Tug, Stack, and Build: Engineering with Rubber Band Dynamics

Grade Levels: Third to Fifth Grade / Duration: 60 minutes

Standards:

- Next Generation Science Standards (NGSS):
    - 3-5-ETS1-1: Define a simple design problem reflecting a need or a 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.
- Common Core State Standards (CCSS):
    - CCSS.ELA-LITERACY.SL.3.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
    - CCSS.ELA-LITERACY.SL.4.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
    - CCSS.ELA-LITERACY.SL.5.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

Objectives:

- Students will collaborate in small groups to synchronize movements in order to unstack and restack cups using rubber bands and strings.
- Students will demonstrate effective communication and problem-solving skills during the activity.
- Students will reflect on the teamwork process and discuss strategies for improvement.

Materials:

- Rubberbands
- Strings
- Plastic cups (vary the amount based on grade level)
- Timer or stopwatch

Procedure:

Introduction (5 minutes):

- Gather students and introduce the activity.
- Explain that students will work in small groups to unstack and restack cups using rubber bands and strings.
- Briefly discuss the importance of teamwork and collaboration in completing the task.

Group Formation and Instructions (5 minutes):

- Divide students into small groups and distribute materials.
- Explain the challenge: to unstack and restack cups to form a pyramid using the rubber bands and strings.

Activity (30 minutes):

- Allow students time to work in their groups to experiment with the rubber bands and strings to unstack and restack cups.
- Encourage communication and collaboration as students strategize and problem-solve together.
- Differentiate the challenge by varying the number of cups for each group, based on grade level.

Testing and Discussion (15 minutes):

- After the activity, gather students for a discussion.
- Ask each group to share what strategies they used to unstack and restack the cups.
- Facilitate a reflection on the teamwork process, discussing what worked well and what could be improved.

Conclusion (5 minutes):

- Summarize key points from the discussion.
- Thank students for their participation and teamwork.
- Reinforce the importance of collaboration and problem-solving in engineering challenges.

Assessment:

- Observation of students' collaboration and communication during the activity.
- Participation in group discussions and reflection on teamwork.

Extension:

- Encourage students to experiment with different cup stacking techniques and strategies.
- Challenge students to design and build their own structures using rubber bands and strings, incorporating principles of engineering and teamwork.