

# NATIONAL TECHNOLOGY EDUCATION STANDARDS & BENCHMARKS

## GRADES 6-8

### **Standard #1 Students will develop an understanding of the characteristics and scope of technology**

- F. New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.
- H. Technology is closely linked to creativity which is resulted in innovation.
- G. The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.
- I. Corporations can often create demand for a product by bringing it onto the market and advertising.

### **Standard #2 Students will develop an understanding of the core concepts of technology**

- M. Technological systems include input, processes, output, and, at times, feedback.
- O. An open-loop system has no feedback path and requires a human intervention, while a closed-loop system uses feedback.
- Q. Malfunctions of any part of a system may affect the function and quality of the system.
- S. Trade-off is a decision process recognizing the need for careful compromises among competing factors.
- U. Maintenance is the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability.
- N. Systems thinking involves considering how every part relates to others.
- P. Technological systems can be connected to one another.
- R. Requirements are the parameters placed on the development of a product or system.
- T. Different technologies involve different sets of processes.
- V. Controls are mechanisms or particular steps that people perform using information about the system that causes systems to change.

### **Standard #3 Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study**

- D. Technological systems often interact with one another.
- F. Knowledge gained from other fields of study has a direct effect the development of technological products and systems.
- E. A product, system, or environment developed for one setting may be applied to another setting.

### **Standard #4 Students will develop an understanding of the cultural, social, economic, and political effects of technology.**

- D. The use of technology affects humans in various way, including their safety, comfort, choices, and attitudes about technology's development and use.
- F. The development and use of technology poses ethical issues.
- G. Economic, political, and cultural issues are influenced by the development and use of technology.
- E. Technology, by itself, is neither good nor bad but decisions about the use of products and systems can result in desirable or undesirable results.

### **Standard #5 Students will develop an understanding of the effects of technology on the environment**

- D. The management of waste produced by technological systems is an important societal issue.
- F. Decisions to develop and sue technologies often put environmental and economic concerns in direct competition with one another.
- E. Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.

### **Standard #6 Students will develop an understanding of the role of society in the development and use of technology**

- H. Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.
- J. A number of different factors, such as advertising, the strength of economy, the goals of the company, and the latest fads contribute to shaping the design of and demand for various technologies.
- I. The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.

### **Standard #7 Students will develop an understanding of the influence of technology on history**

- C. Many inventions and innovations have evolved by using slow and methodical processes of tests and refinements.
- E. The design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.
- D. The specialization of function has been at the heart of many technological improvements.
- F. In the past, an invention or innovation was not usually developed with the knowledge of science.

### **Standard #8 Students will develop an understanding of the attributes of design**

- E. Design is a creative planning process that leads to useful products and systems.
- F. There is no perfect design
- G. Requirements for a design are made up of criteria and constraints.

### **Standard #9 Students will develop an understanding of engineering design**

- F. Design involves a set of steps, which can be performed in different sequences and repeated as needed.
- H. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.
- G. Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.

**GRADES 6-8**  
**NATIONAL STANDARDS & BENCHMARKS**

**Standard #10 Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving**

- F. Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system
- G. Invention is a process of turning ideas and imagination into devices and systems. Innovations is the process of modifying an existing product or system to improve it.
- H. Some technological problems are best solved through experimentation.

**Standard #11 Students will develop abilities to apply the design process**

- H. Apply a design process to solve problems in and beyond the laboratory-classroom.
- I. Specify criteria and constraints for the design
- J. Make two-dimensional and three-dimensional representations of the designed solution.
- K. Test and evaluate the design in relation to the pre-established requirements, such as criteria and constraints, and refine as needed.
- L. Make a product or system and document the solution

**Standard #12 Students will develop abilities to use and maintain technological products and systems**

- H. Use information provided in manuals, protocols, or by experienced people to see and understand how things work.
- I. Use tools, materials, and machines safely to diagnose, adjust, and repair systems.
- J. Use computers and calculators in various applications
- K. Operate and maintain systems in order to achieve a given purpose.

**Standard #13 Students will develop abilities to assess the impact of products and systems**

- F. Design and use instruments to gather data.
- G. Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology .
- H. Identify trends and monitor potential consequences of technological development.
- I. Interpret and evaluate the accuracy of the information obtained and determine if it useful.

**Standard #14 Students will develop an understanding of and be able to select and use medical technologies.**

- G. Advances and innovations in medical technologies are used to improve healthcare.
- H. Sanitation processes used in the disposal of medical products help to protect people from harmful organisms, and disease, and shape the ethics of medical safety.
- I. The vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.
- J. Genetic engineering involves modifying the structure of DNA to produce novel genetic make-ups

**Standard #15 Students will develop an understanding of and be able to select and use agricultural and related biotechnologies**

- F. Technological advances in agriculture directly affect the time and number of people required to produce food for a large population.
- G. A wide range of specialized equipment and practices is used to improve the production of food, fiber, fuel, and other useful products and in the care of animals
- H. Biotechnology applies the principles of biology to create commercial products or processes.
- I. Artificial ecosystems are human-made complexes that replicate some aspects of the natural environment.
- J. The development of refrigeration, freezing, dehydration, preservation and irradiation provide long-term storage of food and reduce the health risks caused by tainted food.

**Standard #16 Students will develop an understanding of and be able to select and use energy and power technologies**

- E. Energy is the capacity to do work
- F. Energy can be used to do work using many processes.
- G. Power is the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done
- H. Power systems are used to drive and provide propulsion to other technological products and systems.
- I. Much of the energy used in our environment is not used efficiently.

**Standard #17 Students will develop an understanding of and be able to select and use information and communication technologies**

- H. Information and communication systems allow information to be transferred from human to human, human to machine, and machine to human.
- I. Communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
- J. The design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message
- K. The use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.

**Standard #18 Students will develop an understanding of and be able to select and use transportation technologies**

- F. Transporting people and goods involves a combination of individuals and vehicles.
- G. Transportation vehicles are made-up of subsystems, such as structural, propulsion, suspension, guidance control, and support, that must function together
- H. Governmental regulations often influence the design and operation of

transportation systems.

for a system to work efficiently.

- I. Processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently.

(3)

## GRADES 6-8

### NATIONAL STANDARDS & BENCHMARKS

**Standard #19 Students will develop an understanding of and be able to select and use manufacturing technologies**

- F. Manufacturing systems use mechanical processes that change the form of materials through the processes of separating, forming, combining, and conditioning them.
- H. The manufacturing process includes the designing, development, making, and servicing of products and systems
- J. Materials must first be located before they can be extracted from the earth through such processes as harvesting, drilling, and mining.
- G. Manufactured goods may be classified as a durable and non-durable.
- I. Chemical technologies are used to modify or alter chemical substances.
- K. Marketing a product involves informing the public about it as well as assisting in selling and distributing it.

**Standard #20 Students will develop an understanding of and be able to select and use construction technologies.**

- F. The selection of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate and function.
- H. Some structures are temporary, while others are permanent.
- G. Structures rest on a foundation.
- I. Buildings generally contain a variety of subsystems.