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between schools it was being used all the time, in effect wearing out equipment due to use rather than it growing outdated on a shelf when a particular class was finished with it.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➔Problem Solving,
Troubleshooting Information Technology Applications➔Creativity
Systems
Safety, Health and Environmental➔Safety Leadership & Teamwork➔Teamwork, Adaptability,
Flexibility
Ethics & Legal Responsibilities➔Work Ethic Employability &Career Development➔Job Information
Technical Skills➔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	Biology Concepts
• Plant Biology	Physics Concepts
• Genetics	Chemistry Concepts Bio Tech Ecology
• 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 Pneumatics/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.

Modules	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	Glen Ullin	Mott/Regent	New Salem	South Heart
Belfield	Hebron	New England	Scranton	Richardton/Taylor
Bowman County	Killdeer			

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	Fairmount	LaMoure	North Sargent	Wahpeton HS
Campbell/Tintah	Gackle-Streeter	Lidgerwood	Oakes	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	
North Dakota Technology Education Standards Taught in Module 1 Mill	
Standard 1 Characteristics 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 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core 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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	None
Standard 5 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	5 G Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
Competencies	6 H Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
Standard 7 Influence 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 Attributes of Design: Explore the attributes of design	

Competencies	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 Engineering 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.)
	9 K Create a prototype as a working model used to test a design concept by making actual observations and necessary adjustments.
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
Standard 11 Application 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 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 Technological Products and Systems: Use and maintain technological products and systems	
Competencies	12 O Operate systems to function as designed.
Standard 13 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	13 J Collect information and evaluate quality.
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information and Communication Technologies: Select and use information and communication technologies	
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.
	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 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing 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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 2 Laser Engraver	
Standard 1 Characteristics 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 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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
	3 J Recognize how technological progress has advanced science and mathematics.
Standard 4 Effects 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.
	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.
Standard 5 Technology 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 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 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 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 Influence 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 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 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.
Standard 8 Attributes 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 efficiency) sometimes compete with each other.
Standard 9 Engineering 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.)

Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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: Application 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.
	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: Technological 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 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: Impacts 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 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 Medical 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 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	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 N Illustrate how power systems must have a source of energy, a process, and loads.
Standard 17 Information 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 Transportation Technologies: Research and develop an understanding of how to select and 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 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 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.

	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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 3 Router	
Standard 1 Characteristics and scope of technology-recognize the characteristics and scope of technology	
	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 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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	None
Standard 5 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	5 G Specify how humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling.
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
Competencies	6 H Compare and contrast different cultures and the development of their own technologies to satisfy individual needs, wants, and values.
Standard 7 Influence 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 Attributes of Design: Explore the attributes of design	
Competencies	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 Engineering 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 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	10 I Incorporate research and development as a specific problem-solving approach.
	10 J Research solutions to technological problems.
Standard 11 Application 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 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 Technological Products and Systems: Use and maintain technological products and systems	
Competencies	12 O Operate systems to function as designed.
Standard 13 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	13 J Collect information and evaluate quality.
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information and Communication Technologies: Select and use information and communication technologies	
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.

	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 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing 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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 4 Robots	
Standard 1 Characteristics 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 M Explain why most development of technologies is driven by the profit motive and the market.
Standard 2 Core 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 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 Technology Relationships: Interpret the relationships among technologies and the connections 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 Effects 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.
	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 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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.
	6 I Interpret whether decisions to develop a technology is influenced by societal opinions, demands, and/or corporate cultures.
Standard 7 Influence 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 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 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 Attributes 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.
Standard 9 Engineering 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 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 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 Application 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 Technological 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, and knowledge to repair it.
	12 O Operate systems to function as designed.
Standard 13 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None
Standard 14 Medical 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 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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.
Standard 18 Transportation Technologies: Research and develop an understanding of how to select and 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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 5 Color Cam	
Standard 1 Characteristics 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 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 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 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.
Standard 3 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects 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 Technology 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.
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
Competencies	None
Standard 7 Influence 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 Attributes 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 Engineering 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.
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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.
Standard 11 Application 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 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 Technological 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 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None

Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies.	
Competencies	None
Standard 17 Information 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 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.
Standard 18 Transportation Technologies: Research and develop an understanding of how to select and 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 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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 6 CNC Embroidery	
Standard 1 Characteristics 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 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 Technology Relationships: Interpret the relationships among technologies and the connections 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 Effects 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.
	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 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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 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.
Standard 8 Attributes 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 efficiency) sometimes compete with each other.
Standard 9 Engineering 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.)

Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 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 Application 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 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 Technological 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 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 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	13 H Identify trends and monitor the potential consequences of technological development.
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing 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 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 M Classify how materials have different qualities (natural, synthetic, or mixed).
	19 N Differentiate between durable and nondurable goods.
	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 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 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 8 Bio Tech	
Standard 1 Characteristics 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 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 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.

	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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects 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.
	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.
Standard 5 Technology 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 of other technologies.
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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 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 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 Attributes of Design: Explore the attributes of design	
Competencies	None
Standard 9 Engineering Design: Integrate engineering design	
Competencies	None
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 Application of the Design Process: Implement the design process	
Competencies	None
Standard 12 Technological 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 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 Impacts 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 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 Medical Technologies: Relate medical technologies for selection and use	
Competencies	14 G Analyze advances and innovations in medical technologies used to improve 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 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
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.).
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information and Communication Technologies: Select and use information and communication technologies	
Competencies	None
Standard 18 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 9 Sci WS/Probes	
Standard 1 Characteristics 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.
Standard 2 Core 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 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.).
Standard 3 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	None

Standard 5 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 G Examine why meeting societal expectations is the driving force behind the acceptance and use of products and systems.
	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 Influence 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 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 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 exchange of information.
Standard 8 Attributes 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 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.
Standard 9 Engineering Design: Integrate engineering design	
Competencies	None
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	None
Standard 11 Application of the Design Process: Implement the design process	
Competencies	None
Standard 12 Technological 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 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 Impacts 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 Medical Technologies: Relate medical technologies for selection and use	
Competencies	14 G Analyze advances and innovations in medical technologies used to improve 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 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 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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 O Show how communication systems are made up of source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
	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 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
	None
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 10 CADD	
Standard 1 Characteristics and scope of technology-recognize the characteristics and scope of technology	
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 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 W Demonstrate 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.
Standard 3 Technology Relationships: Interpret the relationships among technologies and the connections 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 patenting.
	3 G Adapt an existing innovation developed for one purpose into a different function to demonstrate technology transfer.
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	4 H Connect changes caused by the use of technology ranging from gradual to rapid and from subtle to obvious.
Standard 5 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 company, the latest fads, etc.)
Standard 7 Influence 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 Attributes 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 Engineering 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 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.)
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	10 G Differentiate between invention and innovation.
	10 J Research solutions to technological problems.
Standard 11 Application of the Design Process: Implement the design process	
Competencies	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. criteria, constraints, refine, etc.).
	11 L Make a product or system and document the solution.
	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 design process.
Standard 12 Technological 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 O Operate systems to function as designed.
Standard 13 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None

Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 and use transportation technologies	
Competencies	None
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 Construction 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 Characteristics and scope of technology-recognize the characteristics and scope of technology	
Competencies	1 K Correlate the rate of technological development with diffusion which is 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.
Standard 2 Core 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.).
Standard 3 Technology Relationships: Interpret the relationships among technologies and the connections 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 function to demonstrate technology transfer.
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
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 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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 Attributes of Design: Explore the attributes of design	
Competencies	None
Standard 9 Engineering Design: Integrate engineering design	
Competencies	None
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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.
Standard 11 Application 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 Technological 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 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 Impacts 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 it is useful.
Standard 14 Medical 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.)
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information and Communication Technologies: Select and use information and communication 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.
Standard 18 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None

Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology-Technology Education	
North Dakota Technology Education Standards Taught in Module 12 Electro	
Standard 1 Characteristics 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 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 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 Technology Relationships: Interpret the relationships among technologies and the connections between technology and other fields of study	
Competencies	None
Standard 4 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	None
Standard 5 Technology 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 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 Development and Use of Technology: Examine the role of society in the development and use of technology	
Competencies	None
Standard 7 Influence 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 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 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.
Standard 8 Attributes 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.
Standard 9 Engineering 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.)
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 Application 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. 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 Technological 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 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 audiences using appropriate oral and written techniques.
Standard 13 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology – Technology Education	
North Dakota Technology Education Standards Taught in Module 13 P/H/M	
Standard 1 Characteristics and scope of technology-recognize the characteristics and scope of technology	
Competencies	None
Standard 2 Core 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 Technology Relationships: Interpret the relationships among technologies and the connections between technology and other fields of study	
Competencies	3 E Illustrate how a product, system, or environment developed for one setting may 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 Effects of Technology: Predict cultural, social, economical and political effects of technology	
Competencies	None
Standard 5 Technology 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.
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology.	
Competencies	None
Standard 7 Influence 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.).
Standard 8 Attributes of Design: Explore the attributes of design	
Competencies	None
Standard 9 Engineering Design: Integrate engineering design	
Competencies	9 H Transform ideas into practical solutions by modeling, testing, evaluating, and modifying.
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 Application 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 design and to note areas where improvements are needed.
Standard 12 Technological 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 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 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	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.
Standard 17 Information and Communication Technologies: Select and use information and communication technologies	
Competencies	17 K Use symbols, measurements, and drawings to promote clear communication by providing a common language to express ideas.
Standard 18 Transportation 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.
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
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	
Standard 1 Characteristics 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 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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects 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.
	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 Technology 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 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 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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 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.
Standard 8 Attributes 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 Engineering Design: Integrate engineering design	
Competencies	None
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	None
Standard 11 Application of the Design Process: Implement the design process	
Competencies	None
Standard 12 Technological 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 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 Impacts of Products and Systems: Assess the impact of products and systems	
Competencies	None
Standard 14 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
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.).
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	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 L Discuss how it is impossible to build an engine to perform work that does not exhaust thermal energy to the surroundings.
Standard 17 Information 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 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 Transportation 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.
Standard 19 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology – Technology Education	
North Dakota Technology Education Standards Taught in Module 16 GPS	
Standard 1 Characteristics 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 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

	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 Technology Relationships: Interpret the relationships among technologies and the connections 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.
Standard 4 Effects 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.
	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 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	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 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 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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 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 Attributes 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 K Explore how requirements of a design (e.g. criteria, constraints, and efficiency) sometimes compete with each other.
Standard 9 Engineering Design: Integrate engineering design	
Competencies	None
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving	
Competencies	None
Standard 11 Application of the Design Process: Implement the design process	
Competencies	None
Standard 12 Technological 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 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 Impacts 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 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 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
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 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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 Transportation 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 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 Manufacturing Technologies: Understand, select and use manufacturing technologies	
Competencies	None
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None

Emerging Technology – Technology Education	
North Dakota Technology Education Standards Taught in Module 18 Digital Editing	
Standard 1 Characteristics 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 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.).

	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 Technology Relationships: Interpret the relationships among technologies and the connections 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 Effects 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.
	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 Technology and the Environment: Investigate the effects of technology on the environment	
Competencies	None
Standard 6 Development and Use of Technology: Examine the role of society in the development and use of technology	
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 Influence 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,

	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.
Standard 8 Attributes 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 efficiency) sometimes compete with each other.
Standard 9 Engineering 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.)
Standard 10 Problem Solving: Translate the role of troubleshooting, research and development, invention 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 Application 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. 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 Technological 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 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 Impacts 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 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 Medical Technologies: Relate medical technologies for selection and use	
Competencies	None
Standard 15 Agricultural and Related Biotechnologies: Understand, select and use agricultural and related biotechnologies	
Competencies	None
Standard 16 Energy and Power Technologies: Research and develop an understanding of how to select and use energy and power technologies	
Competencies	None
Standard 17 Information 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 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 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.).
Standard 18 Transportation Technologies: Research and develop an understanding of how to select and use transportation technologies	
Competencies	None
Standard 19 Manufacturing 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.).
Standard 20 Construction Technologies: Understand, select and use construction technologies	
Competencies	None