

Engineering Fundamentals: Design, Principles, and Careers, 3e Alignment to ITEEA Standards for Technological and Engineering Literacy

Standards for Technological and Engineering Literacy	
Core Disciplinary Standards	
1. Nature and Characteristics of Technology and Engineering	
To demonstrate their understanding of the nature and characteristics of technology and engineering, students in Grades 9-12 should be able to:	
Explain how the world around them guides technological development and engineering design.	4, 9, 16, 19, 21, 36, 56, 126, 240, 442, 458
Assess how similarities and differences among scientific, mathematical, engineering, and technological knowledge and skills contributed to the design of a product or system.	6–7, 24 (Act. 1-1), 25 (Act. 1-2)
Analyze the rate of technological development and predict future diffusion and adoption of new technologies.	7, 17-21, 25 (Act. 1-2), 86-87, 71 (Act. 3-6),
Conduct research to inform intentional inventions and innovations that address specific needs and wants.	7, 25 (Act. 1-2),
Develop a plan that incorporates knowledge from science, mathematics, and other disciplines to design or improve a technological product or system.	5-7, 9, 24 (Act. 1-1), 25 (Act. 1-2), 334 (Act. 12-4), 365 (Act. 13-4)
2. Core Concepts of Technology and Engineering	
To demonstrate their understanding of the core concepts of technology and engineering, students in Grades 9-12 should be able to:	
Demonstrate the use of conceptual, graphical, virtual, mathematical, and physical modeling to identify conflicting considerations before the entire system is developed and to aid in design decision making.	55-57, 70 (Act. 3-5), 71 (Act. 3-6), 142-151
Diagnose a flawed system embedded within a larger technological, social, or environmental system.	160, 165 (Act. 7-3)
Analyze the stability of a technological system and how it is influenced by all the components in the system, especially those in the feedback loop.	285, 325
Select resources that involve tradeoffs between competing values, such as availability, cost, desirability, and waste, while solving problems.	5, 110-111, 118 (Act. 5-2)
Cite examples of the criteria and constraints of a product or system and how they affect final design.	51-52, 54-56, 66 (Act. 3-1), 69 (Act. 3-4)
Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.	152-156, 163 (Act. 7-1),
Use management processes in planning, organizing, and controlling work.	29, 159, 249-256
3. Integration of Knowledge, Technologies, and Practices	

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To demonstrate their ability to integrate knowledge, technologies, and practices, students in Grades 9-12 should be able to:	
Analyze how technology transfer occurs when a user applies an existing innovation developed for one function to a different purpose.	103
Evaluate how technology enhances opportunities for new products and services through globalization.	40-41, 193-194, 242-247, 353, 382
Connect technological progress to the advancement of other areas of knowledge and vice versa.	7, 40-41, 58, 149, 344, 404, 450
4. Impacts of technology.	
To demonstrate their understanding of the impacts of technology, students in Grades 9-12 should be able to:	
Evaluate ways that technology can impact individuals, society, and the environment.	7, 36-40, 45 (Act. 2-2)
Critique whether existing or proposed technologies use resources sustainably.	40, 58, 158, 418
Assess a technology that minimizes resource use and resulting waste to achieve a goal.	251, 420-421
Develop a solution to a technological problem that has the least negative environmental and social impact.	421, 423, 477-478
Evaluate how technologies alter human health and capabilities.	459 (Act. 16-2)
5. Influence of Society on Technological Development	
To demonstrate their understanding of the influence of society on technological development, students in Grades 9-12 should be able to:	
Evaluate a technological innovation that arose from a specific society's unique need or want.	18-21, 458 (Act. 16-1)
Evaluate a technological innovation that was met with societal resistance impacting its development.	440, 459 (Act. 16-2)
Design an appropriate technology for use in a different culture.	477-478
6. History of Technology	
To demonstrate their understanding of the history of technology, students in Grades 9-12 should be able to:	
Relate how technological development has been evolutionary, often the result of a series of refinements to basic inventions or technological knowledge.	17-21, 441,

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Verify that the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools, materials, and processes.	17-21
Evaluate how technology has been a powerful force in reshaping social, cultural, political, and economic landscapes throughout history.	17-21
Analyze how the Industrial Revolution resulted in the development of mass production, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	7, 18-19, 340
Investigate the widespread changes that have resulted from the Information Age, which has placed emphasis on the processing and exchange of information.	19-20
7. Design in Technology and Engineering Education	
To demonstrate their ability to design in technology and engineering education, students in Grades 9-12 should be able to:	
Determine the best approach by evaluating the purpose of the design.	4-5, 48, 53-54, 111-112
Document trade-offs in the technology and engineering design process to produce the optimal design.	5, 110-111, 118 (Act. 5-2)
Optimize a design by addressing desired qualities within criteria and constraints.	51-52, 54-56, 66 (Act. 3-1), 69 (Act. 3-4)
Apply principles of human-centered design.	319, 450-454
Illustrate principles, elements, and factors of design.	75-89, 92-93 (Act. 4-1, 4-2), 95-113, 116-119 (Act. 5-1 through 5-3), 121-135, 138-139 (Act. 61, 6-2), 141-160, 163-165 (Act. 7-1 through 7-3)
Implement the best possible solution to a design.	48, 50, 53-54, 61, 70 (Act. 3-5)
Apply a broad range of design skills to their design process.	75-89, 92-93 (Act. 4-1, 4-2), 95-113, 116-119 (Act. 5-1 through 5-3), 121-135, 138-139 (Act. 61, 6-2), 141-160, 163-165 (Act. 7-1 through 7-3)
Apply a broad range of making skills to their design process.	141-160
8. Applying, Maintaining, and Assessing Technological Products and Systems	
To demonstrate their understanding of how to use and maintain technological products and systems, students in Grades 9-12 should be able to:	
Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.	159-160, 253-256, 288-290, 312-313

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Develop a device or system for the marketplace.	200 (Act. 8-3), 237 (Act. 9-5), 365 (Act. 13-4)
Apply appropriate methods to diagnose, adjust, and repair systems to ensure precise, safe, and proper functionality.	155, 185, 258, 288-290
Synthesize data and analyze trends to make decisions about technological products, systems, or processes.	111-112, 312, 313
Interpret the results of technology assessment to guide policy development.	108-109, 156-157