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| Lesson 5: Develop a plan |

Problem Statement:

The city of Bothell needs help! In the event of a natural disaster (e.g., earthquake, fire, flood, land/mudslides, and storms), power goes out, methods of communication and transportation are often lost or damaged, medical care is needed, and basic survival resources need to be maintained and distributed to those in the disaster area. Often, resources are low or have been damaged/contaminated. Your goal is to aid the community in the event of a disaster, with each group in charge of an area within the city affected by the disaster. Groups will identify two problems that can occur within a city grid, then develop a physical solution (build/repair) or a conceptual solution to a problem in future lessons.

Learning Objectives: Students will…

* Develop a Plan : After research students will develop a plan to solve their problem, either by budgeting a physical solution to build a model or a develop a conceptual solution to analyze.
* Implement a detailed labeled design sketch and determine costs to implement solution using a budget.
* Utilize 21st century skills in a group setting.

Lesson Standards (NGSS, CCSS, CTE):

* MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
* MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions already in place, to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
* MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Materials:

* Calculators for budget proposals
* Access to computer/internet for additional research of cost of materials/supplies
* Google Powerpoint - Disaster Strikes Lesson 5
* Physical Models: Materials needed to build physical models of proposed student solutions..
  + Example Road/Bridge Model Materials: popsicle sticks, toothpicks, index cards, wooden dowels, clay, cotton balls, soil, straws, spoons, yarn, rocks, sand, legos, rubber band, sponges, small wooden planks, cardstock, small plastic cups, plastic bins
  + Student Worksheet to record and document plan.

* Conceptual Models:
  + Access to internet and computer devices to develop powerpoint, PREZI, moviemaker, (tech presentation tool of choice) presentations. Students could also develop a mini model display of their conceptual idea with advertisement using construction paper, cardstock, fabric.
  + Student Worksheet to record and document plan.

Lesson Preparation:

* + Student Worksheet to record and document plan.
  + Materials listed above for physical models - preparing access to these materials for student evaluation/collection before building model.

Time Required:

40 Minutes (one class period)

Grouping of students for instruction:

* Students will be in their “anchor groups” which is their assigned seating. These groups are based on prior performance in order to scaffold each group to have a strong leader, strong academic performer, and a social individual. Each group should have 3-4 students.

(TEACHER SPECIFIC) Brainstorm What Students Know/Need to Know from prior lessons

Student Worksheet to record and document plan.

LESSON PROCEDURE:

* Teacher leads discussion on how to document and explain proposed plans. Teacher may use example of a developed plan on an unrelated (or related) solution to facilitate student thinking in developing their plan. Use Google Catastrophic Events Powerpoint Lesson 5 to demonstrate examples.
* Teacher evaluates each team’s plan, each student completes this on their own individual worksheet with their team. Teacher evaluation occurs with a conference with each team as we evaluate information written on the student PBL Disaster Strikes: Step 3 Develop a Plan.
  + Is the material budget written and tallied for physical solutions?
  + Is there a labeled diagram which shows how the materials will be built?
  + Does the conceptual plan have a labeled, step by step procedure diagram of how the plan will be carried out?
  + Does the conceptual plan have materials needed for this solution to be carried out and researched actually cost of items with total budget projected are listed?
* Teacher stamps each member’s plan once evaluation is complete.

Accommodations:

* Accommodations based on individual student/group needs. For example, assigning roles within the group, two students work on budgeting and the other two students focus on the labeled diagram of solution. For physical solutions, assign two students to collect materials and evaluate cost and budget. The other two students begin to draw out the labeled diagram of how the materials will be put together.

Extensions:

* Student groups that need extension to this lesson can think of modifications to their proposed solutions. What foreseen missteps might occur? What are some problem solving ideas the group can list and brainstorm before testing their solution?