Global Connections Exchange

Global Inventors: 3D Printing and Design

OVERVIEW

Topic	3D Printing
Age range	10-14
Subject	Science & Technology | Arts & Design
Duration	8 weeks

DESCRIPTION

This course introduces students to 3D printing technology through hands-on engineering challenges that encourage them to use the engineering design cycle to develop and refine their ideas. Students will gain an appreciation for the sustainable and customizable nature of 3D printed objects while being encouraged to think critically about how they can use technology to solve everyday problems.

TASK TOPICS	LEARNING OBJECTIVES Students will:
Task 1: Getting to Know Our Partners	• be able to share their culture with their global partners by creating a video to describe a typical school day, favorite activities and sports, and favorite holidays and celebrations. • interact with their global partners about their videos.
Task 2: "Innovation is KEY – Keyring Design"	• learn about the engineering design cycle and apply it • understand the basics of 3D printing technology, including how to create a digital design, how 3D printers create physical objects, and the benefits and limitations of 3D printing materials. • use Tinkercad website to create their own 3D key ring design that can be used to identify keys, bags, even badges - anything that can be attached via a keyring!
Task 3: Printable Prototyping	• consider how failure is a necessary part of invention • learn how to take an existing idea and improve upon it through iterative prototyping • prototype their design for a pencil holder using both low-cost materials and digital tools
Task 4: Tinkering with Tools	• learn about what makes an effective tool, thinking about ergonomics, function, and aesthetics (look). • gain additional experience applying the engineering design cycle to a more open ended problem • understand the importance of sustainable design in 3D printing, including considering material use and waste reduction. • develop an appreciation for the role 3D printing technology in reducing transportation and production costs of one-of-a-kind or "as-needed" item
Task 5: Reflection	• reflect on their learning about design thinking. • reflect on their culture and design thinking as it relates to their partners' culture.

United Nations Sustainable Development Goals (UN SDGs)

Goal 16 Industry, Innovation and Infrastructure

Goal 11 Sustainable Cities and Communities

ISTE Student Standards

1.1 Empowered Learner
1.2 Digital Citizen
1.3 Knowledge Constructor
1.4 Innovative Designer
1.5 Computational Thinker
1.6 Creative Communicator
1.7 Global Collaborator

New Jersey Student Learning Standards

MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).