

Lesson Plan

Title: From carpet cleaning to 3d printing

NATURE Sunday Academy 2016-2017

Project Description:

In this project, student will learn the working principles of 3d printing technologies. The students will study the process steps for building an object with 3d printing technology that we have available in the 3d printing laboratory. With this basic knowledge about the 3d printing, they will perform a vacuum cleaning activity. Students will study their vacuum motion and identify the characteristics. Then they will use that knowledge in the 3d printing domain. At the end, they will measure the performance of the 3d printer and check if their carpet cleaning knowledge can help the 3d printing technology.

Project Objectives:

Student will learn about-

1. Steps of 3d printing.
2. Effect of different steps on the finished product.
3. Current challenges of 3d printing (cons)
4. How to speed-up 3d printing
5. Machine architecture and control language (G-code)

Session Organization:

11:00-11:30 Cultural connection/brief introduction

11:30-12:00 Activity I

12:00-12:45 Lunch

1:00-1:30 Activity II

1:30-2:15 Activity III

2:15-2:45 Activity IV

2:45-3:00 Wrap up

Introduction:

What is 3d printing? What are its potentials? What are the challenges?

Background information on topic and its importance to the real world. How understanding aspects of STEM drive the technology demonstrated in the activity.

Activity I:

Effect of Build Direction- Students will be given different 3d geometry and ask for their favorite build vector. Further discussing will focus on pros and cons of different build vectors. A software will measure the best build vector at the end.

Activity II:

Deposition Direction – Introduce deposition direction in 3d printing. Defining the motion profile in a 3d printer. How this motion profile will affect the time for part building. How to measure the printing speed?

Activity III:

Preparation for vacuum work - We will select a room for vacuuming and draw the geometry with Auto CAD or Solid works. Each group will identify there pattern in CAD.

Collecting and Data analyzing- We will perform the vacuum cleaning and collect the data such as time, number of turns, convenience/easiness. The data will be analyzed and identify the pattern with benefits under different circumstances.

Activity IV:

Learning G-code and make the 3d printed part

We will show you how to write G-code machine language. Then we will print the part with our own pattern.

Equipment required:

A 3d printer, Materials, Laptop, CAD (Rhino, AutoCAD, ProE), A vacuum

Wrap-Up & Discussion:

1. How were the concepts of STEM used in today's activity?
2. What was the most successful idea you used in the activity?
3. What did you try in the activity that did not work?
4. Why do think it did not work?