Composition through an Engineering Lens

Apollo 13 Lesson Plan

Lesson Plan Note: This lesson may be divided up among more than one class period. Teacher should feel free to omit/include parts as they deem fit for their unique situation and teaching style.

Materials Needed

- Projector
- Sound/Speaker system to play the piece "Music From Apollo 13"
  - James Horner (Arr. James Moss)
  - https://youtu.be/LxbP_DPyzEA
  - Beginning - :38 then 1:50 - end
- Engineering design process flow chart
- Variety of percussion instruments (Glockenspiel, melody bell, triangle, hand drum, maracas, claves, etc.) Use whatever you have in your room.

Main Objectives – Students will be able to:
Compose the soundtrack to an action (i.e. rocket blasting off, etc) using different instruments, tempos and dynamics following the design process.

Music State Standards:
MU.4.O.3.2 – Add expressive elements to a vocal or instrumental piece and, using correct music vocabulary, explain one's choice.
MU.4.F.2.1 – Describe roles and careers of selected musicians.
MU.4.H.3.1 – Identify connections among music and other contexts, using correct music and other relevant content-area vocabulary and explore how learning in one academic area can help with knowledge or skill acquisition in a different academic area.
MU.5.C.1.2 - Hypothesis and discuss, using correct music vocabulary, the composer's intent for a specific musical work.
Other State Standard Benchmarks:
SC.3.N.1.5 - Recognize that scientists question, discuss, and check each other's evidence and explanations.
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
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

Essential Questions:

- How does knowing the timbre of instruments help a composer problem solve?
- How are composition and engineering similar?

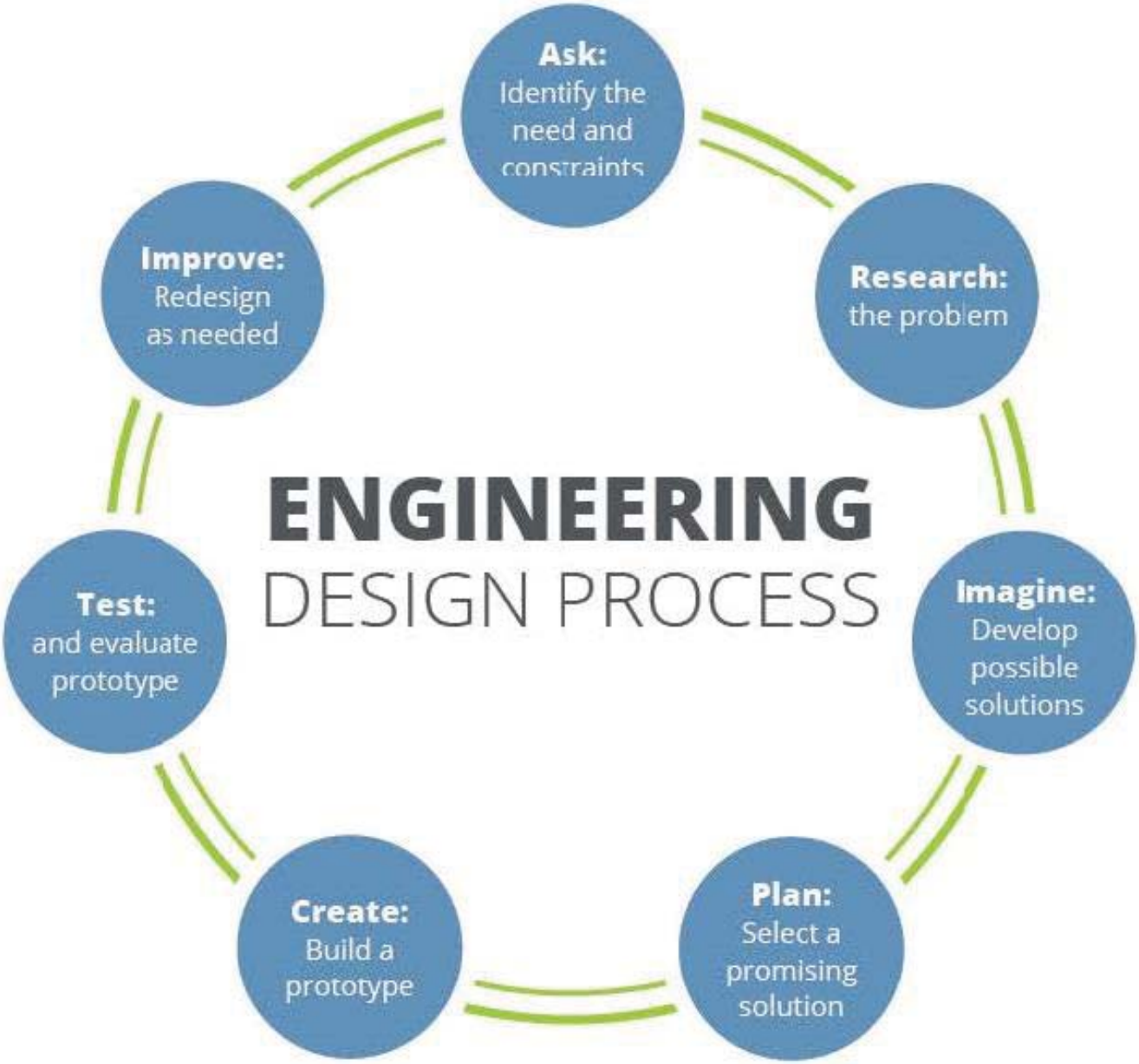
Factual Knowledge – Students will know different tempos, dynamics and timbre of different instruments.
Procedural Knowledge – Students will be able to compose their own music using their choice of instrument dynamics and tempos.
Conceptual Knowledge – Students will be able to understand how and why composers use dynamics, tempo and instruments to portray a certain feeling or storyline

Introduction	Listen to the piece Apollo 13 Tell the students this is a soundtrack to the movie "Apollo 13" Have the students guess or discuss what they think the movie is about. Discuss: • Why the composer used brass instruments at the beginning • Why the dynamics? • Why the tempo? • In which part of the movie might this music happen take place?
Instruction ("I do" – teacher models)	Show the students Engineering Design Process Flow Chart on page 25 Ask - Have you seen this before, where and for what might it be used? • They may have seen it in their classrooms during math or science. • It is the process of thinking engineers use when solving a problem. Ask - Do you think a composer follows these steps when composing music for a movie? Walk through each step and what it might mean for a composer • **Ask:** What is the movie about, what instrument do I have to use, etc • **Research:** What do the instruments sound like, more details about the movie, • **Imagine:** Different melodies, different instrument families being used, differing tempos and dynamics • **Plan:** Choosing a melody they think matches the movie, choosing a tempo and dynamic to match the mood, choosing instruments to match • **Create:** Writing it out on sheet music (we are composing not improvising) • **Test:** Performing the music on non-pitched percussion instruments, playing it along with the music • **Improve:** Going back to make changes

Guided Practice ("We do" – shared practice teacher and students)	Continue showing the Engineering Design Process Flow Chart. Have a set of percussion instruments in the front of the room for students to see. As a class walk through each step of the process for your new composition. ***You have just been hired to compose the soundtrack to a rocket blasting off into space***. • **Ask:** What instruments do we have to work with, what is the sound we need, etc • **Research:** Knowing what a blast off sounds like, what does each instrument sound like, testing each instrument • **Imagine:** Think about all the possibilities of instrument combinations, different tempos, different dynamics • **Plan:** choose your favorite instrument, tempo, and dynamic • **Create:** Have students assigned to play the instrument • **Test:** Play the instruments • **Improve:** make any changes
Independent Practice ("You do" – practice collaboratively/independently)	Divide the class into small groups 4-6 students Give the students a bucket of random percussion instruments. Give the group a scenario, you can choose one of these or make your own. • ***You have just been hired to compose the soundtrack to a rocket flying past the moon***. • ***You have just been hired to compose the soundtrack to a rocket landing***. Allow students 5 minutes to work through the Engineering Design Process to create their sound track composition. Share with the class what each of the groups composed for their scenario.

Extension:

- Create more scenarios or actions for students to compose the soundtrack.
- Find video clips of a rocket blasting off, flying past the moon or rocket landing to add their soundtrack. (Explore collaboration with classroom science teacher)
  - https://youtu.be/lMtWWls4oas?t=120
  - https://youtu.be/OnoNITE-CLc?t=96
  - https://youtu.be/s_7PfocHTmc?t=90
- Using technology, students make a video that includes their soundtrack.
- Show a video clip from the movie Apollo 13 where their engineers have to problem solve with specific materials. https://youtu.be/egWvQuT5TCU


ENGINEERING
DESIGN PROCESS
Ask: Identify the need and constraints
Research: the problem
Imagine: Develop possible solutions
Plan: Select a promising solution
Create: Build a prototype
Test: and evaluate prototype
Improve: Redesign as needed