Emerging Technology-Technology Education



North Dakota Department of Career and Technical Education

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Emerging Technology Project

Focusing on National Standards for Technological Literacy by Department of Career and Technical Education

Premise

The present and future workforce demands that students be technologically literate to succeed in a highly competitive and global market. If we, as a state, are going to remain competitive both in the training and education of knowledge based workers, and attracting new and expanding industries that are looking for a well prepared workforce, we need to provide students with a fundamental understanding, through experiential learning, of the technological principles that will prepare them for their future education and careers. These technological competencies are the National Standards for Technological Literacy that have been adopted by the State Board for Career and Technical Education and are implemented into our Technology Education programs across the state.

Background

The Emerging Technology project had it's beginnings in the High Tech Initiative in the late 1980's. At that time, the State Board for Career and Technical Education helped establish and provide initial federal funding for consortiums of schools to form "High-Tech Cooperatives" each comprised of 9 to 24 schools that rotated a variety of technology based equipment between members of the consortium. This rotation concept enabled the schools to share the cost of equipment and kept expensive equipment in use as it moved from school to school. The results were that the High Tech equipment was being used by students and teachers. Also with the modules rotating between schools it was being used all the time, in effect wearing out equipment due to use rather than it growing outdated on a shelf when a particular class was finished with it.

The SBCTE provided federal startup funding, some for professional development and a minimal amount of funding to be used to repair and maintain the equipment. The balance of the funding to operate, replace, and repair equipment came from the member schools through membership tuition. Each member school paid a yearly tuition fee to the consortium of \$2,000 to \$5000 depending on the consortium that they are in. There are currently 94 schools in six consortiums. The number of schools currently in a consortium varies from 9 to 24.

While these consortiums initially were able to maintain the equipment that were in the learning modules, the equipment replacement cycle and the high usage of the equipment has outpaced the ability of consortiums to replace outdated or worn out equipment. The equipment that is currently being rotated between schools on a four to six week rotation is: Robotics, CNC Milling/Lathe, Biotech/Genetics, Lasers, and Hydraulics & Pneumatics, along with some other equipment that individual consortiums have developed for their area. The variety of equipment, along with new equipment to be added to the rotations, will enable the curriculum to align to the standards for technological literacy.

Initiative

This initiative was intended to provide funding to replace and update equipment in existing schools. There are currently 94 schools receiving funding. The creation of a consortium would be left up to the local schools with basic guidelines set by the DCTE through a management team derived from consortium membership, industry, and state staff. Local schools would apply for approval of their consortiums by identifying the size of the consortiums, the equipment they will utilize, the standards that they will follow, the length of rotation, how they will maintain the equipment, how the equipment will be rotated, a professional development plan, a fiscal agent for the consortium, an equipment and operational budget, and a process for identifying students who have participated in the classes. The guidelines are reflected in the remaining sections of this request.

Emerging Technology Guidelines and Policies February 15, 2006

Updated February 14, 2007

Updated August 29, 2024

Please refer to the Core Concept document to get a better understanding of some of the terminology that may be used in these guidelines.

Guidelines for Equipment/Module Approval

State funds may be used to purchase approved equipment/modules. State funds can be used to repair equipment.

New modules will be approved by the Management Team prior to adding them to the approved list.

Requests for equipment/modules will go to the Technology Education Supervisor for approval. How module will address standards is a top priority.

All equipment requests must be requested using Web Grants.

Consortiums must have a module in each category prior to using state funds for modules in another category.

No more than three equipment/module purchases within each category will be supported with state funds.

Professional development is a priority for local funds. Up to 15% of the consortiums' state funds may be used for that purpose. A plan for use of the state funds for professional development must be submitted for approval.

All modules must follow software licensing guidelines. All modules must be readily able to be

rotated.

General Policies

A new school will be one that has never been a member of a consortium or has been out of a consortium for a minimum of five years. Consortiums will be allocated \$8,000 for the first year for each new school.

Only a consortium may make an application to the Emerging Technology Management Team for admission of a school or schools to an existing consortium.

A priority will be given to an application for new schools to join existing consortiums, to create more efficiency, such as applications that do not require the purchase of more modules to accommodate the additional school(s).

All instructors who use the emerging technology modules must be trained on each module prior to that module being used in the school. Consortiums must submit a list of every instructor who will use the modules. That list would contain the instructors name, the school, primary teaching area (i.e. Ag Ed, Tech Ed, math), module(s) that they will be using, and date of training (to verify that training has been received).

Consortiums must provide a summary of usage that identifies the number of students that participated in the activities.

Consortiums must provide an inventory list of all modules and date of purchase or last upgrade and provide updates as modules change or are acquired.

A school may use local funds to purchase modules that are not approved for state reimbursement.

The purchasing of equipment and rotation scheduling are a local management team responsibility but it is recommended that annual instructor meetings are conducted to obtain feedback on equipment, scheduling, and professional development needs.

Considerations for approving funding for new schools and/or consortiums are: To maintain the size of a consortium at six schools

To start a new consortium with a minimum of six schools

To create more efficiency, such as when a single district joins an existing consortium and not require the purchase of more modules to accommodate the additional school Grant amounts are set based on funds available

Applications for a new school or consortium must include a Local Consortium Agreement which: Identifies all member schools Have signatures from all member school administrators Designates a fiscal agent for the consortium

A consortium budget showing:

Local financial obligation, such as tuition Funding for professional development

A professional development plan

List of instructors by name, teaching area, modules taught, when trained

Module rotation/schedule plan

Other consortium obligations of member schools – such as administrative and technical support

Emerging Technology Core Concepts of Current Modules

On December 1, 2005 a representative group of teachers and technicians from each of the six consortiums met to align the current modules with Core Concepts.

The Overarching Concepts are common to all modules and consist of the Knowledge & Skill Statements and the Basic Core Concepts. The Basic Core Concepts, developed by consortium teachers and technicians, were grouped after the meeting to align with the national Knowledge & Skill Statements. Both are reflected here in their entirety.

Overarching Concepts

Knowledge & Skills Basic Core Concepts Academics → Applies Math, Applied Science Communications → Communication Skills Problem Solving & Critical Thinking \rightarrow Problem Solving, Troubleshooting Information Technology Applications -> Creativity Systems Safety, Health and Environmental \rightarrow Safety Leadership & Teamwork \rightarrow Teamwork, Adaptability, Flexibility Ethics & Legal Responsibilities → Work Ethic Employability & Career Development → Job Information Technical Skills \rightarrow Trade Skills. Research Skills. Measurement All current modules were grouped into four categories: I. Automated Manufacturing II. Science Technologies III. Engineering IV. Information/Communication Technology

A statement follows each grouping to better define the particular category. The Core Concepts that are listed for each category are applicable to every module in that area. While there may be other concepts that are taught within each module, the group named these as the most prevalent. The bulleted items are there to further describe either the module or the Core Concept.

I. Automated Manufacturing

Students will have an understanding of the concepts used in computer numerical control as it relates to the production and handling of materials to create products.

Modules	Core Concepts
Mill	Equipment Function PlasmaCAMM • Tools
Laser Engraver	Feed Rate Router Computer Robotics
	• File Format
ColorCAMM	• Application Software CNC Embroidery 3 Axis
Geometry	
-	Design Processes

II. Science Technologies

Students will have an understanding of basic scientific concepts and principles by applying them to real life applications.

Modules

- Core Concepts
- Fast Plants Basic Science Concepts
 - DNA
 - Plant Biology
 - Genetics Chemistry Concepts Bio Tech Ecology

Biology Concepts

Physics Concepts

- DNA
- Genetics
- Forensics

Science Workshop/Probes

Physiology Concepts

III. Engineering

Students will have an understanding of problem-solving skills using engineering concepts and processes. Integrations of math and science principals and foundations skills used in production will be stressed during support activities.

Modules	Core Concepts	
CADD	Terminology	
 Basic Computer Skills 	Systems Laser	Schematics
• Fiber Optics	Basic Linear Logic	
Electronics	Properties Pneumatic	s/Hydraulics/Mechanical Plastic
Molding		

IV. Information/Communication Technologies

Students will have an understanding of a wide range of information data systems that are used across many discipline areas.

<u>Modules</u>	Core Concepts	
Aviation	Map Reading	
 Experimental Flight 	Navigation GPS	Geography
Tracking	Triangulation GIS	
Video/Digital Editing	-	

Potential modules to be developed

Nanotechnology Rapid Prototyping & Automated Manufacturing Aerospace Semi-conductor Energy – Bio Diesel, Wind Medical PLC's

Department of Career & Technical Education Emerging Technology Consortium Memberships Fiscal Year 2024-2025 (94 Schools)

Dickinson, Roughrider Area Career and Technology Center - 12 Schools

Beach Belfield Bowman County	Glen Ullin Hebron Killdeer	Mott/Regent New England	New Salem Scranton	South Heart Richardton/Taylor
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Devils Lake, Lake Area Career & Technology Center – 18 schools Technology Learning Cooperative

Dakota Prairie	Lake Area CTC	Maddock	Munich	Rolette
Devils Lake	Lakota	Midkota	North Star	Starkweather
Fessenden-Bowden	Langdon	Minnewaukan	Northwood	Warwick
Four Winds	Leeds	Mt. Pleasant-Rolla		

Kenmare, Western Dakota Corp of Discovery – 24 schools

Alexander	Divide County	Kenmare	Parshall	Velva
Bakken Area	East Fairview	Lewis & Clark (Berthold)	Ray	Washburn
Beulah	Grenora	Lewis & Clark (Makoti)	Stanley	Williston
Center	Garrison	McKenzie County	Surrey	Wilton
Dickinson Catholic	Hazen	New Town	Tioga	

Grafton, North Valley Area Career & Technology Center –11 schools Walsh/Pembina Technology Cooperative

Cavalier	Fordville	North Valley CTC	NB-Pembina	Valley/Edinburg
Drayton	Minto	Park River	Manvel	ND-Walhalla
Grafton HS				

Oakes, Southeast Regional Career & Technology Center – 20 schools Southeast High Tech

Ashley Campbell/Tintah	Fairmount Gackle-Streeter	LaMoure Lidgerwood	North Sargent Oakes	Wahpeton HS Wahpeton MS
Edgeley	Hankinson	Lisbon	Richland	Wyndmere
Ellendale	Kulm	Milnor	Sargent Central	Zeeland
Enderlin				

Valley City, Sheyenne Valley Area Career & Technology Center – 9 schools Sheyenne Valley High-Tech

Barnes County North	Hillsboro	Litchville/Marion	Valley City CTC	Valley City MS
Cooperstown	Hope/Page	Maple Valley	Valley City HS	

		Emerging Technology-Technology Education
No	rth Dakot	a Technology Education Standards Taught in Module 1 Mill
technology	racteristic	s and scope of technology-recognize the characteristics and scope of
Competencies		Develop new products and systems to solve problems or to help do things that
		ould not be done without the help of technology.
		Lecognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
		Discover how technology is closely linked to creativity which has resulted in
		xamine and demonstrate how corporations can often create demand for a
		roduct by bringing it onto the market and advertising it.
	1 M E	Explain why most development of technologies is driven by the profit motive
	and the m	
		s of Technology: connect the core concepts of technology
Competencies		Demonstrate systems thinking that applies logic and creativity with
		ppropriate compromises to complex real-life problems.
		Deduce how the stability of a technological system is influenced by all of the
		components in a system (especially those in the feedback loop).
		dentify and determine the criteria and constraints of a product or system and
		ow they affect the final design and development.
		Recognize optimization as an ongoing process or methodology for designing or
	_	product dependent on criteria and constraints.
		Describe how new technologies create new processes (e.g., computers o silicon chips to miniaturization of computers, etc.).
		Analyze how quality control is used to ensure that a product, service, or system
		ablished criteria.
		xamine complex systems that have many layers of controls and feedback loops
		e information.
		elationships: Interpret the relationships among technologies and the etween technology and other fields of study
Competencies		ecognize how technological progress has advanced science and mathematics.
	3 G A	dapt an existing innovation developed for one purpose into a different function
		istrate technology transfer.
Standard 4 Effe technology	cts of Tech	nnology: Predict cultural, social, economical and political effects of
Competencies		Ione
Standard 5 Tec environment	hnology a	nd the Environment: Investigate the effects of technology on the
Competencies	5 G S	pecify how humans can devise technologies to conserve water, soil, and
_	er	nergy through such techniques as reusing, reducing, and recycling.
Standard 6 Dev and use of techn	-	and Use of Technology: Examine the role of society in the development
Competencies		ompare and contrast different cultures and the development of their own chnologies to satisfy individual needs, wants, and values.
Standard 7 Inf		Fechnology: Isolate the influences of technology on history
Competencies		llustrate a technological development that has been evolutionary or a result f a series of refinements to a basic invention.
		ummarize how technology has been a powerful force in reshaping the social,
		political, and economic landscape.
Standard & Att		Design: Explore the attributes of design
Stanuaru o All	ibutes of 1	Design. Explore the attributes of design

Competencies	8 H	Practice the steps of a design process (e.g. defining a problem, brainstorming,
Competencies	011	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, communicating
		processes and results, etc.).
-	8 I	Analyze why design problems are seldom presented in a clearly defined form.
_	8 J	Check and critique the design to redefine and improve upon it.
	8 K	
		Explore how requirements of a design (e.g. criteria, constraints, and efficiency) imes compete with each other.
Standard 0 Engi		g Design: Integrate engineering design
	9 J	Distinguish how engineering design is influenced by personal characteristics
Competencies	9 J	
		(e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
-	9 K	
		Create a prototype as a working model used to test a design concept by making
Standard 10 Dra		observations and necessary adjustments.
		Solving: Translate the role of troubleshooting, research and development,
	10 I	and innovation and experimentation in problem solving Incorporate research and development as a specific problem-solving approach.
Competencies	10 I 10 J	
Standard 11 An		Research solutions to technological problems.
	_	on of the Design Process: Implement the design process
Competencies	11 M	Recommend a design problem to solve and decide whether or not to address it.
	11 0	Refine a design by using prototypes and modeling to ensure quality,
_	11.0	efficiency, and productivity of the final product.
_	11 Q	Develop and produce a product or system using a design process.
	11 N	Identify criteria and constraints and determine how these will affect the design
	proces 11 P	
		Evaluate the design solution using conceptual, physical, and mathematical lels at various intervals of the design process in order to check for proper
	mot	design and to note areas where improvements are needed.
Standard 12 To	chnolo	gical Products and Systems: Use and maintain technological products and
systems	cimolo	gical i roducts and Systems. Ose and maintain technological products and
	12 0	Operate systems to function as designed.
1		of Products and Systems: Assess the impact of products and systems
Competencies	13 J	Collect information and evaluate quality.
L		echnologies: Relate medical technologies for selection and use
Competencies		None
A	ricultu	ral and Related Biotechnologies: Understand, select and use agricultural and
related biotechno		
Competencies	0	None
-		
	ergy an	d Power Technologies: Research and develop an understanding of how to
	<u> </u>	nd Power Technologies: Research and develop an understanding of how to and power technologies
Competencies	<u> </u>	nd power technologies
Competencies Standard 17 Infe	ergy ar	nd power technologies None
Standard 17 Inf	ergy an ormati	nd power technologies None on and Communication Technologies: Select and use information and
Standard 17 Info communication t	ergy an ormati	nd power technologies None on and Communication Technologies: Select and use information and
Standard 17 Info communication t Competencies	ergy an ormati echnol 17 L	nd power technologies None on and Communication Technologies: Select and use information and ogies
Standard 17 Info communication t Competencies	ergy an ormati echnol 17 L receivi	ad power technologies None on and Communication Technologies: Select and use information and ogies Demonstrate the inputs, processes, and outputs associated with sending and
Standard 17 Info communication t Competencies	ergy an ormati echnol 17 L receivi	nd power technologies None on and Communication Technologies: Select and use information and ogies Demonstrate the inputs, processes, and outputs associated with sending and ing information.

Competencies	None
Standard 20 Co	nstruction Technologies: Understand, select and use construction technologies
	it, distributing it, selling it, etc.).
	identity, conducting research on its potential, advertising
	19 R Design a marketing strategy (e.g. establishing a product's
	continuous production, etc.).
	19 O Classify manufacturing systems (e.g. customized production, batch production,
	19 M Classify how materials have different qualities (natural, synthetic, or mixed).
Competencies	19 L Service products to maintain good operating condition.
Standard 19 Ma	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	None
and use transpor	tation technologies
Standard 18 Tr	ansportation Technologies: Research and develop an understanding of how to select
	that incorporate, etc.).
	symbols, measurement, conventions, icons, graphic images, and languages
	communicated through a variety of visual, auditory, and tactile stimuli (e.g.
	17 Q Demonstrate ways that technological knowledge and processes are
	receiver, decoder, storage, retrieval, and destination.
	17 O Show how communication systems are made up of source, encoder, transmitter,

	Emerging Technology-Technology Education
North Da	akota Technology Education Standards Taught in Module 2 Laser Engraver
Standard 1 Cha	racteristics and scope of technology-recognize the characteristics and scope of
technology	
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.
	1 JAnalyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is
	increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed research.
	1 M Explain why most development of technologies is driven by the profit motive
	and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
competencies	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
	others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a
	product or system.
	2 S Recognize the need for careful compromises among competing factors in the
	trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using
	information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with
	appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental
	systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values
	(e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and
	how they affect the final design and development.
	now and arrest the multi-design and development.

	2 BB Recognize optimization as an ongoing process or methodology for
	designing or making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers
	to silicon chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	2 EE Explain how management is the process of planning, organizing, and controlling work.
	2 FF Examine complex systems that have many layers of controls and feedback loops
	to provide information.
Standard 3 Tec	chnology Relationships: Interpret the relationships among technologies and the
connections bet	ween technology and other fields of study
Competencies	3 D Show how technological systems often interact with one another.
	3 E Illustrate how a product, system, or environment developed for one setting may be applied to another setting.
	3 F Correlate how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.
	3 H Relate how technological innovation results when ideas, knowledge, or
	skills are shared within a technology, among technologies, or across other
	fields.
	3 I Examine why technological ideas are sometimes protected through the process of
	patenting.
	3 J Recognize how technological progress has advanced science and mathematics.
Standard 4 Effe technology	ects of Technology: Predict cultural, social, economical and political effects of
Competencies	4 D Show how the use of technology affects humans in various ways (safety,
competencies	comfort, choices, and attitudes) about technology's development and use.
	4 FDetermine how the development and use of technology poses ethical issues.
	4 H Connect changes caused by the use of technology ranging from gradual to rapid
	and from subtle to obvious.
Standard 5 Tee	chnology and the Environment: Investigate the effects of technology on the
environment	mology and the Environment. Investigate the effects of technology on the
	5 D Examine how the management of waste produced by technological systems is an
competencies	important societal issue.
	5 E Explore how technologies can be used to repair damage cause by natural
	disasters and to break down waste from the use of various products and
	systems.
	5 G Specify how humans can devise technologies to conserve water, soil, and
	energy through such techniques as reusing, reducing, and recycling.
	5 H Determine considerations of trade-offs when new technologies are developed to
	reduce the use of resources.
	5 K Recognize how humans devise technologies to reduce the negative consequences
	of other technologies.
Standard 6 Dev	velopment and Use of Technology: Examine the role of society in the development
and use of techn	
Competencies	6 F Summarize the social and cultural priorities and values reflected in technological devices.
	6 G Examine why meeting societal expectations is the driving force behind the
	acceptance and use of products and systems.
	6 HCompare and contrast different cultures and the development of their own
	technologies to satisfy individual needs, wants, and values.
	6 I Interpret whether decisions to develop a technology is influenced by societal
	opinions, demands, and/or corporate cultures.
	· · ·

I	6 I	Explain the different factors that contribute to chaning the design of and
	6 J	Explain the different factors that contribute to shaping the design of and
		demand for various technologies (e.g. advertising, the strength of the
Standard 7 Inf		economy, the goals of a company, the latest fads, etc.)
		of Technology: Isolate the influences of technology on history
Competencies	7 C	Investigate inventions and innovations that have evolved by using slow and odical processes of tests and refinements.
	7 D	Recognize that the specialization of function is at the heart of many
		ological improvements.
	7 E	Understand that 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.
	7 F	Describe how invention or innovation was not always developed with the ledge of science.
	7 G	Illustrate a technological development that has been evolutionary or a result of a
		of refinements to a basic invention.
	7 H	Report how the evolution of civilization has been directly affected by, and
		has in turn affected, the development and use of tools and materials.
	7 I	Summarize how technology has been a powerful force in reshaping the social,
	cultur	al, political, and economic landscape.
	7 N	Evaluate technological developments of the Industrial Revolution (e.g.,
		continuous manufacturing, sophisticated transportation and communication
		systems, advanced construction practices, improved education, and leisure
		time, etc.).
	7 O	Relate how the Information Age places emphasis on the processing and
		nge of information.
Standard 8 Att		of Design: Explore the attributes of design
Competencies	8 E	Illustrate how design as a creative planning process leads to useful products and
	systen	
	8 F 8 G	Infer that there is no perfect design.
		Relate how requirements for a design are made up of criteria and constraints.
	8 H	Practice the steps of a design process (e.g. 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,
	0.1	communicating processes and results, etc.).
	8 I	Analyze why design problems are seldom presented in a clearly defined form.
	8 J	Check and critique the design to redefine and improve upon it.
	8 K	Explore how requirements of a design (e.g. criteria, constraints, and
Standard C.	•	efficiency) sometimes compete with each other.
	T	ng Design: Integrate engineering design
Competencies	9 F	Utilize design processes involving a set of steps, which can be performed in different sequences and repeated as needed.
	9 G	
	90 9H	Use brainstorming as a group problem-solving design process.
	9 H modif	Transform ideas into practical solutions by modeling, testing, evaluating, and
	9 J	Distinguish how engineering design is influenced by personal characteristics
		(e.g. creativity, resourcefulness, and the ability to visualize and think
		abstractly.)
	1	ausuacuy.

	oblem Solving: Translate the role of troubleshooting, research and development,
	vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a problem-solving method.
	10 H Solve technological problems through experimentation.
	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
	10 K Realize that all problems are not technological and not every problem can be
	solved using technology. 10 L Apply a multidisciplinary approach to solve technological problems.
Standard 11. A.	pplication of the Design Process: Implement the design process
Competencies	11 H Apply a design process to solve problems in and beyond the laboratory- classroom.
	11 I Specify criteria and constraints for the design.
	11 J Make two-dimensional and three-dimensional representations of the designed
	solution.
	11 K Test and evaluate the design in relation to reestablished requirements (e.g. criteria, constraints, refine, etc.).
	11 L Make a product or system and document the solution.
	11 M Recommend a design problem to solve and decide whether or not to address it.
	efficiency, and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
	echnological Products and Systems: Use and maintain technological products and
systems	12 II Itilize information gravided in manuals, protocols, or hy experienced georgia to
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced people to
	see and understand how things work. 12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and repair systems.
	12 J Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.
	12 O Operate systems to function as designed.
Standard 13. In	apacts of Products and Systems: Assess the impact of products and systems
Competencies	13 F Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
Competencies	13 G Use data collected to analyze and interpret trends in order to identify
	the positive or negative effects of a technology.
	13 H Identify trends and monitor the potential consequences of technological
	development.
	13 J Collect information and evaluate quality.
	13 L Use assessment techniques to make decisions about the future development of
	technology.
Standard 14 M	edical Technologies: Relate medical technologies for selection and use
Competencies	14 G Analyze advances and innovations in medical technologies used to improve
-	healthcare.
	14 K Research medical technologies which protect and maintain health (e.g.,
	prevention and rehabilitation, vaccines and pharmaceuticals, medical and
	surgical procedures, genetic engineering, etc.)

	14 L Illustrate how telemedicine reflects the convergence of technological advances
	in a number of fields (e.g. medicine, telecommunications, virtual presence,
	computer engineering, informatics, artificial intelligence, robotics, materials
	science, perceptual psychology, etc.).
Standard 15 Ag related biotechn	ricultural and Related Biotechnologies: Understand, select and use agricultural and
Competencies	None
	ergy and Power Technologies: Research and develop an understanding of how to
	ect and use energy and power technologies
Competencies	16 E Define energy as the ability to do work.
competencies	16 DDefine energy as the define to define the defined16 FDemonstrate that energy can be used to do work using many processes.
	16 G Identify power as 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.
	16 H Show that power systems are used to drive and provide propulsion to other technological products and systems.
	16 N Illustrate how power systems must have a source of energy, a process, and loads.
Standard 17 Int	Cormation and Communication Technologies: Select and use information and
communication	technologies
Competencies	17 H Examine information and communication systems that allow information to be
	transferred from human to human, human to machine, and machine to human.
	17 I Illustrate how communication systems are made up of a source, encoder,
	transmitter, receiver, decoder, and destination.
	17 J Interpret how the design of a message is influenced by such factors as the
	intended audience, medium, purpose, and nature of the message.
	17 K Use symbols, measurements, and drawings to promote clear communication
	by providing a common language to express ideas.
	17 L Demonstrate the inputs, processes, and outputs associated with sending and
	receiving information.
	17 N Develop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder, transmitter,
	receiver, decoder, storage, retrieval, and destination.
	17 P Integrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g.
	symbols, measurement, conventions, icons, graphic images, and languages
	that incorporate, etc.).
Standard 18 Tr	ansportation Technologies: Research and develop an understanding of how to select
	rtation technologies
Competencies	None
	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	19 F Use mechanical processes related to manufacturing systems to change
competences	the form of materials (e.g. separating, forming, combining, conditioning,
	etc.).
	19 G Classify manufactured goods as durable and nondurable.
	19 H Explain how the manufacturing process includes designing, developing, making, and servicing products and systems.
<u> </u>	
	19 I Use chemical technologies to modify or alter chemical substances.
	19 K Market a product by informing the public about it as well as assisting in selling
	and distributing.

. E	
	19 L Service products to maintain good operating condition.
	19 M Classify how materials have different qualities (natural, synthetic, or mixed).
	19 O Classify manufacturing systems (e.g. customized production, batch production,
	continuous production, etc.).
	19 P Demonstrate how the interchangeability of parts increases the effectiveness of
	manufacturing processes.
	19 Q Show how chemical technologies provide a means for humans to alter or
	modify materials and to produce chemical products.
	19 R Design a marketing strategy (e.g. establishing a product's identity, conducting
	research on its potential, advertising it, distributing it, selling it, etc.).
Standard 20 Con	struction Technologies: Understand, select and use construction technologies
Competencies	None

	Emerging Technology-Technology Education
Nor	th Dakota Technology Education Standards Taught in Module 3 Router
	racteristics and scope of technology-recognize the characteristics and scope of
	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in
	innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.1 M Explain why most development of technologies is driven by the profit motive and
	the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 W Demonstrate systems thinking that applies logic and creativity with
-	appropriate compromises to complex real-life problems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 AA Identify and determine the criteria and constraints of a product or system and how
	they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for designing or
	making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers to
	silicon chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system
	meets established criteria.
	2 FF Examine complex systems that have many layers of controls and feedback loops to provide information.
Standard 3 Tec	hnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	3 J Recognize how technological progress has advanced science and mathematics.
	3 G Adapt an existing innovation developed for one purpose into a different
	function to demonstrate technology transfer.
technology	cts of Technology: Predict cultural, social, economical and political effects of
Competencies	None
Standard 5 Tec environment	hnology and the Environment: Investigate the effects of technology on the
Competencies	5 G Specify how humans can devise technologies to conserve water, soil, and
	energy through such techniques as reusing, reducing, and recycling.
	relopment and Use of Technology: Examine the role of society in the development
and use of techn	
Competencies	6 H Compare and contrast different cultures and the development of their own
	technologies to satisfy individual needs, wants, and values.
	uence of Technology: Isolate the influences of technology on history
Competencies	7 G Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	7 I Summarize how technology has been a powerful force in reshaping the social,
	cultural, political, and economic landscape.
Standard 8 Attr	ributes of Design: Explore the attributes of design
Competencies	8 H Practice the steps of a design process (e.g. defining a problem, brainstorming,
1	r

	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, communicating
	processes and results, etc.).
	8 I Analyze why design problems are seldom presented in a clearly defined form.
	8 J Check and critique the design to redefine and improve upon it.
	8 K Explore how requirements of a design (e.g. criteria, constraints, and efficiency)
	sometimes compete with each other.
Standard 9 Eng	gineering Design: Integrate engineering design
Competencies	9 J Distinguish how engineering design is influenced by personal characteristics
	(e.g. creativity, resourcefulness, and the ability to visualize and think
	abstractly.)
Standard 10 Pr	oblem Solving: Translate the role of troubleshooting, research and development,
	vention and innovation and experimentation in problem solving
Competencies	10 I Incorporate research and development as a specific problem-solving approach.
L	10 J Research solutions to technological problems.
Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 M Recommend a design problem to solve and decide whether or not to address it.
r	11 O Refine a design by using prototypes and modeling to ensure quality,
	efficiency, and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
	11 N Identify criteria and constraints and determine how these will affect the design
	process.
	11 P 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.
Standard 12 To	echnological Products and Systems: Use and maintain technological products and
systems	
Competencies	12 O Operate systems to function as designed.
•	npacts of Products and Systems: Assess the impact of products and systems
Competencies	13 J Collect information and evaluate quality.
r	
Standard 14 M	edical Technologies: Relate medical technologies for selection and use
Competencies	None
.	gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	
Competencies	None
	ergy and Power Technologies: Research and develop an understanding of how to
	lect and use energy and power technologies
Competencies	None
-	formation and Communication Technologies: Select and use information and
communication	
Competencies	17 L Demonstrate the inputs, processes, and outputs associated with sending and
	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 O Show how communication systems are made up of source, encoder,
	transmitter, receiver, decoder, storage, retrieval, and destination.

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	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols,
	measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Standard 18 Tr	ansportation Technologies: Research and develop an understanding of how to select
an	d use transportation technologies
Competencies	None
Standard 19 Ma	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	19 L Service products to maintain good operating condition.
	19 M Classify how materials have different qualities (natural, synthetic, or mixed).
	19 O Classify manufacturing systems (e.g. customized production, batch production,
	continuous production, etc.).
	19 R Design a marketing strategy (e.g. establishing a product's
	identity, conducting research on its potential, advertising
	it, distributing it, selling it, etc.).
Standard 20 Co	onstruction Technologies: Understand, select and use construction technologies
Competencies	None

	Emerging Technology-Technology Education
Nor	th Dakota Technology Education Standards Taught in Module 4 Robots
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
_	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1 J Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
competencies	feedback.
	2 N Relate how systems thinking involves considering how every part relates to others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 S Recognize the need for careful compromises among competing factors in the
	trade-off decision process.
	2 U Show how maintenance is a 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).
	2 W Demonstrate systems thinking that applies logic and creativity with appropriate
	compromises to complex real-life problems.
	2 Y Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	2 AA Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for designing or
	making a product dependent on
	criteria and constraints.
	2 DD Analyze how quality control is used to ensure that a product, service, or system
	meets established criteria.
	2 EE Explain how management is the process of planning, organizing, and controlling work.
	2 FF Examine complex systems that have many layers of controls and feedback loops to provide information.
Standard 3 Tec	hnology Relationships: Interpret the relationships among technologies and the
con	nections between technology and other fields of study

Competencies	3 D Show how technological systems often interact with one another.
-	3 E Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
Standard 4 Effect technology	cts of Technology: Predict cultural, social, economical and political effects of
Competencies	4 D Show how the use of technology affects humans in various ways (safety, comfort, choices, and attitudes) about technology's development and use.
	4 E Examine how technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
	4 F Determine how the development and use of technology poses ethical issues.
	4 G Identify economic, political, and cultural issues influenced by the development
	and use of technology.
	4 H Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
	4 J Debate ethical considerations important to the development, selection, and use of technologies.
	4 K Hypothesize how the transfer of a technology from one society to another can
	cause cultural, social, economic, and political changes affecting both societies
	to varying degrees.
Standard 5 Tech environment	hnology and the Environment: Investigate the effects of technology on the
Competencies	None
Standard 6 Dev and use of technol	elopment and Use of Technology: Examine the role of society in the development
Competencies	6 E Associate how the use of inventions and innovations has led to changes in societ
Competencies	and the creation of new needs and wants.
	6 I Interpret whether decisions to develop a technology is influenced by societal
	opinions, demands, and/or corporate cultures.
Standard 7 Infl	uence of Technology: Isolate the influences of technology on history
Competencies	7 D Recognize that the specialization of function is at the heart of many technological improvements.
	7 G Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and has it turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,
	continuous manufacturing, sophisticated transportation and communication systems,
	advanced construction practices, improved education, and leisure time, etc.).
Standard 8 Attr	ributes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
	systems.
	8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 I Analyze why design problems are seldom presented in a clearly defined form.
	8 J Check and critique the design to redefine and improve upon it.
	ineering Design: Integrate engineering design
Competencies	9 F Utilize design processes involving a set of steps, which can be performed in

	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	9 K Create a prototype as a working model used to test a design concept by making
	actual observations and necessary adjustments.
Standard 10 Pr	oblem Solving: Translate the role of troubleshooting, research and development,
inv	vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
	problem-solving method.
	10 H Solve technological problems through experimentation.
Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 I Specify criteria and constraints for the design.
	11 K Test and evaluate the design in relation to preestablished requirements (e.g.
	criteria, constraints, refine, etc.).
	11 M Recommend a design problem to solve and decide whether or not to address it.
	11 O Refine a design by using prototypes and modeling to ensure quality,
	efficiency, and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
Standard 12 T	echnological Products and Systems: Use and maintain technological products and
systems	
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
	people to see and understand how things work.
	12 J Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, an
	knowledge to repair it.
	12 O Operate systems to function as designed.
	mpacts of Products and Systems: Assess the impact of products and systems
Competencies	None
Standard 14 Me	edical Technologies: Relate medical technologies for selection and use
Competencies	14 G Analyze advances and innovations in medical technologies used to improve
	healthcare.
	14 K Research medical technologies which protect and maintain health (e.g.,
	prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical
	procedures, genetic engineering, etc.)
	14 L Illustrate how telemedicine reflects the convergence of technological advances
	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence,
	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials
	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.).
	 14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	 14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies
related biotechn Competencies	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None
related biotechn Competencies Standard 16 En	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None None
related biotechn Competencies Standard 16 En sel	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None nergy and Power Technologies: Research and develop an understanding of how to lect and use energy and power technologies
related biotechn Competencies Standard 16 En sel Competencies	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None https://www.technologies: Research and develop an understanding of how to lect and use energy and power technologies None
related biotechn Competencies Standard 16 En sel Competencies Standard 17 Int	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None None hergy and Power Technologies: Research and develop an understanding of how to lect and use energy and power technologies None None formation and Communication Technologies: Select and use information and
related biotechn Competencies Standard 16 En sel Competencies Standard 17 In communication	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None hergy and Power Technologies: Research and develop an understanding of how to lect and use energy and power technologies None formation and Communication Technologies: Select and use information and technologies
related biotechn Competencies Standard 16 En sel Competencies Standard 17 Int	14 L Illustrate how telemedicine reflects the convergence of technological advances in a number of fields (e.g. medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, perceptual psychology, etc.). gricultural and Related Biotechnologies: Understand, select and use agricultural and nologies None hergy and Power Technologies: Research and develop an understanding of how to lect and use energy and power technologies None formation and Communication Technologies: Select and use information and technologies 17 H Examine information and communication systems that allow information to be
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	17 M Information and communication systems allow information to be	
	transferred from human to human, human to machine, machine to human,	
	and machine to machine.	
Standard 18 Tra	ansportation Technologies: Research and develop an understanding of how to select	
an	d use transportation technologies	
Competencies	None	
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies		
Competencies	19 F Use mechanical processes related to manufacturing systems to change	
	the form of materials (e.g. separating, forming, combining, conditioning,	
	etc.).	
	19 P Demonstrate how the interchangeability of parts increases the effectiveness of	
	manufacturing processes.	
Standard 20 Co	nstruction Technologies: Understand, select and use construction technologies	
Competencies	None	

	Emerging Technology-Technology Education
North 1	Dakota Technology Education Standards Taught in Module 5 Color Cam
	acteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 H Discover how technology is closely linked to creativity which has resulted in
	innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.
	1 M Explain why most development of technologies is driven by the profit motive
~	and the market.
	Concepts of Technology: connect the core concepts of technology
	2 M Model technological systems to include input, processes, output, and at times,
_	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
-	others. 2 R Identify and use the requirements of parameters placed on the development of a
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
-	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values
	(e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and
	how they affect the final design and development.2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	nology Relationships: Interpret the relationships among technologies and the
	ections between technology and other fields of study
Competencies	3 D Show how technological systems often interact with one another.
	3 E Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
	3 J Recognize how technological progress has advanced science and mathematics
	3 G Adapt an existing innovation developed for one purpose into a different function
	to demonstrate technology transfer.
	ts of Technology: Predict cultural, social, economical and political effects of
technology	
Competencies	4 E Examine how technology, by itself, is neither good nor bad, but decisions
	about the use of products and systems can result in desirable or undesirable
	consequences.
	4 G Identify economic, political, and cultural issues influenced by the development
_	and use of technology.
	4 J Debate ethical considerations important to the development, selection, and use
	of technologies.
Standard 5 Tech	nology and the Environment: Investigate the effects of technology on the
environment	
Competencies	5 D Examine how the management of waste produced by technological systems is an
-	important societal issue.
	elopment and Use of Technology: Examine the role of society in the development
and use of techno	
Competencies	None
Standard 7 Influ	ence of Technology: Isolate the influences of technology on history

Competencies	7 E Understand that 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.
	7 G Illustrate a technological development that has been evolutionary or a result of a
	series of refinements to a basic invention.
	7 O Relate how the Information Age places emphasis on the processing and
	exchange of information.
Standard 8 Attr	ributes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
-	systems.
	8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 H Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	8 J Check and critique the design to redefine and improve upon it.
	8 K Explore how requirements of a design (e.g. criteria, constraints, and
	efficiency) sometimes compete with each other.
Standard 9 Eng	ineering Design: Integrate engineering design
Competencies	9 F Utilize design processes involving a set of steps, which can be performed in
Competencies	different sequences and repeated as needed.
	9 G Use brainstorming as a group problem-solving design process.
Standard 10 Dr	
	oblem Solving: Translate the role of troubleshooting, research and development, vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
competences	problem-solving method.
Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 I Specify criteria and constraints for the design.
Competences	11 K Test and evaluate the design in relation to preestablished requirements (e.g.
	criteria, constraints, refine, etc.).
	11 M Recommend a design problem to solve and decide whether or not to address it.
	11 Q Develop and produce a product or system using a design process.
	11 N Identify criteria and constraints and determine how these will affect the design
	process
Standard 12 Te	echnological Products and Systems: Use and maintain technological products and
systems	
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced people to
-	see and understand how things work.
	12 J Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 O Operate systems to function as designed.
	12 N Troubleshoot, analyze, and maintain systems to ensure safe and proper function
	and precision.
Standard 13 In	npacts of Products and Systems: Assess the impact of products and systems
Competencies	None
Standard 14 M	edical Technologies: Relate medical technologies for selection and use
Competencies	None
Standard 15 Ag	gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	ologies
Competencies	None

Standard 16 Er	Standard 16 Energy and Power Technologies: Research and develop an understanding of how to	
	lect and use energy and power technologies.	
Competencies	None	
	formation and Communication Technologies: Select and use information and	
communication		
Competencies	17 H Examine information and communication systems that allow information to be	
	transferred from human to human, human to machine, and machine to human.	
	17 J Interpret how the design of a message is influenced by such factors as the	
	intended audience, medium, purpose, and nature of the message.	
	17 I Illustrate how communication systems are made up of a source, encoder,	
	transmitter, receiver, decoder, and destination.	
	17 L Demonstrate the inputs, processes, and outputs associated with sending and	
	receiving information.	
	17 O Show how communication systems are made up of source, encoder,	
	transmitter, receiver, decoder, storage, retrieval, and destination.	
	17 N Develop information and communication systems that can be used to inform,	
	persuade, entertain, control, manage, and educate.	
	ansportation Technologies: Research and develop an understanding of how to select	
	d use transportation technologies	
Competencies	None	
Standard 19 Ma	anufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	19 F Use mechanical processes related to manufacturing systems to change	
	the form of materials (e.g. separating, forming, combining, conditioning,	
	etc.).	
	19 H Explain how the manufacturing process includes designing, developing, making,	
	and servicing products and systems.	
	19 I Use chemical technologies to modify or alter chemical substances.	
Standard 20 Co	onstruction Technologies: Understand, select and use construction technologies	
Competencies	None	

	Emerging Technology-Technology Education
North Da	kota Technology Education Standards Taught in Module 6 CNC Embroidery
Standard 1 Cha	racteristics and scope of technology-recognize the characteristics and scope of
technology	
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.
	1 J Analyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is
	increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed
	research.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
competencies	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
	others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a
	product or system.
	2 S Recognize the need for careful compromises among competing factors in the
	trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using
	information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with appropriate
	compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental
	systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	(e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and how they affect the final design and development
	how they affect the final design and development.

	2 BB	Recognize optimization as an ongoing process or methodology for
		designing or making a product dependent on criteria and constraints.
	2 CC	Describe how new technologies create new processes (e.g., computers
		to silicon chips to miniaturization of computers, etc.).
	2 DD	Analyze how quality control is used to ensure that a product, service, or system
	meets e	established criteria.
		Explain how management is the process of planning, organizing, and controlling
	work.	
	2 FF	Examine complex systems that have many layers of controls and feedback loops
		vide information.
	0.	Relationships: Interpret the relationships among technologies and the
		between technology and other fields of study
Competencies	3 D	Show how technological systems often interact with one another.
	3 E	Illustrate how a product, system, or environment developed for one setting may
	be appl	lied to another setting.
	3 F	Correlate how knowledge gained from other fields of study has a direct effect on
	the dev	velopment of technological products and systems.
	3 H	Relate how technological innovation results when ideas, knowledge, or
		skills are shared within a technology, among technologies, or across other
		fields.
	3 I	Examine why technological ideas are sometimes protected through the process of
	patenti	
Standard 4 Effe	cts of Te	echnology: Predict cultural, social, economical and political effects of
technology		
Competencies	4 D	Show how the use of technology affects humans in various ways (safety,
	comfor	t, choices, and attitudes) about technology's development and use.
	4 E	Examine how technology, by itself, is neither good nor bad, but decisions
		about the use of products and systems can result in desirable or undesirable
		consequences.
	4 F	Determine how the development and use of technology poses ethical issues.
	4 G	Identify economic, political, and cultural issues influenced by the development
	and use	e of technology.
	4 H	Connect changes caused by the use of technology ranging from gradual to rapid
	and fro	om subtle to obvious.
Standard 5 Tec	hnology	and the Environment: Investigate the effects of technology on the
environment		
Competencies		None
		nt and Use of Technology: Examine the role of society in the development
and use of techn		
Competencies	6 D	Illustrate new technologies that have resulted from the demands, values, and
		interests of individuals, businesses, industries, and societies.
	6 E	Associate how the use of inventions and innovations has led to changes in
		society and the creation of new needs and wants.
	6 F	Summarize the social and cultural priorities and values reflected in technological
	devices	3.
	6 G	Examine why meeting societal expectations is the driving force behind the
		acceptance and use of products and systems.
	6 H	Compare and contrast different cultures and the development of their own
	technol	logies to satisfy individual needs,
		wants, and values.
	6 I	Interpret whether decisions to develop a technology is influenced by societal
		opinions, demands, and/or corporate cultures.

I	CI Emploin the different factors that contribute to showing the design of and demond
	6 J Explain the different factors that contribute to shaping the design of and demand
	for various technologies (e.g.
	advertising, the strength of the economy, the goals of a company, the latest fads, etc.)
Standard 7 Inf	Iuence of Technology: Isolate the influences of technology on history
Competencies	7 C Investigate inventions and innovations that have evolved by using slow
Competences	and methodical processes of tests and refinements.
	7 D Recognize that the specialization of function is at the heart of many
	technological improvements.
	7 E Understand that 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.
	7 F Describe how invention or innovation was not always developed with the
	knowledge of science.
	7 G Illustrate a technological development that has been evolutionary or a result
	of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and
	has in turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the social,
	cultural, political, and economic landscape.
	7 J Specify the development of tools and machines that was based on
	technological know-how rather than scientific knowledge.
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,
	continuous manufacturing, sophisticated transportation and communication systems,
	advanced construction practices, improved education, and leisure time, etc.).
	7 O Relate how the Information Age places emphasis on the processing and
	exchange of information.
	tributes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
	systems. 8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 H Practice the steps of a design process (e.g. 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, communicating
	processes and results, etc.).
	8 I Analyze why design problems are seldom presented in a clearly defined form.
	8 J Check and critique the design to redefine and improve upon it.
	8 K Explore how requirements of a design (e.g. criteria, constraints, and
Standard 0 En	efficiency) sometimes compete with each other.
Competencies	gineering Design: Integrate engineering design9 FUtilize design processes involving a set of steps, which can be performed in
Competencies	different sequences and repeated as needed.
	 9 G Use brainstorming as a group problem-solving design process. 9 H Transform ideas into practical solutions by modeling, testing, evaluating, and
	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
	9 J Distinguish how engineering design is influenced by personal characteristics
	(e.g. creativity, resourcefulness, and the ability to visualize and think abstractly.)
	\perp (e.g. creativity, resource tuniess, and the ability to visualize and timik abstractly.)

Standard 10 Pro	oblem Solving: Translate the role of troubleshooting, research and development,
inv	vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
•	problem-solving method.
	10 G Differentiate between invention and innovation.
	10 H Solve technological problems through experimentation.
	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
	10 KRealize that all problems are not technological and not every problem can be
	solved using technology.
	10 L Apply a multidisciplinary approach to solve technological problems.
Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 H Apply a design process to solve problems in and beyond the laboratory-
Competencies	classroom.
	11 I Specify criteria and constraints for the design.
	111Specify criteria and constraints for the design.11 JMake two-dimensional and three-dimensional representations of the designed
	solution.
	11 K Test and evaluate the design in relation to pre-established requirements (e.g.
	criteria, constraints, refine, etc.).
	11 L Make a product or system and document the solution.
	11 M Recommend a design problem to solve and decide whether or not to address it.
	11 O Refine a design by using prototypes and modeling to ensure quality, efficiency,
	and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
Standard 12 To systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
-	people to see and understand how things work.
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair systems.
	12 J Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 L Document processes and procedures and communicate them to different
	audiences using appropriate oral and written techniques.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and
	knowledge to repair it.
	12 O Operate systems to function as designed.
Standard 13 In	npacts of Products and Systems: Assess the impact of products and systems
Competencies	13 H Identify trends and monitor the potential consequences of technological
competencies	development.
Standard 14 M	Indical Technologies: Relate medical technologies for selection and use
Competencies	None
^	gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	
Competencies	None
Standard 16 En	ergy and Power Technologies: Research and develop an understanding of how to
	ect and use energy and power technologies
Competencies	None
Standard 17 Int	formation and Communication Technologies: Select and use information and
communication	0
Competencies	17 H Examine information and communication systems that allow information to be
-	transferred from human to human, human to machine, and machine to human.

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	17 I Illustrate how communication systems are made up of a source,
	encoder, transmitter, receiver, decoder, and destination.
	17 J Interpret how the design of a message is influenced by such factors as the
	intended audience, medium, purpose, and nature of the message.
	17 K Use symbols, measurements, and drawings to promote clear communication
	by providing a common language to express ideas.
	17 L Demonstrate the inputs, processes, and outputs associated with sending and
	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 N Develop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder, transmitter,
	receiver, decoder, storage, retrieval, and destination.
	17 P Integrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g.
	symbols, measurement, conventions, icons, graphic images, and languages
	that incorporate, etc.).
Standard 18 Tr	cansportation Technologies: Research and develop an understanding of how to select
	id use transportation technologies
Competencies	None
	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	19 G Classify manufactured goods as durable and nondurable.
	19 H Explain how the manufacturing process includes designing, developing, making,
	and servicing products and systems.
	19 J Determine materials that can be located and removed by extraction
	processes (e.g. harvesting, drilling, mining, etc.).
	19 KMarket a product by informing the public about it as well as assisting in selling
	and distributing.
	19 L Service products to maintain good operating condition.
	19 M Classify how materials have different qualities (natural, synthetic, or mixed).
	19 N Differentiate between durable and nondurable goods.
	19 0 Classify manufacturing systems (e.g. customized production, batch production,
	continuous production, etc.).
	19 P Demonstrate how the interchangeability of parts increases the effectiveness of
	manufacturing processes
	manufacturing processes. 19 R Design a marketing strategy (e.g. establishing a product's identity, conducting
	19 R Design a marketing strategy (e.g. establishing a product's identity, conducting
Standard 20 C	19 R Design a marketing strategy (e.g. establishing a product's identity, conducting research on its potential, advertising it, distributing it, selling it, etc.).
Standard 20 Competencies	19 R Design a marketing strategy (e.g. establishing a product's identity, conducting

	Emerging Technology-Technology Education
Nort	h Dakota Technology Education Standards Taught in Module 8 Bio Tech
Standard 1 Cha technology	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that could not be done without the help of technology.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1 JAnalyze how the nature and development of technological knowledge and processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed research.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times, feedback.
	2 N Relate how systems thinking involves considering how every part relates to others.
	2 O Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 S Recognize the need for careful compromises among competing factors in the trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with appropriate
	compromises to complex real-life problems.
	2X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for designing or making a product dependent on criteria and constraints.
	ucarganing or making a product dependent on enterna and constraints.

ĺ	2 CC Describe how new technologies areate new processors (a.g. computers
	2 CC Describe how new technologies create new processes (e.g., computers
	to silicon chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system
	meets established criteria.2 EE Explain how management is the process of planning, organizing, and controlling
	work.
	2 FF Examine complex systems that have many layers of controls and feedback loops
	to provide information.
Standard 3 Tec	hnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	3 D Show how technological systems often interact with one another.
I	3 E Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
	3 F Correlate how knowledge gained from other fields of study has a direct effect on
	the development of technological products and systems.
	3 H Relate how technological innovation results when ideas, knowledge, or
	skills are shared within a technology, among technologies, or across other fields.
	3 J Recognize how technological progress has advanced science and mathematics.
Standard 4 Effe	cts of Technology: Predict cultural, social, economical and political effects of
technology	ets of recimerogy, recurs cultured, social, economical and pointear cheers of
Competencies	4 D Show how the use of technology affects humans in various ways (safety,
	comfort, choices, and attitudes) about technology's development and use.
	4 E Examine how technology, by itself, is neither good nor bad, but decisions
	about the use of products and systems can result in desirable or undesirable
	consequences.
	4 F Determine how the development and use of technology poses ethical issues.
	4 H Connect changes caused by the use of technology ranging from gradual to rapid
	and from subtle to obvious.
	hnology and the Environment: Investigate the effects of technology on the
environment	
Competencies	5 D Examine how the management of waste produced by technological systems is an
	important societal issue.
	5 E Explore how technologies can be used to repair damage cause by natural
	disasters and to break down waste from the use of various products and
	systems.
	5 F Investigate how decisions to develop and use technologies often put
	environmental and economic concerns in direct competition with one another.
	5 K Recognize how humans devise technologies to reduce the negative consequences
Standard (Day	of other technologies.
and use of techn	velopment and Use of Technology: Examine the role of society in the development
Competencies	6 D Illustrate new technologies that have resulted from the demands, values, and
competencies	interests of individuals, businesses, industries, and societies.
	6 E Associate how the use of inventions and innovations has led to changes in
	society and the creation of new needs and wants.
	6 F Summarize the social and cultural priorities and values reflected in technological
	devices.
	6 G Examine why meeting societal expectations is the driving force behind the
	acceptance and use of products and systems.
	6 HCompare and contrast different cultures and the development of their own
	technologies to satisfy individual needs, wants, and values.
	technologies to satisfy murvidual needs, wants, and values.

	6 I Interpret whether decisions to develop a technology is influenced by societal
	opinions, demands, and/or corporate cultures.
	6 J Explain the different factors that contribute to shaping the design of and
	demand for various technologies (e.g. advertising, the strength of the
	economy, the goals of a company, the latest fads, etc.)
Standard 7 Inf	uence of Technology: Isolate the influences of technology on history
Competencies	7 C Investigate inventions and innovations that have evolved by using slow and
r	methodical processes of tests and refinements.
	7 D Recognize that the specialization of function is at the heart of many
	technological improvements.
	7 E Understand that 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.
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	7 G Illustrate a technological development that has been evolutionary or a result of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and
	has in turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the
	social, cultural, political, and economic landscape.
	7 O Relate how the Information Age places emphasis on the processing and exchange
	of information.
	ributes of Design: Explore the attributes of design
Competencies	None
Standard 9 Eng	gineering Design: Integrate engineering design
Competencies	None
	oblem Solving: Translate the role of troubleshooting, research and development, vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
Competencies	problem-solving method.
	10 H Solve technological problems through experimentation.
	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
	10 K Realize that all problems are not technological and not every problem can be
	solved using technology.
	10 L Apply a multidisciplinary approach to solve technological problems.
	pplication of the Design Process: Implement the design process
Competencies	None
Standard 12 T systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
F	people to see and understand how things work.
	12 J Incorporate computers and calculators in various applications.
	12 KMaintain and operate systems in order to achieve a given purpose.
	1 1
	audiences using appropriate oral and
	written techniques.
04 1 140 -	12 O Operate systems to function as designed.
	npacts of Products and Systems: Assess the impact of products and systems
Competencies	13 F Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
competences	
	13 H Identify trends and monitor the potential consequences of technological

	development.		
	13 J Collect information and evaluate quality.		
	13 L Use assessment techniques to make decisions about the future development of		
	technology.		
Standard 14 Me	edical Technologies: Relate medical technologies for selection and use		
Competencies	14 G Analyze advances and innovations in medical technologies used to improve		
competencies	healthcare.		
	14 H Explain how different sanitation processes used in the disposal of medical		
	products help to protect people from harmful organisms and diseases and		
	shape the ethics of medical safety.		
	14 J Understand how genetic engineering involves modifying the structure of DNA		
	to produce novel genetic make-ups.		
	14 K Research medical technologies which protect and maintain health (e.g.,		
	prevention and rehabilitation, vaccines and		
	pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)		
	14 M Examine how the sciences of biochemistry and molecular biology have made		
	it possible to manipulate the genetic information found in living creatures.		
Standard 15 Ag	ricultural and Related Biotechnologies: Understand, select and use agricultural and		
related biotechne			
Competencies	15 F Enumerate the technological advances in agriculture directly affect the time		
	and number of people required to		
	produce food for a large population.		
	15 H Relate how biotechnology applies the principles of biology to create commercial		
	products or processes.		
	15 L Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food		
	and beverages, medicine, energy, the environment, genetic engineering,		
	etc.).		
	ergy and Power Technologies: Research and develop an understanding of how to		
	ect and use energy and power technologies		
Competencies	None		
	formation and Communication Technologies: Select and use information and		
communication			
Competencies			
	ansportation Technologies: Research and develop an understanding of how to select		
	d use transportation technologies		
Competencies	None		
	anufacturing Technologies: Understand, select and use manufacturing technologies		
Competencies	None		
	nstruction Technologies: Understand, select and use construction technologies		
Competencies	None		

	Emerging Technology-Technology Education
North D	akota Technology Education Standards Taught in Module 9 Sci WS/Probes
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and
	the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in
	innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.
	1 J Analyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is
	 increasing rapidly. 1 L Connect how inventions and innovations are the results of specific, goal-directed
	research.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
Competencies	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
	others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	2 T Connect how different technologies involve different sets of processes.
	2 W Demonstrate systems thinking that applies logic and creativity with
	appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental
	systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 CC Describe how new technologies create new processes (e.g., computers
	to silicon chips to miniaturization of computers, etc.).
	hnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	3 D Show how technological systems often interact with one another.
	3 E Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
	3 F Correlate how knowledge gained from other fields of study has a direct effect
	on the development of technological products and systems.
	3 H Relate how technological innovation results when ideas, knowledge, or skills are
	shared within a technology, among technologies, or across other fields.
	3 J Recognize how technological progress has advanced science and mathematics.
	cts of Technology: Predict cultural, social, economical and political effects of
technology	
Competencies	None

	hnolog	y and the Environment: Investigate the effects of technology on the
environment Competencies		None
1	alanm	ent and Use of Technology: Examine the role of society in the development
and use of techn		ent and Ose of Technology: Examine the role of society in the development
Competencies	6 D	Illustrate new technologies that have resulted from the demands, values, and
competencies	ΟD	interests of individuals, businesses, industries, and societies.
	6 E	Associate how the use of inventions and innovations has led to changes in
	υĽ	society and the creation of new needs and wants.
	6 G	Examine why meeting societal expectations is the driving force behind the
		tance and use of products and systems.
	6 I	Interpret whether decisions to develop a technology is influenced by societal
	01	opinions, demands, and/or corporate cultures.
	6 J	Explain the different factors that contribute to shaping the design of and
	03	demand for various technologies (e.g. advertising, the strength of the
		economy, the goals of a company, the latest fads, etc.)
Standard 7 Infl	uence	of Technology: Isolate the influences of technology on history
Competencies	7 C	Investigate inventions and innovations that have evolved by using slow
competences	10	and methodical processes of tests and refinements.
	7 D	Recognize that the specialization of function is at the heart of many technological
	-	wements.
	7 G	Illustrate a technological development that has been evolutionary or a result of a
	series	of refinements to a basic invention.
	7 H	Report how the evolution of civilization has been directly affected by, and
		has in turn affected, the development and use of tools and materials.
	7 N	Evaluate technological developments of the Industrial Revolution (e.g.,
		continuous manufacturing, sophisticated transportation and communication
		systems, advanced construction practices, improved education, and leisure time,
		etc.).
	7 O	Relate how the Information Age places emphasis on the processing and
		nge of information.
Standard 8 Attr	ributes	of Design: Explore the attributes of design
Competencies	8 E	Illustrate how design as a creative planning process leads to useful products and
	syster	
	8 F	Infer that there is no perfect design.
	8 H	Practice the steps of a design process (e.g. 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, communicating
	0.1	processes and results, etc.).
	8 I	Analyze why design problems are seldom presented in a clearly defined form.
	gineerii	ng Design: Integrate engineering design
Competencies	 ,,	None
		Solving: Translate the role of troubleshooting, research and development,
	ention	and innovation and experimentation in problem solving
Competencies	1. 1.	None
	pplicat	ion of the Design Process: Implement the design process
Competencies	<u> </u>	None
	echnolo	ogical Products and Systems: Use and maintain technological products and
systems		

<u>a</u>	10.11	
Competencies	12 H	Utilize information provided in manuals, protocols, or by experienced
	10.7	people to see and understand how things work.
	12 J	Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.	
	12 L	Document processes and procedures and communicate them to different
		audiences using appropriate oral and written techniques.
	12 O	Operate systems to function as designed.
Standard 13 In		of Products and Systems: Assess the impact of products and systems
Competencies	13 F	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	13 J	Collect information and evaluate quality.
Standard 14 M	edical 7	Fechnologies: Relate medical technologies for selection and use
Competencies	14 G	Analyze advances and innovations in medical technologies used to improve
	health	
	14 H	Explain how different sanitation processes used in the disposal of medical
		products help to protect people from harmful organisms and diseases and
		shape the ethics of medical safety.
	14 K	Research medical technologies which protect and maintain health (e.g.,
	preven	ntion and rehabilitation, vaccines and
		pharmaceuticals, medical and surgical procedures, genetic engineering, etc.)
		ral and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	ologies	
Competencies		None
	<u> </u>	nd Power Technologies: Research and develop an understanding of how to
	lect and	l use energy and power technologies
Competencies		None
Standard I/ In	tormat	ion and Communication Technologies: Select and use information and
communication	techno	logies
		Logies Examine information and communication systems that allow information to be
communication	technol 17 H	logies Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.
communication	techno	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source,
communication	technol 17 H 17 I	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.
communication	techno 17 H 17 I 17 K	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by
communication	technol 17 H 17 I 17 K provid	logies Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human. Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination. Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.
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communication	technol 17 H 17 I 17 K provic 17 L receiv 17 M 17 O receiv	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ring information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages
<u>communication</u> Competencies	technol 17 H 17 I 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ring information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
communication Competencies	technol 17 H 17 I 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ring information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).tation Technologies: Research and develop an understanding of how to select
communication Competencies	technol 17 H 17 I 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ring information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
communication Competencies	technol 17 H 17 H 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ting information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, ter, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).tation Technologies: Research and develop an understanding of how to select ransportation technologies None
communication Competencies	technol 17 H 17 H 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ing information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).tation Technologies: Research and develop an understanding of how to select transportation technologies: Understand, select and use manufacturing technologies
communication Competencies Standard 18 Tr an Standard 19 M Competencies	technol 17 H 17 H 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logies Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human. Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination. Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas. Demonstrate the inputs, processes, and outputs associated with sending and ing information. Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine. Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination. Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.). tation Technologies: Research and develop an understanding of how to select ransportation technologies: None None turing Technologies: Understand, select and use manufacturing technologies
communication Competencies Standard 18 Tr an Standard 19 M Competencies	technol 17 H 17 H 17 K provic 17 L receiv 17 M 17 O receiv 17 Q	logiesExamine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human.Illustrate how communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination.Use symbols, measurements, and drawings to promote clear communication by ding a common language to express ideas.Demonstrate the inputs, processes, and outputs associated with sending and ing information.Information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.Show how communication systems are made up of source, encoder, transmitter, rer, decoder, storage, retrieval, and destination.Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols, measurement, conventions, icons, graphic images, and languages that incorporate, etc.).tation Technologies: Research and develop an understanding of how to select transportation technologies: Understand, select and use manufacturing technologies

Emerging Technology-Technology Education		
North Dakota Technology Education Standards Taught in Module 10 CADD		
Standard 1 Char technology	racteristics and scope of technology-recognize the characteristics and scope of	
Competencies	1 H Discover how technology is closely linked to creativity which has resulted in innovation.	
	1 F Develop new products and systems to solve problems or to help do things that	
	could not be done without the help of technology.	
	1 K Correlate the rate of technological development with diffusion which is	
	increasing rapidly.	
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology	
Competencies	2 N Relate how systems thinking involves considering how every part relates to	
	others. 2 P Connect technological systems one to another.	
	2 R Identify and use the requirements of parameters placed on the development of a	
	product or system.2 WDemonstrate systems thinking that applies logic and creativity with	
	appropriate compromises to complex real-life problems.	
	2 AA Identify and determine the criteria and constraints of a product or system and	
	how they affect the final design and development.	
	2 BB Recognize optimization as an ongoing process or methodology for	
	designing or making a product dependent on criteria and constraints.	
	hnology Relationships: Interpret the relationships among technologies and the	
	nections between technology and other fields of study	
Competencies	3 D Show how technological systems often interact with one another.	
	3 H Relate how technological innovation results when ideas, knowledge, or	
	skills are shared within a technology, among technologies, or across other	
	fields. 3 I Examine why technological ideas are sometimes protected through the process of	
	3 I Examine why technological ideas are sometimes protected through the process of patenting.	
	3 G Adapt an existing innovation developed for one purpose into a different function	
	to demonstrate technology transfer.	
Standard 4 Effe	cts of Technology: Predict cultural, social, economical and political effects of	
technology	ets of reenhology. Treater cultural, social, economical and pointear cheets of	
Competencies	4 H Connect changes caused by the use of technology ranging from gradual to rapid	
•	and from subtle to obvious.	
Standard 5 Tec	hnology and the Environment: Investigate the effects of technology on the	
environment		
Competencies	None	
	elopment and Use of Technology: Examine the role of society in the development	
and use of techn		
Competencies	6 H Compare and contrast different cultures and the development of their own	
	technologies to satisfy individual needs, wants, and values.	
	6 I Interpret whether decisions to develop a technology is influenced by societal	
	opinions, demands, and/or corporate cultures.	
	6 J Explain the different factors that contribute to shaping the design of and demand	
	for various technologies (e.g. advertising, the strength of the economy, the goals of a	
Stondow 17 I M	company, the latest fads, etc.)	
Standard 7 Infl	uence of Technology: Isolate the influences of technology on history	

<u>a</u>		
Competencies	7 E Understand that the design and construction of struct	
	convenience have evolved from the development of	1
	measurement, controlling systems, and the understar	nding of spatial
	relationships.	
	7 G Illustrate a technological development that has been	evolutionary or a result
	of a series of refinements to a basic invention.	
	7 O Relate how the Information Age places emphasis or	the processing and
Standard & Att	exchange of information.	
	butes of Design: Explore the attributes of design8 EIllustrate how design as a creative planning process	lands to useful products and
Competencies	8 E Illustrate how design as a creative planning process systems.	leads to useful products and
	8 F Infer that there is no perfect design.	
	8 G Relate how requirements for a design are made up of	of criteria and constraints
	8 H Practice the steps of a design process (e.g. defining	
	researching and generating ideas, identifying criteri	
	constraints, exploring possibilities, selecting an app	
	proposal, making a model or prototype, testing and	
	specifications, refining the design, creating or making	
	processes and results, etc.).	8 ,
	8 J Check and critique the design to redefine and impro	ove upon it.
	8 K Explore how requirements of a design (e.g. criteria,	constraints, and
	efficiency) sometimes compete with each other.	
Standard 9 Eng	neering Design: Integrate engineering design	
Competencies	9 F Utilize design processes involving a set of steps, whi	ich can be performed in
	different sequences and repeated as needed.	_
	9 H Transform ideas into practical solutions by modeling	g, testing, evaluating, and
	modifying.	
	9 J Distinguish how engineering design is influenced by	
	(e.g. creativity, resourcefulness, and the ability to vi	isualize and think
	abstractly.)	
	blem Solving: Translate the role of troubleshooting, rese	
	ention and innovation and experimentation in problem s 10 G Differentiate between invention and innovation.	olving
Competencies		
Standard 11 A	10 J Research solutions to technological problems.	20000
	plication of the Design Process: Implement the design p 11 I Specify criteria and constraints for the design.	rocess
Competencies	11 J Make two-dimensional and three-dimensional repres	contations of the designed
	solution.	sentations of the designed
	11 K Test and evaluate the design in relation to preestablis	shed requirements (e.g.
	criteria, constraints, refine, etc.).	
	11 L Make a product or system and document the solution	n.
	11 N Identify criteria and constraints and determine how	these will affect the design
	process.	
	11 Q Develop and produce a product or system using a de	
Standard 12 To systems	chnological Products and Systems: Use and maintain tec	chnological products and
Competencies	12 H Utilize information provided in manuals, protocols,	or by experienced
_	people to see and understand how things work.	
	12 J Incorporate computers and calculators in various app	plications.
	12 O Operate systems to function as designed.	
Standard 13 Im	oacts of Products and Systems: Assess the impact of products	ducts and systems
Competencies	None	

Standard 14 Me	edical Technologies: Relate medical technologies for selection and use		
Competencies	None		
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and			
related biotechn			
Competencies	None		
	ergy and Power Technologies: Research and develop an understanding of how to		
	ect and use energy and power technologies		
Competencies	None		
	formation and Communication Technologies: Select and use information and		
communication	technologies		
Competencies	17 H Examine information and communication systems that allow information to be		
	transferred from human to human, human to machine, and machine to human.		
	17 K Use symbols, measurements, and drawings to promote clear communication		
	by providing a common language to express ideas.		
	17 M Information and communication systems allow information to be transferred		
	from human to human, human to machine, machine to human, and machine to machine.		
	17 O Show how communication systems are made up of source, encoder,		
	transmitter, receiver, decoder, storage, retrieval, and destination.		
Standard 18 Transportation Technologies: Research and develop an understanding of how to select			
an	and use transportation technologies		
Competencies	None		
Standard 19 Ma	Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies		
Competencies	19 P Demonstrate how the interchangeability of parts increases the effectiveness of		
_	manufacturing processes.		
Standard 20 Co	nstruction Technologies: Understand, select and use construction technologies		
Competencies	None		

Emerging Technology-Technology Education		
North Dakota Technology Education Standards Taught in Module 11 Laser		
Standard 1 Char technology	racteristics and scope of technology-recognize the characteristics and scope of	
Competencies	1 K Correlate the rate of technological development with diffusion which is	
Compromotos	increasing rapidly.	
	1 F Develop new products and systems to solve problems or to help do things that	
	could not be done without the help of technology.	
	1 L Connect how inventions and innovations are the results of specific, goal-directed	
	research.	
	e Concepts of Technology: connect the core concepts of technology	
Competencies	2 M Model technological systems to include input, processes, output, and at times,	
	feedback. 2 P Connect technological systems one to another.	
	2 R Identify and use the requirements of parameters placed on the development of a product or system.	
	2 V Identify control mechanisms or particular steps that people perform using	
	information about the system that causes systems to change.	
	2 Y Deduce how the stability of a technological system is influenced by all of the	
	components in a system (especially those in the feedback loop).	
	2 X Show how systems (which are the building blocks of technology) are	
	embedded within larger technological, social, and environmental	
	systems.	
	2 CC Describe how new technologies create new processes (e.g., computers to silicon	
	chips to miniaturization of computers, etc.).	
	nnology Relationships: Interpret the relationships among technologies and the	
con	nections between technology and other fields of study.	
Competencies	3 D Show how technological systems often interact with one another.	
	3 E Illustrate how a product, system, or environment developed for one setting may	
	be applied to another setting.	
	3 F Correlate how knowledge gained from other fields of study has a direct effect on	
	the development of technological products and systems.	
	3 G Adapt an existing innovation developed for one purpose into a different	
Standard / Effa	function to demonstrate technology transfer.	
technology	cts of Technology: Predict cultural, social, economical and political effects of	
Competencies	4 H Connect changes caused by the use of technology ranging from gradual to rapid	
	and from subtle to obvious.	
	4 I Make decisions about the use of technology by weighing the trade-offs between	
	the positive and negative effects.	
	4 J Debate ethical considerations important to the development, selection, and use of	
	technologies.	
Standard 5 Tec	hnology and the Environment: Investigate the effects of technology on the	
environment		
Competencies	None	
	elopment and Use of Technology: Examine the role of society in the development	
and use of techn		
Competencies	6 E Associate how the use of inventions and innovations has led to changes in society and the creation of new needs and wants.	
Standard 7 Infl	uence of Technology: Isolate the influences of technology on history	
Competencies	7 D Recognize that the specialization of function is at the heart of many technological	
	improvements.	

Standard 8 Attr	ibutes of Design: Explore the attributes of design
Competencies	None
	ineering Design: Integrate engineering design
Competencies	None
•	oblem Solving: Translate the role of troubleshooting, research and development,
	rention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
	problem-solving method.
	oplication of the Design Process: Implement the design process
Competencies	11 I Specify criteria and constraints for the design.
	11 L Make a product or system and document the solution.
Standard 12 Te systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
-	people to see and understand how things work.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 O Operate systems to function as designed.
	12 N Troubleshoot, analyze, and maintain systems to ensure safe and proper function
	and precision.
	apacts of Products and Systems: Assess the impact of products and systems
Competencies	13 J Collect information and evaluate quality.
	13 I Interpret and evaluate the accuracy of the information obtained and determine if
Standard 1/ Ma	it is useful. edical Technologies: Relate medical technologies for selection and use
Competencies	14 G Analyze advances and innovations in medical technologies used to improve
Competencies	healthcare.
	14 K Research medical technologies which protect and maintain health (e.g.,
	prevention and rehabilitation, vaccines and pharmaceuticals, medical and
	surgical procedures, genetic engineering, etc.)
Standard 15 Ag related biotechno	ricultural and Related Biotechnologies: Understand, select and use agricultural and ologies
Competencies	None
Standard 16 En	ergy and Power Technologies: Research and develop an understanding of how to
	ect and use energy and power technologies
Competencies	None
Standard 17 Inf communication	formation and Communication Technologies: Select and use information and technologies
Competencies	17 I Illustrate how communication systems are made up of a source,
_	encoder, transmitter, receiver, decoder, and destination.
	17 H Examine information and communication systems that allow information to be
	transferred from human to human, human to machine, and machine to human.
	17 M Information and communication systems allow information to be transferred
	from human to human, human to machine, machine to human, and machine to machine.
	17 O Show how communication systems are made up of source, encoder,
	transmitter, receiver, decoder, storage, retrieval, and destination.
	17 P Integrate ways to communicate information.
	ansportation Technologies: Research and develop an understanding of how to select d use transportation technologies
Competencies	None
Standard 19 Ma	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	None
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Standard 20 Construction Technologies:		Understand, select and use construction technologies
Competencies None		

	Emerging Technology-Technology Education
Nort	h Dakota Technology Education Standards Taught in Module 12 Electro
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in
	innovation. 1 J Analyze how the nature and development of technological knowledge and
	1 J Analyze how the nature and development of technological knowledge and processes are functions of the setting.
	1 L Connect how inventions and innovations are the results of specific, goal-directed
	research.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times, feedback.
	2 N Relate how systems thinking involves considering how every part relates to others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and
	quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 S Recognize the need for careful compromises among competing factors in the
	trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using
	information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with
	appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are embedded within larger technological,
	social, and environmental systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values
	(e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and
	how they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for
	designing or making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers to silicon
	chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system meets established criteria.
	2 EE Explain how management is the process of planning, organizing, and controlling
	work.
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ſ	2 EE Examine complex systems that have many layers of controls and feedback loops
	2 FF Examine complex systems that have many layers of controls and feedback loops to provide information.
Standard 3 Tec	chnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	None
	ects of Technology: Predict cultural, social, economical and political effects of
technology	
Competencies	None
environment	chnology and the Environment: Investigate the effects of technology on the
Competencies	5 D Examine how the management of waste produced by technological systems is an
••••• p•••••• ••	important societal issue.
	5 E Explore how technologies can be used to repair damage cause by natural
	disasters and to break down waste from the use of various products and
	systems.
	5 F Investigate how decisions to develop and use technologies often put
	environmental and economic concerns in direct competition with one another.
	5 G Specify how humans can devise technologies to conserve water, soil, and
	energy through such techniques as reusing, reducing, and recycling.
	5 H Determine considerations of trade-offs when new technologies are developed to
	reduce the use of resources.
	5 I Monitor various aspects of the environment to provide information for decision-
	making with the aid of technology.
	5 J Associate the alignment of technological processes with natural processes to
	maximize performance and reduce negative impacts on the environment.
	5 K Recognize how humans devise technologies to reduce the negative consequences of other technologies.
	5 L Relate how the decisions regarding the implementation of technologies involve
	the weighing of trade-offs between predicted positive and negative effects on
	the environment.
Standard 6 Dev	velopment and Use of Technology: Examine the role of society in the development
and use of techr	
Competencies	None
	luence of Technology: Isolate the influences of technology on history
Competencies	7 C Investigate inventions and innovations that have evolved by using slow
	 and methodical processes of tests and refinements. 7 D Recognize that the specialization of function is at the heart of many technological
	7 D Recognize that the specialization of function is at the heart of many technological improvements.
	7 E Understand that 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.
	7 F Describe how invention or innovation was not always developed with the
	knowledge of science.
	7 G Illustrate a technological development that has been evolutionary or a result
	of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and
	has in turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
	cutural, political, and cconolline landscape.

I	
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,
	continuous manufacturing, sophisticated transportation and communication
	systems, advanced construction practices, improved education, and leisure time,
	etc.). 7 O Relate how the Information Age places emphasis on the processing and
	7 O Relate how the Information Age places emphasis on the processing and exchange of information.
Standard 8 Att	ributes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
competencies	systems.
	8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 H Practice the steps of a design process (e.g. 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, communicating processes and results, etc.).
	8 J Check and critique the design to redefine and improve upon it.
	gineering Design: Integrate engineering design
Competencies	9 F Utilize design processes involving a set of steps, which can be performed in
	different sequences and repeated as needed.
	9 G Use brainstorming as a group problem-solving design process.
	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and
	modifying.
	9 J Distinguish how engineering design is influenced by personal characteristics
	(e.g. creativity, resourcefulness, and the ability to visualize and think
Standard 10 Dr	abstractly.)
	oblem Solving: Translate the role of troubleshooting, research and development, vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
competences	problem-solving method.
	10 H Solve technological problems through experimentation.
	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
	10 K Realize that all problems are not technological and not every problem can be
	solved using technology.
	10 L Apply a multidisciplinary approach to solve technological problems.
Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 H Apply a design process to solve problems in and beyond the laboratory-
	classroom.
	11 I Specify criteria and constraints for the design.
	11 J Make two-dimensional and three-dimensional representations of the designed
	solution. 11 K Test and evaluate the design in relation to preestablished requirements (e.g.
	11 K Test and evaluate the design in relation to preestablished requirements (e.g. criteria, constraints, refine, etc.).
	11 L Make a product or system and document the solution.
	11 M Recommend a design problem to solve and decide whether or not to address it.
	11 O Refine a design by using prototypes and modeling to ensure quality,
	efficiency, and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
Standard 12 T	echnological Products and Systems: Use and maintain technological products and
systems	centological i rouucis anu systems. Ose anu maintain technological products anu
systems	

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Competencies	12 H Utilize information provided in manuals, protocols, or by experienced people to
	see and understand how things work.
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair systems.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 J Incorporate computers and calculators in various applications.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and
	knowledge to repair it.
	12 O Operate systems to function as designed.
	12 L Document processes and procedures and communicate them to different
Standard 12 In	audiences using appropriate oral and written techniques.
	npacts of Products and Systems: Assess the impact of products and systems
Competencies	None
	edical Technologies: Relate medical technologies for selection and use
Competencies	None
	gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	None
Competencies	
	nergy and Power Technologies: Research and develop an understanding of how to
Competencies	lect and use energy and power technologies None
communication	formation and Communication Technologies: Select and use information and technologies
Competencies	17 H Examine information and communication systems that allow information to be
competencies	transferred from human to human, human to machine, and machine to human.
	17 IIllustrate how communication systems are made up of a source,
	encoder, transmitter, receiver, decoder, and destination.
	17 J Interpret how the design of a message is influenced by such factors as the
	intended audience, medium, purpose, and nature of the message.
	17 K Use symbols, measurements, and drawings to promote clear communication by
	providing a common language to express ideas.
	17 L Demonstrate the inputs, processes, and outputs associated with sending and
	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 N Develop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder,
	transmitter, receiver, decoder, storage, retrieval, and destination.
	17 P Integrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols,
	measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Standard 18 Tr	ansportation Technologies: Research and develop an understanding of how to select
	id use transportation technologies
Competencies	None
	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	None
	onstruction Technologies: Understand, select and use construction technologies
Competencies	None
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	Emerging Technology – Technology Education
Nort	h Dakota Technology Education Standards Taught in Module 13 P/H/M
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	None
	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times, feedback.
	2 N Relate how systems thinking involves considering how every part relates to others.
	2 O Differentiate an open-loop system (no feedback path and requires human intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 V Identify control mechanisms or particular steps that people perform using information about the system that causes systems to change.
	 2 AA Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
Standard 3 Taal	hnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	3 E Illustrate how a product, system, or environment developed for one setting may
Competencies	be applied to another setting.
	3 G Adapt an existing innovation developed for one purpose into a different
	function to demonstrate technology transfer.
Standard 4 Effect technology	cts of Technology: Predict cultural, social, economical and political effects of
Competencies	None
Standard 5 Tech environment	hnology and the Environment: Investigate the effects of technology on the
Competencies	5 D Examine how the management of waste produced by technological systems is an important societal issue.
Standard 6 Dev	elopment and Use of Technology: Examine the role of society in the development
and use of techn	ology.
Competencies	None
Standard 7 Infl	uence of Technology: Isolate the influences of technology on history
Competencies	7 D Recognize that the specialization of function is at the heart of many technological improvements.
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,
	continuous manufacturing, sophisticated transportation and communication systems,
	advanced construction practices, improved education, and leisure time, etc.).
	ributes of Design: Explore the attributes of design
Competencies	None
	ineering Design: Integrate engineering design
Competencies	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and
a	modifying.
	oblem Solving: Translate the role of troubleshooting, research and development, vention and innovation and experimentation in problem solving
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a
Suprements	 problem-solving method. 10 H Solve technological problems through experimentation.
	1011 Sorve teennoisgiear problems unough experimentation.

Standard 11 A	pplication of the Design Process: Implement the design process
Competencies	11 H Apply a design process to solve problems in and beyond the laboratory-
-	classroom.
	11 I Specify criteria and constraints for the design.
	11 K Test and evaluate the design in relation to pre-established requirements (e.g.
	criteria, constraints, refine, etc.).
	11 O Refine a design by using prototypes and modeling to ensure quality,
	efficiency, and productivity of the final product.
	11 Q Develop and produce a product or system using a design process.
	11 N Identify criteria and constraints and determine how these will affect the design
	process.
	11 P Evaluate the design solution using conceptual, physical, and mathematical
	models at various intervals of the design process in order to check for proper
G4 1 110 T	design and to note areas where improvements are needed.
Standard 12 To systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
	people to see and understand how things work.
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair systems.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and
	knowledge to repair it.
	12 O Operate systems to function as designed.
	12 N Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.
Standard 13 In	apacts of Products and Systems: Assess the impact of products and systems
Competencies	None
	edical Technologies: Relate medical technologies for selection and use
Competencies	None
Standard 15 Ag	ricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	
Competencies	None
Competencies Standard 16 En	None ergy and Power Technologies: Research and develop an understanding of how to
Competencies Standard 16 En sel	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies
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Competencies Standard 16 En sel	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes.
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Competencies Standard 16 En sel	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems.
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Competencies Standard 16 En sel	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be
Competencies Standard 16 En sel	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another.
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Competencies Standard 16 En sel Competencies Standard 17 Int	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another. 16 N Illustrate how power systems must have a source of energy, a process, and loads.
Competencies Standard 16 En sel Competencies Standard 17 Inf communication	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another. 16 N Illustrate how power systems must have a source of energy, a process, and loads. Formation and Communication Technologies: Select and use information and technologies
Competencies Standard 16 En sel Competencies Standard 17 Int	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another. 16 N Illustrate how power systems must have a source of energy, a process, and loads. formation and Communication Technologies: Select and use information and technologies 17 K Use symbols, measurements, and drawings to promote clear communication
Competencies Standard 16 En sel Competencies Standard 17 In communication Competencies	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another. 16 N Illustrate how power systems must have a source of energy, a process, and loads. formation and Communication Technologies: Select and use information and technologies 17 K Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
Competencies Standard 16 En sel Competencies Standard 17 Inf communication Competencies	None ergy and Power Technologies: Research and develop an understanding of how to ect and use energy and power technologies 16 E Define energy as the ability to do work. 16 F Demonstrate that energy can be used to do work using many processes. 16 G Identify power as 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. 16 H Show that power systems are used to drive and provide propulsion to other technological products and systems. 16 I Uncover how much of the energy use in our environment is not used efficiently. 16 J Explain how energy cannot be created nor destroyed; however, it can be converted from one form to another. 16 N Illustrate how power systems must have a source of energy, a process, and loads. formation and Communication Technologies: Select and use information and technologies 17 K Use symbols, measurements, and drawings to promote clear communication

Competencies	18 F Identify that transporting people and goods involves a combination of individuals	
	and vehicles.	
Standard 19 Ma	Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None	
Standard 20 Co	Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None	

	Emerging Technology – Technology Education
North	Dakota Technology Education Standards Taught in Module 15 Aviation
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1 J Analyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed research.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
-	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
	others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 S Recognize the need for careful compromises among competing factors in the trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using
	information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with
	appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values
	(e.g., availability, cost, desirability, waste, etc.).2 AA Identify and determine the criteria and constraints of a product or system and
	how they affect the final design and development.

	2 BB Recognize optimization as an ongoing process or methodology for
	designing or making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers
	to silicon chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system
	meets established criteria.
	2 EE Explain how management is the process of planning, organizing, and controlling
	work.
	2 FF Examine complex systems that have many layers of controls and feedback loops
	to provide information.
Standard 3 Tec	hnology Relationships: Interpret the relationships among technologies and the
	nections between technology and other fields of study
Competencies	3 D Show how technological systems often interact with one another.
I	3 E Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
	3 F Correlate how knowledge gained from other fields of study has a direct effect
	on the development of technological products and systems.
	3 H Relate how technological innovation results when ideas, knowledge, or
	skills are shared within a technology, among technologies, or across other
	fields.
Standard 4 Effectechnology	cts of Technology: Predict cultural, social, economical and political effects of
Competencies	4 D Show how the use of technology affects humans in various ways (safety,
•	comfort, choices, and attitudes) about technology's development and use.
	4 E Examine how technology, by itself, is neither good nor bad, but decisions about
	the use of products and systems can result in desirable or undesirable consequences.
	4 F Determine how the development and use of technology poses ethical issues.
	4 G Identify economic, political, and cultural issues influenced by the development
	and use of technology.
	4 H Connect changes caused by the use of technology ranging from gradual to rapid
~	and from subtle to obvious.
Standard 5 Tec. environment	hnology and the Environment: Investigate the effects of technology on the
Competencies	5 D Examine how the management of waste produced by technological systems is an
1	important societal issue.
	5 F Investigate how decisions to develop and use technologies often put
	environmental and economic concerns in direct competition with one another.
	5 G Specify how humans can devise technologies to conserve water, soil, and
	energy through such techniques as reusing, reducing, and recycling.
	5 H Determine considerations of trade-offs when new technologies are developed to reduce the use of resources.
	5 I Monitor various aspects of the environment to provide information for decision- making with the aid of technology.
	5 J Associate the alignment of technological processes with natural processes to
	maximize performance and reduce negative impacts on the environment.
	5 K Recognize how humans devise technologies to reduce the negative consequences
	of other technologies.
	5 L Relate how the decisions regarding the implementation of technologies involve
	the weighing of trade-offs between predicted positive and negative effects on the

	environment.
Standard 6 Dev	elopment and Use of Technology: Examine the role of society in the development
and use of techn	blogy
Competencies	6 D Illustrate new technologies that have resulted from the demands, values, and
_	interests of individuals, businesses, industries, and societies.
	6 E Associate how the use of inventions and innovations has led to changes in society
	and the creation of new needs and wants.
	6 F Summarize the social and cultural priorities and values reflected in technological
	devices.
	6 G Examine why meeting societal expectations is the driving force behind the
	acceptance and use of products and systems.
	6 H Compare and contrast different cultures and the development of their own
	technologies to satisfy individual needs, wants, and values.
	6 I Interpret whether decisions to develop a technology is influenced by societal
	opinions, demands, and/or corporate cultures.
	6 J Explain the different factors that contribute to shaping the design of and
	demand for various technologies (e.g. advertising, the strength of the
	economy, the goals of a company, the latest fads, etc.)
Standard 7 Inf	ience of Technology: Isolate the influences of technology on history
Competencies	7 C Investigate inventions and innovations that have evolved by using slow and
F	methodical processes of tests and refinements.
	7 D Recognize that the specialization of function is at the heart of many technological
	improvements.
	7 E Understand that 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.
	7 F Describe how invention or innovation was not always developed with the
	knowledge of science.
	7 G Illustrate a technological development that has been evolutionary or a result
	of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and
	has in turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the social,
	cultural, political, and economic landscape.
	7 J Specify the development of tools and machines that was based on technological
	know-how rather than scientific knowledge.
	7 M Review the important developments of history in technology during the
	Renaissance.
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,
	continuous manufacturing, sophisticated transportation and communication
	systems, advanced construction practices, improved education, and leisure time,
	etc.).
	7 O Relate how the Information Age places emphasis on the processing and exchange
	of information.
	ibutes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
	systems.
	8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 K Explore how requirements of a design (e.g. criteria, constraints, and
	efficiency) sometimes compete with each other.

Standard 9 Eng	gineering Design: Integrate engineering design
Competencies	None
	oblem Solving: Translate the role of troubleshooting, research and development,
	vention and innovation and experimentation in problem solving
Competencies	None
	pplication of the Design Process: Implement the design process
Competencies	None
Standard 12 To systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced people to
	see and understand how things work.
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair systems.
	12 J Incorporate computers and calculators in various applications.
	12 K Maintain and operate systems in order to achieve a given purpose.
	12 L Document processes and procedures and communicate them to different
	audiences using appropriate oral and written techniques.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and
	knowledge to repair it.
Standard 12 In	12 OOperate systems to function as designed.npacts of Products and Systems: Assess the impact of products and systems
Competencies	None
-	edical Technologies: Relate medical technologies for selection and use
Competencies	None
•	gricultural and Related Biotechnologies: Understand, select and use agricultural and
related biotechn	
Competencies	5 F Enumerate the technological advances in agriculture directly affect the
-	time and number of people required to produce food for a large
	population.
	15 G Identify the wide range of specialized equipment and practices used to improve
	the production of food, fiber, fuel,
	and other useful products and in the care of animals.
	15 K Classify the agricultural businesses using a wide array of products and systems
	to produce, process, and distribute food, fiber, fuel, chemical, and other useful
	products.
	15 L Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food and
	beverages, medicine, energy, the environment, genetic engineering, etc.).
	ergy and Power Technologies: Research and develop an understanding of how to lect and use energy and power technologies
Competencies	16 H Show that power systems are used to drive and provide propulsion to other
Competences	technological products and systems.
	16 I Uncover how much of the energy use in our environment is not used efficiently.
	16 L Discuss how it is impossible to build an engine to perform work that
	does not exhaust thermal energy to the surroundings.
	formation and Communication Technologies: Select and use information and
communication Competencies	17 H Examine information and communication systems that allow information to be
Competencies	transferred from human to human, human to machine, and machine to human.
	17 IIllustrate how communication systems are made up of a source,
	encoder, transmitter, receiver, decoder, and destination.
	17 J Interpret how the design of a message is influenced by such factors as the
	intended audience, medium, purpose, and nature of the message.

і Г	
	17 K Use symbols, measurements, and drawings to promote clear communication by
	providing a common language to express ideas.
	17 L Demonstrate the inputs, processes, and outputs associated with sending and
-	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 N Develop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder,
	transmitter, receiver, decoder, storage, retrieval, and destination.
	17 P Integrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols,
	measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
Standard 18 Tra	nsportation Technologies: Research and develop an understanding of how to select
and	use transportation technologies
Competencies	18 F Identify that transporting people and goods involves a combination of
	individuals and vehicles.
	18 H Explain how governmental regulations often influence the design and operation
	of transportation systems.
	18 G Observe that transportation vehicles are made up of subsystems that must
	function together for a system to work effectively (e.g., structural, propulsion,
	suspension, guidance, control, support, etc.).
	18 I Examine how processes are necessary for the entire transportation system to
	operate efficiently (e.g. receiving, holding, storing, loading, moving,
	unloading, delivering, evaluating, marketing, managing, communicating,
_	using conventions, etc.).
	18 J Relate how transportation plays a vital role in the operation of other technologies
	(e.g. manufacturing, construction, communication, health and safety, agriculture, etc.)
	18 K Demonstrate how intermodalism uses different modes of transportation to move
	people and goods easily from one mode to another (e.g. highways, railways, and
	waterways as part of an interconnected system, etc.).
	18 L Expand on how transportation services and methods have led to a population that
	is regularly on the move.
	nufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	None
Standard 20 Cor Competencies	nstruction Technologies: Understand, select and use construction technologies
	None

	Emerging Technology – Technology Education
Noi	th Dakota Technology Education Standards Taught in Module 16 GPS
	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
-	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a
	product by bringing it onto the market and advertising it.
	1 J Analyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is
	increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed research.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
	feedback.
	2 N Relate how systems thinking involves considering how every part relates to others.
	2 O Differentiate an open-loop system (no feedback path and requires human
	intervention) with a closed-loop system (uses feedback).
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 S Recognize the need for careful compromises among competing factors in the trade-off decision process.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 W Demonstrate systems thinking that applies logic and creativity with appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are embedded within larger technological, social, and environmental systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values
	(e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and
	how they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for
	designing or making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers to silicon chips to miniaturization of computers, etc.).
	2 DD Analyze how quality control is used to ensure that a product, service, or system

n – – – – – – – – – – – – – – – – – – –	neets established criteria.
	EE Explain how management is the process of planning, organizing, and controlling
	vork.
2	2 FF Examine complex systems that have many layers of controls and feedback loops
	o provide information.
	ology Relationships: Interpret the relationships among technologies and the ctions between technology and other fields of study
	D Show how technological systems often interact with one another.
	BE Illustrate how a product, system, or environment developed for one setting may
	be applied to another setting.
	F Correlate how knowledge gained from other fields of study has a direct effect
	on the development of technological products and systems.
3	H Relate how technological innovation results when ideas, knowledge, or skills are
s	hared within a technology, among technologies, or across other fields.
	s of Technology: Predict cultural, social, economical and political effects of
technology	
Competencies 4	D Show how the use of technology affects humans in various ways (safety,
	comfort, choices, and attitudes) about technology's development and use.
	E Examine how technology, by itself, is neither good nor bad, but decisions about
	he use of products and systems can result in desirable or undesirable consequences.
	F Determine how the development and use of technology poses ethical issues.G Identify economic, political, and cultural issues influenced by the development
	G Identify economic, political, and cultural issues influenced by the development ind use of technology.
	H Connect changes caused by the use of technology ranging from gradual to rapid
	and from subtle to obvious.
Standard 5 Techn	ology and the Environment: Investigate the effects of technology on the
environment	
1	F Investigate how decisions to develop and use technologies often put
e	environmental and economic concerns in direct competition with one another.
	K Recognize how humans devise technologies to reduce the negative consequences
	of other technologies.
5	E Relate how the decisions regarding the implementation of technologies involve
	the weighing of trade-offs between predicted positive and negative effects on the environment.
Standard 6 Daval	opment and Use of Technology: Examine the role of society in the development
and use of technolo	
Competencies 6	D Illustrate new technologies that have resulted from the demands, values, and
	interests of individuals, businesses, industries, and societies.
6	E Associate how the use of inventions and innovations has led to changes in
	society and the creation of new needs and wants.
	5 F Summarize the social and cultural priorities and values reflected in technological
	levices. 5 G Examine why meeting societal expectations is the driving force behind the
	G Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	6 H Compare and contrast different cultures and the development of their own
0	technologies to satisfy individual needs, wants, and values.
	teennologies to substy marviadul needs, wants, and vardes.
6	I Interpret whether decisions to develop a technology is influenced by societal
	I Interpret whether decisions to develop a technology is influenced by societal ppinions, demands, and/or corporate cultures.
0	ppinions, demands, and/or corporate cultures.
0	opinions, demands, and/or corporate cultures.5 JExplain the different factors that contribute to shaping the design of and
0	ppinions, demands, and/or corporate cultures.

Competencies	7 C Investigate inventions and innovations that have evolved by using slow
	and methodical processes of tests and refinements.
	7 D Recognize that the specialization of function is at the heart of many technological
	improvements.
	7 E Understand that 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.
	7 F Describe how invention or innovation was not always developed with the knowledge of science.
	7 G Illustrate a technological development that has been evolutionary or a result
	of a series of refinements to a basic invention.
	7 H Report how the evolution of civilization has been directly affected by, and has in
	turn affected, the development and use of tools and materials.
	7 I Summarize how technology has been a powerful force in reshaping the social,
	cultural, political, and economic landscape.
	7 O Relate how the Information Age places emphasis on the processing and
	exchange of information.
Standard 8 Att	ributes of Design: Explore the attributes of design
Competencies	8 E Illustrate how design as a creative planning process leads to useful products and
competencies	systems.
	8 F Infer that there is no perfect design.
	8 G Relate how requirements for a design are made up of criteria and constraints.
	8 H Practice the steps of a design process (e.g. 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, communicating
	processes and results, etc.).8 I Analyze why design problems are seldom presented in a clearly defined form.
	8 K Explore how requirements of a design (e.g. criteria, constraints, and
	efficiency) sometimes compete with each other.
9	ineering Design: Integrate engineering design
Competencies	None
	oblem Solving: Translate the role of troubleshooting, research and development,
	vention and innovation and experimentation in problem solving
Competencies	None
	pplication of the Design Process: Implement the design process
Competencies	None
Standard 12 To systems	echnological Products and Systems: Use and maintain technological products and
Competencies	12 H Utilize information provided in manuals, protocols, or by experienced
Competencies	people to see and understand how things work.
	12 I Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair systems.
	12 J Incorporate computers and calculators in various applications.
	12 JIncorporate computers and carculators in various applications.12 KMaintain and operate systems in order to achieve a given purpose.
	12 L Document processes and procedures and communicate them to different
	audiences using appropriate oral and written techniques.
	12 M Diagnose a system that is malfunctioning and use tools, materials, machines, and
	knowledge to repair it.
	12 O Operate systems to function as designed.

Standard 13 In	npacts of Products and Systems: Assess the impact of products and systems
Competencies	13 F Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
F	13 G Use data collected to analyze and interpret trends in order to identify
	the positive or negative effects of a technology.
	13 H Identify trends and monitor the potential consequences of technological
	development.
	13 J Collect information and evaluate quality.
	13 L Use assessment techniques to make decisions about the future development of
	technology.
Standard 14 M	edical Technologies: Relate medical technologies for selection and use
Competencies	None
Standard 15 Ag related biotechn	
Competencies	15 F Enumerate the technological advances in agriculture directly affect the time and
	number of people required to produce food for a large population.
	15 G Identify the wide range of specialized equipment and practices used to
	improve the production of food, fiber, fuel, and other useful products and in
	the care of animals.
	15 K Classify the agricultural businesses using a wide array of products and systems
	to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.
	15 L Apply biotechnology applications (e.g. agriculture, pharmaceuticals, food
	and beverages, medicine, energy, the environment, genetic engineering,
	etc.).
	15 M Demonstrate how conservation practices control the environment (e.g. soil
	erosion, reduce sediment in waterways, conserve water, improve water quality,
	etc.).
Standard 16 En	ergy and Power Technologies: Research and develop an understanding of how to
sel	lect and use energy and power technologies
Competencies	None
	formation and Communication Technologies: Select and use information and
communication	
Competencies	17 H Examine information and communication systems that allow information to be
	transferred from human to human, human to machine, and machine to human.
	17 I Illustrate how communication systems are made up of a source, encoder,
	transmitter, receiver, decoder, and destination.
	17 J Interpret how the design of a message is influenced by such factors as the
	intended audience, medium, purpose, and nature of the message.17 K Use symbols, measurements, and drawings to promote clear communication
	 by providing a common language to express ideas. 17 L Demonstrate the inputs, processes, and outputs associated with sending and
	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 NDevelop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder,
	transmitter, receiver, decoder, storage, retrieval, and destination.
	17 PIntegrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are communicated through a variety of visual, auditory, and tactile stimuli (e.g. symbols,
	measurement, conventions, icons, graphic images, and languages that incorporate, etc.).
	measurement, conventions, icons, graphic images, and languages that incorporate, etc.).

Standard 18 Tr	ansportation Technologies: Research and develop an understanding of how to select		
an	and use transportation technologies		
Competencies	18 F Identify that transporting people and goods involves a combination of individuals		
	and vehicles.		
	18 J Relate how transportation plays a vital role in the operation of other		
	technologies (e.g. manufacturing, construction, communication, health and		
	safety, agriculture, etc.)		
	18 K Demonstrate how intermodalism uses different modes of transportation to		
	move people and goods easily from one mode to another (e.g. highways,		
	railways, and waterways as part of an interconnected system, etc.).		
	18 L Expand on how transportation services and methods have led to a population that		
	is regularly on the move.		
Standard 19 Ma	anufacturing Technologies: Understand, select and use manufacturing technologies		
Competencies	None		
Standard 20 Co	nstruction Technologies: Understand, select and use construction technologies		
Competencies	None		

	Emerging Technology – Technology Education
North Da	akota Technology Education Standards Taught in Module 18 Digital Editing
Standard 1 Cha technology	racteristics and scope of technology-recognize the characteristics and scope of
Competencies	1 F Develop new products and systems to solve problems or to help do things that
_	could not be done without the help of technology.
	1 G Recognize that the development of technology is a human activity, a result of
	individual or collective needs, and the ability to be creative.
	1 H Discover how technology is closely linked to creativity which has resulted in innovation.
	1 I Examine and demonstrate how corporations can often create demand for a product by bringing it onto the market and advertising it.
	1 JAnalyze how the nature and development of technological knowledge and
	processes are functions of the setting.
	1 K Correlate the rate of technological development with diffusion which is
	increasing rapidly.
	1 L Connect how inventions and innovations are the results of specific, goal-directed research.
	1 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core	e Concepts of Technology: connect the core concepts of technology
Competencies	2 M Model technological systems to include input, processes, output, and at times,
•	feedback.
	2 N Relate how systems thinking involves considering how every part relates to
	others.
	2 P Connect technological systems one to another.
	2 Q Determine how malfunctions to any part of a system may affect the function and quality of the system.
	2 R Identify and use the requirements of parameters placed on the development of a product or system.
	2 T Connect how different technologies involve different sets of processes.
	2 U Show how maintenance is a 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).
	2 V Identify control mechanisms or particular steps that people perform using
	information about the system that causes systems to change.
	2 W Demonstrate systems thinking that applies logic and creativity with
	appropriate compromises to complex real-life problems.
	2 X Show how systems (which are the building blocks of technology) are
	embedded within larger technological, social, and environmental
	systems.
	2 Y Deduce how the stability of a technological system is influenced by all of the
	components in a system (especially those in the feedback loop).
	2 Z Relate how selecting resources involves trade-offs between competing values (e.g., availability, cost, desirability, waste, etc.).
	2 AA Identify and determine the criteria and constraints of a product or system and how they affect the final design and development.
	2 BB Recognize optimization as an ongoing process or methodology for designing or
	making a product dependent on criteria and constraints.
	2 CC Describe how new technologies create new processes (e.g., computers
	to silicon chips to miniaturization of computers, etc.).
	to smoon emps to miniaturization of computers, etc.).

I					
	2 EE Explain how management is the process of planning, organizing, and controlling				
	work. 2 FF Examine complex systems that have many layers of controls and feedback loops				
	2 FF Examine complex systems that have many layers of controls and feedback loops to provide information.				
Standard 3 Tec	chnology Relationships: Interpret the relationships among technologies and the				
	nections between technology and other fields of study				
Competencies	3 D Show how technological systems often interact with one another.				
	3 E Illustrate how a product, system, or environment developed for one setting may				
	be applied to another setting.				
	3 F Correlate how knowledge gained from other fields of study has a direct effect				
	on the development of technological products and systems.				
	3 H Relate how technological innovation results when ideas, knowledge, or				
	skills are shared within a technology, among technologies, or across other				
	fields.				
	3 I Examine why technological ideas are sometimes protected through the process of				
	patenting.				
Standard 4 Effe	ects of Technology: Predict cultural, social, economical and political effects of				
Competencies	4 D Show how the use of technology affects humans in various ways (safety,				
-	comfort, choices, and attitudes) about technology's development and use.				
	4 E Examine how technology, by itself, is neither good nor bad, but decisions about				
	the use of products and systems can result in desirable or undesirable consequences.				
	4 F Determine how the development and use of technology poses ethical issues.				
	4 G Identify economic, political, and cultural issues influenced by the development				
	and use of technology.				
	4 H Connect changes caused by the use of technology ranging from gradual to rapid				
	and from subtle to obvious.				
Standard 5 Teo environment	chnology and the Environment: Investigate the effects of technology on the				
Competencies	None				
Standard 6 Dev	velopment and Use of Technology: Examine the role of society in the development				
and use of techr	nology				
Competencies	6 D Illustrate new technologies that have resulted from the demands, values, and				
	interests of individuals, businesses, industries, and societies.				
	6 E Associate how the use of inventions and innovations has led to changes in				
	society and the creation of new needs and wants.				
	6 F Summarize the social and cultural priorities and values reflected in technological				
	devices.				
	6 G Examine why meeting societal expectations is the driving force behind the				
	acceptance and use of products and systems.				
	6 H Compare and contrast different cultures and the development of their own				
	technologies to satisfy individual needs, wants, and values.				
	6 I Interpret whether decisions to develop a technology is influenced by societal				
	opinions, demands, and/or corporate cultures.				
	6 J Explain the different factors that contribute to shaping the design of and				
	demand for various technologies (e.g. advertising, the strength of the				
	economy, the goals of a company, the latest fads, etc.)				
	luence of Technology: Isolate the influences of technology on history				
Competencies	7 D Recognize that the specialization of function is at the heart of many				
	technological improvements.				
	7 E Understand that the design and construction of structures for service or convenience have evolved from the development of techniques for measurement,				
	- convenience have evolved from the development of techniques for measurement.				

	controlling systems, and the understanding of spatial relationships.			
	7 F Describe how invention or innovation was not always developed with the knowledge of science.			
	7 G Illustrate a technological development that has been evolutionary or a result of a			
	series of refinements to a basic invention.			
	7 H Report how the evolution of civilization has been directly affected by, and			
	has in turn affected, the development and use of tools and materials.			
	7 I Summarize how technology has been a powerful force in reshaping the			
	social, cultural, political, and economic landscape.			
	7 J Specify the development of tools and machines that was based on			
	technological know-how rather than scientific knowledge.			
	7 N Evaluate technological developments of the Industrial Revolution (e.g.,			
	continuous manufacturing, sophisticated transportation and communication			
	systems, advanced construction practices, improved education, and leisure time,			
	etc.).			
	7 O Relate how the Information Age places emphasis on the processing and			
Standard & Att	exchange of information.			
	ributes of Design: Explore the attributes of design8 EIllustrate how design as a creative planning process leads to useful products and			
Competencies	systems.			
	8 F Infer that there is no perfect design.			
	8 G Relate how requirements for a design are made up of criteria and constraints.			
	8 H Practice the steps of a design process (e.g. 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, communicating			
	processes and results, etc.).			
	8 I Analyze why design problems are seldom presented in a clearly defined form.			
	8 J Check and critique the design to redefine and improve upon it.			
	8 K Explore how requirements of a design (e.g. criteria, constraints, and			
	efficiency) sometimes compete with each other.			
Standard 9 Eng	gineering Design: Integrate engineering design			
Competencies	9 F Utilize design processes involving a set of steps, which can be performed in			
-	different sequences and repeated as needed.			
	9 G Use brainstorming as a group problem-solving design process.			
	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and			
	modifying.			
	9 J Distinguish how engineering design is influenced by personal characteristics			
	(e.g. creativity, resourcefulness, and			
	the ability to visualize and think abstractly.)			
	oblem Solving: Translate the role of troubleshooting, research and development, vention and innovation and experimentation in problem solving			
Competencies	10 F Identify a malfunction in a technological system by using troubleshooting as a			
	problem-solving method.			
	10 H Solve technological problems through experimentation.			
	10 I Incorporate research and development as a specific problem-solving approach.			
	10 J Research solutions to technological problems.			
	10 K Realize that all problems are not technological and not every problem can be			
	solved using technology.			
	10 L Apply a multidisciplinary approach to solve technological problems.			

Standard 11 A	pplicatio	on of the Design Process: Implement the design process
Competencies		Apply a design process to solve problems in and beyond the laboratory-
-	classroo	
	11 I	Specify criteria and constraints for the design.
	11 J	Make two-dimensional and three-dimensional representations of the designed
	solution	
	11 K '	Test and evaluate the design in relation to preestablished requirements (e.g.
		, constraints, refine, etc.).
		Make a product or system and document the solution.
		Recommend a design problem to solve and decide whether or not to address it.
		Refine a design by using prototypes and modeling to ensure quality,
		efficiency, and productivity of the final product.
		Develop and produce a product or system using a design process.
Standard 12 T systems	echnolog	gical Products and Systems: Use and maintain technological products and
Competencies	12 H	Utilize information provided in manuals, protocols, or by experienced
-		people to see and understand how things work.
	12 I	Practice using tools, materials, and machines safely to diagnose, adjust, and
	repair s	systems.
		Incorporate computers and calculators in various applications.
	12 K	Maintain and operate systems in order to achieve a given purpose.
	12 L	Document processes and procedures and communicate them to different
		audiences using appropriate oral and written techniques.
	12 M	Diagnose a system that is malfunctioning and use tools, materials, machines, and
		edge to repair it.
		Operate systems to function as designed.
	1	f Products and Systems: Assess the impact of products and systems
Competencies	13 F	Design and use instruments (chart, spreadsheet, graph, etc.) to gather data.
	13 G	Use data collected to analyze and interpret trends in order to identify
		the positive or negative effects of a technology.
		Identify trends and monitor the potential consequences of technological
	develo	pment.
	13 J	Collect information and evaluate quality.
	13 L	Use assessment techniques to make decisions about the future development of
	technol	
	1	echnologies: Relate medical technologies for selection and use
Competencies		None
		al and Related Biotechnologies: Understand, select and use agricultural and
related biotechr	<u> </u>	N.
Competencies		None
		d Power Technologies: Research and develop an understanding of how to d power technologies
Competencies		None
		None
<u> </u>		and Communication Technologies. Select and use information and
Standard 17 In	formatio	on and Communication Technologies: Select and use information and
Standard 17 In communication	formatio technolo	ogies
Standard 17 In	formation technolo 17 H	Examine information and communication systems that allow information to be
Standard 17 In communication	formation technolo 17 H	by the second se
Standard 17 In communication	formation technolo 17 H 17 I	Examine information and communication systems that allow information to be transferred from human to human, human to machine, and machine to human. Illustrate how communication systems are made up of a source,
Standard 17 In communication	formation technoloc 17 H 17 I	by b
Standard 17 In communication	formation technolo 17 H 17 I 17 J	by b
Standard 17 In communication	formation technolog 17 H 17 I 17 J	by b

	receiving information.
	17 M Information and communication systems allow information to be
	transferred from human to human, human to machine, machine to human,
	and machine to machine.
	17 N Develop information and communication systems that can be used to inform,
	persuade, entertain, control, manage, and educate.
	17 O Show how communication systems are made up of source, encoder, transmitter,
	receiver, decoder, storage, retrieval, and estimination.
	17 P Integrate ways to communicate information.
	17 Q Demonstrate ways that technological knowledge and processes are
	communicated through a variety of visual, auditory, and tactile stimuli (e.g.
	symbols, measurement, conventions, icons, graphic images, and languages
	that incorporate, etc.).
	ansportation Technologies: Research and develop an understanding of how to select
	d use transportation technologies
Competencies	None
	anufacturing Technologies: Understand, select and use manufacturing technologies
Competencies	19 K Market a product by informing the public about it as well as assisting in selling
	and distributing.
	19 L Service products to maintain good operating condition.
	19 N Differentiate between durable and nondurable goods.
	19 P Demonstrate how the interchangeability of parts increases the effectiveness of
	manufacturing processes.
	19 R Design a marketing strategy (e.g. establishing a product's identity, conducting
	research on its potential, advertising it, distributing it, selling it, etc.).
	nstruction Technologies: Understand, select and use construction technologies
Competencies	None