**Children’s Engineering – A Definition**

“Children's Engineering is a common name given to technology education at the elementary level. It integrates STEM education into the elementary classroom. Children’s Engineering includes hands-on, age-appropriate technology-based activities that enhance, not add to, any local, state, or national curriculum. These activities are designed to extend and to promote mastery of required standards. Taught skills are applied, not just to one content area, but across the curriculum in authentic integrated learning lessons.”

(Children’s Engineering a Handbook for Elementary Teachers, 2009 By Ginger Whiting and Marcia Hickey)

**Children’s Engineering is the “T & E” in STEM**

**Science, Technology, Engineering, and Mathematics**

**Science** – deals with natural phenomena. It explains nature so that humans can understand their natural environment.  
**Technology** deals with human-made phenomena. It is everything in our environment that has been human made or human altered (artifacts). It is how people have modified the natural world to meet their needs and wants.  
**Engineering -** is the application of mathematics, science, technology and creativity to make and improve the things we need, and to benefit mankind.  
**Mathematics** – is the study of numbers, patterns, space and change.

**Why is STEM education important for all students?**

* The number of college graduates in the US earning STEM-related degrees has fallen from 3rd to 17th in the last 30 years
* Specialized jobs in STEM fields increased 32% from 2002-2012
* Students need to develop the interest and skills needed to be successful in STEM fields if the US is to remain a leader in innovation
* STEM education provides students with the skills needed for the 21st century workplace: critical thinking, problem solving, creative thinking, collaborative learning, oral and written communication

**How can I use Children’s Engineering in my classroom?**

Add criteria to an existing project or activity that you use. Suggestions include requiring: a simple machine, moving parts, pop-ups, an electric feature, geometric shapes, angles of different measures, size limits for measuring, load requirements for weight, that the product stand on its own, the use of certain energy sources: pneumatics, hydraulics, solar, wind, battery, a budget in which materials cost various amounts, the use of scale measurement: 1/4 in. = 1 ft.

Set up a STEM corner in your classroom for students who complete class assignments early.

**The Design Technology Loop**

This is the process for completing a Children’s Engineering project.

1. **What is the problem?** The challenge and criteria are presented.
2. **Brainstorm solutions.**
3. **Design and build the best solution.**
4. **Test the solution.** Does the product meet the required criteria?
5. **Evaluate the solution.** Did it work? What could be improved, added, or changed?

**Parts of a Design Brief**

* **Background**: Describes what has lead up to this project. The skill, fact, or theme covered in class.
* **Challenge**: Poses a problem and describes what type of product will be designed
* **Criteria**: Lists specific components that must be present in the finished project. This is the basis for evaluation and assessment.
* **Materials**: Lists consumable items that may be used
* **Tools**: Lists items used to construct the product

**Conducting a Children’s activity in the classroom or Engineering Lab**

1. Choose a ready-made design brief from the Children’s Engineering Folder or create your own!
2. Collect required materials and tools
3. Present challenge to your students in the design brief format. Make sure they understand the problem and complete the brainstorming step in the portfolio.
4. Review safety rules and procedures with students. Point out materials and tools that are available for them to use.
5. When students complete projects, have them complete their portfolios and self-evaluations.
6. Leave time for cleanup by students.
7. Allow time for students to share their solutions. They should be able to justify and explain their choices and final product. Please note that not all products will look the same. This is not a science experiment or a craft activity.

**Children’s Engineering:  
Teaches** children to use creative and critical thinking skills while applying classroom learning.  
**Addresses** individual learning styles, needs of gifted students and special needs students.  
**Promotes** state and national standards, critical and creative thinking, problem solving, hands-on learning, decision-making, reading comprehension, cooperative skills, and differentiated instruction.  
**Results in** ownership of essential knowledge, self-confident learners, and applied knowledge.

(Children’s Engineering Educators, LLC, 2012)

**S\*T\*R\*E\*A\*M\*S**

Children’s Engineering activities can integrate, reinforce, extend and enhance any area of the elementary curriculum including:  
**Science \* Technology \* Reading \* Engineering \* Arts \* Math \* Social Sciences**

For more information contact Bobbie Arbogast

[barbogast@rockingham.k12.va.us](mailto:barbogast@rockingham.k12.va.us)