A Long Walk to Water Engineering Design Challenge

1. Class reads A Long to Water (read aloud in ELA, DEAR time, Social Studies). Reading the book can vary from class to class and team to team. ELA teachers have many resources for covering the book.
2. Identify problems that characters faced in the novel.
3. Identify which problems could be solved using engineering and introduce Engineering Design Process.
4. Brainstorming solutions individually.
5. Share potential solutions in small groups.
6. Plan and build prototypes.
7. Give and receive feedback from peers.
8. Test and redesign prototypes.
9. Share designs with the class.
10. Students will write an alternate ending to the novel—one that includes their design.

Day 1	Day 2	Day 3	Day 4
Reading the text aloud	Reading the text in pairs	Sharing in small groups	Testing and redesigning prototypes
Discussing characters and plot	Introduce the EDP. Identify engineering problems	Planning and building prototypes	Sharing designs with the class
Identifying problems in the novel.	Brainstorming solutions individually	Getting feedback from peers	

It is important to note that this is an iterative process.

This timeline can and may vary for each student, class, and team.

The length and the rubric of the alternate ending to the novel can vary based on students, class, and team.

Potential Hiccups

1. Teachers will want to be too involved in the design of student projects, rather than letting students work their ideas out for themselves.
2. Students may view this project in terms that they understand (creating a diorama, or short story, or presentation) instead of an engineering project.
3. Student designs may rely on “magic.” Ex. Students cannot just say they have a designed a button and food will come out. Press students to describe in step-by-step detail how their devices will function.
4. Students may have trouble conceptualizing the task, do not know how to work as a team, or think of solution that was not mentioned in the book.
5. Resources for the design. Send out a letter requesting materials from parents.

Additional resources:

Water Walk A short video with an accompanying poem.

Commonlit Resources Additional readings for students to have a deeper understanding of the issues in Sudan.

3rd World Farmer A FREE computer simulation of the real-world mechanism that sustain poverty in Sudan.

The Boy Who Harnessed the Wind This is a Netflix film that shows how STEM and engineering can make a difference in Africa.

How I Harnessed the Wind TED Talk by William Kamkwamba.

How Can I get Started with Novel Engineering A short article for a better conceptual understanding of the project.

TUCKER MIDDLE SCHOOL STEM
SCIENCE | TECHNOLOGY | ENGINEERING | MATH

A Long Walk to Water EDC Rubric

Group Members _____

CATEGORY	0	-1%	-2%	-3%
Task A: Teamwork, Formation & Documentation	Team identifies and utilizes each member's skill set. Team breaks PBL into sub-tasks with milestones and deadlines. Team members hold each other accountable for progress toward end goal. Team's deliverables are integrated and cohesive. Team roles are clearly documented.	Team breaks PBL into sub-tasks with milestones and deadlines. Team members hold each other somewhat accountable for progress toward end goal. Team's deliverables are integrated and cohesive. Team roles are clearly documented.	Team breaks PBL into sub-tasks with milestones and deadlines. Team members hold each other accountable for progress toward end goal. Team's deliverables are somewhat integrated but incomprehensive or repetitive. Team roles are clearly documented.	No effort is made to identify or utilize each team member's skill set. Team members deflect any constructive criticism. Team member roles are unclear and/or not clearly documented. Deliverables are not integrated and are incomprehensive.
CATEGORY	**4**	**3**	**2**	**0**
Task B: Design Problem Discovery & Ideation (40%)	Student identifies design problem Consistently displays willingness to explore multiple solutions to come up with an innovative result.	Student identifies design problem. Student explores more than one solution to develop an interesting result.	Student identifies design problem. Student considers more than one option but does not actively pursue these additional options.	Student does not identify a problem.
Task C: Budget (20%)	The presented budget is clearly organized. All information is both current and accurate. Sufficient details are present. All costs are supported by quotes from suppliers or taken from other reliable sources.	The presented budget is clearly organized. Most information is current and accurate. Most costs are supported by quotes from suppliers or taken from other reliable sources.	The presented budget is adequately organized. Some information is outdated and/or inaccurate. Costs are NOT adequately supported.	The presented budget is unorganized or non-existent. Most or all information is inaccurate. Costs are not supported.
Task D: Reflection and Understanding of the Text (15%)	Student work reflects a deep understanding of the text. Work uses detailed analysis of the text to support design innovation.	Student work reflects an understanding of the text. Work uses some analysis of the text to support design innovation.	Student work shows some understanding of the text. Work uses little analysis of the text to support design innovation.	Student work does not show any understanding of the text or problems found in the text.
Task E: Testable design (25%)	Student has created a working prototype that works as intended.	Student has a prototype that mostly works as intended.	Student has a prototype but it does not work as intended.	Student did not create a prototype.
Extra Credit	Up to 4 extra points! (discretion of teacher)			

Task/% of Total Points	Raw Score	Total % Points	Final Grade
B/40			
C/20			
D/15			
E/25			