Standards for Technological Literacy Correlation Chart

The International Technology Education Association (ITEA) and its Technology for All Americans Project developed *Standards for Technological Literacy: Content for the Study of Technology* to identify the essential core of technological knowledge and skills for students in grades K–12. This work defined twenty separate standards, divided into five broad categories. Within each standard, benchmark topics are defined for four different grade levels:

- Grades K–2.
- Grades 3–5.
- Grades 6–8.
- Grades 9–12.

The following chart lists the standards and the benchmark topics for grades 9–12. Adjacent to each standard and benchmark topic are the chapter and page references identifying material in *Technology* relating to the item.

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Standard 1. Students will develop an understanding of the characteristics and scope of technology.	Chapter 1: 17–19 Chapter 3: 46–53 Chapter 4 Chapter 5: 82, 85–98 Chapter 9 Chapter 32: 640–641
Benchmark Topics:	
The nature and development of technological knowledge and processes are functions of the setting.	Chapter 3: 49–53 Chapter 5: 85–98
The rate of technological development and diffusion is increasing rapidly.	Chapter 1: 19 Chapter 4
Inventions and innovations are the results of specific, goal-directed research.	Chapter 4 Chapter 9
Most development of technologies these days is driven by the profit motive and the market.	Chapter 1: 17–18 Chapter 3: 46–48 Chapter 5: 82 Chapter 32: 640–641
Standard 2. Students will develop an understanding of the core concepts of technology.	Chapter 1: 17–19 Chapter 2: 31–40 Chapter 5: 82–83, 99 Chapter 6: 109–118 Chapter 8: 168–170 Chapter 9 Chapter 10: 190–192 Chapter 11: 206–214, 218 Chapter 32: 641–644 Chapter 33: 661–663

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Benchmark Topics:	
Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.	Chapter 10: 190–191 Chapter 11: 206–214
Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	Chapter 10: 190–191
The stability of a technological system is influenced by all of the components in the system, especially those in the feedback loop.	Chapter 2: 31–40
Selecting resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.	Chapter 10: 192
Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.	Chapter 5: 82–83 Chapter 9 Chapter 10: 192
Optimization is an ongoing process or methodology of designing or making a product and is dependent on criteria and constraints.	Chapter 11: 210–211, 218
New technologies create new processes.	Chapter 1: 19
Quality control is a planned process to ensure that a product, service, or system meets established criteria.	Chapter 6: 109–111 Chapter 8: 168–170 Chapter 33: 661–663
Management is the process of planning, organizing, and controlling work.	Chapter 2: 38 Chapter 5: 99 Chapter 32: 641–644
Complex systems have many layers of controls and feedback loops to provide information.	Chapter 2: 40 Chapter 6: 109–118
Standard 3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	Chapter 1: 20–22 Chapter 2: 34 Chapter 3: 52 Chapter 4 Chapter 5: 97 Chapter 6: 108, 117 Chapter 7: 148 Chapter 8: 171 Chapter 9: 187 Chapter 10: 198 Chapter 11: 213–214 Chapter 12: 231 Chapter 13: 251 Chapter 14: 265 Chapter 15: 277 Chapter 17: 333 Chapter 18: 353 Chapter 19: 368, 370 Chapter 20: 389 Chapter 21: 405, 413 Chapter 22: 418–420, 423–424, 429 *(continued)*

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Standard 3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study. *(continued from the previous page)*	Chapter 23: 442–443, 451 Chapter 24: 471 Chapter 25: 501 Chapter 26: 515 Chapter 27: 530 Chapter 28: 558 Chapter 29: 584 Chapter 30: 607 Chapter 31: 621–627 Chapter 33: 668
Benchmark Topics:	
Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.	Chapter 4
Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.	Chapter 1: 21–22 Chapter 4
Technological ideas are sometimes protected through the process of patenting.	Chapter 4: 61–63
Technological progress promotes the advancement of science and mathematics.	Chapter 2: 34 Chapter 3: 52 Chapter 4: 73 Chapter 6: 108, 117 Chapter 8: 171 Chapter 10: 198 Chapter 11: 213–214 Chapter 13: 251 Chapter 14: 265 Chapter 15: 277 Chapter 18: 353 Chapter 19: 368 Chapter 20: 389 Chapter 21: 405 Chapter 22: 423–424 Chapter 23: 442–443 Chapter 24: 471 Chapter 25: 501 Chapter 26: 515 Chapter 28: 558 Chapter 30: 607 Chapter 31: 621–627 Chapter 33: 668
Standard 4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.	Chapter 1: 17–18, 20–21 Chapter 3: 44–46 Chapter 6: 105–109 Chapter 9: 185–187 Chapter 32: 644–649 Chapter 33: 653–655, 665–671 Chapter 35 Chapter 36: 716–719

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Benchmark Topics:	
Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.	Chapter 3: 44–46 Chapter 6: 107–109 Chapter 35: 692–695 Chapter 36: 718–719
Making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.	Chapter 1: 20–21 Chapter 6: 105–107 Chapter 32: 644–645 Chapter 35 Chapter 36: 716–718
Ethical considerations are important in the development, selection, and use of technologies.	Chapter 9: 185–187
The transfer of a technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees.	Chapter 1: 17–18
Standard 5. Students will develop an understanding of the effects of technology on the environment.	Chapter 1: 20–21 Chapter 6: 111–113 Chapter 18: 352–354 Chapter 25: 496–498 Chapter 28: 543–544 Chapter 31: 627–629 Chapter 35: 691–692, 696–700 Chapter 36: 716–718
Benchmark Topics:	
Humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.	Chapter 18: 352–354
When new technologies are developed to reduce the use of resources, considerations of trade-offs are important.	Chapter 31: 627–629 Chapter 35: 697–699
With the aid of technology, various aspects of the environment can be monitored to provide information for decision-making.	Chapter 6: 111–113 Chapter 25: 496–498 Chapter 35: 696–700
The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.	Chapter 1: 20–21 Chapter 18: 352–354 Chapter 28: 543–544
Humans devise technologies to reduce the negative consequences of other technologies.	Chapter 18: 352–354
Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.	Chapter 1: 20–21 Chapter 35: 699–700 Chapter 36: 716–718
Standard 6. Students will develop an understanding of the role of society in the development and use of technology.	Chapter 2 Chapter 4: 61–63, 75–76 Chapter 6: 104 Chapter 22: 429 Chapter 33: 653–654, 664–665, 671 Chapter 35: 692, 700–702 Chapter 36: 706–710

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Benchmark Topics:	
Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	Chapter 6: 104 Chapter 36: 706–710
The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.	Chapter 2 Chapter 4: 61–63
A number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads, contribute to shaping the design of and demand for various technologies.	Chapter 4: 61–63, 75–76 Chapter 22: 429 Chapter 33: 664–665, 671 Chapter 35: 692, 700–702
Standard 7. Students will develop an understanding of the influence of technology on history.	Chapter 1: 17–20, 24–27 Chapter 2: 32–34 Chapter 4: 60–72, 75–76 Chapter 5: 97 Chapter 7: 127–142, 144–148 Chapter 8: 157–160, 165–168 Chapter 9: 187 Chapter 12: 224 Chapter 21: 413 Chapter 22: 374, 423–424 Chapter 23: 451 Chapter 25: 492 Chapter 27: 530 Chapter 28: 540–542 Chapter 29: 584 Chapter 33: 656–657 Chapter 35: 692–695 Chapter 36: 706–710
Benchmark Topics:	
Most technological development has been evolutionary, the result of a series of refinements to a basic invention.	Chapter 1: 17–18, 24–27 Chapter 4: 60 Chapter 8: 157–160 Chapter 33: 656–657
The evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.	Chapter 1: 19, 24–27 Chapter 2: 32–34 Chapter 4: 63–72 Chapter 7: 127–139 Chapter 8: 165–168
Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.	Chapter 1: 17–19, 24–27 Chapter 4: 60–63, 75–76 Chapter 35: 692–695
Early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	Chapter 1: 24 Chapter 22: 374
The Iron Age was defined by the use of iron and steel as the primary materials for tools.	Chapter 1: 24–25 Chapter 28: 540–542

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The Middle Ages saw the development of many technological devices that produced long-lasting effects on technology and society.	Chapter 1: 25 Chapter 7: 146 Chapter 28: 542
The Renaissance, a time of rebirth of the arts and humanities, was also an important development in the history of technology.	Chapter 1: 26
The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	Chapter 1: 26–27 Chapter 7: 134, 140–142, 144–148 Chapter 12: 224 Chapter 22: 423–424 Chapter 25: 492 Chapter 36: 708–709
The Information Age places emphasis on the processing and exchange of information.	Chapter 1: 27 Chapter 36: 709–710
Standard 8. Students will develop an understanding of the attributes of design.	Chapter 2: 36–37 Chapter 5: 82–84 Chapter 9: 179–187 Chapter 10: 192–202 Chapter 11 Chapter 12
Benchmark Topics:	
The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	Chapter 2: 36–37 Chapter 5: 82–84 Chapter 9: 179–182 Chapter 10: 192–202 Chapter 11: 206–214 Chapter 12
Design problems are seldom presented in a clearly defined form.	Chapter 5: 82–83 Chapter 9: 183–187
The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved.	Chapter 5: 83–84 Chapter 10: 195–196 Chapter 11: 214–218
Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.	Chapter 5: 82–83 Chapter 10: 192
Standard 9. Students will develop an understanding of engineering design.	Chapter 2: 36–37 Chapter 5: 82–84 Chapter 9 Chapter 10: 192 Chapter 11: 212–218 Chapter 12 Chapter 20

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Benchmark Topics:	
Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.	Chapter 12: 231 Chapter 20
Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.	Chapter 2: 36–37 Chapter 5: 82–84 Chapter 9 Chapter 12
A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	Chapter 5: 84 Chapter 11: 212–213
The process of engineering design takes into account a number of factors.	Chapter 11: 214–218
Standard 10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	Chapter 3: 46–48 Chapter 9 Chapter 33: 654–658
Benchmark Topics:	
Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	Chapter 3: 46–48 Chapter 33: 654–658
Technological problems must be researched before they can be solved.	Chapter 9: 179, 182, 185–187
Not all problems are technological, and not every problem can be solved using technology.	Chapter 9: 179
Many technological problems require a multidisciplinary approach.	Chapter 9
Standard 11. Students will develop abilities to apply the design process.	Chapter 5: 82–84 Chapter 9: 182–187 Chapter 10 Chapter 12 Chapter 17: 242–243 Chapter 20: 396–399 Chapter 21: 416–417 Chapter 22: 438–440 Chapter 23: 460–461
Benchmark Topics:	
Identify the design problem to solve and decide whether or not to address it.	Chapter 5: 82–83 Chapter 9: 183–187 Chapter 10: 194
Identify criteria and constraints and determine how these will affect the design process.	Chapter 5: 82–83 Chapter 9: 182, 184–185
Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	Chapter 5: 83–84

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Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	Chapter 5: 84
Develop and produce a product or system using a design process.	Chapter 10 Chapter 17: 242–243 Chapter 20: 396–399 Chapter 21: 416–417 Chapter 22: 438–440 Chapter 23: 460–461
Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	Chapter 5: 84 Chapter 12
Standard 12. Students will develop the abilities to use and maintain technological products and systems.	Chapter 7 Chapter 11: 221–222 Chapter 12: 239–241 Chapter 13: 250–252 Chapter 18: 347–350 Chapter 20: 398–399 Chapter 23: 460–461 Chapter 26: 515–516 Chapter 31: 634–635 Chapter 34: 675–680
Benchmark Topics:	
Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	Chapter 12: 239
Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.	Chapter 13: 250–252 Chapter 18: 347–350 Chapter 34: 677–679
Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	Chapter 7 Chapter 18: 347–350 Chapter 26: 515–516
Operate systems so that they function in the way they were designed.	Chapter 7: 151–153, 155
Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	Chapter 11: 221–222 Chapter 12: 240–241 Chapter 20: 398–399 Chapter 23: 460–461 Chapter 31: 634–635
Standard 13. Students will develop the abilities to assess the impact of products and systems.	Chapter 18 Chapter 31: 634–635 Chapter 33: 680–682 Chapter 34 Chapter 35: 692–695

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Benchmark Topics:	
Collect information and evaluate its quality.	Chapter 31: 634–635
Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.	Chapter 31: 634–635
Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.	Chapter 34 Chapter 35: 692–695
Design forecasting techniques to evaluate the results of altering natural systems.	Chapter 18 Chapter 34
Standard 14. Students will develop an understanding of and be able to select and use medical technologies.	Section 1: 15 Chapter 3: 52 Chapter 5: 95 Chapter 31
Benchmark Topics:	
Medical technologies include prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained.	Chapter 5: 95 Chapter 31
Telemedicine reflects the convergence of technological advances in a number of fields, including medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology.	Chapter 31
The sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.	Section 1: 15 Chapter 3: 52
Standard 15. Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.	Section 1: 15 Chapter 1 Chapter 3: 52 Chapter 5: 85–86 Section 9: 565 Chapter 29 Chapter 30 Chapter 31: 620–631 Section 11: 689 Chapter 35
Benchmark Topics:	
Agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.	Chapter 29: 567–586

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Biotechnology has applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering.	Section 1: 15 Chapter 3: 52 Section 9: 565 Chapter 29: 586–587 Chapter 30 Chapter 31: 620–631
Conservation is the process of controlling soil erosion, reducing sediment in waterways, conserving water, and improving water quality.	Chapter 1 Chapter 35
The engineering design and management of agricultural systems require knowledge of artificial ecosystems and the effects of technological development on flora and fauna.	Section 11: 689
Standard 16. Students will develop an understanding of and be able to select and use energy and power technologies.	Chapter 4: 70, 74–75 Chapter 5: 91–92 Chapter 7: 139–145 Chapter 15: 285 Chapter 27 Chapter 28
Benchmark Topics:	
Energy cannot be created nor destroyed; however, it can be converted from one form to another.	Chapter 5: 92 Chapter 7: 139–145 Chapter 27: 531 Chapter 28: 539–555
Energy can be grouped into major forms: thermal, radiant, electrical, mechanical, chemical, nuclear, and others.	Chapter 4: 74–75 Chapter 5: 91–92 Chapter 15: 285 Chapter 27: 529–531
It is impossible to build an engine to perform work that does not exhaust thermal energy to the surroundings.	Chapter 27 Chapter 28
Energy resources can be renewable or nonrenewable.	Chapter 4: 70 Chapter 27: 532–534 Chapter 28
Power systems must have a source of energy, a process, and loads.	Chapter 5: 91–92 Chapter 28: 556–559
Standard 17. Students will develop an understanding of and be able to select and use information and communication technologies.	Chapter 5: 86–88 Chapter 7: 145–151 Section 6: 361 Chapter 19 Chapter 20 Chapter 21 Chapter 22 Chapter 23
Benchmark Topics:	
Information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information.	Chapter 5: 86–88 Chapter 7: 145–151

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Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.	Chapter 19: 365–366
Information and communication systems can be used to inform, persuade, entertain, control, manage, and educate.	Chapter 19: 364 Chapter 22
Communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.	Chapter 5: 86–88 Chapter 19: 364–365 Chapter 22
There are many ways to communicate information, such as graphic and electronic means.	Chapter 5: 86–88 Section 6: 361 Chapter 19: 366–370 Chapter 20 Chapter 21: 403–413 Chapter 22: 420–434
Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.	Chapter 23
Standard 18. Students will develop an understanding of and be able to select and use transportation technologies.	Chapter 5: 95–98 Section 7: 465 Chapter 24 Chapter 25 Chapter 26
Benchmark Topics:	
Transportation plays a vital role in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.	Chapter 24: 467–468 Chapter 26
Intermodalism is the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.	Chapter 24
Transportation services and methods have led to a population that is regularly on the move.	Section 7: 465 Chapter 24 Chapter 26: 512–514
The design of intelligent and nonintelligent transportation systems depends on many processes and innovative techniques.	Chapter 24: 468–473 Chapter 25: 476–479 Chapter 26: 508–512, 517

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Standard 19. Students will develop an understanding of and be able to select and use manufacturing technologies.	Chapter 1 Chapter 4 Chapter 5: 93–95 Chapter 7: 134 Chapter 12: 224 Chapter 13 Chapter 14 Chapter 15 Chapter 16 Chapter 18: 344–350 Chapter 33: 658–665 Chapter 36: 708–709
Benchmark Topics:	
Servicing keeps products in good operating condition.	Chapter 13: 250–252 Chapter 18: 347–350
Materials have different qualities and may be classified as natural, synthetic, or mixed.	Chapter 4 Chapter 14
Durable goods are designed to operate for a long period of time, while non-durable goods are designed to operate for a short period of time.	Chapter 13
Manufacturing systems may be classified into types, such as customized production, batch production, and continuous production.	Chapter 7: 134 Chapter 33: 658–663
The interchangeability of parts increases the effectiveness of manufacturing processes.	Chapter 1 Chapter 12: 224 Chapter 36: 708–709
Chemical technologies provide a means for humans to alter or modify materials and to produce chemical products.	Chapter 15
Marketing involves establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it.	Chapter 33: 664–665
Standard 20. Students will develop an understanding of and be able to select and use construction technologies.	Chapter 5: 88–91 Chapter 13 Chapter 17 Chapter 18: 347–351 Chapter 34: 678
Benchmark Topics:	
Infrastructure is the underlying base or basic framework of a system.	Chapter 17
Structures are constructed using a variety of processes and procedures.	Chapter 5: 88–91 Chapter 34: 678
The design of structures includes a number of requirements.	Chapter 17
Structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.	Chapter 5: 91 Chapter 13 Chapter 18: 347–351
Structures can include prefabricated materials.	Chapter 17