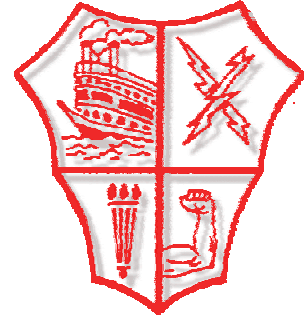


OHIO ACADEMIC CONTENT STANDARDS TECHNOLOGY STANDARDS

Adopted from the Ohio Department of Education



Grade 11

New Richmond Exempted Village School District

Grade 11

Academic Correlation

Standard 1 ~ Nature of Technology

Benchmark A: Synthesize information, evaluate and make decisions about technologies.

1. Articulate and cite examples of how the development of technological knowledge and processes are functions of the setting.
2. Illustrate ways that the rate of technological development and diffusion is exponential.
3. Describe, discuss and cite examples of how goal-directed research results in innovation.
4. Predict how profit incentive and the market economy influence technological development.

Benchmark B: Apply technological knowledge in decision-making.

1. Cite examples of how the failure of system components contributes to the instability of a technological system (e.g., if the fuel pump in an automobile malfunctions, the entire system will not work properly, or if a computer hard drive fails, the computer system will not work properly).
2. Discuss how sustainability is a balance of economic prosperity, environmental quality and social equity.

Benchmark C: Examine the synergy between and among technologies and other fields of study when solving technological problems.

1. Identify technologies suitable for transfer and defend the rationale for selection.
2. Cite examples of how technological innovation has resulted when ideas, knowledge or skills have been shared within, or among, other technologies.
3. Illustrate the relationship of technological progress to the advancement of science, mathematics and other fields.

Standard 2 ~ Technology and Society Interaction

Benchmark A: Interpret and practice responsible citizenship relative to technology.

1. Assess technology systems, resources and services relative to responsible usage of technology.

2. Describe how changes caused by the use of technology can range from gradual to rapid, and from subtle to obvious.

3. Compare and evaluate the advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole.

4. Analyze the causes, consequences and possible solutions to problems in a persistent, contemporary and emerging world (e.g., health, security, resource allocation, economic development or environmental quality).

5. Examine the ethical considerations of a governmental policy that affects the physical characteristics of a place or region (e.g., oil drilling in Alaska).

6. Compare and evaluate alternate public policies for technology deployment and the use of natural resources.

Benchmark B: Demonstrate the relationship among people, technology and the environment.

1. Understand that humans can devise technologies to conserve water, soil and energy through such techniques as reusing, reducing and recycling.

2. Demonstrate how technological decisions involve trade-offs between predicted positive and negative effects on the environment.

Benchmark C: Interpret and evaluate the influence of technology throughout history, and predict its impact on the future.

1. Compare and contrast periods of technology proliferation in the world and the related social and economic influences.

2. Understand the basic elements of the evolution of technological tools and systems throughout history.

Benchmark D: Analyze ethical and legal technology issues and formulate solutions and strategies that foster responsible technology usage.

1. Debate the ethical considerations involved in the development or deployment of new technologies (e.g., medical technologies to create or extend life, satellite imagery, software to capture content or monitor user activity).

2. Examine and discuss how technology, its use and resultant societal changes are viewed by different ethnic, cultural and religious groups.

3. Evaluate access (expanded and limited) determined by technology law, legislation and/or policy.

Benchmark E: Assess the impact of products and systems.

1. Use assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology.

2. Locate and evaluate past predictions about the development of technology.

3. Describe techniques for making decisions about the future development of technology.

Standard 3 ~ Technology for Productivity Applications

Benchmark A: Integrate conceptual knowledge of technology systems in determining practical applications for learning and technical problem solving.

1. Research technology systems, resources and services to solve technical problems.

2. Explore state-of-the-art devices to store data.

3. Make informed choices among technology systems, resources and services.

Benchmark B: Identify, select and apply appropriate technology tools and resources to produce creative works and to construct technology-enhanced models.

1. Apply emerging technology tools and resources for managing and communicating personal/professional information (e.g., distance-learning, voice-recognition tools, personal digital devices).

Standard 4 ~ Technology and Communication Applications

Benchmark A: Apply appropriate communication design principles in published and presented projects.

1. Employ design techniques taking into consideration the psychological impact and cultural connotations of color when designing for print media and multimedia, video and Web pages.

2. Select and evaluate message-appropriate designs for print, multimedia, video and Web pages for curricular and personal needs (e.g., silly graphics may not be appropriate for academic projects).

3. Apply principles of design (contrast, repetition, alignment and proximity) for academic and personal needs (e.g., resume for post-secondary/scholarship application).

4. Adapt design concepts to emerging technologies.

Benchmark B: Create, publish and present information, utilizing formats appropriate to the content and audience.

1. Archive communication products in appropriate electronic forms (e.g., store electronic publications so that they may be accessed when needed).

2. Critique personal communication products.

Benchmark C: Identify communication needs, select appropriate telecommunication tools and design collaborative interactive projects and activities to communicate with others, incorporating emerging technologies.

1. Select appropriate e-mail discussion list to meet communication need (e.g., purpose of list, participants, audience, topics, ease of use).

2. Integrate online communication capabilities to make inquiries, do research and disseminate results (e.g., group writing projects, college searches, career information inquiry).

3. Collaborate in online learning/video-conferencing activities based on research and/or an investigation of real world problems (e.g., study of community or regional ecosystem).

4. Select and use appropriate online structured learning experiences to meet individual learning needs.

Standard 5 ~ Technology and Information Literacy

Benchmark A: Determine and apply an evaluative process to all information sources chosen for a project.

1. Seek and evaluate information to answer both personal and curricular needs.

2. Analyze the intent and authorship of information sources used for a curricular need.

3. Determine valid information for an assignment from a variety of sources.

Benchmark B: Apply a research process model to conduct research and meet information needs.

1. Select essential questions for research and use a recognized or personally developed model to conduct independent research.

2. Identify, evaluate information and select relevant and pertinent information found in each source.

3. Identify relevant facts and check for validity, and record appropriate information keeping track of all sources.

4. Analyze information and synthesize into a communicated product.

5. Respect copyright laws and guidelines, and use standard bibliographic format to list sources.

6. Critique and revise the information product.

7. Review the research process for efficiency and effectiveness.

Benchmark C: Formulate advanced search strategies, demonstrating an understanding of the strengths and limitations of the Internet, and evaluate the quality and appropriate use of Internet resources.

1. Demonstrate the use of parentheses for nesting search terms to alter retrieval strategies through multiple Internet resources.

2. Create a product on a specific curricular topic that includes annotated Web sites constructed according to a standard style manual (e.g., electronic pathfinder on careers).

3. Develop a systematic approach to judge the value of the retrieved Web information.

Benchmark D: Evaluate choices of electronic resources and determine their strengths and limitations.

1. Modify a search through the use of different key words and other techniques specific to an electronic resource (e.g., online database, Web-based index).

2. Integrate online subscription resources and other electronic media to meet needs for research and communication on a routine basis.

3. Differentiate coverage of electronic resources to select information need.

4. Support choices of free and fee-based Web information used to create a class project.

Standard 6 ~ Design

Benchmark A: Identify and produce a product or system using a design process and evaluate the final solution and communicate findings.

1. Explain how a design needs to be continually checked and critiqued, and must be redefined and improved (e.g., the heating system design for one home may not be the best for another, given a different location, shape, or size).

2. Identify how contradictions were overcome in existing solutions.

3. Apply the uniqueness principle in solving problems in systems.

4. Explain and demonstrate how constraints influence the solution of problems (e.g., funding, space, materials, human capabilities, time, and the environment).

5. Identify a system archetype in an existing system.

6. Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product (e.g., proposed or existing designs in the real world).

7. Interpret plans, diagrams and working drawings in the construction of a prototype.

8. Employ Universal Design considerations in the design of a product or system (e.g., design a shower for use by people with and without physical handicaps).

9. Evaluate and rate the quality of an existing household product or system.

10. Explain and use appropriate design processes and techniques to develop or improve products or services in one of the technological systems (manufacturing, construction, information and communication, energy and power, transportation, medical, and agricultural and related biotechnologies).

11. Predict the outcome if no copyright or patent laws were in place.

Benchmark B: Recognize the role of teamwork in engineering design and of prototyping in the design process.

1. Evaluate a design done by another group of students using established design principles.

2. Describe the relationship between engineering disciplines.

3. Describe how a prototype is a working model used to show how subsystems interact.

4. Understand that a prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

5. Collaborate with peers and experts to develop a solution to a specific problem.

6. Describe how to identify conflicts or contradictions in technological systems.

7. Understand the professional and legal responsibilities associated with being an engineer.

8. Demonstrate the importance of teamwork, leadership, integrity, honesty, work habits and organizational skills in the design process.	
Benchmark C: Understand and apply research, development, and experimentation to problem solving.	
1. Recognize, identify, and apply the concept of function to the solution of technological problems.	
2. Describe and demonstrate the reverse engineering process in problem solving.	
Standard 7 ~ Designed World	
Benchmark A: Classify, demonstrate, examine, and appraise energy and power technologies.	
1. Classify energy-using devices and systems into the major forms: thermal, radiant, electrical, mechanical, chemical, nuclear and acoustic.	
2. Evaluate different types of energy sources for personal transportation (e.g., cleaner fuels like biodiesel, electricity, hybrid electric, ethanol, natural gas (CNG, LNG), propane (LPG).	
3. Build and operate a transportation device (e.g., a magnetic levitation vehicle, a CO ₂ car, wind vehicle).	
4. Identify and explain sources of resistance (e.g., 450 elbow, 900 elbow, type of pipes, changes in diameter; for water moving through a pipe).	
5. Identify and explain the tools, controls, and properties of materials used in a thermal system (e.g., thermostats, R Values, thermal conductivity, temperature sensors).	
6. Describe the differing power quality needs of end users (e.g., uninterruptability, backup generators, frequency and voltage stability).	
7. Explain and demonstrate series and parallel circuit usage in residential wiring.	
8. Use series circuit and a parallel circuit to modify the voltage and current available from a group of batteries.	
Benchmark B: Classify, demonstrate, examine, and appraise transportation technologies.	
1. Define intermodalism as the use of different modes of transportation, such as highways, railways and waterways as part of an interconnected system that can move people and goods easily from one mode to another.	
2. Investigate emerging (state-of-the-art) and innovative applications of transportation technology.	
Benchmark C: Classify demonstrate, examine and appraise manufacturing technologies.	
1. Demonstrate product- and system-maintenance and service technique. e.g., installing, diagnosing, troubleshooting, recalling, maintaining, repairing, altering and upgrading and retrofitting).	
2. Describe how durable goods are designed to operate for a long period of time, while non-durable goods are designed to operate for a short period of time (e.g., durable goods: steel, furniture, washing machines; nondurable goods: food, batteries, paper).	

3. Differentiate the selection of tools and procedures used in the safe production of products in the manufacturing process (e.g., hand tools, power tools, computer-aided manufacturing, three-dimensional modeling).	
4. Describe the factors that influence the cost of producing technological products and systems in manufacturing technologies (e.g., materials, labor, energy, time, location).	
5. Calculate the mean, median, mode and standard deviation for a set of data and apply that information to an understanding of quality assurance.	
Benchmark D: Classify, demonstrate, examine and appraise construction technologies.	
1. Determine the need for maintenance, alteration, or renovation in a structure (e.g., determine when is a new roof needed, calculate the cost benefit of purchasing more energy efficient windows).	
2. Describe how structures are constructed using a variety of processes and procedures (e.g., welds, bolts, and rivets are used to assemble metal framing materials).	
3. Describe the factors that influence the selection of technological products and systems in construction technologies (e.g., function, cost, aesthetics).	
4. Investigate emerging (state-of-the-art) and innovative applications of construction technology. e.g., carbon-fiberglass trusses that are stronger than steel).	
Benchmark E: Classify, demonstrate, examine and appraise information and communication technologies.	
1. Use information and communication systems to cause the transfer of information from human to human, human to machine, machine to human, and machine to machine (e.g., two people talking to each other on the phone; a person inputting data in a computer using a keyboard; an electric fax machine providing a copy of a message to a person; and an automated system transferring financial records from one bank computer to another bank computer).	
2. Analyze communication systems and identify the source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination (e.g., telephone, TV, newspaper).	
3. Explain how information travels through different media (e.g., electrical wire, optical fiber, air, space).	
Benchmark F: Classify, demonstrate, examine and appraise medical technologies.	
1. List advances in the sciences of biochemistry and molecular biology that have made it possible to manipulate the genetic information found in living creatures.	
2. Describe how medicines and treatments may have both expected and unexpected results.	
3. Investigate and evaluate new medical technologies.	
4. Employ medical technologies to resolve practical problems (e.g., choose an appropriate bandage for an injury, contact the appropriate service provider in an emergency).	
5. Monitor and apply appropriate safety measures when working with medical technologies.	

Benchmark G: Classify, demonstrate, examine, and appraise agricultural and related biotechnologies.

1. List biotechnology applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment and genetic engineering (e.g., fermentation, bio-products, microbial applications, separation and purification techniques, genetically modified seeds, modified organisms, algal fertilizers).	
2. Consult with experts and determine the effect of emerging biotechnologies on the job market (e.g., compare and contrast the amount of produce at a local produce distribution center grown hydroponically and traditionally).	
3. Employ agricultural and biotechnologies to resolve practical problems (e.g., growing food year round, using plants to eliminate erosion).	