



Chapter 3 – Elementary School Technology and Engineering

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1 – Introduction

This chapter contains the materials from the **ITEA- STEM Center for Teaching and Learning™**, Technology Starters: A Standards-Based Guide (ITEA 2002) for grades K-5. This document was developed by and for the STEM Center Consortium for use by its members. Missouri has been a consortium member since the 2000-2001 school year, the year that this product was developed, giving us the rights to utilize, copy and distribute this product to our teachers. The Technology Starters Guide contains 180 pages.

These guides are available by visiting the **ITEA- STEM Center for Teaching and Learning™, Engineering by Design™** consortium website at

<http://www.iteaconnect.org/EbD/CATTS/cattsconsortium.htm> and clicking on the Missouri Access

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2 – Why Should Elementary Students Study Technology and Engineering?

We seem to have no problem beginning the formal primary education of our nation's youth with core subjects such as language arts and mathematics. National conferences, field research, state task force reports, and local curriculum reform efforts acknowledge that a study of the most pervasive and powerful cultural force, technology, should be a regular and significant subject for study in all grades in our nation's schools. This new "core" subject is essential to preparing students for life in a world defined by technology and innovation.

Imagine a world without the wonderful innovations that are found in all areas of daily life: in transportation, health care, communication, recreation, and careers. Students who develop technological literacy beginning in the early grades will have the thinking skills and basic understandings necessary to use and manage technology responsibly and to make wise decisions concerning new innovations.

Technology is not an add-on subject in the primary grades. Rather, the study of technology is an integral part of the elementary curriculum. At this level, technology provides the theme or context for studying other subjects. For example, studying life in the colonial period of American history includes content concerning what kinds of houses people lived in and how news and events were communicated between towns and across the ocean to Europe. The early settlers devised systems for transportation and developed tools and irrigation systems for growing crops. An activity incorporating the study of technology might engage students in designing and making models of colonial homes and communities, designing and creating kitchen utensils out of materials available at that time, or assembling a medical kit with mock supplies that would have been used at the time. Students are curious about how people lived in different contexts; technology provides an exciting context for studying and experiencing ways that people have adapted to new places and improved upon what was already there.

3 – Course Content, Unit Descriptions, and Resources

There are a variety of options available to schools and they are copyrighted and require membership and/or contractual agreement between the local educational authority and the International Technology Education Association.

Standards-Based Resources that provide Strategic Advantages for Elementary Students: (ITEA)

Innovation, Innovation, and Inquiry (I3)

Invention, Innovation, and Inquiry units for Technological Literacy, Grades 5-6, was funded by the National Science Foundation. This project is so named because invention and innovation are the hallmarks

of technological thinking and action. Each unit has standards-based content, suggested teaching approaches, and detailed learning activities, including brainstorming, visualizing, testing, refining, and assessing technological design. Students will learn how inventions, innovations, and systems are created and how technology becomes part of their lives. The following units are available and contain teacher background information, handouts, transparency masters, and a student packet that are designed to integrate mathematics and science with technology and take 8 to 10 days:

Invention: The Invention Crusade

Students develop an idea for an invention by designing and constructing a working model or prototype of a gadget that helps a small child to do a household task.

Innovation: Inches, Feet, and Hands

Students use the engineering design process to design and develop and improve a product that is used by the human hand.

Communication: Communicating School Spirit

Students examine communication processes and mediums by designing, developing, and implementing different types of commercial projects promoting school spirit.

Transportation: Across the United States

Students investigate the systems of transportation and how transportation has impacted the United States. Then they apply their learning by designing a transportation vehicle.

Inquiry: The Ultimate School Bag

Students use inquiry skills to redesign a school bag and construct a model of the “Ultimate School Bag”.

Manufacturing: The Fudgeville Crisis

Students explore food preservation and packaging as their companies mass-produce and package “fudge” for a fudge festival.

Construction: Beaming Support

Students act as structural engineers and design and construct at least two laminated paper beams—testing, evaluating, and redesigning their beams for maximum strength.

Power and Energy: The Whispers of Willing Wind

Students gain an understanding of wind energy and power as they construct a device that captures wind energy and converts it to electricity.

Design: Toying with Technology

Students explore two-dimensional (2-D) and three-dimensional (3-D) visualization processes and mediums by designing, developing, and building toys that solve a given problem.

Technological Systems: Creating Mechanical Toys

Students investigate two mechanical devices—pneumatics and linkage mechanisms—and design a toy that uses both to create movement.

These resources and more are available online through the ITEA web publications resource page at:

<http://www.iteaconnect.org/Membership/elementaryteacher.htm>

A recommended resource for Elementary Teachers



The Virginia Children's Engineering Council (VCEC) is an excellent resource and it is dedicated to developing design and technology instructional material, and providing local, regional and statewide in-service opportunities for educators at grades K-5 throughout Virginia. The in-service programs help teachers ensure that children develop an understanding of how to use, create, control, and assess technology. These instructional experiences are provided in a design, critical thinking, and problem solving context. They undergird attainment of selected Standards of Learning in English, mathematics, science, and history and social science