OMES - STEAM Lab - Week of April 18-22

Lesson Overview/Summary

Big Idea: A successful maker/innovator/change agent/superhero has qualities that contribute to her success.

Guiding Questions:

What value does imaginative and fearless thinking add to something I create or something I do?
How does engaging in making and creating make me a change agent?

Interdisciplinary Connections:

Science – Invention, Manufacturing, Ingenuity, Human effect on environment
Technology – Use of tools, construction, typing/word processing, Digital Citizenship
Engineering – Design process, construction
the Arts – Invention, Creativity, Imagination
Math – Measurement, Problem Solving, Perseverance

Standards Addressed:

21st Century Skills: Creativity and Innovation, Critical Thinking, Problem Solving and Decision Making, Digital Citizenship

Engineering:

K-2, 3-5-ETS1-1. – Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time, or cost.
K-2, 3-5-ETS1-2. – Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
K-2, 3-5-ETS1-3. – Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Arts:

AH-I-SA-U-2 – Understand the principles of design and the elements of visual arts.
AH-I-SA-U-4 – Understand that existing and emerging technologies can inspire new applications of structural components.
RI.5.9 – Integrate information from several texts in order to write or speak about a subject knowledgeably.
W.5.9 – Draw evidence from literary or informational texts to support analysis, reflection, and research.

Math:

CCSS.Math.Practice.MP2 – Reason abstractly and quantitatively.
CCSS.Math.Practice.MP4 – Model with mathematics.
CCSS.Math.Practice.MP5 – Use appropriate tools strategically.

Learning Activities & Instructional Strategies

Each student will select one station for the full five-day rotation. Students will commit to the maker project presented at that station with the goal of completing a project for a Mini Maker Expo (student presentation/exposition) on Day 5 of the rotation. When the next rotation meets, students will select another station, etc.

Students will be pulled by groups once in the five-day rotation to visit Guided STEAM, where they will work on a growth mindset or Design Thinking project and where teachers will review and evaluate work and progress on maker projects.

General Daily Structure

Maker Townhall **(whole group instruction)** - *10 minutes* - Introduction to themes, revisiting expectations/procedures, review from previous day
Makerspace **(individual and collaborative work)** - *40 minutes* - Student independent or collaborative Makerspace work in stations differentiated by student interest/choice, one group per class period with teacher in Guided STEAM group
Reflection and Clean-Up - *5/10 minutes* - Student reflection via Google Classroom self-assessment (4th grade only), exit slip or sharing/reflection carpet time

	Makerspace Stations				
	Tinker Workshop	**Music & the Arts**	**Tech Take-Apart**	**Digital Life: Coding (Grades 2, 3, 4)**	**FAB(rication) LAB (Grades 2, 3, 4)**
Learning Targets **I can...**	...create new things to develop new making skills; and, ...create new things not yet found in the world, that serve a purpose or help solve a problem.	...use technology to compose a piece of music. ...construct a musical instrument.	...use tools strategically; ...categorize technological components; ...collaborate to create art with disassembled parts; and, create a detailed, sequenced list.	...create computer programs with loops and events; .....express movement as a series of commands; and, ...write algorithms for everyday tasks.	...translate a two-dimensional sketch into a design in three dimensions; and, ...expertly use TinkerCAD to engage in rapid prototyping.
Student Activities	For specific activities, see individual center sheets, or visit http://oldmillsteam.weebly.com and visit Learning Menus				
***POW!* Questions (Higher Order Thinking)**	Are your maker skills in Zone 1, 2, 3, 4 or 5?	Are your maker skills in Zone 1, 2, 3, 4 or 5?	Are your maker skills in Zone 1, 2, 3, 4 or 5?	Are your maker skills in Zone 1, 2, 3, 4 or 5?	Are your maker skills in Zone 1, 2, 3, 4 or 5?

	How is what you've created today beautiful? How is what you've created today useful? What could be done to improve your invention?	How is what you've created today beautiful? How is what you've composed today like the model piece of music? How is what you've composed today different that other pieces of music?	What could you create with the parts you've discovered? How do the parts make your technology work?	Rate your understanding of coding - 1 (Not so much) to 5 (I could teach it to the class) How do programmers use technology to create art?	How is what you've created today useful? How is what you've created today new and innovative? What could be done to improve your design? How big is your design on TinkerCAD? How big would it be in real life if fully realized?
Evaluation	Formative = Anecdotal notes (Evernote), teacher observation, Maker Journal/reflection sheet, individual station sheets with feedback, student reflections, Google Classroom self-assessments (4th grade classes only) Summative = Project completion for Weekly Maker Faire				
Critical Vocab	Engineering Design Process, possibly architectural terms (arch, buttress, tower)	jazz, musical form, beat, rhythm, harmony, texture, recording, composition	screwdriver, Phillips-head, circuits, Lab Safety	abstraction, algorithm, binary, Blockly, bug, code, command, computational thinking, computer science, conditionals, data, debugging, decompose, digital citizen, digital footprint, iteration, program	tinker, computer-aided-design, three-dimensional, two-dimensional, metric, rapid prototyping, .stl (file format) - STereoLithography, slicing, Makerbot, filament, ABS/PLA filament, extruder
Accommodations/ Modifications	Visual timer, redirection, corrective feedback, preferential seating, model targeted skills/direction, structured transition with advanced warning, frequent feedback, positive feedback **For student specific accommodations/modifications see Confidential Folder in wall tray**				
Homework	No formal homework - students are encouraged to practice making skills at home through the website www.diy.org and practice typing skills through the District-required word processing site TypingAgent provided on school website				

Guided STEAM Lesson Activities and Other Grade Level Variations:

In Guided STEAM for Grades 2, 3, 4, & 5 (Lumpkins) - Students will meet to discuss Design Thinking Process and engage in design thinking activity using The Extraordinaires activity cards.

POW! (Higher Order Thinking Questions):
Are your maker skills in Zone 1, 2, 3, or 4?
How is what you've created today beautiful?
How is what you've created today useful to your client?
How is what you've designed today enduring?

Extension for Grade 4:

Students will use this activity as a gateway to exploring Environmental Engineering and Sustainability. Students will design water filters using current Flint, Michigan water crisis as the context and materials from the Engineering is Elementary unit "Water, Water Everywhere: Designing Water Filters."

Grade 1/Grade 4 - Paleontology

Dinosaur Discovery: Paleontology Unearthed
Essential Questions: - **What is paleontology and what do paleontologists do?** - **What tools help us to understand the way dinosaurs lived and died?** - **What can we know for sure about dinosaurs and what do we have to make educated guesses about?** - **How can paleontologists help us better understand animals that exist today?**

Unit Summary: Aspiring paleontologists learn about the many species of these "terrible lizards" from the famous T-Rex to the only recently identified Linheraptor. Students unravel the mysteries of how these animals lived, looked and died as they literally and figuratively "dig" deep into the fossil record.

This is a two-rotation unit.

Standards Addressed:

21st Century Skills –

Learning Skills – Critical Thinking, Creative Thinking, Collaborating, Communicating

Literacy Skills – Information Literacy, Media Literacy, Technology Literacy

Life Skills – Flexibility, Initiative, Social Skills, Productivity, Leadership

See http://oldmillsteam.weebly.com/lessons.html for more detailed information about the 21st Century Standards used.

Learning Targets:

We can:

- Demonstrate the work of paleontologists.
- Create our own dinosaurs and name them.
- Describe the prehistoric world.

Learning Stations – 40 minutes

Day 1-2 – Dinosaur Measuring Activity – Students will measure lengths of dinosaurs using appropriate math tools/standard measurement/and non-standard units of measure. Students will "wonder" about the height of dinosaurs.

Day 3-4 – Cookie Fossil Activity – Students will excavate the elusive Chocolatechipcookieasaurus Snax and practice recording data from their excavation.

Day 5-6 – Create a Dino – Greek Root Words – Students will create a dinosaur, then place it in an appropriate time period (Jurassic, Cretacious, Triassic) with specific characteristics (herbivore, carnivore, omnivore, bipedal, quadripedal, marine)

Day 6-7 – Create a Dino – Greek Root Words/Create a Fossil – Students will finish their dino creation that use modeling clay to create an impression of their dinosaur.

Day 7-8 – Natural History Museum Expo – Students create an interactive exhibit that enables other students to see what goes on behind the scenes in fossil preparation.

Reflection – 10 minutes

Critical Vocabulary -

Verify, remains, paleontologist, reptile, extinct, fossil, imprint, preservation, mineral, impression, unearthed, species, fossilize, organic, math tool/ruler/foot/feet

Accommodations/Modifications -

Technology, visual timer, redirection, corrective feedback, preferential seating, model targeted skills/direction, structured transition with advanced warning, frequent and positive feedback, instruction based on student interest, instruction based on MAP data

Assessment -

- **Anecdotal notes**
- **Teacher observation**
- **Wonderopolis Tests/Wonder Words**
- **Self-Assessment**
- **Brainpopjr.com Test**
- **Create a Dino Projects**
- **Design Process Prompts –**
  - **What is the problem?**
  - **What have others done?**
  - **What are some solutions?**
  - **What are the constraints?**

Wonders **(Higher Order Thinking Questions):**

For Measurement Activity:

How tall is a dinosaur based on its length?
How big would a dinosaur be based on its footprint?
What was the biggest dinosaur? The smallest?
How do paleontologists use math to determine important information about dinosaurs?

For Cookie Fossil Activity:

What do the pieces you removed represent?
In Station 1, what does the cookie represent?
Why is it important for paleontologists to remove fossils carefully?
Which method of removing chocolate chips worked best and why?
How might tools help paleontologists in the field?
What sort of tools and/or technology do you think a paleontologist might need to remove fossils from rock? Name as many as you can.