

Explore – Impact of Computing Innovations

Written Response Submission Template

Please see [Assessment Overview and Performance Task Directions for Student](#) for the task directions and recommended word counts.

Computational Artifact

2a)

My computing innovation is a 3D Printer. 3D printing allows its users to create their desired object by using their choice of material in a quick and efficient way. With 3D Printing, new toys, custom shoes, musical instruments, parts to an airplane and so much more can be printed to benefit people and the society. (1) This is done by creating a computer aided design that instructs the printer to layer materials to produce a finished product. (4) In my artifact, I provide diagrams that clearly outline these steps involved in this process. 3D printing is safe, easy and reliable.

2b)

My first step in creating my computing artifact was to open google slides and create a one slide presentation. I then changed the background colour to gradient blue and purple because those are my two favourite colours. I then gathered images from google that represented the function of 3D printing. (8) I placed arrows to convey the sequence of the printing process. Brief descriptions were written inside a bubble in order to provide a clearer image and understanding for the viewers. Pictures of the printed heart, toys, hearing aids and more were used to depict the purpose of 3D Printers.

Computing Innovation

2c)

There are numerous benefits to 3D Printing. One such benefit includes the ability of the printer to design and produce products in new ways while also reducing material waste, saving energy, and shortening the time needed to bring products to the market. (1) With this, the consumers are provided with custom made products that are unique to each individual. Printing takes only a click of the button and the machine starts whirling to create a product. The 3D Printer eliminates the need of industrial factories and by doing this, it reduces the amount of pollution, which makes the world a much safer environment. (6) 3D printers are also beneficial to medicine. The printers make it possible for things such as, prosthetic limbs, artificial tissues, organs and other body parts to be printed in order to save many lives.(3) Instead of hopelessly waiting for an organ donor that matches the patient, you can simply print the body parts they are in desperate need of.

However, aside from these benefits, there are still a few harmful effects to 3D printing. The materials used in 3D printing emit hazardous fumes during the printing process and these inhaled compounds can affect the blood, liver and heart when consumed in high amounts. (5) While 3D printers use raw plastic resources, the machines still leave an excess amount of unused plastics in the print beds. This will eventually lead into landfills filled with plastic which will ultimately negatively affect the environment. (6)

2d)

The first step of using a 3D printer is to create a computer aided design (CAD), which is an image file format, on the software and then upload it to your computer. Once you hit print, a command is sent to the computer to begin printing the computer aided design. (2) 3D Printers contain G- code files which is a widely used numerical control programming language that instructs the printer how to build the product layer by layer. (9) This process begins by heating the printing material, which is usually thermoplastic, until it liquefies.(3) By using information from the digital file, the design is split into 2 dimensional cross

sections so the printer knows to place the material in its correct location. The material then solidifies quickly which allows other layers of the material to bond and form a complete structure. (1) Once the printing is finished, your final product is produced from your design. This could be anything from toys, to hearing aids to even artificial tissues. (3) One security concern is that other companies can easily steal a CAD file with a completely brand new design on it, and then manufacture it as though it was their own design. (7) Another concern is that these files lack encryption or integrity checking capabilities. This means that an attacker could easily gain access to your G- code and modify your files without you even knowing. (9)

References

2e)

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- (5) Scott, Troy "3D Printing Hazards" Graphic Products December 16, 2018. <https://www.graphicproducts.com/articles/3d-printing-hazards/>
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- (7) Pearson, Amada "10 Disadvantages of 3D Printing Technology" December 16, 2018. Written January 24, 2018. <https://3dinsider.com/3d-printing-disadvantages/>
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