

A 3D printed orange lattice structure, resembling a complex geometric pattern, is shown on a printer bed. The structure is composed of interconnected orange plastic beams forming a series of hexagonal and pentagonal shapes. The printer bed is a flat, light-colored surface with a grid pattern. The background is dark, with some mechanical components of the printer visible.

3D PRINTING IN THE CLASSROOM

BY LINDA MARTIN

30
YEARS

3D printers have actually been around for about 30 years. Barriers like cost are breaking down, so they're now becoming available to the public.



Printed objects can be incredibly intricate. They can also be created with working components, hinges, and parts within parts.

Biology students can study cross-sections of hearts or other organs.



REVOLUTIONIZING *the* **CLASSROOM**

Engineering and design students can print out prototypes of their creations.



Chemistry students could print out molecules to study.



3D printing has caught the attention of educators who are looking into ways to incorporate it into the classroom.

Architecture students could easily print out 3D models of their designs.



Auto class students could print replacement or modified car parts.



Using 3D printers in the classroom could mean:

History classes could print out historic artifacts for closer examination.



Cooking class students could design intricate molds for ices and gelatins.



Graphic design students could create 3D versions of their artwork.

Students in geography courses could print out maps showing the topography, population or demographics of an area.

What is 3D Printing?

- * Another name for 3D printing is **Additive Manufacturing**
- * It is the process of creating an object one layer at a time to give it dimensions of height, depth and width (**3 Dimensions**).



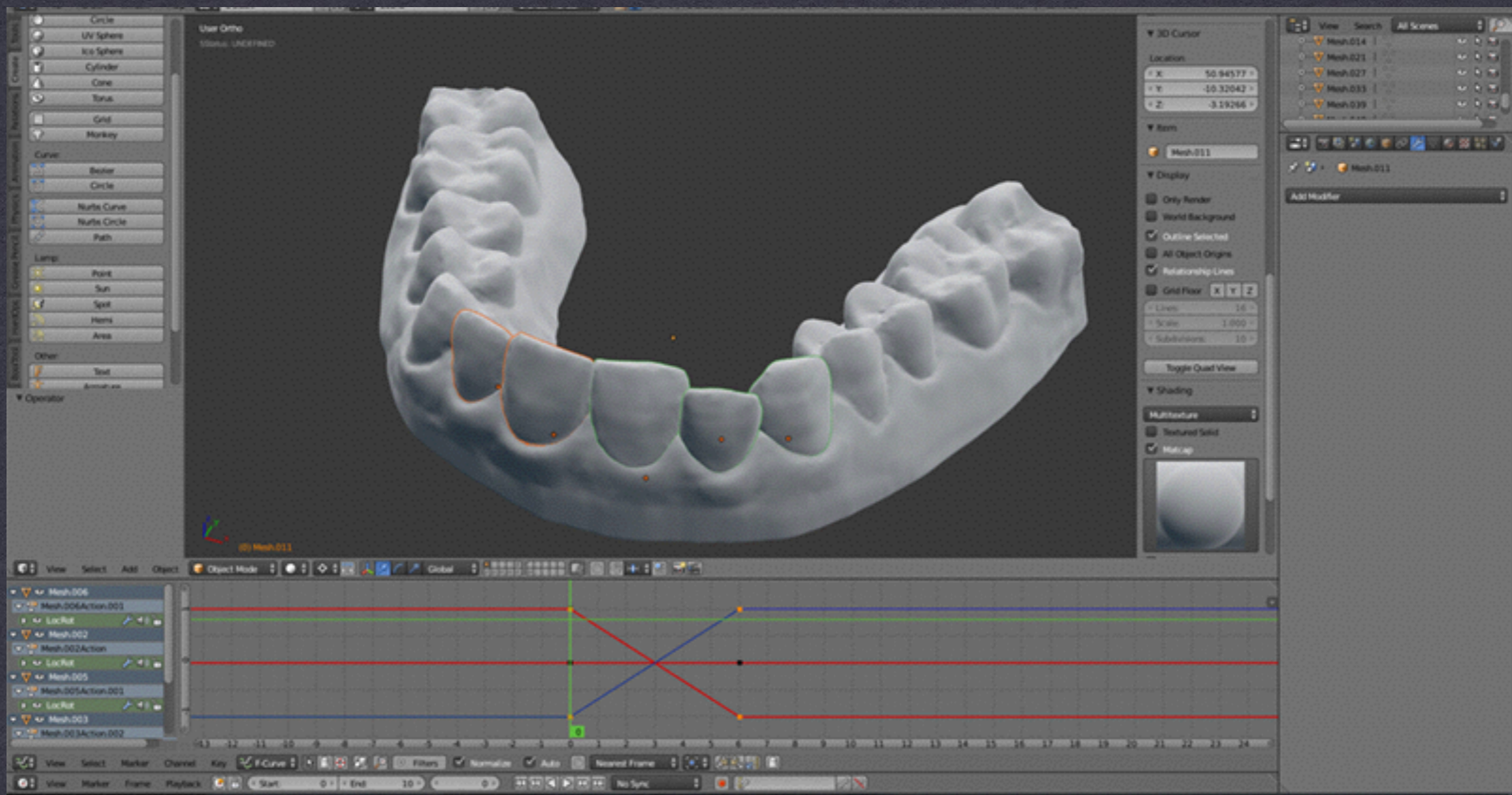
Why 3D Printing?

- * 3D printing allows for more authentic exploration of objects that may not be readily available to education institutions
- * Typically, students are not allowed to handle fragile objects like fossils and artifacts; 3D printing shows promise as a rapid prototyping and production tool, providing users with the ability to touch, hold, and even take home an accurate model.
- * 3D printing in classrooms is a good way for young inventors to learn the principles of design.
- * It is a “Learn by Doing” Approach - dealing with failures and how to make something better and actually created a new prototype

HOW IS 3D PRINTING USED IN THE REAL WORLD

[Click to View](#)

FRED THE TORTOISE



COLLEGE STUDENT DESIGNS HIS OWN BRACES

SO, WHERE DO I START?

Objects to Use in Classroom



<http://www.thingiverse.com/Curriculum/about>

Lesson Plan Ideas

* Language Arts

- * Tactile Writing Prompts - using symbols from books
- * Make your own Word Dice -prompts for creative writing
- * Invent/Design something then write about the process
- * Recreate scenes/characters from a story

Lesson Plan Ideas

* Math

- * 3D Geometry
- * Create Your Own Monetary System - economics
- * Design your Dream Home/Room/Furniture - scale
- * Create Your Own Manipulatives

Lesson Plan Ideas

* Science

- * Frog Dissections
- * Fossils & Bones
- * Design a Bird House - engineering design
- * Design a better.....

Lesson Plan Ideas

* History / Social Studies

- * Recreate models of ancient ruins and objects from history
- * Create models of artifacts from different cultures

Lesson Plan Ideas

* Art & Music

- * 3D Design

- * Jewelry-Making

- * Create a Digital Sculpture - Sculptris

- * Design a unique Instrument

- * Design a desktop music stand

Critical Thinking

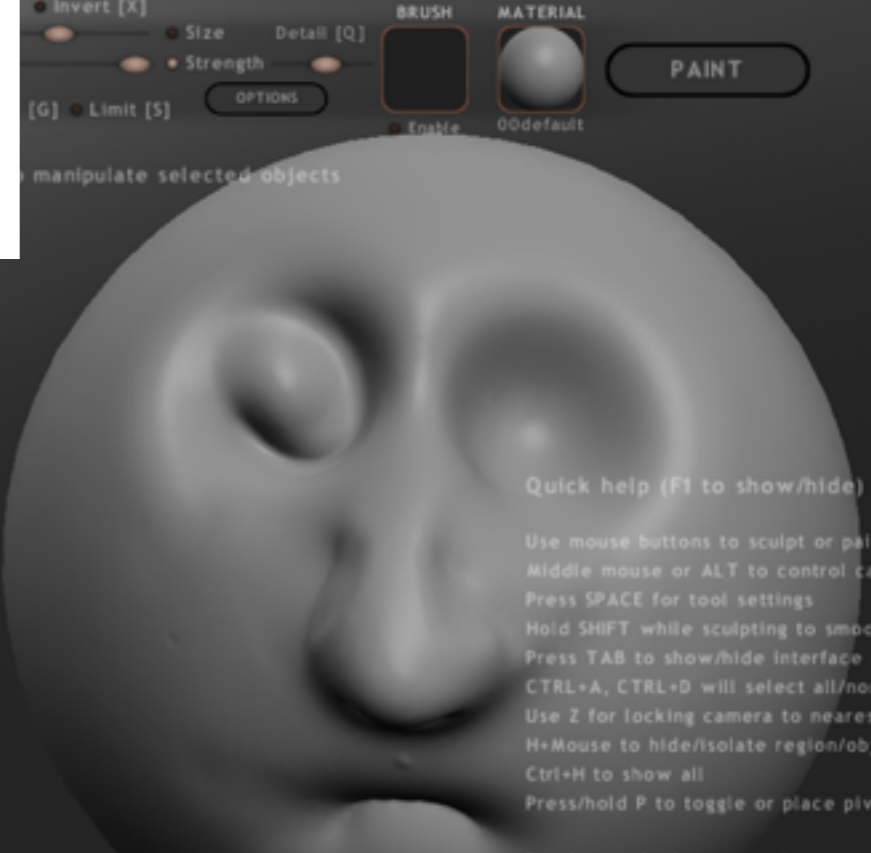
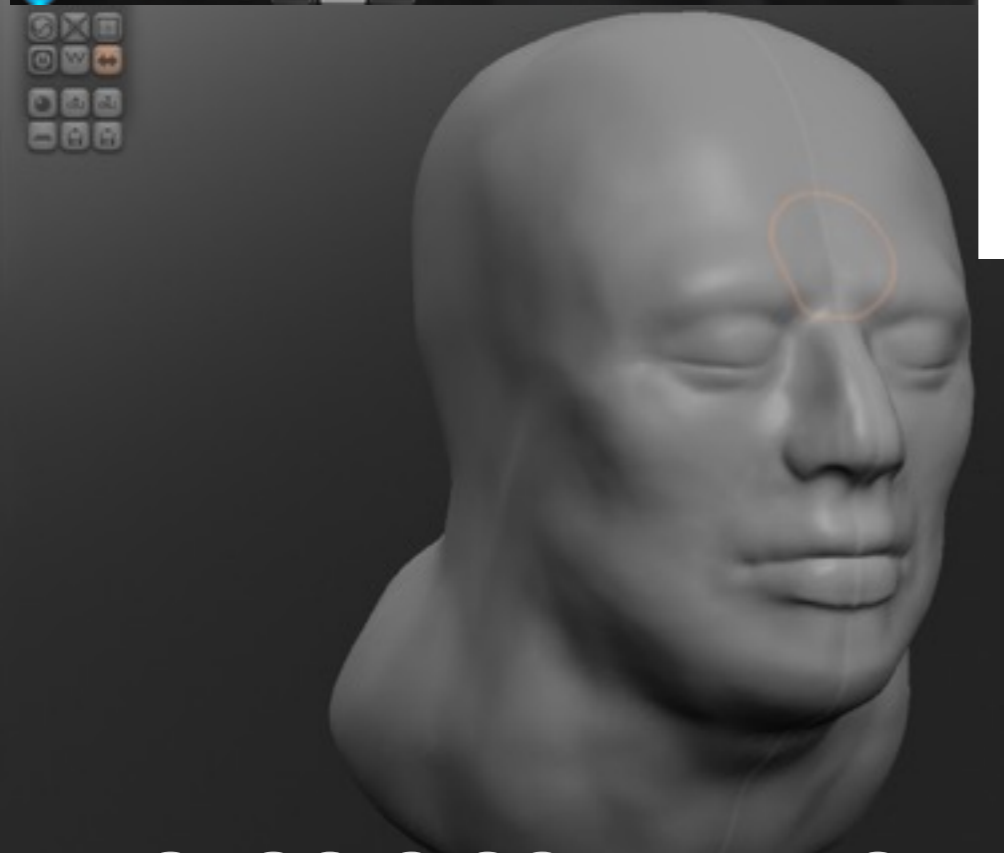
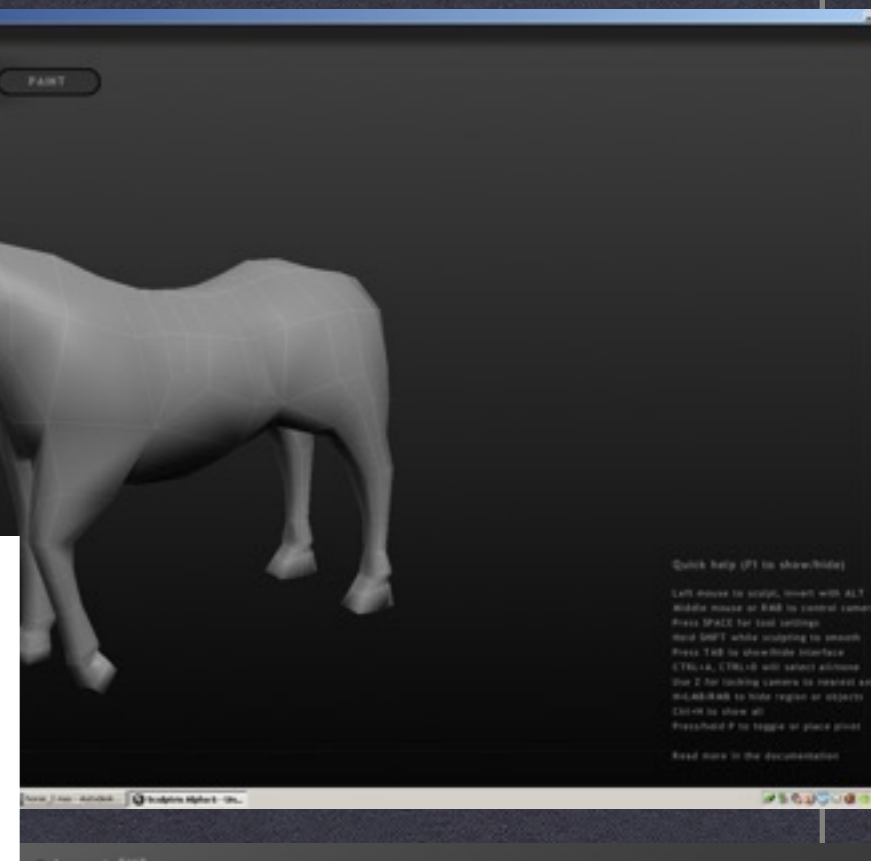
- * Have students break into groups and have them create different parts for an object. Once created have them put all the pieces together to determine the final object.
- * Students will come to realize how many objects in the world around them are created by basic 3D shapes that are manipulated to create them.

3D DESIGN PROGRAMS



TINKERCAD

TINKERCAD IS AN EASY-TO-USE 3D CAD DESIGN TOOL. QUICKLY TURN YOUR IDEA INTO A CAD MODEL FOR A 3D PRINTER.



PIXOLOGIC SCULPTRIS

DOWNLOADABLE PROGRAM - TURN A DIGITAL PIECE OF "CLAY" INTO A WORK OF ART

Quick help (F1 to show/hide)

Use mouse buttons to sculpt or paint
 Middle mouse or ALT to control camera
 Press SPACE for tool settings
 Hold SHIFT while sculpting to smooth
 Press TAB to show/hide interface
 CTRL+A, CTRL+D will select all/none
 Use Z for locking camera to nearest axis
 H+Mouse to hide/isolate region/object
 Ctrl+H to show all
 Press/hold P to toggle or place pivot

Read more in documentation.txt

Pixologic
 makers of ZBRUSH

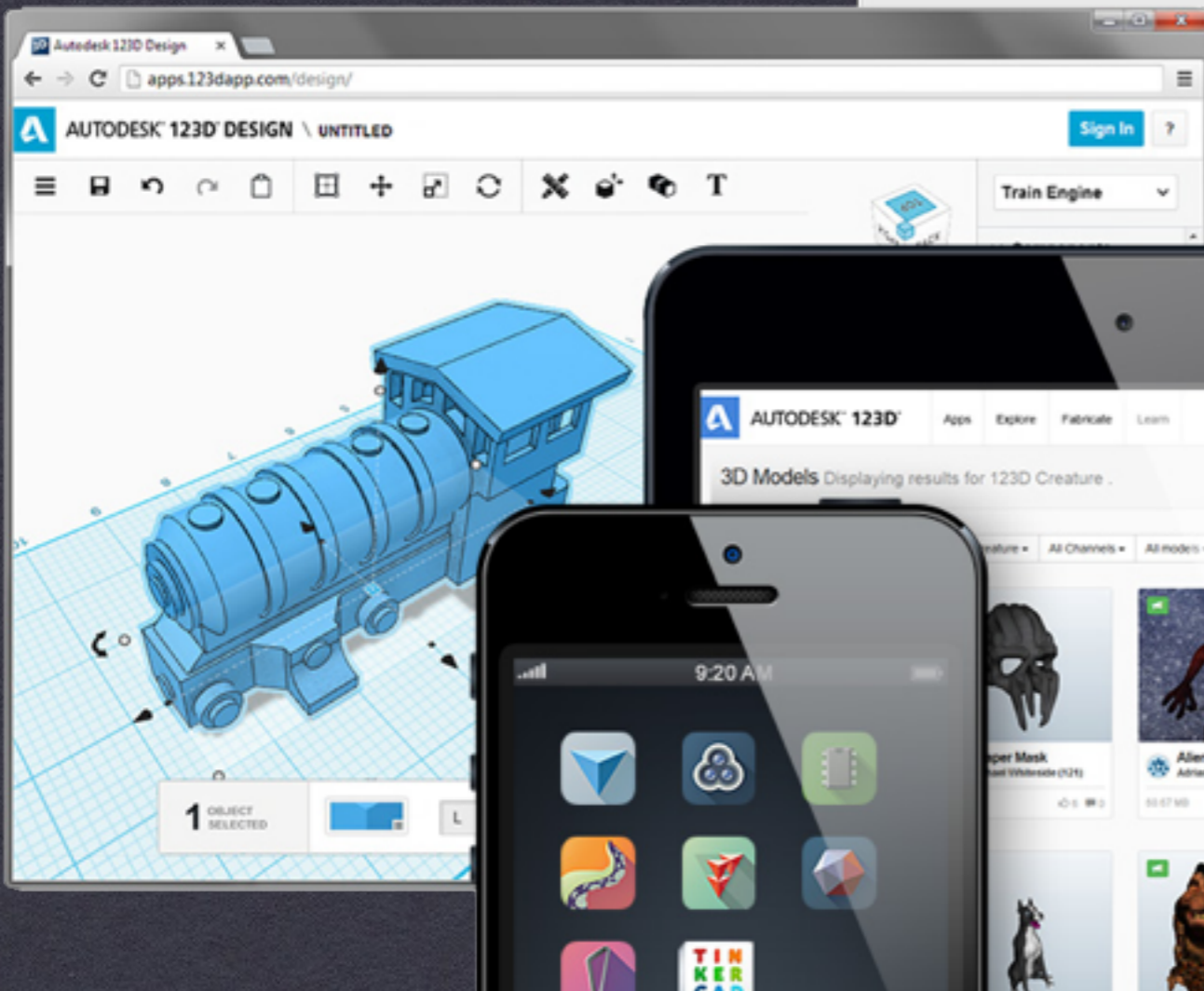
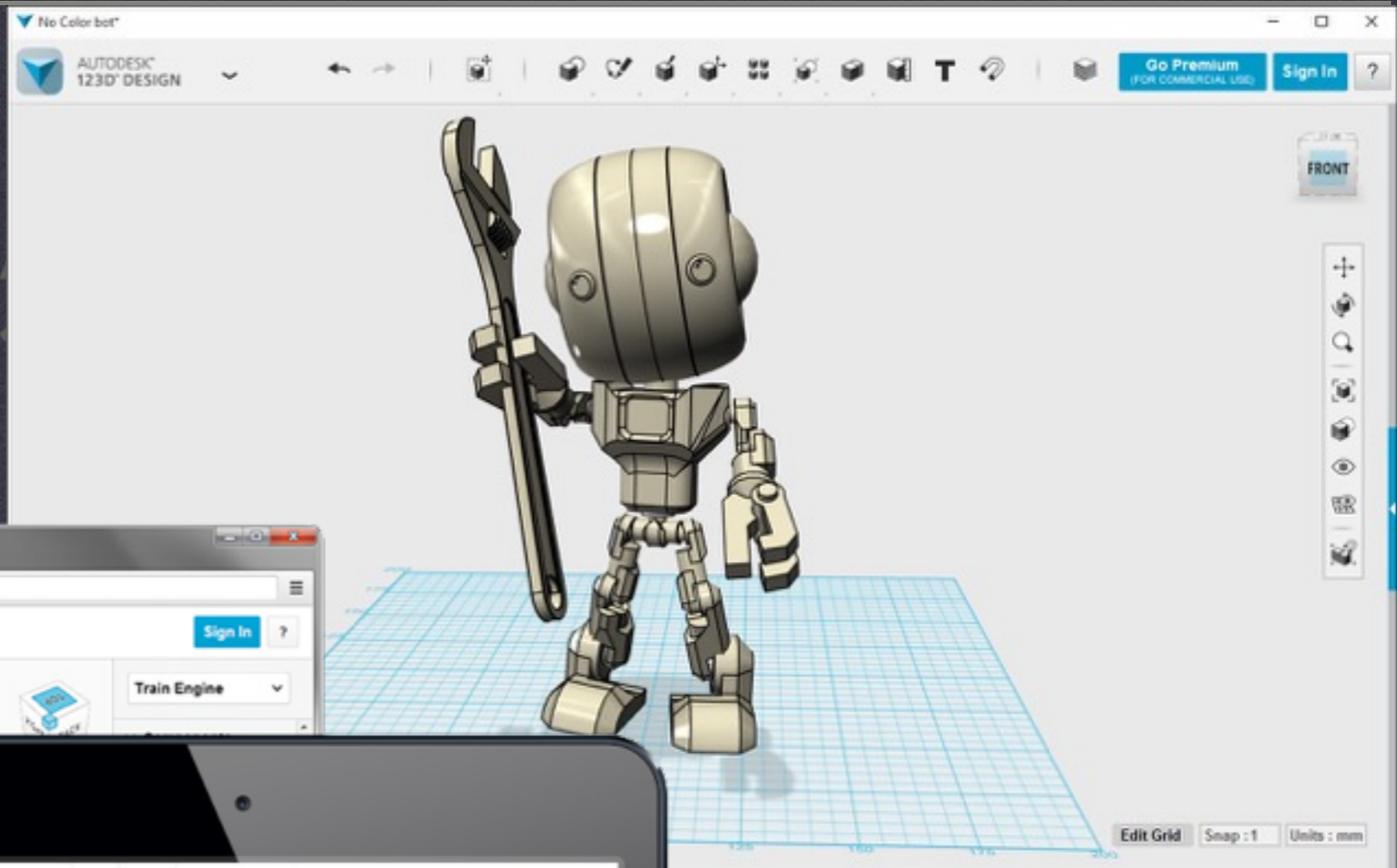
This is a prototype of software
 being developed by Pixologic™.
 Visit www.pixologic.com to learn more.

28156 triangles

Quick help (F1 to show/hide)

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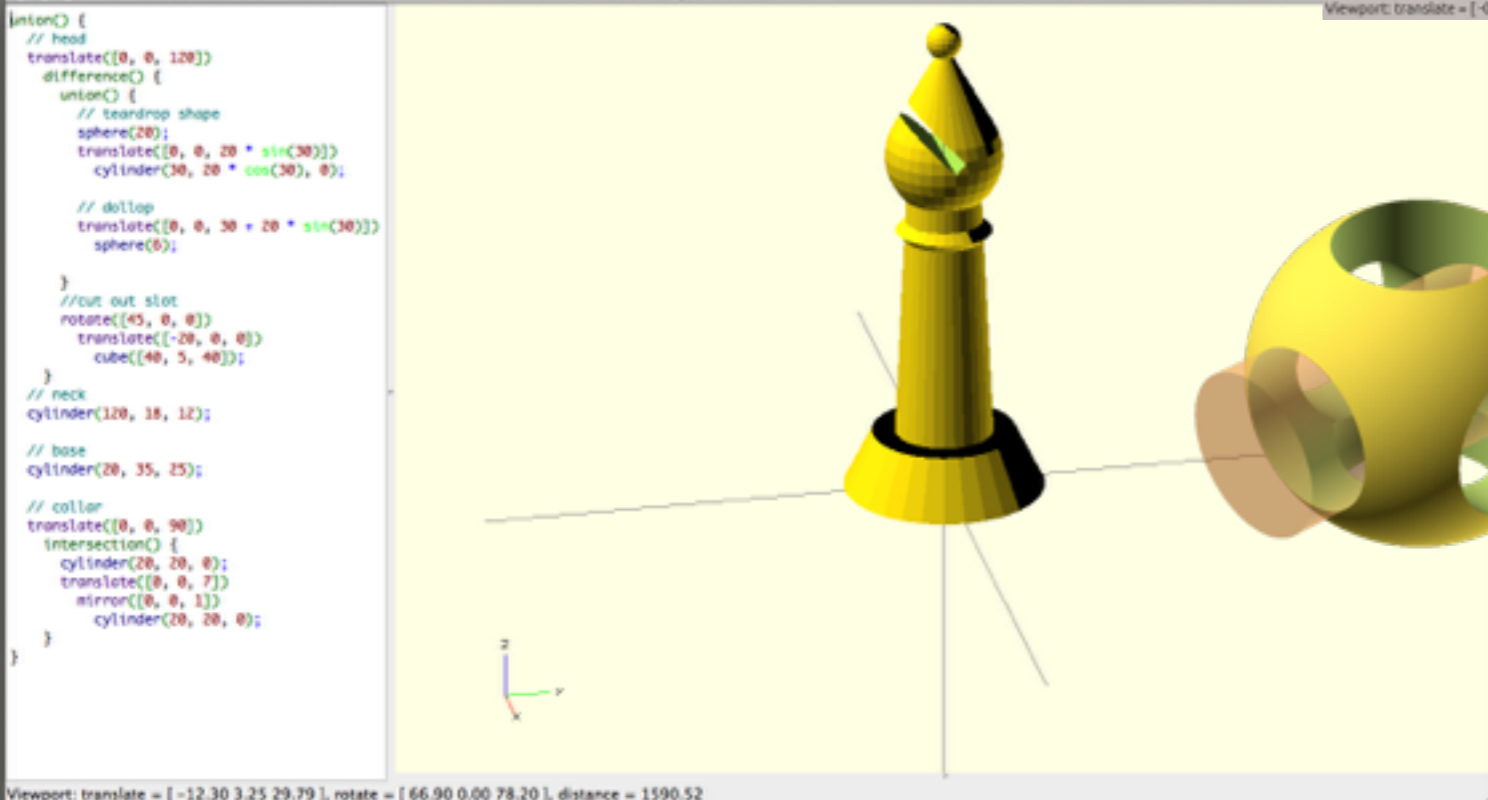
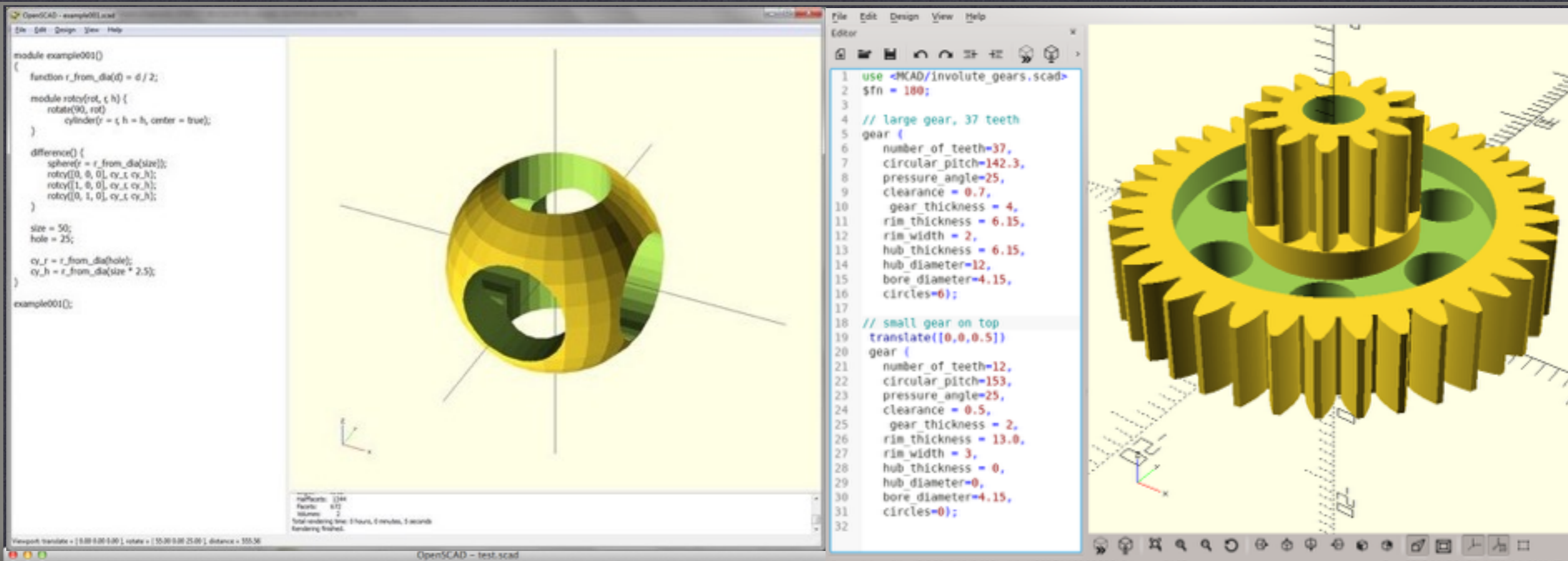
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AUTODESK®
123D® DESIGN

AUTODESK 123D DESIGN

DOWNLOADABLE APP FOR MULTIPLE DEVICES



OpenScad

OPENS CAD

PROGRAMMING AND 3D DESIGN

Some More 3D Programs

- * Autodesk Maya - professional program - 3D animations

iPad apps

- * PrintShop by Makerbot
- * 123D Sculpt+ by Autodesk
- * Sage by Media Utopia
- * Gravity Sketch - 3D Sketching
- * UMake - Sketch in 3D

For Chromebooks

- * TinkerCAD
- * google Sketchup
- * Sculpt GL - <http://stephaneginier.com/sculptgl/>
online program similar to Sculptris

Don't have a 3D printer?

Contact local Library, High School or College and see if they can print the files for you

or

Send to a Professional Company (fee required)

- * <http://www.shapeways.com/>
- * <https://www.sculpteo.com/en/>
- * <https://www.makexyz.com/>

Click to View

Help Kids Make a Difference in the World!!

E-NABLE

<http://www.matterhackers.com/e-NABLE>

My Contact info

Twitter - @mrsmartinusa

**Website -
mrsmartinusa.com**

**eMail -
mrsmartinusa@gmail.com**