

# DEVELOPING “TEACHER-MADE” STEM DESIGN CHALLENGES

Now that your students have completed some introductory STEM design problems, you may want to develop additional activities that encourage creativity, cooperation, and problem solving. One of the most difficult, yet important, skills that a teacher must master is the ability to be critical and fair with the work of others. Mediocrity flourishes when teachers are afraid of being critical. And, in truth, teachers are not fair to their students when they are unduly non-critical. The criteria listed below are designed to allow you to critically analyze problem solving activities designed for elementary STEM classroom. Use these criteria when evaluating commercially available problem solving activities, those developed by fellow teachers, or problem solving activities of your own creation. High-quality problem solving activities exhibit the following characteristics:

## Rationale

All quality lessons contain a rationale. A rationale provides the student with a reason for completing the lesson. It also provides the student with the answer to the question: “Why do I need to know this?”

- Does the engineering design problem include a rationale?
- Could I defend this problem solving activity if a parent asked, “why is my child doing this activity?”
- How could the rationale, included with this problem solving activity, be improved?

## Material Lists

All problem solving lessons should contain a list of materials available for the student. This list of materials should contain all materials that the students will be able to use in their solution to the given problem. By providing the list of materials necessary, both the teacher and the student can adequately prepare for the activity.

- Does this problem solving activity contain a list of materials?
- If so, does this list seem reasonable? (could the problem be solved using this list?)
- What materials could be added to the list to make the problem more reasonable?

## Scenario

Problem solving lessons should contain some type of background information that puts the problem in context. This background information could be factual or it could be in the form of

**Summary**

Remember, one purpose of a problem solving activity in elementary STEM is to allow students the opportunity to apply the content being delivered in the classroom. An additional purpose for using the problem solving method (or any other method) of instruction is to extend the knowledge and capabilities of the students involved. Problem solving activities should be summarized, evaluated, and synthesized by the student. This summarization allows the student the opportunity to reflect upon the activity and categorize this newly learned information. Quality problem solving activities contain ample opportunities for student or teacher summarization. This summarization may be accomplished by providing the teacher or student with a series of probing questions, like:

- What did you like the most about this lesson?
- How could've your solution to the given problem been improved?
- How could've you used solutions from classmates to improve your final solution?
- What additional materials would have been helpful in solving the given problem?

