AMUM
Lesson Plan Template

Teacher	
Grade/Subject	**Middle & High Science / STEAM**
Lesson Title	**Build like Kamkwamba: Engineering & Renewable Energy**

Lesson Overview

Students will explore natural, recycled materials, and renewable energy and their uses, engage with the story of William Kamkwamba, design and fabricate a device similar to Kamkwamba's.

Suggested Standards

- ESS3: Earth and Human Activity
- ETS1: Engineering Design
- ETS2: Links Among Engineering, Technology, and Applications of Science

Objectives

- Explore how natural and recycled resources can be used for renewable energy.
- Understand William Kamkwamba's story as an example of innovation of engineering and environmental science.
- Analyze traditional African art and its use of natural materials.
- Design and fabricate a small wind-powered device using natural and recycled materials.

Assessment

- Pre-Instruction guided recall questions
- Strategic questioning as a group during instruction
- Fabrication and functionality of their device
- Present and reflect on choices made during the activity (group talk or exit ticket)

Materials

Images and examples of natural & recycled resources, Images/videos/diagrams and examples of windmills/turbines, William Kamkwamba's 2009 TEDGlobal Talk, misc. natural and recycled materials (activity), tools for construction of a small wind powered device (scissors, tape, glue, etc.), fan to test student devices

Introduction

- Show William Kamkwamba's TEDGlobal 2009 talk, How I harnessed the wind.
- Ask students:
    - "What problem was William trying to solve?
    - "What materials did he use and why?" (Locally available materials)

Instruction

- Introduce the concepts of locally available resources and renewable energy, specifically wind power.
- Introduce windmills/turbines, go over the key components, and look at diagrams with students.
    - What are the bare minimum components needed to create a windmill?
    - Remind students of the scrap materials William used: tractor fan, shock absorber, PVC pipes, bicycle frame and an old bicycle dynamo.

Activity

- Students will design and fabricate a small wind-powered device that spins when placed in front of a fan using natural and recycled materials.
    - Activity can be completed solo or as a small group.
- Encourage students to consider the available materials and create sketches of their designs.
- Encourage trial and error!
- Testing:
    - Have students place their projects in front of a fan and evaluate what worked and what didn't.
    - Have students either write or present about the function, materials, and device efficiency.

Reflection

- Have students complete an exit slip or journal prompt answering:
    - "How do creativity and resourcefulness help people solve real-world problems?"
    - "What did you take away from William Kamkwamba's story that can apply to your life?"

Additional Resources

- Link to William Kamkwamba's TED talk: William Kamkwamba: How I harnessed the wind
- Watch or read the book based on William’s story, The Boy Who Harnessed the Wind