

TABLE 1

Lesson overview.

Phase	Phase Components	Student Considerations and Goals	Activities that took place both in-person and online
Defining the problem	<i>Problem Statement</i>	To notice there are multiple groups that need water; there is a limited amount of water	Information provided on how limited freshwater is on Earth and even more limited in specific places; How images of different locations without water and pooled water appear (place-based ideas)
	<i>Criteria</i>	Each group must have their water needs met	Present and talk through different pieces of the worksheet
	<i>Constraints</i>	No overflow water	Materials defined for student use. Safety discussed, behavioral expectations
Develop Solutions	<i>Research</i>	To understand the needs of each group and the resources available for the project	Thinking about different ways this occurs in the real world, how do we recreate that through a physical model; modeling discussion with guiding questions; how to use a model with others; Team/communication building
	<i>Generation of multiple solutions</i>	Develop multiple plans (e.g., holes at different levels; different lengths of straw; different sizes of straws)	Supporting multiple student ideas about water and collaboration. Student model presentations and explanations
	<i>Discussion</i>	Discussion related to criteria and problem	Using the engineering design process to help students focus their considerations, going back to the problem definition
	<i>Prototyping</i>	Combined/building ideas	Students are allowed to build and support the building process
Optimization	<i>Testing</i>	Pouring water into the main container	Students test ideas; observe and question testing
	<i>(Re)Evaluating</i>	Assess the amount for each group, was water lost	Measuring water amounts; talking about resource allocation; framed as gathering evidence
	<i>Improving</i>	Changes based on water loss and retesting	(model revision from evidence) Rebuilding and testing