

Lesson Planning for STEM

Title: Understanding The Design Process by Creating the World's Tallest Buildings

Description:

Being able to create with the same process that designers and engineers use is one of the biggest learning super powers we can give our students. The steps are relatively simple to master and create a productive, growth-centered mindset in our learners. The following project is a collection of activities that can turn your students' thinking from "just doing school" to thinking like a creative professional. Building scale models of the world's tallest buildings is a great way to foster and practice these abilities.

Learning Targets:

- Describe each step of the design process
- Successfully design a product or solution
- Work as a productive team member with empathy and cooperation
- Plan and manage activities that lead to a solution or product
- Use a number of digital tools in the process of solving problems or creating products

Online Enriching Content Links:

PBS Kids: Kid Engineer -The Design Process

<https://youtu.be/Vcma79mVAYw>(link is external)

PBS Kids: Design it. Build it. Fidgets Game

<http://pbskids.org/designsquad/games/fidget/>(link is external)

Science Buddies: Engineering Process Chart

<http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml>(link is external)

Caine's Arcade

<https://youtu.be/falFNkdq96U>(link is external)

Khan Academy: Making a Scale Drawing

<https://www.khanacademy.org/math/basic-geo/basic-geo-area-perimeter/basic-geo-scale-drawings/v/constructing-scale-drawings>(link is external)

World's Tallest Buildings

https://en.wikipedia.org/wiki/List_of_tallest_buildings_in_the_world

How are the standards assessed?

For all assessment activities, the class will develop a proficiency rubric together so that students know the explicit expectations for each part of the unit

Student Prerequisite and Knowledge:

A simple understanding that designers and engineers use a process that involved a number of steps to create products and solutions.

How are the concepts or procedures are being explained or demonstrated in this lesson/unit ?

Week 1: Begin by watching the PBS Kids video "Kid Engineer: The Design Process(link is external)" and then review the steps with the students. Have them use this mindset as they interact with the PBSkids.org game "Design it. Build it. Fidgit"(link is external).

Week 2: Review the design process with a review activity of your choosing. Think about utilizing Kahoot or a Google Form for formative assessment. Show students the **Caine's Arcade(link is external)** video and then explain that students will be prototyping their own cardboard models of the world's largest building. Divide class into groups of four or five students and assign one of the **world's largest buildings(link is external)**. Students will research the dimensions and formulate a paper/pencil or digitally created plan for building a scale model out of cardboard. Dependent upon space, teachers may decide how big the scale should be. Students will need some direct instruction and group practice in understanding scale. The linked Khan Academy video can serve as an assistant.

Week 3: Students and teachers should be collecting cardboard and recycled building supplies. Before construction begins, conference with each team to see the details of their plans. Specific dimensions need to be clear and present on the plan so the final product will be accurate. Once students begin building constantly move about the space to ensure teamwork is being fostered and remind students that the steps of the process are how roadblocks are cleared.

Weeks 4-6: Depending on the amount of time available and the speed of your students, this project may take several weeks to complete. **Stick with it!** It will take some patience and grit to get to the end but will be worth the time and effort.

Week 7: Celebrate by touring the buildings and having each group prepare a one minute talk about the structure and experience. Have students complete a peer review evaluation of their teammates and a reflection on their building's final version.

How did go? Homerun or Crash and Burn?

Reflect on how the lesson or unit delivered on your goals

Remix: List your tweaks, areas of emphasis, or revision for using this unit again.

Students work through a combination of in-class instruction, online activities, and potentially guest speakers.