Growing the STEL Maker requires the learner to apply effective practices. This session presents ideas on how to use Making and Doing Practices to implement STEL Core/Contexts and integrate STEM learning.
### Three session goals

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<th>Review STEL Organizers</th>
<th>Provide/Create STEL Examples for Classroom Use</th>
<th>Making &amp; Doing Practices</th>
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#### STEL Challenge (Teacher Guide)

**Title:** Skipper Jumper's Nutrition Show

**Grade Level:** Kindergarten - 1st grade

**Link to Classroom:** Skipper Jumper by Judy Orihuela

**STEM: Measuring, Problems Solving, Modeling**

**STEM Literacy:**

1. Describe several measurable attributes of a single object, including but not limited to length, weight, height, and temperature.
2. Solve a simple model involving a physical model to illustrate that the shape of an object helps a function as needed to solve a given problem.

**Standards for Technology and Engineering Core Concepts of Technology and Engineering**

A. Business has systems that work together to accomplish a goal.
B. Science investigation system to operate tasks.
C. Design that maximize the desired for use because they promote diverse impact as contributors to the problem.
D. Design that are easy to keep clean in the hands.
E. Collaboration effectively as a member of a team.

**Big Ideas**

- We can use materials to problem solve.
- After reading a book, we can identify the role of the characters.
- When we solve problems, we can construct models that fit the context of the problem.
- The engineering design process can help people solve construction problems.

**Ponder:** Skipper shows how important it is to identify the role of the characters. We need to identify the role of the characters because the role of the characters can add to the overall understanding of a problem.
Engineering ... Verb

Act of engineering
- Envisioning
- Comparing
- Designing (under constraints)
- Making
- Evaluating
- Re-designing
- Presenting/marketing

Career of engineering
- The use of scientific and technological principles to design and plan the building of machines, structures, and other items, including bridges, tunnels, roads, vehicles, and buildings
Effective Making & Doing Practices

“Real World” Challenges
Solving challenges that address standards in a real-world scenario

Engineering Design
Breaking ill-structured problems down into smaller parts to identify strategies, techniques, and possibilities for solving them creatively

Teamwork
Utilizing 21st Century Skills to communicate, collaborate, cooperate and think critically
Creating Making and Doing STEL lessons

Lessons
- Literacy-based lesson prompts
- Construction blocks
- Coding
- Paper engineering
- Scale models
- Real-world applications
- Application of concepts
- Opportunities for teamwork

Creating Lessons
- Start with standards
- Determine intended outcomes first
- Remember, applied learning leads to long-term learning gains
- Use engineering design methodology
- Ill-structured problems are best
- End with a presentation or defense

Lesson Writing Tool
- STEL Lesson Plan Tool
- On the ITEEA website
- Efficient - standards aligned
- End result - complete lesson plan emailed to you
Strategically integrating STEM context

Resources

STEL Appendix A (pg. 118) ... interactive STEL website that provides resources and examples to assist educators in the development of integrated STEM curriculum and lessons. (https://www.iteea.org/Activities/2142/STEL/stel_resources/175086.aspx)

Features:
- A compendium that lists the benchmarks at the grade band level.
- A crosswalk matrix that links STEL standards and benchmarks to Next Generation Science Standards (NGSS), Common Core Mathematics (CCSS-Math) benchmarks, and Common Core English Language Arts (CCSS-ELA) benchmarks.
  https://www.iteea.org/File.aspx?id=175089&v=cf8fd955
- A verb matrix that aligns benchmarks to the cognitive, affective, and psychomotor domains (p. 120).
  https://www.iteea.org/File.aspx?id=175128&v=lace7ee6

STEL Lesson Plan Tool

ITEEA Webpage

Publications > Standards > (tab) STEL Lesson Plans
https://www.iteea.org/Activities/2142/STEL/STELLessonPlans.aspx#tabs

Features:
- Demonstrates how to use the Lesson Plan Tool
- Provides Copy/Paste fields
- Check boxes for STEL Standards/Benchmarks
- Allows you to incorporate your state standards
- Includes link to integration of other subject content learning
- Has ITEEA Lesson Plans
Lesson

How Not To Start Third Grade- Literature-based Curriculum Design Challenge

Teachers Guide

Grade Level: 3rd to 4th Grade

Literacy Connection: How Not To Start Third Grade by Cathy Hapka and Ellen Titlebaum

STEM Content Standards:

STEM CHALLENGE

Title: Vibe RCT Challenge (Teacher Edition)

Grade Level: 4th - 8th

Literacy Connection: Zap! Vibe E. Coyote Experiments with Energy by Suzanne Slade

Unit: Materials, Motion, Circuits, Balloons, Weight, Resistance, Troubleshooting

Science:

Physical Science:

4-PS2-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

Technology and Engineering:

Engineering, Technology, and Applications of Science:

4-ETS1-1: Define a simple design problem (e.g., How do we make this bottle hold more water?) within a constrained context.

4-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to satisfy criteria and constraints of the problem.

4-ETS1-3: Plan and carry out investigations in which variables are controlled and failure points are identified to identify aspects of a model or prototype that can be improved.

Standards for Technological and Engineering Literacy

Standard 2: Core Concepts of Technology and Engineering Education

1. Describe how some systems in a system that operates as part of another, larger system
2. Illustrate how, when parts of a system are missing, it may not work as planned.
3. Describe requirements of designing or making a product or system.
Create a Making & Doing Lesson


• Start with standards
• Determine intended outcomes first
• Remember, applied learning leads to long-term learning gains
• Use engineering design methodology
• Ill-structured problems are best
• End with a presentation or defense

• Literacy-based lesson prompts
• Construction blocks
• Coding
• Paper engineering
• Scale models
• Real-world applications
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• Resources
  [https://www.iteea.org/Activities/2142/STEL/stel_resources/175086.aspx](https://www.iteea.org/Activities/2142/STEL/stel_resources/175086.aspx)
• Publications > Standards > (tab) STEL Lesson Plans
  [https://www.iteea.org/Activities/2142/STEL/STELLessonPlans.aspx#tabs](https://www.iteea.org/Activities/2142/STEL/STELLessonPlans.aspx#tabs)