ITEEA Standards Alignment

Student Standards

Legend

●	The standard is clearly addressed by program activities.
-	This standard potentially could be addressed as part of *FIRST*® LEGO® League Challenge either by actions that the coach or teacher takes when working with the students or by conditions established by the program.

Grades 3-5

Cluster	Indicator	Indicator Statement	Addressed
The Nature of Technology	1	Students will develop an understanding of the characteristics and scope of technology.	●
	C	*Things that are found in nature differ from things that are human-made in how they are produced and used.*	-
	D	*Tools, materials, and skills are used to make things and carry out tasks.*	-
	E	*Creative thinking and economic and cultural influences shape technological development.*	-
	2	Students will develop an understanding of the core concepts of technology.	●
	F	*A subsystem is a system that operates as a part of another system.*	-
	G	*When parts of a system are missing, it may not work as planned.*	-
	H	*Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time.*	-
	I	*Tools are used to design, make, use, and assess technology.*	-
	J	*Materials have many different properties.*	-
	K	*Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.*	●
	L	*Requirements are the limits to designing or making a product or system.*	●
	3	Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	●
	B	*Technologies are often combined.*	●
	C	*Various relationships exist between technology and other fields of study.*	-
Technology and Society	4	Students will develop an understanding of the cultural, social, economic, and political effects of technology.	●
	B	*When using technology, results can be good or bad.*	●
	C	*The use of technology can have unintended consequences.*	●
	5	Students will develop an understanding of the effects of technology on the environment.	-
	B	*Waste must be appropriately recycled or disposed of to prevent unnecessary harm to the environment.*	-
	C	*The use of technology affects the environment in good and bad ways.*	-
	6	Students will develop an understanding of the role of society in the development and use of technology.	●
	B	*Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes.*	-
	C	*Individual, family, community, and economic concerns may expand or limit the development of technologies.*	-
	7	Students will develop an understanding of the influence of technology on history.	-
	B	*People have made tools to provide food, to make clothing, and to protect themselves.*	-
Design	8	Students will develop an understanding of the attributes of design.	●
	C	*The design process is a purposeful method of planning practical solutions to problems.*	●
	D	*Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.*	●
	9	Students will develop an understanding of engineering design.	●

	C	*The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), [making, evaluating, and presenting].*	●
	D	*When designing an object it is important to be creative and consider all ideas.*	●
	E	*Models are used to communicate & test design ideas & processes.*	●
	10	Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	●
	C	*Troubleshooting is a way of finding out why something does not work so that it can be fixed.*	●
	D	*Invention and innovation are creative ways to turn ideas into real things.*	●
	E	*The process of experimentation, which is common in science, can also be used to solve technological problems.*	●
Abilities for a Technological World	11	Students will develop abilities to apply the design process.	●
	D	*Identify and collect information about everyday problems that can be solved by technology, and generate ideas and requirements for solving a problem.*	●
	E	*The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s)… .*	-
	F	*Test and evaluate the solutions for the design problem.*	●
	G	*Improve the design solutions.*	●
	12	Students will develop abilities to use and maintain technological products and systems.	●
	D	*Follow step-by-step directions to assemble a product.*	●
	E	*Select and safely use tools, products, and systems for specific tasks.*	-
	F	*Use computers to access and organize information.*	●
	G	*Use common symbols, such as numbers and words, to communicate key ideas.*	●
	13	Students will develop abilities to assess the impact of products and systems.	●
	C	*Compare, contrast and classify collected information in order to identify patterns.*	-
	D	*Investigate and assess the influence of a specific technology on the individual, family, community, and environment.*	●
	E	*Examine the trade-offs of using a product or system and decide when it could be used.*	-
The Designed World	14	Students will develop an understanding of and be able to select and use medical technologies.	-
	D	*Vaccines are designed to prevent diseases from developing and spreading; medicines are designed to relieve symptoms and stop diseases from developing.*	-
	E	*Technological advances have made it possible to create new devices, to repair or replace certain parts of the body, and to provide a means for mobility.*	-
	F	*Many tools & devices have been designed to help provide clues about health and to provide a safe environment.*	-
	15	Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.	-
	C	*Artificial ecosystems are human-made environments that are designed to function as a unit and are comprised of humans, plants, and animals.*	-
	D	*Most agricultural waste can be recycled.*	-
	E	*Many processes used in agriculture require different procedures, products or systems.*	-
	16	Students will develop an understanding of and be able to select and use energy and power technologies.	-
	C	*Energy comes in different forms.*	-
	D	*Tools, machines, products, and systems use energy in order to do work.*	-
	17	Students will develop an understanding of and be able to select and use information and communication technologies.	-
	D	*The processing of information through the use of technology can be used to help humans make decisions and solve problems.*	-
	E	*Information can be acquired & sent through a variety of technological sources, including print & electronic media.*	-
	F	*Communication technology is the transfer of messages among people and/or machines over distances through the use of technology.*	-
	G	*Letters, characters, icons, and signs are symbols that represent ideas, quantities, elements and operations.*	-
	18	Students will develop an understanding of and be able to select and use transportation technologies.	-

	D	*The use of transportation allows people and goods to be moved from place to place.*	-
	E	*A transportation system may lose efficiency/fail if a part is missing/malfunctioning or a subsystem isn't working.*	-
	19	Students will develop an understanding of and be able to select and use manufacturing technologies.	-
	C	*Processing systems convert natural materials into products.*	-
	D	*Manufacturing processes include designing products, gathering resources, and using tools to separate, form, and combine materials in order to produce products.*	-
	E	*Manufacturing enterprises exist because of a consumption of goods.*	-
	20	Students will develop an understanding of and be able to select and use construction technologies.	-
	C	*Modern communities are usually planned according to guidelines.*	-
	D	*Structures need to be maintained.*	-
	E	*Many systems are used in buildings.*	-

Grades 6-8

Cluster	Indicator	Indicator Statement	Addressed
The Nature of Technology	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.*	●
	G	*The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative.*	●
	H	*Technology is closely linked to creativity, which has resulted in innovation.*	●
	I	*Corporations can often create demand for a product by bringing it onto the market and advertising it.*	-
	2	Students will develop an understanding of the core concepts of technology.	●
	M	*Technological systems include input, processes, output, and at times, feedback.*	●
	N	*Systems thinking involves considering how every part relates to others.*	-
	O	*An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.*	-
	P	*Technological systems can be connected to one another.*	-
	Q	*Malfunctions of any part of a system may affect the function and quality of the system.*	-
	R	*Requirements are the parameters placed on the development of a product or system.*	●
	S	*Trade-off is a decision process recognizing the need for careful compromises among competing factors.*	●
	T	*Different technologies involve different sets of processes.*	-
	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 quality.*	-
	V	*Controls are mechanisms or particular steps that people perform using information about the system that causes systems to change.*	-
	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.*	●
	E	*A product, system, or environment developed for one setting may be applied to another setting.*	-
	F	*Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.*	-
Technology and Society	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 ways, including their safety, comfort, choices, and attitudes about technology's development and use.*	-
	E	*Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.*	●
	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.*	-
	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.*	-
	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.*	-

	F	*Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.*	-
	6	Students will develop an understanding of the role of society in the development and use of technology.	●
	D	*Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.*	-
	E	*The use of inventions and innovations has led to changes in society and the creation of new needs and wants.*	●
	F	*Social and cultural priorities and values are reflected in technological devices.*	-
	G	*Meeting societal expectations is the driving force behind the acceptance and use of products and systems.*	-
	7	Students will develop an understanding of the influence of technology on history.	-
	C	*Many inventions and innovations have evolved using slow and methodical processes of tests and refinements.*	-
	D	*The specialization of function has been at the heart of many technological improvements.*	-
	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.*	-
	F	*In the past, an invention or innovation was not usually developed with the knowledge of science.*	-
Design	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 design are made up of criteria and constraints.*	●
	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.*	●
	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.*	●
	H	*Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.*	●
	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. Innovation is the process of modifying an existing product or system to improve it.*	●
	H	*Some technological problems are best solved through experimentation.*	●
Abilities for a Technological World	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 pre-established requirements, such as criteria and constraints, and refine as needed.*	●
	L	*Make a product or system and document the solution.*	●
	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.*	●
	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 and 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 is useful.*	-

The Designed World	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 health care.*	-
	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 sufficient amounts of vaccines are produced.*	-
	J	*Genetic engineering involves modifying the structure of DNA to produce novel genetic make-ups.*	-
	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 humanmade 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.*	-
	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.*	-
	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 a clear communication by providing a common language to express ideas.*	-
	18	Students will develop an understanding of and be able to select and use transportation technologies.	-
	F	*Transporting people and good 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 for a system to work effectively.*	-
	H	*Governmental regulations often influence the design and operation of transportation systems.*	-
	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.*	-
	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.*	-
	G	*Manufactured goods may be classified as durable and nondurable.*	-
	H	*The manufacturing process includes the designing, development, making, and servicing of products and systems.*	-
	I	*Chemical technologies are used to modify or alter chemical substances.*	-
	J	*Materials must first be located before they can be extracted from the earth through such processes as harvesting, drilling, and mining.*	-
	K	*Marketing a product involves informing the public about it as well as assisting in selling and distributing it.*	-

	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.*	-
	G	*Structures rest on a foundation.*	-
	H	*Some structures are temporary, while others are permanent.*	-
	I	*Buildings generally contain a variety of subsystems.*	-