# 3D Printing
## An Emerging Technology
## (Subtopic 1 – What is a 3D Printer)

Ammon Smith
Instructional Design and Technology
Full Sail University
2014

For Art students & Business professionals

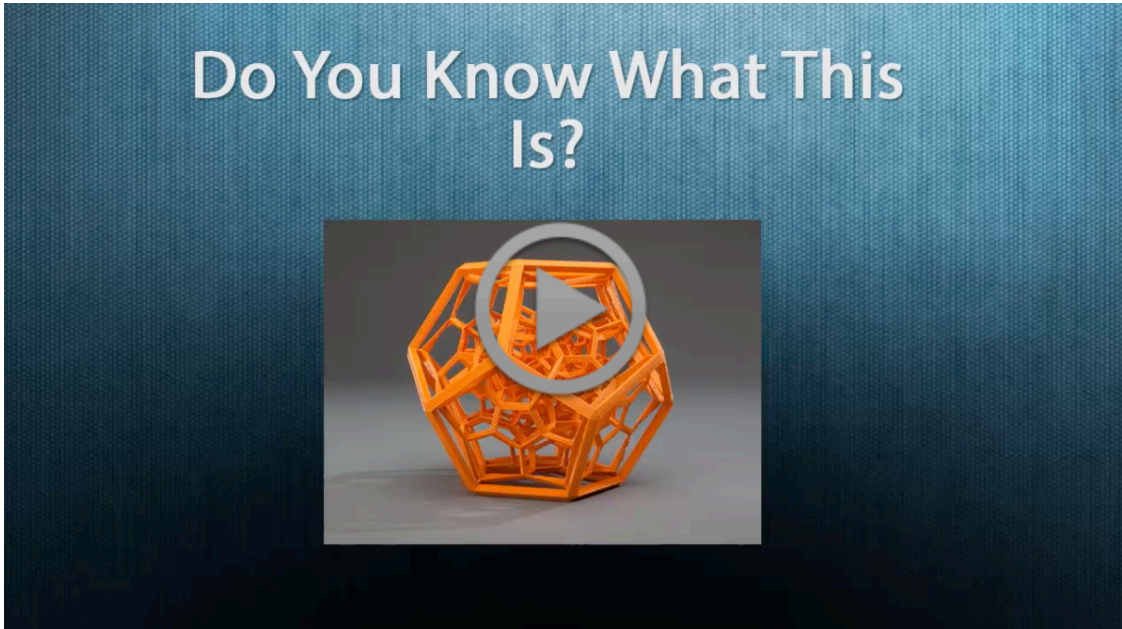| Name: Ammon Smith | Module: Basics of 3D Printing Introduction | Slide # 0.1 | Date 11/04/14 |
|---|---|---|---|

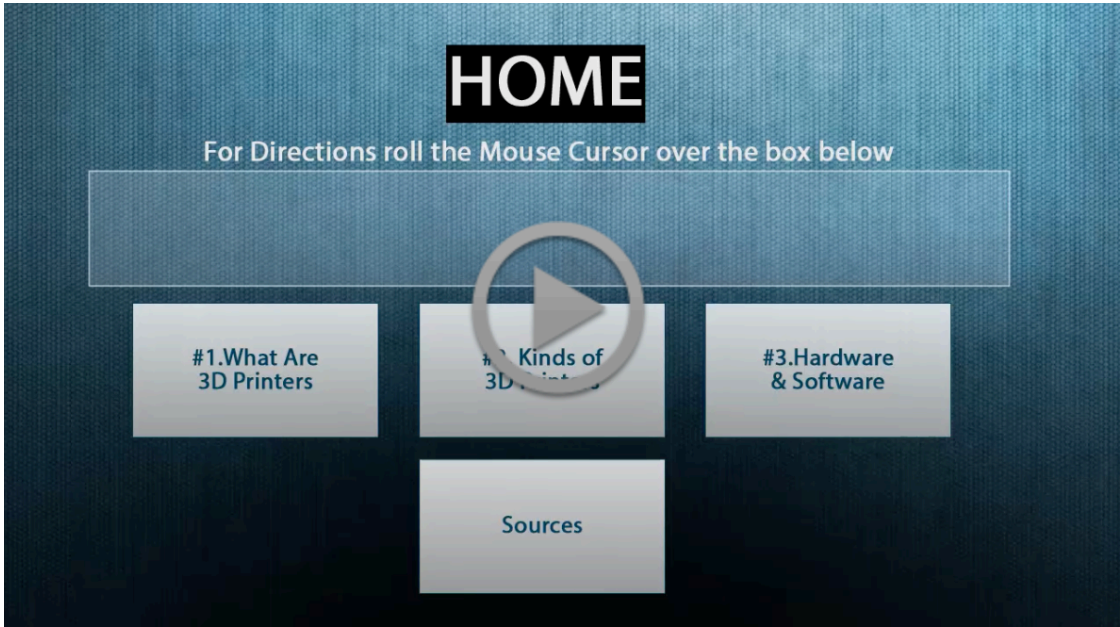| | |
|---|---|
| (Video footage displaying close up image of a 3D printed sculpture.) Image below will be replaced for final build. | Do you know what this is? This a a sculpture that was created using a 3D printer. In this module you will discover what 3D printers are, the kinds of printers available, and what hardware and software are required to use this new an exciting emerging technology. |
|  | The purpose of this module is to help you as artists or business professionals to become aware and familiar with new technologies that can be of use in your profession, specifically 3D printers. |
| | As a result of this training you will be able to demonstrate your knowledge of what 3D printers are, what they do, and what is required to operate a 3D printer. Other possible outcomes will be for you to discover ways 3D printing can be of service to you. |
| | As you progress through this training you will see next and back buttons on the bottom right hand side of the screen. Select this to progress forward or backward as needed if you feel you need additional time. |

| Media Information | Navigation Information |
|---|---|
| Soft Contemporary background music<br><br>Time –  1.01 seconds including Title Slide<br><br>Total Time – 1.01 seconds | At the conclusion of the intro video learners will be taken Directly to the Home Hub. |

| Name: Ammon Smith | Home Hub | Slide # 0.2 | Date 11/04/14 |
|---|---|---|---|

Narration – Here is the Home page where you can refer back as often as you would like to review the module content.

Text – For Directions roll the Mouse Cursor over the box below.

## Media Information

Soft Contemporary background music

Time – 9 seconds – Student can remain on this page until they select a subtopic.

Total Time – 1.10 minutes

## Navigation Information

Homepage that contains links for subtopic 1,2, and 3 as well as a sources link. Links for subtopic 2 and 3 will be locked out until successful completion of the knowledge check portion of each subtopic.

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 1.1: How They Look | Slide # 1.0 | Date 11/04/14 |
|---|---|---|---|



(Video footage of me showing a 3D printer and an example of a digital 3D file and printed object.)

What are 3D printers exactly?

As an artist, or business professional it is important to be aware of new emerging technologies and how they can assist you in your field to be as productive as possible, and 3D printers are one of those new technologies, but before we can appreciate them we need to know what they look like, and what they are.

3D Printers are machines that translate 3D digital files into tangible physical objects.

**Media Information**

Soft Contemporary background music

Time – 23 seconds

Total Time – 1.33 Minutes

**Navigation Information**

Next Button, Back Button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 1.2: How They Look | Slide # 1.2 | Date 11/04/14 |
|---|---|---|---|

## (Diagram showing core parts of a 3D Printer)



Plastic Filament

Extruder Motor

Printer Control Board

X-Axis Motor

Hot End

PC connected via USB

Heated Bed

Z-axis Motor

Y-Axis Motor

Z-axis Motor

Narration - Traditional 3D Printers have 4 core parts that make them easily recognizable. Those 4 parts are the

Extruder Head

Mechanical Arm

Heated Bed

Plastic filament

The plastic filament is the building material used to make your 3d object

3D Printers are much larger than the traditional 2d paper printer you have grown up using. Roughly 3 to 4 times bigger on the small size.

| Media Information | Navigation Information |
|---|---|
| Soft Contemporary background music<br><br>Time – 14 seconds<br><br>Total Time – 1.47 Minutes | Next Button, Back Button |

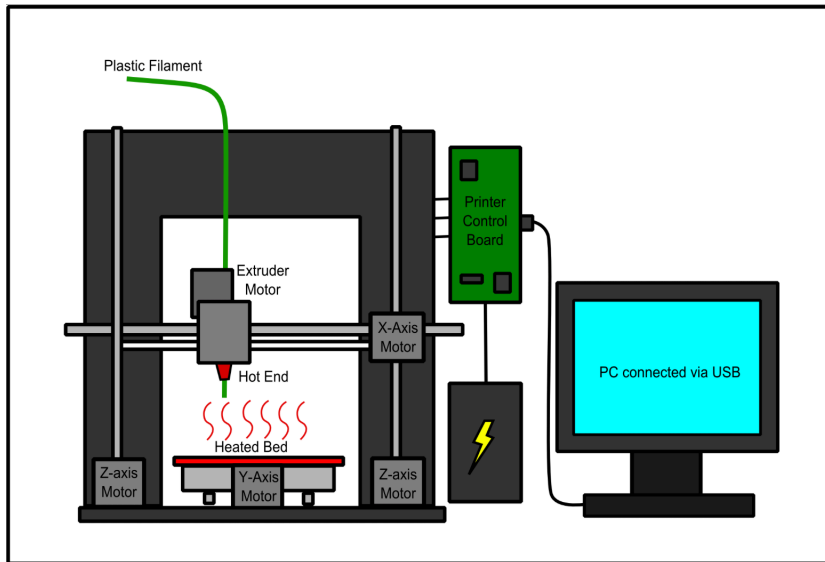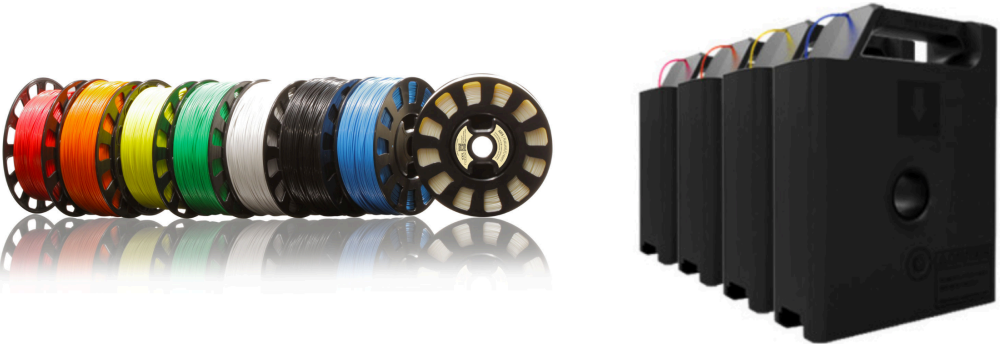| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 1.3: How They Look | Slide # 1.3 | Date 11/04/14 |
|---|---|---|---|

(Image of 3D Printer Plastic Filament)

Narration - The plastic filament as seen here is what is melted to produce the final physical object when the printing process has been completed.

This spool of filament is often hidden within a cartridge as seen here where it is then stored in a compartment in the printer itself, much the same as ink is stored within a regular 2D paper printer.

**Media Information**

Soft Contemporary background music

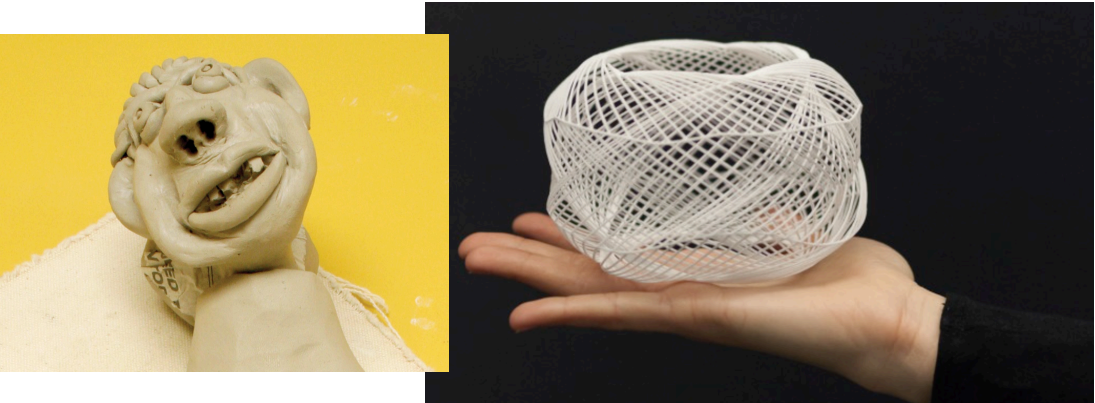Time – 15 seconds

Total Time – 2.02 Minutes

**Navigation Information**

Next Button, Back Button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 2.1: What They Do (Benefits) | Slide # 1.4 | Date 10/04/14 |
|---|---|---|---|

| | Narrative Script |
|---|---|
| (Video of me struggling to create a sculpture on the left side of the screen while some simultaneous time lapse footage shows the same process going much faster using a 3D printer on the right side of the screen.) | Narration – So what do 3D printers do, and how can 3D printing benefit you as a artist or business professional?<br><br>As it turns out there are many ways 3D Printers can be a tremendous benefit, including allowing a artist to convert a 3D digital art piece such as a sculpture into a physical tangible form in a very short period of time vs making the sculpture all by hand.<br><br>For a business professional they could show the 3D printed sample to a client and have changes made if needed before the final copy was made. |
| **Media Information** | **Navigation Information** |
| Soft Contemporary background music<br><br>Time –  27 seconds<br><br>Total Time – 2.29 Minutes | Next Button, Back Button |

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 2.2: What They Do (Benefits) | Slide # 1.5 | Date 10/04/14 |
|---|---|---|---|

Image showing Skylanders figurines that have been 3D printed by the company Toys For Bob.
(Brief Video footage of the Skylanders Game)

Narration - Another way business professionals use 3D printers is to print and sample a physical product to check for defects before they are sent through mass production potentially saving the company a lot of time and money such as the company Toys For Bob with the Skylanders video game series.

Text on Image – Video game company Toys For Bob uses 3D printers to create and test the figurines for the popular Skylanders Video Game.

**Media Information**

**Navigation Information**

Soft Contemporary background music

Time – 16 seconds

Total Time – 2.45 Minutes

Next Button, Back Button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 2.2: What They Do (Benefits) | Slide # 1.6 | Date 10/04/14 |
|---|---|---|---|

(Image of a drooping clay Object unable to support itself due to the weight of the clay, and a Elegant thin detailed 3D printed object in a position impossible in clay.)

**Narrative Script**

Narration - 3D printing can also allow artists to create pieces that are not limited by the medium of material they are created in because 3D printed pieces are made of very firm a rigid material such as plastic, sandstone, and various metals.

The Artist for this small figurine likely would have wanted to have had more detail in this clay head, however due to its size detail is limited. 3D Printers excel at capturing detail in small objects.

**Media Information**

Soft Contemporary background music

Time – 20 seconds

Total Time – 3.05 Minutes
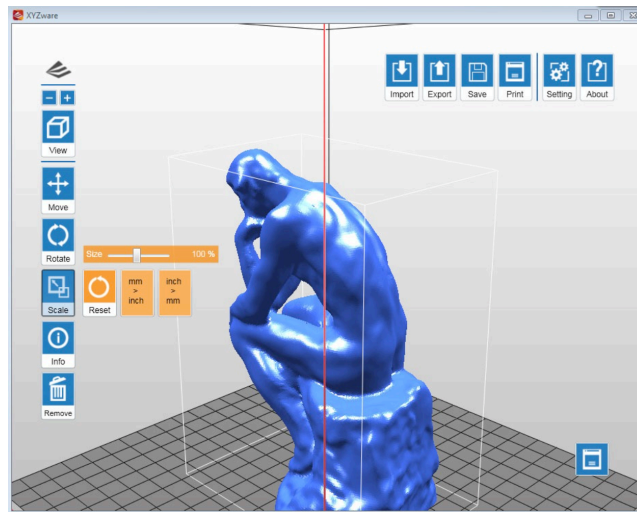
**Navigation Information**

Next Button, Back Button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 3.1: How They Work | Slide # 1.7 | Date 10/04/14 |
|---|---|---|---|

# (Video showing File Print Process)

## Narrative Script

Narration – A 3D printer works by first creating a 3D file ready to be printed on your computer.

The file is then transferred into the printer much the same way as a normal paper printer by selecting file print in the 3D printer software as seen here.
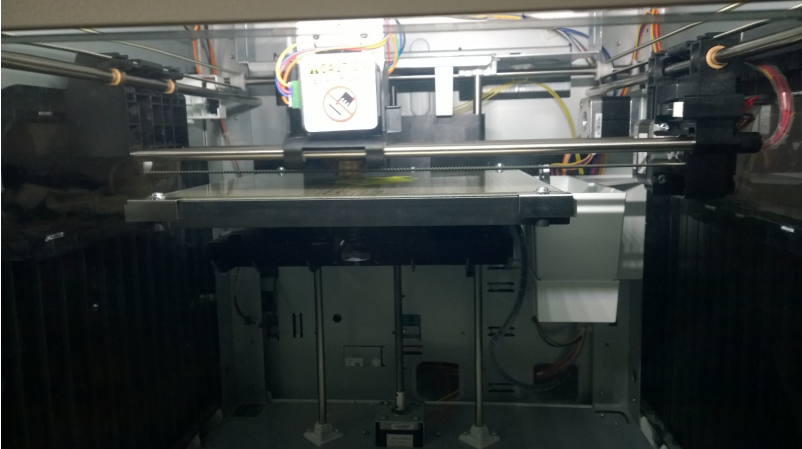
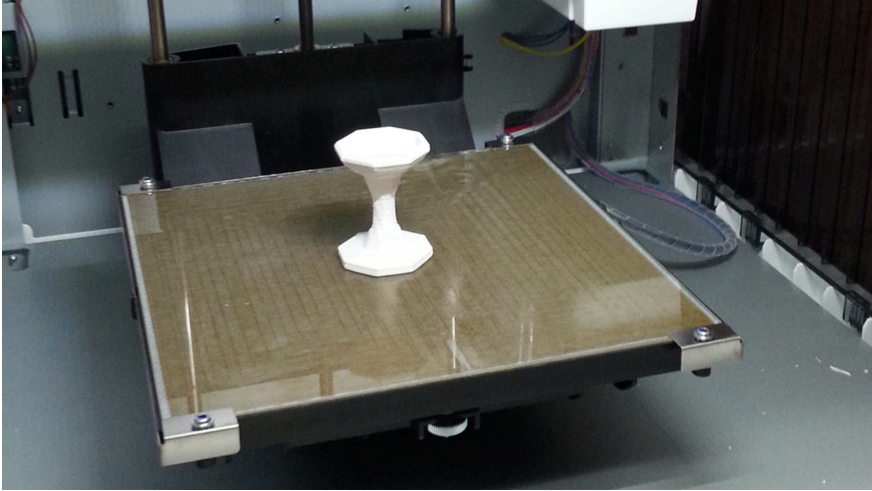| Media Information | Navigation Information |
|---|---|
| Soft Contemporary background music<br><br>Time – 11 seconds<br><br>Total Time – 3.16 Minutes | Next Button, Back Button |

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 3.2: How They Work | Slide # 1.8 | Date 10/04/14 |
|---|---|---|---|

| | |
|---|---|
| (Time Lapse Video Footage of a object being printed. Additional images will populate during this footage to show close ups of important 3D printer components.)<br><br> | Narration – After the digital file has been sent the 3D Printer is able to read and convert the digital file into a physical object by melting plastic filament as you see here similar to how a hot glue gun works.<br><br>The extruder ejects the melted plastic through an additive process layer by layer to slowly build the physical object until it is complete. |

| Media Information | Navigation Information |
|---|---|
| Soft Contemporary background music<br><br>Time – 14 seconds<br><br>Total Time – 3.30 Minutes | Next Button, Back Button |

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Subtopic 3.3: How They Work | Slide # 1.9 | Date 10/04/14 |
|---|---|---|---|

(Video of a 3D printer finishing a object, and the 3d printed figurine being removed)

Narration – During the building process the mechanical arm moves back and forth to extend the melted filament on a heated bed into the shape of the object matching the digital file.

The bed is heated to keep the plastic warm during the building process, ensures that the object remains on the platform, and that the printed object can be easily removed once completed.

**Media Information**

Soft Contemporary background music

Time – 20 seconds

Total Time – 3.50 Minutes

**Navigation Information**

Next Button, Back Button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Knowledge Check | Slide # 1.9 | Date 10/04/14 |
|---|---|---|---|

**Narrative Script**

Knowledge Check

(Multiple Choice)
What is a 3D Printer?

A. A machine that takes a physical object and converts it into a 3D file.

B. A machine that makes 2D files 3D.

C. A machine that converts a 3D digital file into a physical tangible object

**Media Information**

**Navigation Information**

Next button, Back button

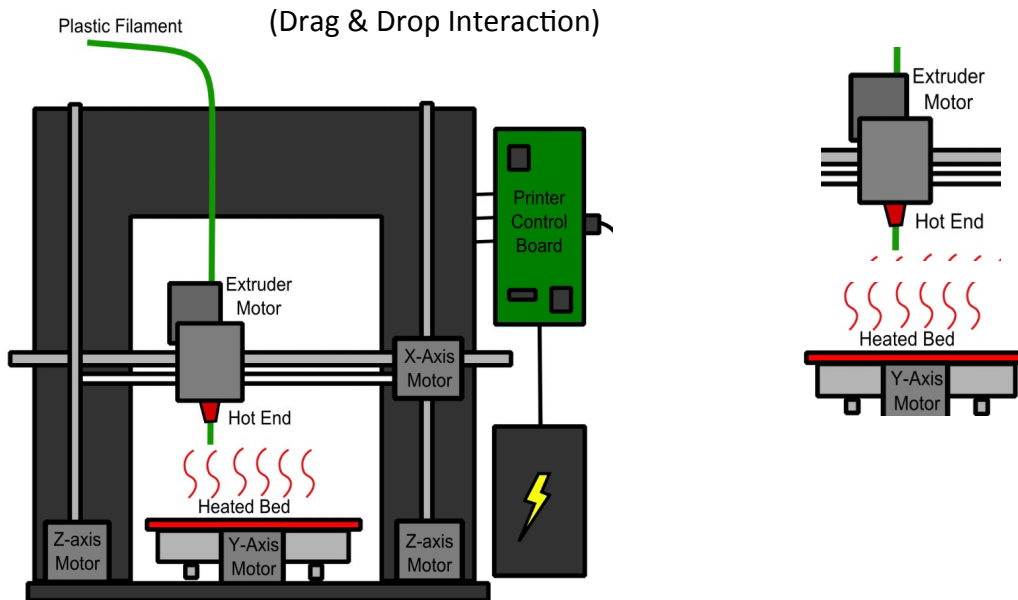| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Knowledge Check | Slide # 1.10 | Date 10/04/14 |
|---|---|---|---|

(Drag & Drop Interaction)

Plastic Filament

Extruder Motor

Printer Control Board

Extruder Motor

X-Axis Motor

Hot End

Heated Bed

Z-axis Motor

Y-Axis Motor

Z-axis Motor

Extruder Motor

Hot End

Heated Bed

Y-Axis Motor

**Media Information**

(I would like to add a mechanical sound effect when the learner selects and drops an object to enhance engagement and simulate assembling the printer)

**Navigation Information**

Next button, Back button

| Name: Ammon Smith | Module: Basics of 3D Printing<br>Subtopic 1: What is a 3D Printer<br>Knowledge Check | Slide # 1.11 | Date 10/04/14 |
|---|---|---|---|

# Drag & Drop Interaction

Artists will be able to bring their digital creations into reality over a longer period of time.

Artists will be able to bring their digital creations into reality over a much shorter period of time.

Artists & Professionals using 3D printers can make prototypes for unreleased products before they go into production so they can be checked for defects

3D Printers are smaller than regular printers so they a better for businesses.

3D Printers are less costly than regular printers.

## Media Information

Clicking noise added when objects are selected to add to learner engagement.

## Navigation Information

Next Button, Back Button. If student answers incorrectly they will be sent back to
 the slide containing the appropriate information for needed review and then return back to the knowledge check. Upon successful completion student will transfer directly to subtopic 2.

## Credits

Skylanders -http://www.engadget.com/2014/11/06/3d-printing-skylanders/

3D Printer Diagram -  http://gronkwena.files.wordpress.com/2013/04/mendel90-diagram.png

3D Printer Info - http://www.livescience.com/37513-how-3d-printers-work-infographic.html

Fine Print 3D Object - http://www.creativeapplications.net/wp-content/uploads/2013/03/06_gphillips_guilloche_cuff-640x4451.jpg