

## Design Tool 1.3: STEM Basics

*Directions:* Use this tool as a reference, as a checklist for your STEM classroom or program, and as a discussion/learning tool with teachers who are working together to teach STEM. Note that some basics must be scaffolded for elementary students.

### What Things Are in Place in a Quality STEM Education Program?

#### STEM Curriculum

1. Science, technology, engineering, and mathematics are applied to solve real-world problems and challenges.
2. STEM content areas are integrated in meaningful ways to solve problems or challenges.
3. Science and mathematics content is deep, grade-level appropriate, and applied.
4. An engineering design process drives student thinking and decision-making.
5. The STEM curriculum, over time, uses a broad range of engineering practices.
6. The STEM problems or challenges include explicitly stated limitations (constraints) and conditions that must be met (criteria) for a successful solution.
7. Multiple approaches and different possible solutions exist for solving the problem.

#### STEM Instructional Practices

8. Teachers use an inquiry-based and student-centered approach that involves students in active engagement and hands-on investigation.
9. Failure is regarded as okay, as a natural part of the design process, and an essential step toward creating an improved or successful solution.
10. Teachers connect the problems or challenges to STEM careers and applications, especially those of local relevance.

## **STEM Student Practices**

11. Students work in productive teams and use beneficial teamwork behaviors.
12. Students (in teams) brainstorm, design, and create prototypes to solve the problem; then test and evaluate their prototypes' performance and make decisions for redesign.
13. Students use effective communication approaches to describe their challenge and justify their results and/or recommendations.
14. Students demonstrate curiosity, innovation, entrepreneurship, and creativity.