Correlation of

***Technology: Engineering Our World,* Gradwell and Welch**

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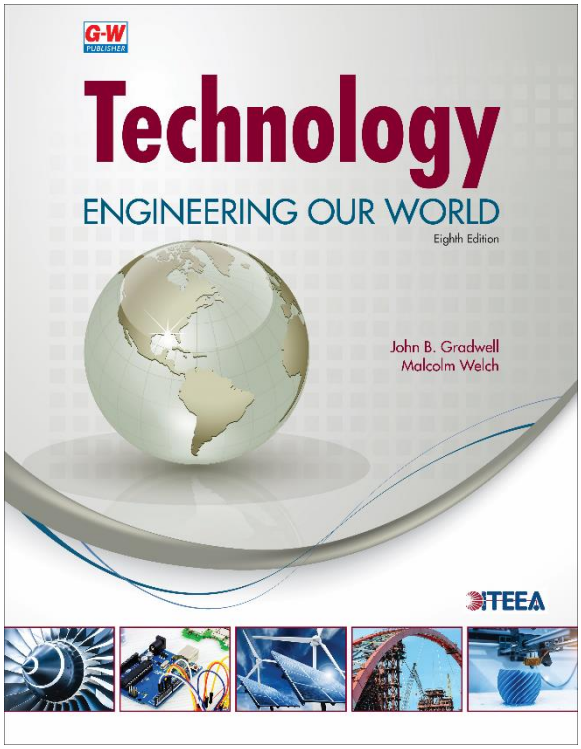
to

ITEEA's Standards of Technological Literacy

The International Technology and Engineering Educators Association (ITEEA) and its Technology for All Americans Project developed the *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 20 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 6–8. Adjacent to each benchmark topic are the chapter and page references identifying material in *Technology: Engineering Our World* that relates to the item.



Standards	G-W Content
Standard 1: Students will develop an understanding of the characteristics and scope of technology.	
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.	Textbook: Chapter 1, pg. 4, 5; Chapter 3, pg. 43; Chapter 6, pg. 157–164; Chapter 18, pg. 517; Chapter 19, pg. 559
The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.	Textbook: Chapter 1, pg. 2–23; Chapter 3, pg. 45–48
Technology is closely linked to creativity, which has resulted in innovation.	Textbook: Chapter 3, pg. 61, 62; Chapter 4, pg. 69–76; Chapter 5, pg. 99
Corporations can often create demand for a product by bringing it onto the market and advertising it.	Textbook: Chapter 4, pg. 88; Chapter 8, pg. 206, 229–231; Chapter 20, pg. 593, 598–599

Standards	G-W Content
Standard 2: Students will develop an understanding of the core concepts of technology.	
Technological systems include input, processes, output, and, at times, feedback.	Textbook: Chapter 5, pg. 117; Chapter 11, pg. 314–315; Chapter 14, pg. 428; Chapter 17, pg. 492–493, 511, 515; Chapter 20, pg. 591–592
Systems thinking involves considering how every part relates to others.	Textbook: Chapter 11, pg. 314; Chapter 13, pg. 372, 391; Chapter 20, pg. 590
An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.	Textbook: Chapter 11, pg. 315, 340; Chapter 17, pg. 492–493, 511, 515
Technological systems can be connected to one another.	Textbook: Chapter 11, pg. 314–318; Chapter 12, pg. 359, 363–364; Chapter 13, pg. 372, 378–379, 391–393; Chapter 15, pg. 435–436; Chapter 17, pg. 498–499
Malfunctions in any part of a system may affect the function and quality of the system.	Textbook: Chapter 4, pg. 93
Requirements are the parameters placed on the development of a product or system. [These parameters are often referred to as criteria or constraints.]	Textbook: Chapter 3, pg. 48–58; Chapter 4, pg. 78
Trade-off is a decision process recognizing the need for careful compromises among competing factors.	Textbook: Chapter 9, pg. 240, 245; Chapter 10, pg. 300
Different technologies involve different sets of processes.	Textbook: Chapter 1, pg. 5, 9, 11; Chapter 14, pg. 428; Chapter 15, pg. 372; Chapter 17, pg. 492–494; Chapter 19, pg. 563
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.	Textbook: Chapter 11, pg. 326–327, 341; Chapter 13, pg. 387, 398
Controls are mechanisms or particular steps that people perform using information about the system that causes systems to change.	Textbook: Chapter 11, pg. 315–318, 328, 332–336; Chapter 12, pg. 359–360; Chapter 15, pg. 443, 446; Chapter 18, pg. 521–522
Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	
Technological systems often interact with one another.	Textbook: Chapter 8, pg. 218–224; Chapter 11, pg. 314–318; Chapter 13, pg. 372, 378–379, 391–393; Chapter 14, pg. 428; Chapter 17, pg. 498–499
A product, system, or environment developed for one setting may be applied to another setting.	Textbook: Chapter 8, pg. 225, 226; Chapter 11, pg. 315; Chapter 19, pg. 561–564, 566
Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.	Textbook: Chapter 1, pg. 8–10; Chapter 3, pg. 46, 57; Chapter 19, pg. 561–564, 566, 568

Standards	G-W Content
Standard 4: Students will develop an understanding of the cultural, social, economic, and political effects of technology.	
The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use.	Textbook: Chapter 1, pg. 2–23; Chapter 2, pg. 24–41; Chapter 3, pg. 49–50, 53–58
Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.	Textbook: Chapter 1, pg. 11–12; Chapter 9, pg. 240–241; Chapter 17, pg. 503; Chapter 19, pg. 572, 574
The development and use of technology poses ethical issues.	Textbook: Chapter 8, pg. 217–218; Chapter 9, pg. 240–277; Chapter 18, pg. 552–553; Chapter 19, pg. 574
Economic, political, and cultural issues are influenced by the development and use of technology.	Textbook: Chapter 8, pg. 224–226; Chapter 9, pg. 245, 256, 267, 276; Chapter 18, pg. 541; Chapter 19, pg. 562–563, 570, 572
Standard 5: Students will develop an understanding of the effects of technology on the environment.	
The management of waste produced by technological systems is an important societal issue.	Textbook: Chapter 6, pg. 147, 157; Chapter 9, pg. 251–253, 257–260, 262, 268–273, 333, 366; Chapter 14, pg. 409, 464, 503
Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.	Textbook: Chapter 3, pg. 55, 56; Chapter 9, pg. 245, 251–253, 259, 272–273; Chapter 10, pg. 279; Chapter 11, pg. 322; Chapter 18, pg. 547–548
Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.	Textbook: Chapter 1, pg. 11–12, 22; Chapter 8, pg. 205, 214, 217–218, 224–225; Chapter 9, pg. 238–277; Chapter 11, pg. 332–335; Chapter 14, pg. 427
Standard 6: Students will develop an understanding of the role of society in the development and use of technology.	
Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.	Textbook: Chapter 1, pg. 5–7, 16–20; Chapter 3, pg. 45–47, 57, 61; Chapter 6, pg. 124; Chapter 8, pg. 224; Chapter 11, pg. 321, 336–337; Chapter 16, pg. 464; Chapter 18, pg. 541; Chapter 19, pg. 560–561, 564
The use of inventions and innovations has led to changes in society and the creation of new needs and wants.	Textbook: Chapter 1, pg. 2–23; Chapter 3, pg. 61–62; Chapter 8, pg. 209–225; Chapter 11, pg. 320, 321; Chapter 16, pg. 464
Social and cultural priorities and values are reflected in technological devices.	Textbook: Chapter 1, pg. 4–5; Chapter 3, pg. 56–57; Chapter 8, pg. 231–233
Meeting societal expectations is the driving force behind the acceptance and use of products and systems.	Textbook: Chapter 1, pg. 11; Chapter 3, pg. 45–47, 56–57; Chapter 4, pg. 75, 76
Standard 7: Students will develop an understanding of the influence of technology on history.	
Many inventions and innovations have evolved by using slow and methodical processes of tests and refinements.	Textbook: Chapter 3, pg. 61–62; Chapter 4, pg. 67, 71–72, 92–93; Chapter 6, pg. 158; Chapter 8, pg. 223; Chapter 11, pg. 321

Standards	G-W Content
The specialization of function has been at the heart of many technological improvements.	Textbook: Chapter 1, pg. 5–7, 9; Chapter 4, pg. 71, 76; Chapter 17, pg. 498, 501
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.	Textbook: Chapter 1, pg. 5–7; Chapter 8, pg. 232; Chapter 10, pg. 278–301; Chapter 11, pg. 314–319
In the past, an invention or innovation was not usually developed with the knowledge of science.	Textbook: Chapter 1, pg. 16–20; Chapter 12, pg. 344; Chapter 19, pg. 560
Standard 8: Students will develop an understanding of the attributes of design.	
Design is a creative planning process that leads to useful products and systems.	Textbook: Chapter 2, pg. 42–65; Chapter 4, pg. 69–70
There is no perfect design.	Textbook: Chapter 4, pg. 89
Requirements for a design are made up of criteria and constraints.	Textbook: Chapter 4, pg. 78
Standard 9: Students will develop an understanding of engineering design.	
Design involves a set of steps, which can be performed in different sequences and repeated as needed.	Textbook: Chapter 4, pg. 72–93
Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.	Textbook: Chapter 3, pg. 43; Chapter 4, pg. 82–83
Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.	Textbook: Chapter 4, pg. 85–93
Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	
Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.	Textbook: Chapter 4, pg. 93
Invention is a process of turning ideas and imagination into devices and systems. Innovation is the process of modifying an existing product or system to improve it.	Textbook: Chapter 3, pg. 62
Some technological problems are best solved through experimentation.	Textbook: Chapter 4, pg. 69, 70, 90, 93
Standard 11: Students will develop abilities to apply the design process.	
Apply a design process to solve problems in and beyond the laboratory-classroom.	Textbook: Chapter 4, pg. 67–97; Chapter 10, pg. 279; Chapter 11, pg. 341; Chapter 14, pg. 401; Chapter 13, pg. 399
Specify criteria and constraints for the design.	Textbook: Chapter 5, pg. 117; Chapter 11, pg. 341; Chapter 12, pg. 369
Make two-dimensional and three-dimensional representations of the designed solution.	Textbook: Chapter 4, pg. 67, 85–87, 90–91; Chapter 6, pg. 167; Chapter 5, pg. 103–106, 110–113, 118

Standards	G-W Content
Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed.	Textbook: Chapter 4, pg. 92–93, 97; Chapter 6, pg. 127; Chapter 10, pg. 290; Chapter 11, pg. 341; Chapter 13, pg. 384, 386, 395, 399
Make a product or system and document the solution.	Textbook: Chapter 10, pg. 301; Chapter 11, pg. 341; Chapter 12, pg. 369; Chapter 13, pg. 386, 399
Standard 12: Students will develop the abilities to use and maintain technological products and systems.	
Use information provided in manuals, protocols, or by experienced people to see and understand how things work.	Textbook: Chapter 1, pg. 9; Chapter 2, pg. 28–31, 31–33, 35, 37, 38; Chapter 4, pg. 80–81; Chapter 8, pg. 229
Use tools, materials, and machines safely to diagnose, adjust, and repair systems.	Textbook: Chapter 2, pg. 30–32; Chapter 11, pg. 341
Use computers and calculators in various applications.	Textbook: Chapter 8, pg. 219; Chapter 11, pg. 311, 313; Chapter 15, pg. 441
Operate and maintain systems in order to achieve a given purpose.	Textbook: Chapter 11, pg. 341; Chapter 14, pg. 428
Standard 13: Students will develop the abilities to assess the impact of products and systems.	
Design and use instruments to gather data.	Textbook: Chapter 9, pg. 277; Chapter 11, pg. 341; Chapter 19, pg. 577
Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.	Textbook: Chapter 3, pg. 65; Chapter 8, pg. 237; Chapter 14, pg. 430; Chapter 19, pg. 577
Identify trends and monitor potential consequences of technological development.	Textbook: Chapter 3, pg. 65; Chapter 8, pg. 236, 237; Chapter 9, pg. 276; Chapter 14, pg. 430; Chapter 17, pg. 514, 515; Chapter 20, pg. 603
Interpret and evaluate the accuracy of the information obtained and determine if it is useful.	Textbook: Chapter 4, pg. 80–81
Standard 14: Students will develop an understanding of and be able to select and use medical technologies.	
Advances and innovations in medical technologies are used to improve healthcare.	Textbook: Chapter 19, pg. 566–572, 576–577
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.	Textbook: Chapter 19, pg. 570, 576
The vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced.	Textbook: Chapter 19, pg. 568, 572
Genetic engineering involves modifying the structure of DNA to produce novel genetic makeups.	Textbook: Chapter 19, pg. 572–574

Standards	G-W Content
Standard 15: Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.	
Technological advances in agriculture directly affect the time and number of people required to produce food for a large population.	Textbook: Chapter 19, pg. 561–564
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.	Textbook: Chapter 19, pg. 561–564
Biotechnology applies the principles of biology to create commercial products or processes.	Textbook: Chapter 19, pg. 572–574
Artificial ecosystems are human-made complexes that replicate some aspects of the natural environment.	Textbook: Chapter 19, pg. 563, 577
The development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food.	Textbook: Chapter 19, pg. 564–566
Standard 16: Students will develop an understanding of and be able to select and use energy and power technologies.	
Energy is the capacity to do work.	Textbook: Chapter 12, pg. 344; Chapter 14, pg. 402
Energy can be used to do work, using many processes.	Textbook: Chapter 12, pg. 344–354; Chapter 14, pg. 402–408, 430, 431
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.	Textbook: Chapter 12, pg. 364; Chapter 16, pg. 475–476
Power systems are used to drive and provide propulsion to other technological products and systems.	Textbook: Chapter 14, pg. 404, 407, 411–413, 416–418, 420–428
Much of the energy used in our environment is not used efficiently.	Textbook: Chapter 14, pg. 408–409; Chapter 15, pg. 438–439
Standard 17: Students will develop an understanding of and be able to select and use information and communication technologies.	
Information and communication systems allow information to be transferred from human to human, human to machine, and machine to human.	Textbook: Chapter 17, pg. 493
Communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.	Textbook: Chapter 17, pg. 492–493
The design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message.	Textbook: Chapter 17, pg. 492–493
The use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.	Textbook: Chapter 4, pg. 85–87; Chapter 5, pg. 100–121; Chapter 17, pg. 506

Standards	G-W Content
Standard 18: Students will develop an understanding of and be able to select and use transportation technologies.	
Transporting people and goods involves a combination of individuals and vehicles.	Textbook: Chapter 13, pg. 391
Transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control, and support, that must function together for a system to work efficiently.	Textbook: Chapter 13, pg. 380–392
Governmental regulations often influence the design and operation of transportation systems.	Textbook: Chapter 13, pg. 372, 391
Processes, such as receiving, holding, storing, loading, moving, unloading, delivery, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently.	Textbook: Chapter 8, pg. 230; Chapter 13, pg. 373, 391, 392
Standard 19: Students will develop an understanding of and be able to select and use manufacturing technologies.	
Manufacturing systems use mechanical processes that change the form of materials through the processes of separating, forming, combining, and conditioning them.	Textbook: Chapter 7, pg. 171–200
Manufactured goods may be classified as durable and nondurable.	Textbook: Chapter 8, pg. 209–210
The manufacturing process includes the designing, development, making, and servicing of products and systems.	Textbook: Chapter 8, pg. 208–225
Chemical technologies are used to modify or alter chemical substances.	Textbook: Chapter 6, pg. 128–129, 140, 142, 144, 145; Chapter 7, pg. 181, 184, 192–195
Materials must first be located before they can be extracted from the earth through such processes as harvesting, drilling, and mining.	Textbook: Chapter 6, pg. 136, 139; Chapter 8, pg. 206, 208
Marketing a product involves informing the public about it as well as assisting in selling and distributing it.	Textbook: Chapter 8, pg. 230; Chapter 20, pg. 597–600
Standard 20: Students will develop an understanding of and be able to select and use construction technologies.	
The selection of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function.	Textbook: Chapter 10, pg. 281–282, 286–299; Chapter 11, pg. 305, 307, 310, 320, 321, 322, 324, 330, 333, 341
Structures rest on a foundation.	Textbook: Chapter 10, pg. 286–287; Chapter 11, pg. 309–312
Some structures are temporary, while others are permanent.	Textbook: Chapter 10, pg. 279, 280, 293; Chapter 11, pg. 331–332
Buildings generally contain a variety of subsystems.	Textbook: Chapter 11, pg. 314–318