

Verona Public School District Curriculum Overview

6th Grade TED



Curriculum Committee Members:
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Curriculum Developed:
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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

Grade 6 introduces students to inventions vs. innovations and delves further into how technology emphasizes needs and wants. Students learn the basics of inventing, with a focus on problem-solving. The course culminates in students applying the design process to develop a solution to a problem of their choice.

Prerequisite(s):

None

Standard 8: Technology Standards

8.1: Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>	8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming: <i>All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.</i>
<ul style="list-style-type: none"> X A. Technology Operations and Concepts X B. Creativity and Innovation X C. Communication and Collaboration <li style="padding-left: 20px;">D. Digital Citizenship X E. Research and Information Fluency X F. Critical thinking, problem solving, and decision making 	<ul style="list-style-type: none"> X A. The Nature of Technology: Creativity and Innovation X B. Technology and Society X C. Design X D. Abilities for a Technological World <li style="padding-left: 20px;">E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: <i>These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities</i>	Career Ready Practices: <i>These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.</i>
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	<ul style="list-style-type: none"> X CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	<ul style="list-style-type: none"> CRP3. Attend to personal health and financial well-being. X CRP6. Demonstrate creativity and innovation. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	<ul style="list-style-type: none"> CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	<ul style="list-style-type: none"> X CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	<ul style="list-style-type: none"> X CRP5. Consider the environmental, social, and economic impact of decisions. X CRP7. Employ valid and reliable research strategies. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: <i>This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.</i>	9.2: Career Awareness, Exploration & Preparation: <i>This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.</i>	9.3: Career and Technical Education: <i>This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.</i>
<ul style="list-style-type: none"> X A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing X E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting 	<ul style="list-style-type: none"> A. Career Awareness (K-4) X B. Career Exploration (5-8) C. Career Preparation (9-12) 	<ul style="list-style-type: none"> X A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security X M. Manufacturing X N. Marketing X O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: <i>These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.</i>	Differentiated Resources: <i>These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.</i>
●	● Various Teacher Constructed Materials



Unit Title / Topic: Invention and Innovation	Unit Duration: 6 weeks
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Stage 1: Desired Results

Established Goals:

- MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Transfer Goal:

Students will be able to independently use their learning to design solutions to real-world problems by applying a design process that includes defining a problem, generating ideas, selecting a solution, and using simple modeling tools or techniques to test and revise a design.

Students will understand:

- the engineering design process is a method that is used to solve technological challenges to change and improve products for the way we live.
- technology changes constantly due to the continuing effort to improve products and systems; good is not good enough if better is possible.
- technology, by itself, is neither good nor bad, products and systems can result in desirable or undesirable consequences.
- all technologies have flaws; there is no perfect design.

Essential Questions:

- What drives the need for an invention or innovation?
- How do products impact our daily lives?

Students will know:

- the engineering design process includes defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results.
- that products are invented to meet specific needs and wants.
- the rights of "intellectual property," including patents, copyrights and trademarks.
- inventions and innovations have led to changes in society and the creation of new needs and wants.
- design is a creative planning process that leads to useful products and systems.
- requirements for a design are made up of criteria and constraints.
- an innovation is an improvement of an existing technological product, system, or method of doing something.
- inquiry is a process that people use to study to the natural world and develop knowledge and understanding of scientific ideas.
- an invention is a new product, system, or process that has never existed before, created by study and experimentation.
- a prototype is a full-scale working model of a product or system.
- universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialized design.
- the use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas.

Students will be able to:

- explain and demonstrate how ideas can become inventions by using an engineering design process.
- analyze objects and situations in order to find potential problems.
- Identify possible problems which could be solved through technological invention or innovation.
- apply design criteria to the development of solutions to problems.
- document creative solutions through drawings, diagrams, simple models, and/or sketches.
- implement a proposed design through the development of a prototype.
- evaluate completed technological designs or products.
- communicate the process of technological design.
- demonstrate how to design products to meet specific needs.
- formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- develop and evaluate inferences and predictions that are based on data.
- identify limitations for a given device or design..
- constructed products that meet design brief specifications.
- apply and document the steps in arriving at a solution to a technological problem.

Stage 2: Acceptable Evidence

Transfer Task

Shark Tank: Invention Project -Students use the steps of the Engineering Design Process to develop a solution to a problem of their choice. Students are expected to thoroughly research their topic, learn and understand the dynamics of the issue, and create/develop a possible solution to the problem at hand. This project will require students to think outside the box and develop knowledge about issues that exist not only in their country, but around the world as well.

Other Evidence of Learning

Engineering Journals- Throughout instruction, students record observations, data, notes, and ideas. This information is used by students to form conclusions and support reasoning with evidence. The body of student work is reviewed by the teacher in order to assess both content and procedural knowledge.

Performance Assessments- Students design, construct, and test solutions to various technological challenges. Student work cooperatively to complete design activities and deliver presentations. Students are evaluated using performance and process rubrics.

Summative Assessments- Students complete pre/post content knowledge tests that consist of selected response items. Students also complete brief constructed response assignments that require a written response to a question or statement.

Stage 3: Activities to Foster Learning

Learning Activities**Week 1: Tradition of Inventing**

Students will be acquainted with the tradition of inventing. They will develop a perspective of the importance of invention in history. They will also gain an understanding of the patent process and other legal protections.

Week 2: Process of Inventing

Students will develop an understanding of a number of approaches to inventing. They will apply their knowledge through "practice designing" activities.

Week 3: Identify a Problem & Solution Generation

Students will develop skills in analyzing situations, gathering information, and identifying problems which may be solved through technology. Students will choose a topic of interest to them and identify a problem to solve. Students will work on generating, evaluating, and refining solution ideas.

Week 4: Prototyping

Students will gain an understanding of the various materials and processes used in prototyping.

Week 5: Building Prototypes

Students will develop a prototype solution to their problem.

Week 6: Shark Tank: Presenting Results and Conclusions

Students will organize and present data from test results, apply strategies to evaluate results and draw conclusions, report project implications, and make recommendations.

Extensions: Invite inventors to speak/share their stories or take part as "sharks" in the presenting stage of EDP.