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This week I will be focusing my research on 3D printing pens to see if they will be a better learning tool for children compared to a 3D printer.

Price

The price for different 3D pens on the market is far less than cheapest 3D printer which would be great for children, and those working with them. The 3D pen would help them learn in a similar manner as a 3D printer, but would not be too expensive for them to be accessible. Overall the price of these pens is reasonable for what they can do, and how they can be used to teach children.

3Doodler

The 3Doodler costs 99 dollars and uses ABS and PLA plastic filaments. It has 2 speeds and comes with interchangeable tips and a stand.

3D Air Pen

The 3D Air Pen costs 70 dollars, uses ABS plastic filaments and has only one speed.

3D Simo(only available in Europe, Japan and South Korea)

The 3D Simo costs 100 dollars and can use ABS, PLA, WOOD, HIPS, LAYbrick, Bendlay, and Flexi type filaments. The speed and temperature can both be digitally adjusted on the pen.

3D Printer Pen (only available in the Netherlands)

The 3D Printer Pen costs 88 dollars and can use ABS, PLA and HIPS filaments, it has two speeds and the temperature is digitally adjustable.

Yaya 3D pen

The Yaya 3D pen costs 120 dollars, uses ABS filaments and has two speeds.

CreoPop

The CreoPop costs 119 dollars and it uses light-sensitive photopolymers instead of plastic. It has one speed and has no temperature settings as there are no heating elements. The polymers are set with UV light instead of heat. It comes with a rechargeable battery and a USB charger.

Lix 3D Pen

The Lix 3D pen costs 140 dollars and uses ABS and PLA filaments.

Educational Price

The 3Doodler has an education bundle where you can get enough 3Doodlers, plastic and accessories to outfit an entire classroom for a thousand dollars. The other pens did not state whether they had these deals or not but I sent an email to CreoPop asking if they had any discounts for teaching applications but have not gotten a reply by the time of deadline. Due to the nature of most of these pens being kickstarter based, it would be strange for them to offer these deals.

Safety

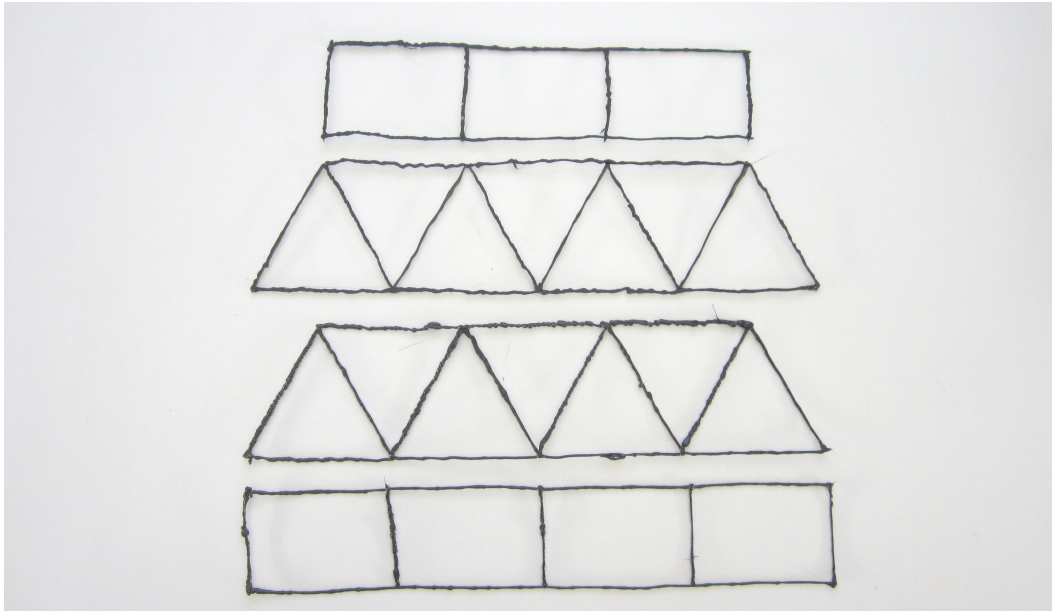
Some would say that the melting of plastic and the hot extruder tip of the pen would be harmful to children, but the harm to them would be comparable to that of a glue gun. There is a chance they could hurt themselves on it, but the amount of damage that would occur would not be as bad as the damage an actual 3D printer could cause. Since a 3D printer has moving parts along with a hot extruder tip the chance of a child hurting themselves on a 3D printer is way greater then them hurting themselve on a 3D pen. If safety is the main concern when considering this product to help children learn, then you could get the CreoPop pen. CreoPop does not actually have any heated parts and thus would pose the same danger to a child as a normal pen. Overall these products are extremely safe. If you do burn yourself, it's just a pen and you can drop it. Even if dropping it damages the pen, they are not that expensive to replace.

Usability

These pens are extremely easy to use as you can use it just like a normal pen. You can print out a two-dimensional picture and then trace over that picture with the 3D pen, allowing you to create a 3D representation of that picture. These pens can be used on normal paper which is convenient as it means you do not have to buy special paper. You can also make templates such that the child can trace over the simple separate parts of the template to make 2D parts, these can then be put together using the 3D pen to weld the parts together to make a 3D object. The biggest reason for why the pens would be easier for children is because they would not have to use the complicated modeling software that is associated with normal 3D printing. This lack of software is especially great for children as they do not have to spend the time learning a complicated software suite. They can just go straight to making the object, and learning from the experience. Overall 3D pens are extremely easy to use which is nice for kids. Children don't really have to learn how to use the pen, they can just start using it to create whatever they want.

Templates

For the templates you could create, you could start off by making simple 2D shapes such as squares and triangles. Give these to children to figure out how they can go together to make more complex shapes. After this you could create a template for certain sides of a 3D shape and have the children trace over these templates to make the different sides. Once the sides are made you could then have them figure out how to assemble the sides into a 3D shape. The pictures below show this concept in action and shows how a 3D pen would be an extremely useful tool for teaching children about complex shapes and geometry.



Durability

These pens are very durable due to their compact nature and lack of moving parts. These pens can tolerate a lot of abuse. Compared to 3D printers that have a wide array of moving parts and things that could break down, a 3D pen would be a lot more durable especially in the hands of children. This durability is extremely nice for children as they have the freedom to create what they want in 3D, but don't have to worry about the possibility breaking the product. Since 3D pens are used exactly the same way as a normal pen there is less chance of it breaking as all children know how to use a pen. They would be less inclined to figure out how it works by taking it apart, like they might do with a 3D printer.

Appeal to Children

These products would be very appealing to children compared to 3D printers as they don't have to use software and they can freely make anything that comes to their mind. They can also make their creations extremely colourful as they can start with one color and then switch to another for different parts before assembling the final piece. This gives the child more freedom to express themselves in their creation and learn how to be more creative. Since you can add more things onto an already existing project -- unlike normal 3D printers -- with a 3D pen this allows children to decorate their work, and truly make it their own. This post production method is great for children that want to make their work more real and life like, especially if they are making models of different animals. These pens are also very small which would allow the child to bring it with them wherever they go so that they can make objects whenever they feel like it. The CreoPop 3D pen in particular has a very wide assortment of different inks that would be awesome for children, these inks include elastic, magnetic, glow-in-the-dark, aromatic and body paint. There is also ink that changes color based on temperature and ink that conducts electricity.

Bibliography

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