

I³

I³ is short for Invention, Innovation, and Inquiry: Units for Technological Literacy, Grades 5-6, an ITEA project 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 designs. Students learn how inventions, innovations, and systems are created and how technology becomes part of people's lives.

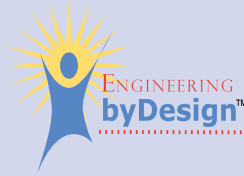
“I think this is a fantastically designed unit. I am excited to use it with my students.”

(Marlene M., 6th grade teacher, Brooklyn, NY)



“It told me that not only adults can make innovations or innovate, kids can too!”

Student quote



International Technology Education Association

Invention, Innovation, and Inquiry (I³)

1914 Association Drive
Reston, VA 20191

to order these units,
contact ITEA at:
www.iteaconnect.org/i3/index.htm
(703) 860-2100

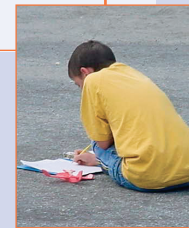
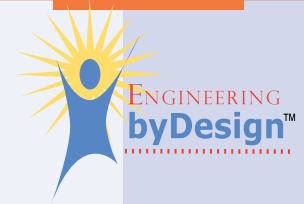
“It’s a great unit! The hands-on, along with the critical-thinking skills the students will develop, will be used in other areas. I hope to connect this unit with every aspect of their learning.”

(Steve S., 6th grade teacher, East Hartford, CT)

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Invention,
Innovation,
and Inquiry



Unit Titles and Descriptions:

1. **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.

2. **Innovation: Inches, Feet, & Hands**

- Students use the engineering design process to design and develop an improved product that is used by the human hand.

3. **Communication: Communicating School Spirit**

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

4. **Manufacturing: The Fudgeville Crisis**

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

5. **Transportation: Across the United States**

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

6. **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.

7. **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.

8. **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.

9. **Inquiry: The Ultimate School Bag**

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

10. **Technological Systems: Creating Mechanical Toys**

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

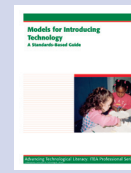
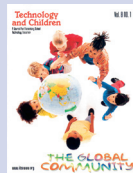
What students learned from I³ units (according to teachers):

- Inquiry skills
- Problem-solving skills
- The engineering design process
- Research skills via Internet/printed sources
- Writing skills
- Thinking “outside the box”
- Enhanced creativity
- An appreciation of inventors
- An historical perspective of (inventors’) struggles and achievements
- That even a good design may fail
- How to follow specific directions
- To test different materials
- The role technology plays in their lives
- The concept of systems and subsystems
- To communicate a message to a specific audience
- What makes a good design
- Designing skills
- Inventing takes much work
- Technology uses math, science, language arts, etc. to make something work as designed
- How people’s wants and needs dictate what is developed and what is successful
- To identify alternatives in decision-making situations



Other ITEA products aimed specifically to the elementary level:

Technology & Children; Kids Inventing Technology Series; Models for Introducing Technology: A Standards-Based Guide; and Technology Starters: A Standards-Based Guide.



What students did (according to teachers):

- Constructed an innovated product using the design process
- Used the design process to innovate two objects
- Used problem-solving techniques to complete their invention
- Worked as part of a team
- Implemented the design process in the problem solving of their package design
- Analyzed simple products to determine their component parts, how they work, and their ergonomic features
- Used computer technology to create and enhance output
- Produced a product from start to finish!
- Explored the entire process of invention from initial design to modeling to patent
- Gathered information from a variety of media, like books, Internet, and newspapers
- Used a variety of “soft” materials and simple tools to construct simple design models
- Created diagrams and sketches by hand and electronically to express design ideas and solutions

All units contain teacher background information, handouts, transparency masters, and a student packet.

Each unit is designed to integrate mathematics and science with technology and take 8 to 10 days.

“Students learned that technology has influenced our way of life.”

(Susan H., 5th grade teacher, Westerville, OH)