Delaware Technology Education

Grades 9, 10, 11, 12

Adopted 2007

Methodology of Technology Education

M1. Students will recognize The Nature, Impacts, and Evolution of Technology as they relate to the chronological human presence on Earth, as well as recognize the consequential influence of inventions and innovations that extend human capabilities. M1

01. Evaluate the impacts that technological solutions can have upon the environments in which they are applied. M1.01

    01. Analyze the impact, including the ethical, cultural, social, economic, and political ramifications, of a past or present technological trend on today's individuals and society. M1.01.01

    02. Evaluate the safety aspects of a student-generated product or system. M1.01.02

    03. Perform a market analysis to ascertain a product's potential impact or real impact on individuals and communities. M1.01.03

    04. Develop and implement a performance-testing plan for a selected product or process. M1.01.04

    05. Design a model, prototype, or process that improves or enhances the form or function of a product. M1.01.05

    06. Understand that the evolutionary nature of technology is a function of setting and that technological development, which may be profit driven, is a result of specific goal-directed research. M1.01.06

    07. Identify how cultures develop specific technologies to meet their own needs and understand that technological development is influenced by societal opinions and demands. M1.01.07

    08. Understand the impacts of and relationships between the technological ages (i.e., Stone Age, Bronze Age, Iron Age, Pre-Industrial Revolution, Industrial Revolution, and Information Age) relative to advances in inventions, processes, and the use of available resources. M1.01.08

    09. Collect and evaluate information, synthesize data, analyze trends, and draw conclusions; use assessment techniques to make decisions about future technologies; and design forecasting techniques to evaluate the results of altering natural systems. M1.01.09

M2. Students will effectively communicate technological solutions by using Technology Education as an Interdisciplinary and Technological Link. M2

01. Arrive at solutions to technological challenges by synthesizing and using knowledge from and interactions with applicable curricular areas. M2.01

    01. Consult and collaborate with instructors from other disciplines to successfully complete a design challenge. M2.01.01

    02. Generate a portfolio for the design challenge that contains evidence of cross-curricular information. M2.01.02

    03. Identify cross-curricular concepts of technology, including technology transfer, the relationship of science and math to technology, and progress that results from technology. M2.01.03

    04. Deliver a presentation and complete a technical document in the final stage of the design challenge. M2.01.04

    05. Demonstrate knowledge of the patent process and how it protects technological ideas. M2.01.05

M3. Students will develop and apply a practical understanding of The Use and Management of Technological Resources and Systems. M3

01. Solve complex technological challenges and model working solutions by employing the design process and the systems model. M3.01

    01. Demonstrate the appropriate use and management of technological resources. M3.01.01

    02. Identify criteria for evaluating the appropriateness of resources, processes, and products used to achieve an end goal. M3.01.02

    03. Develop an evaluation plan for testing according to pre-established criteria. M3.01.03

    04. Make decisions that result in optimal resource use and align technological processes with natural processes. M3.01.04

    05. Compare a past technological process or product with a current technological process or product. M3.01.05

    06. Contrast the technological resources used for and the environmental impacts of each selected example M3.01.06

    07. Identify new technologies used to reduce the environmental impact of other technologies and ways in which these new technologies can monitor the environment to guide optimal decisions. M3.01.07

    08. Understand that complex systems have layers of controls and feedback loops and learn to diagnose, troubleshoot, analyze, operate, and maintain these systems. M3.01.08

    09. Use electronic media to access, retrieve, organize, process, maintain, interpret, and evaluate data and information. M3.01.09

    10. Demonstrate knowledge of systems relative to logic and creativity, stability, optimization, quality control, and management. M3.01.10

M4. Students will demonstrate technological problem solving by applying The Design Process and The Systems Model. M4

01. Solve complex technological challenges and model working solutions by employing the Design Process and the Systems Model. M4.01

    01. Demonstrate a working knowledge of the Design Process, understanding that design requirements, such as criteria, constraints, and efficiency, sometimes compete with each other. M4.01.01

    02. Achieve technological solutions by identifying problems, criteria, and constraints, then refining solutions to ensure quality, efficiency, and productivity. M4.01.02

    03. Document revisions made during the design process by using verbal, graphic (including three-dimensional models), quantitative, virtual, and written means. M4.01.03

    04. Produce a prototype that exemplifies the safe and effective use of technological resources. M4.01.04

    05. Assume both a team approach and an individual approach to solve technological challenges. M4.01.05

    06. Understand that design problems are seldom presented in a clearly defined form and a design needs to be continually checked, critiqued, refined, and improved. M4.01.06

    07. Demonstrate that the engineering Design Process takes into account a range of factors and that design is influenced by personal characteristics. M4.01.07

M5. Students will develop an operational awareness of Technological Concepts through focused invention and subsequent innovation. M5

01. Synthesize and apply discrete technological concepts to arrive at innovative solutions. M5.01

    01. Research and identify technological concepts. M5.01.01

    02. Develop a successful product or prototype. M5.01.02

    03. Generate plans or graphic displays to construct a solution. M5.01.03

    04. Document the information resources used to solve a given problem. M5.01.04

    05. Deliver a presentation to explain the rationale and operation of a product or prototype. M5.01.05

M6. Students will explore technology-related skills, leadership skills, personal growth, and careers through opportunities provided by Active Participation in the Technology Student Association (TSA). M6

01. Explore technology-related skills and careers through TSA activities. M6.01

    01. Participate in current competitive events and related programs at local, state, and national levels. M6.01.01

    02. Participate in leadership training activities at local, state, and national levels. M6.01.02

    03. Interact with each other on current competitive events and related programs in class, during which time they will be encouraged to examine the related political, ethical, cultural, and social issues. M6.01.03

    04. Engage in, through competitive events and related programs, real-world simulations that incorporate technology, innovation, design, and engineering through competitive events and related programs. M6.01.04

Technical and Practical Application of Technology Education

TPA1. Students will develop an understanding of The Design Process and be able to apply and transfer the related knowledge and skills to solve technological problems. TPA1

01. Understand that the design process includes defining a problem; brainstorming, researching, and generating ideas; identifying criteria and specifying constraints; exploring possibilities and selecting an approach; developing a design proposal and making a model or prototype; testing and evaluating the design using specifications; refining the design and creating or making it; and communicating processes and results. TPA1.01

    01. Design problems are seldom presented in a clearly defined form. TPA1.01.01
    02. The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved. TPA1.01.02
    03. Design requirements, such as criteria, constraints, and efficiency, sometimes compete with each other. TPA1.01.03
    04. Established design principles are used to evaluate existing designs, collect data, and guide the design process. TPA1.01.04
    05. Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and an ability to visualize and think abstractly. TPA1.01.05
    06. A prototype (or working model) helps an engineer test and observe a design in order to make necessary adjustments. TPA1.01.06
    07. The process of engineering design takes into account a number of factors. TPA1.01.07
    08. Research and development is a specific problem-solving approach that is intensively used in business and industry to prepare devices and systems for the marketplace. TPA1.01.08
    09. Technological problems must be researched before they can be solved. TPA1.01.09
    10. Not every problem is technological in nature, and not every problem can be solved through technology. TPA1.01.10
    11. Many technological problems require a multidisciplinary approach. TPA1.01.11

TPA2. Students will develop an understanding of Agricultural, Bio-related, and Medical Technologies and be able to apply and transfer the related knowledge and skills. TPA2

01. Understand, apply, and transfer knowledge and skills related to agricultural, bio-related, and medical technologies. TPA2.01

    01. Agriculture collaborates with related businesses that use a wide array of products and systems to process and distribute such things as food, fiber, fuel, and chemicals. TPA2.01.01

    02. Conservation, which is essential to the maintenance of the environment, is the process of controlling soil erosion, reducing sediment in waterways, conserving water, and improving water quality. TPA2.01.02

    03. Engineering design and management of agricultural systems requires knowledge of artificial ecosystems and the effects of technological development on plant and animal sciences. TPA2.01.03

    04. A variety of specialized equipment, techniques, and practices are used to care for animals and to improve the production of food, fuel, and other commodities. TPA2.01.04

    05. Advances in biochemistry and molecular biology have made it possible to manipulate the genetic information of living creatures. TPA2.01.05

    06. Biotechnology has applications in areas such as agriculture, pharmaceuticals, food and beverages, medicine, energy, genetic engineering, and the environment. TPA2.01.06

    07. Processes used to manage, recycle, and dispose of hazardous materials help protect people from harmful organisms and disease and shape the ethics of environmental safety. TPA2.01.07

    08. Medical practices used to maintain and protect health include prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, and genetic engineering. TPA2.01.08

    09. The convergence of technological advances in a number of fields (e.g., medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology) has created an emerging area called "telemedicine." TPA2.01.09

TPA3. Students will develop an understanding of Information and Communication Technologies and be able to apply and transfer the related knowledge and skills. TPA3

01. Understand, apply, and transfer knowledge and skills related to information and communication technologies. TPA3.01

    01. Information and communication systems allow information to be transferred between humans and machines. TPA3.01.01

    02. The components of a communication system are made up of symbols and drawings that include the source, encoder, transmitter, receiver, and decoder, and storage, retrieval, and destination. TPA3.01.02

    03. People use information and communication systems for many purposes, for instance, to inform, persuade, entertain, control, manage, and educate. TPA3.01.03

    04. Technological knowledge and processes are communicated through symbols, measurement, conventions, icons, and graphic images, as well as through languages that incorporate a variety of visual, auditory, and tactile stimuli. TPA3.01.04

TPA4. Students will develop an understanding of Drafting, Design, and CADD and be able to apply and transfer the related knowledge and skills. TPA4

01. Understand, apply, and transfer knowledge and skills related to Drafting, Design, and CADD. TPA4.01

    01. Drafting skills can be used to address design problems, accurately generating and conveying solutions to technological challenges. TPA4.01.01

    02. Drafting and design conventions help to generate and communicate design ideas to appropriate stakeholders. TPA4.01.02

    03. Precision measurements, accurate scale drawings, and proportion are essential to drafting and design conventions. TPA4.01.03

    04. A working knowledge of CADD systems and software helps to communicate solutions to design challenges. TPA4.01.04

    05. Applying the essential elements of design (i.e., research, design, development, and the integration of previous knowledge) is necessary to solve complex technological challenges. TPA4.01.05

TPA5. Students will develop an understanding of Energy, Power, and Transportation Technologies and be able to apply and transfer the related knowledge and skills. TPA5

01. Understand, apply, and transfer knowledge and skills related to Energy, Power, and Transportation Technologies. TPA5.01

    01. Energy cannot be created or destroyed, yet it can be converted from one form to another. TPA5.01.01

    02. Energy can be grouped into major forms, such as thermal, radiant, electrical, mechanical, chemical, and nuclear. TPA5.01.02

    03. It is impossible to build an engine that does not release thermal energy. TPA5.01.03

    04. Energy resources can be renewable or nonrenewable. TPA5.01.04

    05. Power systems must have a source of energy, a process, and loads. TPA5.01.05

    06. Transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, agriculture, and health and safety. TPA5.01.06

    07. Intermodalism is the use of different modes of transportation (e.g., highways, railways, and waterways) to form an interconnected system in which people and goods can easily shift between modes. TPA5.01.07

    08. Transportation services and methods have led to a population that is regularly in transit. TPA5.01.08

    09. The design of intelligent and non-intelligent transportation systems depends on many processes and innovative techniques. TPA5.01.09

TPA6. Students will develop an understanding of Construction and Manufacturing Technologies and be able to apply and transfer the related knowledge and skills. TPA6

01. Understand, apply, and transfer knowledge and skills related to Construction and Manufacturing Technologies. TPA6.01

    01. Manufacturing and construction and manufacturing infrastructures form the basic framework of a system. TPA6.01.01

    02. Materials used in construction and manufacturing have different qualities and may be classified as natural, synthetic, or mixed. TPA6.01.02

    03. Construction and manufacturing systems can be classified by type, such as customized or mass production. TPA6.01.03

    04. The interchangeability of parts increases the effectiveness of construction and manufacturing and processes. TPA6.01.04

    05. Emerging technology helps humans alter or modify natural materials to create new products. TPA6.01.05

    06. Marketing involves establishing a product identity; conducting research on product potential; and then advertising, distributing, and selling a product. TPA6.01.06

    07. The selection of design for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function. TPA6.01.07

    08. Structures are constructed through a variety of processes and procedures. TPA6.01.08

    09. Constructed and manufactured products periodically undergo maintenance, alterations, or renovations to improve and prolong their functions. TPA6.01.09