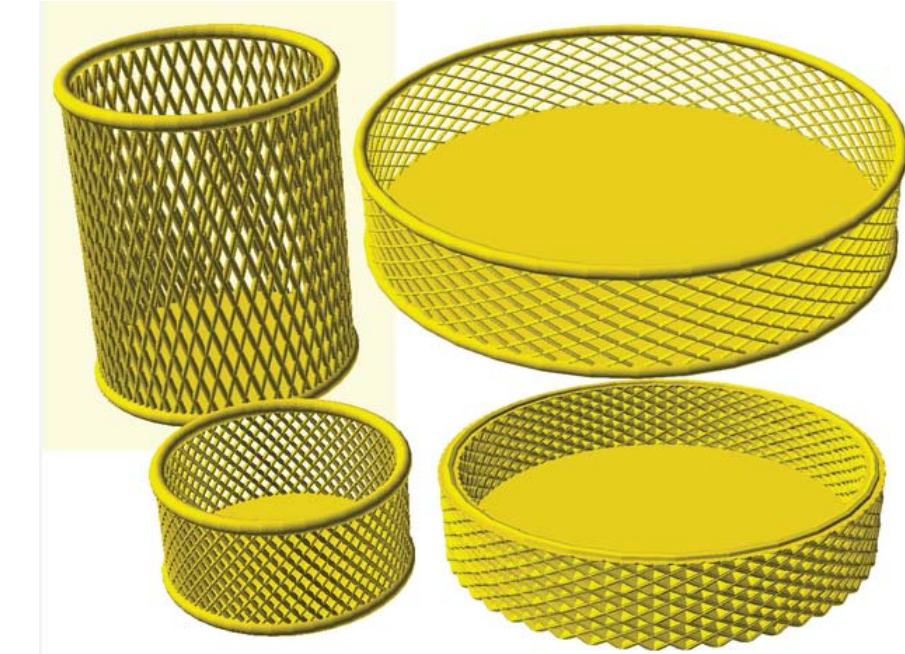


Figure 2: Stationary storage model from Thingiverse.com

Future Work

- ≡ We foresee that the findings of this research may help to inform the design of future curriculum, and 3D modeling and printing software tools.
- ≡ We hope to compare students' understanding of 3D modeling and printing technology before and after our year-long workshop and empower them to continue solving problems and utilizing 3D printing to enhance their classroom experience.

Acknowledgements

This work is supported, in part, by the National Science Foundation under Grant No. IIS- 1451661.