# TECH Trends: 3D Printing

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## Introduction

3D printing is a fun way to create objects using special CAD software. This type of printing activity can now be brought into the elementary classroom using personal 3D printers. In this document, I will explain the history of 3D printing, how it can be used in the classroom, as well as a basic proposal for implementation.

A keynote presentation accompanies this document as a visual stimulus to spark imagination and curiosity to the amazing transformation and capabilities of 3D printing.

## History of 3D printing

3D printing has revolutionized many industries since the first appearance was made in 1984. 3D printing was developed after the first functioning ink jet printer in the 1970's. Scaled models of engineered designs were the original motivation for the development of the printers. Like computers at this time, 3D printers were very large and only used in commercial settings. As technology has advanced and demand has grown, 3D printers have become smaller and more affordable. 3D printing has filled needs across the industry.

As the industry has changed; metals, plastics, and woods can now be printed. 3D printing is used in the world of engineered automotive parts, in the medical field to create artificial organs, and in the food industry to create molds for decorating. The use of the printer has become increasingly diverse and will continue to grow.

In my opinion, the most influential industry that is currently using 3D printers is the classroom.

**3D printing in the classroom**

The classroom is where imagination and knowledge begin. Whether it is in the elementary classroom or the college classroom, innovation and an inspiring teacher can spark ideas of the future.

Students benefit from the hands on approach that the printer provides. The printer takes each lesson one step further by allowing students to create what they are learning. The creation of an object requires a higher level of understanding and thinking. The creation of the object also involves cross content learning.

Many models of the 3D printer have a scanner to get the measurements of the object you intend to duplicate. Otherwise, students can create their own objects. Students use CAD design software and computers skills to create the object. Content knowledge of the object can include the knowledge of mathematical equations, history of the object, and much more. (Please refer to the Keynote presentation for examples of how the 3D printers can be used in each subject area.)

**Affordable 3D printing for the classroom**

The 3D printer has a wide range of cost based on our needs and what type of printer we desire. First, consider what type of printer is best for our school. Many schools in higher education may consider commercial printers for their capacity to make diverse objects in size and material. Personal printers may also be purchased at a lower price and fit the needs of our school.

For our school system, I propose individual printers to be used in the third and fourth grade classrooms. Students at this age can learn the basic CAD design skills to create smaller objects for a specific purpose. The exposure to the printer will spark imagination and interest into a possible future that at this age, students would not be typically exposed.

I propose a trial period of one year before purchasing printers for the entire district. The trial period would serve as a time to access the educational value of the printers to the students as well as give further research based reason to support the decision to continue the implementation of 3D printers. Teachers included in the trial will carry out the documentation of this research with the support of the district Educational Technology Specialist. The trial would include an initial purchase of ten printers in total to include the trial cost of software, printer materials, and the printers themselves. After researching, I have come up with the following cost information. See the chart below and follow each link for further cost information.

Estimated cost of total 3D printer experience.

| CAD Software | Cost | 3D printers | Cost | Materials | Cost |
|---|---|---|---|---|---|
| ThinkerCAD | $19/mo start | Cube | $1600/ea | Color cartridge | $50/ea |
| SketchUp Pro | $590 total | MakerBot | $2900/ea | Color cartridge | $50/ea |

We would first begin by writing a proposal for a grant to fund our trial project to entirety. If the funding from the grant were to fall short or be denied. We will reevaluate how many printers are needed to complete a successful trial period. We will then continue our funding with fundraisers and donations to support the cost of this project.

**Conclusion**

3D printers have been active in many industries for a number of years and are making their way into the classroom setting. 3D printers will allow elementary students to have exposure to tasks that they would normally not see at such a young age. The CAD design programs will be a fun challenge for students as well as take each lesson one step further. The printers are affordable with the aid of grants, fundraisers, or donations. The proposal is for a small number of printers and a trial period to test the overall influence of the 3D printing experience.

AECT Standards: 3.1 Media Utilization; 3.2 Diffusion of Innovations.

Reference

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