Unit 4 Guide - Engineering is Responsive

Driving Questions
- How is being responsive important to engineering success?

Description
Students review and discuss customer feedback and teamwork evaluations to identify needed improvements to their design solution and their ability to work collaboratively on a team. The debrief, which includes review and discussions, is a crucial step to inform students of areas they need to address in order to improve. Students then use a project management plan to identify and assign tasks and duties to their team members to iterate their design solution. Afterwards, students present the revised design to their class and their community stakeholder(s). Students engage in a final debrief to address feedback and discuss further improvements. Having explored engineering to address a local problem, students will continue their exploration of what it means to engineer and be an engineer.

Key Concepts
Connect with Engineering: Engineering teamwork, the considerations of ethics in engineering design are important in engineering design Engineering in Society: Engineering solutions must take societal implications into account Engineering Professional Skills: Teamwork skills development is informed by feedback and evaluations. Engineering Design: Effective engineering responds to feedback and evaluations to improve the design.

Learning Outcomes*

Connect With Engineering

CE.A	Iterate and evolve the definition of what it means to engineer and be an engineer.	

Engineering Professional Skills

PS.A	Use various engineering communication methods.	
PS.B	Collaborate effectively in a team.	
PS.C	Develop, implement, and adapt a project management plan.	

Engineering Design

ED.B	Identify appropriate stakeholders and content experts and evaluate their input.	
ED.E	Evaluate solution alternatives and select a final design by considering assumptions, trade offs, criteria, and constraints.	
ED.F	Create a prototype.	
ED.I	Articulate and reflect on how an engineering design process could be applied to solving a problem.	

Misconceptions
- The first solution is THE solution. Avoid design fixation.
- Failure means ONLY that we did not succeed.
- Feedback and criticism = summative assessment only.
- Design teams don't necessarily need feedback from others outside the team to know how well their designed solutions perform.

Teaching Challenges
- Helping students acknowledge feedback will help them improve their design and their ability to work together as a team.
- Ensuring all students have a voice that contributes to their team.
- Project iteration work in teams needs to occur inside the classroom as working outside of class time collaboratively will be challenging. However, we can expect individual parts of the projects to be accomplished outside of class time.
- Due to the availability of stakeholders, the video presentation may not get feedback, but the teacher can still use the listed needs and the feedback to assess their iteration.

Lesson and Content Overview

Lesson Name (duration)	Lesson Description	Activity
4.1 Valuing Feedback [2 hours, 8 mins] Video: Lesson 4.1	Design-a-thon Debrief	3.2.2 Knowledge Café [45 mins]

LIVE

		3.6.2 Chiming with Team Members [40+ mins]
4.2 Iteration [3 hours, 53 mins] Video: Lesson 4.2	Planning for and beginning the process of Design Iteration & Refinement	3.8.3 Project Management Planning for Design-a-thon [1 hour]
4.3 Design Communication Through Presentations [5 hours, 3 mins] Video: Lesson 4.3-4.4	Design Presentation to Stakeholders Iterative debrief: Design iteration and teamwork	4.3.1 Iteration Presentations [3.5 hours] 4.3.2 Musical Share One - Get One [1 hour]
4.4 Reflect on What it Means to Engineer and be an Engineer [1 hour, 35 mins]	Unit Debrief	1.1.2 Think-Pair-Share [15 mins]

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