

Student Achievement Committee Meeting

Monday, June 24, 2013 6:30 PM

BOE - Auditorium, 129 Church Street, Bristol, CT 06010

1. **Call to Order**

2. **Approval of the minutes of the June 4, 2013 meeting (Decision Item)**

3. **Proposed policy revision: Policy 5144.1 Physical Restraint(s)/Seclusion (Decision Item)**

Presenter: Kim Hapken, Director of Special Services

4. **First Presentation: AP Chemistry Curriculum (Decision Item)**

Presenter: Richard Gagliardi, Supervisor of Science, Technology and Engineering

5. **First Presentation: Grades 6-7-8 Engineering and Technology Curriculum (Decision Item)**

Presenter: Richard Gagliardi, Supervisor of Science, Technology and Engineering

6. **First Presentation: High School Physical Education Curriculum (Decision Item)**

Presenter: Ellen Benham, Supervisor of Physical Education, Wellness and Athletics

7. **First Presentation: Grade 7 Social Studies Curriculum (Decision Item)**

Presenter: Pam Brisson, Supervisor of Humanities and World Language

8. **Set next meeting date**

9. **Adjournment**



Bristol Public Schools Office of Teaching & Learning

DEPARTMENT: Middle School Engineering & Technology

COURSE: Grade 6: Computers & Technology

DEPARTMENT PHILOSOPHY:

Engineering and Technology in the Bristol Public Schools prepares students to use technology and appreciate its role and contribution in our society. Recognizing that students learn in different ways, Engineering and Technology teachers employ a variety of instructional methods to facilitate student learning.

Engineering and Technology courses provide students with opportunities to explore a variety of technologies, work independently and cooperatively toward a common goal, and to view technology from personal, societal, and career perspectives. Hands-on learning occurs in laboratory settings that employ methods of research, design, engineering, problem-solving, experimentation, and material science.

Engineering and Technology courses employ the computational thinking framework as an organizational strategy to deliver engineering and computer instruction. Students formulate problems, organize, analyze, and represent data, break down tasks into manageable parts, develop a series of ordered steps to achieve a desired outcome, and organize resources.

The Engineering and Technology Department utilizes standards from a wide range of disciplines, including ISTE, ITEEA, NSTA and CCSS. This promotes and encourages collaboration, critical thinking and creativity through interdisciplinary experiences.

Program Goals

- Encourage students to pursue advanced technical study;
- Provide experiences for students to develop and demonstrate technological skills and knowledge;
- Employ instructional methods and interdisciplinary activities that stimulate student interest in technology;
- Emphasize the ethical and safe use of tools and technology;
- Engage students with real-world problem solving experiences.

Student Goals

- Achieve skills and knowledge for success in post secondary technology programs;
- Become responsible, technologically literate citizens and consumers;
- Work cooperatively as a team member toward a common goal;
- Explore, understand and evaluate different aspects of technology;

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- Competently and safely use a variety of technologies, tools, materials and technical processes.

Course Description: Grade 6 - Computers & Technology

The Grade 6 Computers & Technology course introduces students to the world of technology and to methods and procedures of computational thinking. Students will be challenged to think creatively, solve problems, and use data and ideas to discover scientific and technical relationships.

Students will use computer hardware, software and peripherals, computer productivity tools, online research and resources, sketching and 3D modeling, simple machines, LEGO components, hand and machine tools, and a variety of material resources to explore computer operations and systems, digital citizenship, engineering, CAD, manufacturing production and fabrication, energy and transportation, digital imaging, video and animation, and architectural design.

Instructional topics for this **45 day** experience will include:

Computer Systems and Operations

- Computer Fundamentals
- Computer Productivity Tools

Digital Citizenship

- Internet Safety
- Technology Responsibility and Ethics

Research and Information Fluency

- Internet Research
- Digital Literacy

Communication and Collaboration

- Cloud-Based Applications
- Digital Imaging and Animation

Creativity and Innovation

- Engineering and Design
- Lab Safety, Manufacturing and Transportation Technology

Critical Thinking, Problem Solving, and Decision Making

- CAD, 3D Modeling, and Simulations
- Robotics and Simple Machines

Participation in this learning experience will nurture and expand the technological literacy of Bristol Middle School Students and actively engage them in a creative design process as they develop solutions to simulated and real-world problems. Students will employ the techniques of brainstorming, research and development, troubleshooting, invention, innovation, modeling, prototyping and testing.

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Students will employ a wide range of contemporary computer technologies and laboratory equipment as they construct prototypes. Computer software experiences will utilize Computer Assisted Design (CAD), desktop publishing, and web publishing software. LEGO technology will be used by students to design, construct, and test their prototypes and model solutions. Students will share their ideas and communicate their design solutions through a variety of verbal, written, graphic and/or electronic means.

Throughout the creative design process, students will continuously apply their reading, writing, math and science skills. Students will be expected to use appropriate vocabulary and terminology in discussions with their teachers and classmates about their design solutions.

Students will learn to select and apply tools, materials, and other technological resources as they innovate design solutions to teacher developed challenges. Laboratory activities will be executed in a team environment that encourages the development of skills in cooperation, teamwork, and creative thinking.

This curriculum references the following standards:

- **International Technology and Engineering Education Association - Standards for Technological Literacy (STL)**
- **International Society for Technology in Education - National Educational Technology Standards for Students (NET-S)**
- **Common Core State Standards for Literacy in Science and Technical Subjects (CCSS)**

SUBJECT: Grade 6: Computers & Technology
TOPIC: Computer Systems and Operations - Computer Fundamentals
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S #6: Technology Operations and Concepts].2. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].
PERFORMANCE STANDARDS: <ol style="list-style-type: none">1. Understand and use technology systems [NET-6a].2. Use a variety of computer tools and applications [STL-12j].
Reading Standards for Literacy in Science and Technical Subjects 6-8 <p>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].</p> Writing Standards for Literacy in Science and Technical Subjects 6-8 <p>Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing-4].</p>

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Understand and use	Technology systems
Use	Computer tools and applications
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	Clear and coherent writing appropriate to task and purpose
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What are the key components of a computer system? 2. What will computers be like (or, be capable of) in the future? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. A computer system consists of hardware, software, and peripheral devices. 2. Computers get smaller with increased capabilities (computing speed, memory, storage, etc.). 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Identify the components of a computer • Create, name and organize storage folders • Create, name, save, and retrieve files to a personal network location • Identify different types of networks. • Describe the benefits and limitations of each network type. • Illustrate how a student pc connects to both the intranet and internet. • Explain the historical development of computers • Describe the evolution of computer systems • Compare new products, devices and/or systems to previous versions • Predict future developments in the field of computers 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Guide students through activity to identify computer components
- Facilitate classroom discussion about computer networks
- Provide students with graphic organizers and visual examples of folder creation and organization
- Outline different types of networks.
- Discuss and demonstrate the benefits and limitations of each network.
- Explain how data moves from a key stroke across a network.
- Stimulate prior learning with class discussions
- Present a variety of products and ask students to analyze their properties
- Engage students in a web quest to create a timeline of historical computer events
- Demonstrate computer software

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Create and organize personal network folders by grade and content area.
- Identifying computer components.
- Tech Journal entries
- Written response
- Performance assessment
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line

SUBJECT: Grade 6: Computers & Technology
TOPIC: Computer Systems and Operations - Computer Productivity Tools
CONTENT STANDARDS: 1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S # 6: Technology Operations and Concepts]. 2. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].

PERFORMANCE STANDARDS:
 1. Select and use applications effectively and productively [NET-6b]. 2. Use computers to access and organize information [STL-12f].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Select and Use	Applications
Use	Computers
Access and Organize	Information
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	Clear and coherent writing appropriate to task and purpose
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. How can a computer technology help you access, organize and present ideas and information?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Computer technologies help you:</p> <ol style="list-style-type: none"> a. connect to databases of information on the Internet; b. create and share documents that transfer information to others; and, c. present information through a variety of visual and digital forms 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Create word processing documents • Create desktop publishing documents • Create spreadsheets and database documents • Create digital presentation • Apply document formatting techniques • Modify page layout • Review and edit spelling, grammar, and content • Produce printed output 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Explain the differences between and among various computer software applications
- Model proper document formatting techniques
- Exhibited samples of exemplary models
- Demonstrate the various features and commands
- Guide students through document editing exercises
- Stimulate prior learning with class discussions

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Identifying computer software
- Written response
- Performance assessment base on document output
- Student participation using rubric
- Quiz/Test

SUBJECT: Grade 6: Computers & Technology
TOPIC: Digital Citizenship - Internet Safety
CONTENT STANDARDS: 1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship]. 2. Students will develop an understanding of the cultural, social, economic, and political effects of technology [ITEEA STL #4].

PERFORMANCE STANDARDS:
 1. Advocate and practice safe, legal, and responsible use of information and technology [NETS-5a]. 2. The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use [STL-4d].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS	
Skills: Be able to:	Concepts: Need to know about:
Advocate & Practice	Safe, legal, responsible use of information/technology
Understand & Appreciate	Technology affects humans in various ways, including their safety, comfort, choices, and attitudes
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	Clear and coherent writing appropriate to task and purpose
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What are consequences of unsafe internet activity? 2. Why is it necessary to always practice safe computing? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Consequences for unsafe internet use include identity theft, loss of privacy, viruses, malware and spyware. 2. Safe computing will help protect me by keeping your identification and information secure. 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define digital citizenship • Recognize and describe safe and ethical computing • Summarize potential consequences of unsafe internet use • Demonstrate how to use digital information in a safe and responsible manner • Use presentation software to explain digital citizenship practices 	
INSTRUCTIONAL STRATEGIES	
<i>Based on our department philosophy for student learning, teachers will:</i>	
<ul style="list-style-type: none"> • Facilitate a classroom discussion about digital citizenship. • Model and practice • Stimulate prior learning with class discussions • Video and web resources • Demonstrate computer software • Present examples of positive and negative use of information • Present a variety of articles for students to learn of the impact of human, cultural, and societal issues relating to legal and ethical technological behavior 	

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Exhibit explaining responsible use of technology
- Observations of students using technology

SUBJECT: Grade 6: Computers & Technology
TOPIC: Digital Citizenship - Technology Responsibility and Ethics
CONTENT STANDARDS: 1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship]. 2. Students will develop an understanding of the cultural, social, economic, and political effects of technology [ITEEA STL #4].

PERFORMANCE STANDARDS:
 1. Demonstrate personal responsibility for lifelong learning [NETS-5c]. 2. The development and use of technology poses ethical issues. [STL-4f]
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Demonstrate	Personal responsibility.
Explain how	Use of technology poses ethical issues.
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	Clear and coherent writing appropriate to task and purpose
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is ethical computer use? 2. What are ethical issues related to computers and the internet? 3. Is technology (computers / internet) good or bad? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Computer ethics are a set of moral principles that guide the use of computers. 2. Ethical issues related to computers can include copyright, privacy, safety, piracy, etc. 3. Technology is neither good, nor bad, how we use technology determines its effects. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define ethics • Define computer ethics • Define digital citizenship • Recognize and describe safe and ethical computing • List several ethical issues related to computers and the internet • Demonstrate how to use digital information in a safe and responsible manner • Use presentation software to explain digital citizenship practices 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital citizenship.
- Model and practice
- Stimulate prior learning with class discussions
- Present a variety of products and ask students to analyze their properties
- Present examples of positive and negative use of information
- Present a variety of articles for students to learn of the impact of human, cultural, and societal issues relating to legal and ethical technological behavior.
- Observations of students using technology

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Feedback from discussions
- Comments and reactions to videos and/or guest speakers

SUBJECT: Grade 6: Computers & Technology
TOPIC: Research and Information Fluency - Internet Research
CONTENT STANDARDS <ol style="list-style-type: none">1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency].2. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving [ITEEA STL #10].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media [NETS-3b].2. Technological problems must be researched before they can be solved [STL-10j].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Locate	Information from a variety of sources and media
Organize	Information from a variety of sources and media
Analyze	Information from a variety of sources and media
Evaluate	Information from a variety of sources and media
Synthesize	Information from a variety of sources and media
Ethically use	Information from a variety of sources and media
Research	Technological problems
Solve	Technological problems
Cite	textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is meant by "doing research"? 2. Why do companies conduct research and development? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Research is a systematic inquiry or investigation into a subject in order to discover or revise facts or theories. 2. R&D enables companies to create, test, and improve products and services. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define research • Conduct research project • Explain acceptable research methods • Describe the role of research and development. • Compare content sources • Utilize a variety media sources • Demonstrate how to use digital information in a safe and responsible manner • Use presentation software to explain digital citizenship practices 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion on research
- Model and practice
- Stimulate prior learning with class discussions
- Demonstrate computer software and internet
- Discuss how information relates to essential question
- Lead a class discussion on selecting specific information in order to answer essential questions
- Lead a class discussion on organizing information from multiple sources
- Discuss refocusing inquiry based on findings
- Demonstrate how to choose relevant print, non-print, and electronic sources
- Model using keywords to locate information in print and non-print sources
- Lead a class discussion on the quality of the final product

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Completion of research project
- Student participation using rubric
- Proper formatting and citation
- Acquisition and use of vocabulary
- Appropriate visuals
- Quiz/test

SUBJECT: Grade 6: Computers & Technology
TOPIC: Research and Information Fluency - Digital Literacy
CONTENT STANDARDS: 1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency]. 2. Students will develop the abilities to assess the impact of products and systems [ITEEA STL #13].

PERFORMANCE STANDARDS:
 1. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks [NETS-3c]. 2. Collect information and evaluate its quality [STL-13j].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text [Integration of Knowledge and Ideas # 8]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Evaluate	Information sources and digital tools
Select	Information sources and digital tools
Evaluate	Appropriateness to specific tasks
Collect	Information
Evaluate	Quality
Distinguish in text	Facts, reasoned judgment based on research findings, and speculation
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is digital literacy? 2. How do you know if information you read is true and accurate? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Digital literacy is the ability to use digital technology, communication tools or networks to locate, evaluate, use and create information. 2. Ways to determine if information is accurate include using credible sources, knowing the difference between fact and opinion, verifying the info, and being aware that some info is meant to mislead.. 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define digital literacy • Utilize web-search strategies • Use presentation software to explain digital literacy • Determine possible sources • Select the best sources • Find information within sources • Extract relevant information 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital literacy.
- Model and practice
- Demonstrate web evaluation criteria
- Demonstrate web-search strategies
- Lead a class discussion on selecting materials based on accuracy, detail, format, illustrations, special features, level of material and purpose
- Guide the organization of information from multiple sources

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Research activity checklist
- Completion of research project
- Proper formatting and citation
- Acquisition and use of vocabulary
- Appropriate visuals
- Quiz/test

SUBJECT: Grade 6: Computers & Technology
TOPIC: Communication and Collaboration - Cloud Based Applications
CONTENT STANDARDS
<ol style="list-style-type: none">1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2: Communication and Collaboration].2. Students will develop an understanding of the characteristics and scope of technology [ITEEA STL #1].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media [NETS-2a].2. The development of technology is a human activity and is the result of individual and collective needs and the ability to be creative [STL-1g].
Reading Standards for Literacy in Science and Technical Subjects 6-8
Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8
Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Interact	Peers, experts and others
Collaborate	Peers, experts and others
Publish	Digital media
Employ	Digital environments and media
Develop	Human activity (collaboration)
Compare	Individual and Collective needs
Be	Creative
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How can we use technology to collaborate? 2. What is cloud-based computing? 3. What are the advantages of using the cloud? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Collaboration is working together with technology to complete a task or solve a problem. 2. Cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. 3. Benefits of cloud computing include lower costs, more storage, easier collaboration, and more mobility. 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define collaboration • Participate in and contribute to a collaborative project • Define cloud computing • Compare the cloud to network and stand alone computing. • Utilize cloud computing resources to create and store data and documents • Utilize the cloud to collaborate with peers 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Stimulate prior learning with class discussions
- Facilitate a classroom discussion about collaboration
- Facilitate a classroom discussion about cloud computing
- Model and practice
- Demonstrate computer software and applications
- Develop projects and scenarios that foster collaboration
- Establish computer lab protocols for cloud-based computing

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Collaborative projects
- Proper creation and storage of projects in cloud

SUBJECT: Grade 6: Computers & Technology
TOPIC: Communication and Collaboration - Digital Imaging and Animation
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2: Communication and Collaboration].2. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study [ITEEA STL #3].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Contribute to project teams to produce original works or solve problems [NETS-2d].2. Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields [STL-3h].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts [<i>Integration of Knowledge and Ideas # 7</i>].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [<i>Production and Distribution of Writing # 6</i>].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Contribute	Project teams
Produce	Original works
Solve	Problems
Share	Ideas, knowledge and skills
Innovate	Technology
Integrate charts, graphs, photographs, videos, or maps	Print and digital texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How can you communicate with images and icons? 2. How do you animate a computer image? 3. What can you gain by working in a team? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Images and icons convey ideas, information, emotions, and can be used to influence. 2. A variety of computer software applications can be used to create digital animations. 3. The benefits of working as a team include improved problem solving, creativity, speed, support and satisfaction. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Create and save digital images (photos, drawings, charts, etc.) • Define digital animation • Utilize a variety of computer software applications • Create original animations • Compare a variety of file formats • Express ideas and information graphically 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital imagining.
- Model and practice
- Stimulate prior learning with class discussions
- Present a variety of digital images
- Demonstrate computer software applications
- Create projects and activities that incorporate digital imagining and animation

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Projects
- Proper file formats
- Proper storage and output

SUBJECT: Grade 6: Computers & Technology
TOPIC: Creativity and Innovation - Engineering and Design
CONTENT STANDARDS: 1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation]. 2. Students will develop an understanding of the attributes of design [ITEEA STL #8].

PERFORMANCE STANDARDS: 1. Create original works as a means of personal or group expression [NETS-1b]. 2. The design process includes 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, and communicating processes and results [STL-8h].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Create	Original works
Express	Personal or group goals
Define	A problem
Brainstorm and generate	Ideas
Identify	Criteria
Specify	Constraints
Explore	Possibilities
Select	Approach (method)
Develop	Design proposals
Make	Models and prototypes
Test, evaluate and refine	Design
Create	Product
Communicate	Process and results
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
ESSENTIAL QUESTIONS - Teacher's guiding questions:	
<ol style="list-style-type: none"> 1. What is engineering? 2. How do engineers solve problems? 3. What is innovation? 	
BIG IDEAS - Student's statements of enduring ideas:	
<ol style="list-style-type: none"> 1. Engineering uses mathematics, science, technical knowledge, imagination and creativity to solve problems. 2. Engineers solve problems in systematic way that includes: Creating solutions define problem, consider possible solutions, evaluate and select the best, build a prototype and test. 3. Innovation involves creating new and improved products and solutions. 	

LEARNING OBJECTIVES

The student will be able to:

- Define engineering
- List the steps in the Engineering Design Process (EDP)
- Employ the EDP to a problem or product
- Brainstorm effectively
- Compare criteria and constraints
- Create models and prototypes
- Test and evaluate design ideas
- Refine products and solutions
- Define innovation

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about engineering.
- Model and practice
- Stimulate prior learning with class discussions
- Create projects and activities that engage students in engineering
- Present a variety of products and ask students to analyze their properties
- Engage students in a reverse engineering activity
- Demonstrate computer software applications

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Student participation using rubric
- Engineering activities
- Design activity checklist
- Load testing (or other evaluation) of students projects
- Participation in collaborative engineering challenges

SUBJECT: Grade 6: Computers & Technology
TOPIC: Creativity and Innovation - Manufacturing and Transportation Technologies
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].2. Students will develop the abilities to apply the design process [ITEEA STL #11].3. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL # 12].4. Students will develop an understanding of and be able to select and use transportation technologies [ITEEA STL #18].5. Students will develop an understanding of and be able to select and use manufacturing technologies [ITEEA STL #19].

PERFORMANCE STANDARDS:	
<ol style="list-style-type: none"> 1. Apply existing knowledge to generate new ideas, products, or processes [NETS-1a]. 2. Make a product or system and document the solution [STL-11]. 3. Select and safely use tools, products, and systems for specific tasks [STL-12e]. 4. Vehicles move people or goods from one place to another in water, air or space, and on Land [STL-18b]. 5. Manufacturing processes include designing products, gathering resources, and using tools to separate, form, and combine materials in order to produce products [STL-19d]. 	
<p>Reading Standards for Literacy in Science and Technical Subjects 6-8</p> <p>Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].</p> <p>Writing Standards for Literacy in Science and Technical Subjects 6-8</p> <p>Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].</p>	
UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Apply	Knowledge
Generate	Ideas, products or processes
Make	Product or system
Select and safely use	Tools, products and systems
Document	Solution
Describe	Vehicles
Compare and contrast	Land, water, air and space transportation
Design	Products
Gather	Resources
Use	Tools
Separate, form and combine	Materials
Produce	Products
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

ESSENTIAL QUESTIONS - Teacher's guiding questions:

1. What is transportation?
2. What is manufacturing?
3. How does design influence vehicles and products?
4. How are tools and equipment used safely and properly?

BIG IDEAS - Student's statements of enduring ideas:

1. Transportation involves moving people and goods on land, water, air and space.
2. Manufacturing involves the design, production and packaging of products.
3. All vehicles and products must be designed for safety, effectiveness, and appeal.
4. There is a safe and proper way to use tools and equipment.

LEARNING OBJECTIVES

The student will be able to:

- Define transportation
- Compare various transportation systems
- Describe different transportation modes
- Design and test model vehicles
- Define manufacturing
- Design products
- Select appropriate materials and resources
- Use tools and machines properly and safely
- Create products
- Document processes

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion transportation and manufacturing.
- Model and practice
- Stimulate prior learning with class discussions
- Create activities that engage students in transportation and manufacturing
- Supply and prepare appropriate material resources
- Maintain all tools and equipment

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Completion of models and prototypes
- Completion of products and vehicles

SUBJECT: Grade 6: Computers & Technology
TOPIC: Critical Thinking, Problem Solving, and Decision Making - CAD, 3D Modeling, and Simulations
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].1. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. [ISTE NET-S #4].2. Students will develop an understanding of engineering design [ITEEA STL #9].3. Students will develop the abilities to apply the design process [ITEEA STL #11].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Use models and simulations to explore complex systems and issues [NETS-1c]2. Plan and manage activities to develop a solution or complete a project [NETS-4b].3. Models are used to communicate and test design ideas and processes [STL-9e].4. Make two-dimensional and three-dimensional representations of the designed solution [STL-11j].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Use	Models and simulations
Explore	Complex systems and issues
Plan and manage	Activities
Develop and complete	Projects
Use	Models
Communicate	Design ideas
Communicate	Processes
Test	Design Ideas
Test	Processes
Make	Two-dimensional and three-dimensional representations
Design	Solutions
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS -Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is a computer simulation? 2. What is Computer Aided Design (CAD)? 3. What is a 3-D model? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Computer simulations allow for the creation and testing of ideas and processes in a safe, inexpensive and creative virtual environment. 2. CAD uses computers and digital tools to draw and design objects and products. 3. A 3-D model is an object you create on a computer that has real-life properties and scale. 	

LEARNING OBJECTIVES

The student will be able to:

- Distinguish the complexity from among a variety computer simulations
- Utilize computer simulations to test ideas, create solutions and collect data
- Define CAD
- Use a variety of CAD software applications
- Create detailed CAD drawings and designs
- Generate graphic and print output of CAD designs
- Create 3-D models of objects and products
- Adhere to specific dimensions and scale

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about CAD and 3-D modeling.
- Model and practice
- Stimulate prior learning with class discussions
- Engage students in design challenges
- Demonstrate computer software
- Create worksheets and handouts
- Update software as applicable

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Engagement with computer simulations
- Completion of CAD assignments
- Completion of 3-D modeling assignments
- Proper storage and retrieval of files
- Proper output

SUBJECT: Grade 6: Computers & Technology
TOPIC: Critical Thinking, Problem Solving, and Decision Making - Robotics and Simple Machines
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources [ISTE NET-S #4].2. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving [ITEEA STL #10].3. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].

PERFORMANCE STANDARDS:
 <ol style="list-style-type: none">1. Use multiple processes and diverse perspectives to explore alternative solutions [NETS-4d].2. Troubleshooting is a way of finding out why something does not work so that it can be fixed [STL-10c].3. Follow step-by-step directions to assemble a product [STL-12d].4. Operate and maintain systems in order to achieve a given purpose [STL-12k].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Use	Multiple processes
Use	Diverse perspectives
Explore	Alternate solutions
Troubleshoot and fix	Problems
Follow	Step-By-Step instructions
Assemble	Product
Operate and maintain	Systems
Achieve	Given purpose
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What are simple machines and how do they work? 2. How do you build and program a robot? 3. What is troubleshooting? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Simple machines make it easier to do work (reducing the amount of effort). 2. You follow step-by-step instructions to build a robot; You write code and download files to program a robot. 3. Troubleshooting involves diagnosing a problem and trying to fix it, often by process of elimination. 	

LEARNING OBJECTIVES

The student will be able to:

- Define simple machines and work
- Identify and describe a variety of simple machines
- Explain how simple machine reduce effort and do work
- Build and test simple machines from LEGO or other materials
- Build robot devices from set plans and/or creatively.
- Demonstrate basic programming skills
- Program robot to perform specific tasks
- Define troubleshooting
- Apply troubleshooting skills to solve problems

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Model and practice
- Stimulate prior learning with class discussions
- Facilitate a classroom discussion about simple machines.
- Prepare materials and components
- Create presentations
- Design challenges and activities

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Building and testing a variety of machines
- Building a functioning robot
- Writing successful computer programs
- Troubleshooting practice and skill development



Bristol Public Schools Office of Teaching & Learning

DEPARTMENT: Middle School Engineering & Technology

COURSE: Grade 7 - Computers & Robotics

DEPARTMENT PHILOSOPHY:

Engineering and Technology in the Bristol Public Schools prepares students to use technology and appreciate its role and contribution in our society. Recognizing that all students learn in different ways, Engineering and Technology teachers regularly employ a variety of instructional methods to facilitate student learning.

Engineering and Technology courses provide students with opportunities to discover and learn about a variety of contemporary technologies. As students explore these technologies, they learn to work independently and cooperatively toward a common goal, and to view technology from personal, societal, and career perspectives. Hands-on learning occurs in laboratory settings that employ methods of research and development, design, engineering, problem-solving, and material science.

Engineering and Technology courses employ the computational thinking framework as an organizational strategy to deliver engineering and computer instruction. Students formulate problems, organize, analyze, and represent data, break down tasks into manageable parts, develop a series of ordered steps to achieve a desired outcome, and organize resources.

The Engineering and Technology Department utilizes standards from a wide range of disciplines, including ISTE, ITEEA, NSTA and CCSS. This promotes and encourages collaboration, critical thinking and creativity through interdisciplinary experiences.

Program Goals

- Encourage all students to pursue advanced technical study;
- Provide experiences for students to develop and demonstrate technological skills and knowledge;
- Employ instructional methods and interdisciplinary activities that stimulate student interest in technology;
- Emphasize the ethical and safe use of tools and technology; and,
- Engage students with real-world problem solving experiences.

Student Goals

- Achieve skills and knowledge for success in post secondary technology programs;
- Become responsible, technologically literate citizens and consumers;
- Work cooperatively as a team member toward a common goal;
- Explore, understand and evaluate different aspects of technology; and,
- Competently use a variety of technologies, tools, materials and technical processes.

Course Description: Grade 7 - Computers & Robotics

Computers and Robots are everywhere. The study of computers and robotics will engage middle school students with emerging technologies in this field. Students will learn promising new applications of technology along with related principles of Science, Technology, Engineering, and Mathematics (STEM) in a hands-on/minds-on problem-solving experience.

We live in a society that increasingly relies on computers and robotics to meet our daily needs and solve our problems. Humans employ computers and automated systems to simplify our lives by making routine tasks easier. Robots and automated machines now enable us to produce products safely and more efficiently.

Robots are complex electro-mechanical systems that move independently, sense and perform programmed tasks. True robots interact within their environment in response to touch, sound, and electromagnetic radiation.

Students within the Grade 7 Engineering & Technology Program will participate in a variety of activities that develop practical knowledge of how machines move, sense, and process information. Students will explore past, present and future roles of robotics in our society including references to this technology in literature and film. Students will discover the fundamentals of robotic systems, and apply that knowledge to creativity solutions of real-world challenges and problems.

Students will apply methods and procedures of computational thinking and be challenged to think creatively, solve problems, and use data and ideas to discover scientific and technical relationships.

Students will use computer hardware, software and peripheral devices, computer productivity tools, online research and resources, sketching and 3D modeling, simple machines, LEGO components, hand and machine tools, and a variety of material resources to explore computer operations and systems, digital citizenship, engineering, CAD, manufacturing production and fabrication, energy and transportation, digital imaging, video and animation, and architectural design.

Instructional topics for this **45 day** experience may include:

Computer Systems and Operations

- Computer Fundamentals and Productivity Tools
- Cloud-Based Computer Applications

Bristol Public Schools

Digital Citizenship

- On-Line Safety, Internet Security and Cyber-Bullying
- Digital Responsibility and Ethics

Research and Information Fluency

- Internet Research & Digital Literacy
- Perspectives and Applications of Automation & Robotics

Communication and Collaboration

- Cloud-Based Computer Collaboration
- Digital Imaging, Video Production and Animation

Creativity and Innovation

- CAD, 3D Modeling, App Design and Computer Programming
- Lab Safety, Applications of Technology

Critical Thinking, Problem Solving, and Decision Making

- NXT Programming, Problem Solving, Control Systems and Processes
- Simple Machines & Mechanical Systems (Electric, Hydraulic and Pneumatic)

Participation in this learning experience will nurture and expand the technological literacy of Bristol Middle School Students and actively engage them in a creative design process as they develop solutions to simulated and real-world problems. Students will employ the techniques of brainstorming, research and development, troubleshooting, invention, innovation, modeling, prototyping and testing.

Students will employ a wide range of contemporary computer technologies and laboratory equipment as they construct robotic devices to solve problems and document their creative solutions. Computer software experiences will utilize Computer Assisted Design (CAD), desktop publishing, and web publishing software. LEGO Mindstorms technology will be used by students to design, construct, program, and test their prototypes and model solutions. Students will share their ideas and communicate their design solutions through a variety of verbal, written, graphic and/or electronic means including their school web page.

Throughout the creative design process, students will apply their reading, writing, math and science skills. Students will be expected to use appropriate vocabulary and terminology in discussions with their teachers and classmates about their design solutions.

Students will learn to select and apply tools, materials, and other technological resources as they innovate design solutions to teacher developed challenges. Laboratory activities will be executed in a team environment that encourages the development of skills in cooperation, teamwork, and creative thinking.

Bristol middle school students may have the opportunity to demonstrate their skills in automation and robotics by participating in district-wide, state, and national competitions.

This curriculum references the following standards:

- **International Technology and Engineering Education Association - Standards for Technological Literacy (STL)**
- **International Society for Technology in Education - National Educational Technology Standards for Students (NET-S)**
- **Common Core State Standards for Technical Subjects (CCSS)**

SUBJECT: Grade 7: Computers & Robotics
TOPIC: Computer Systems and Operations - Computer Fundamentals and Productivity Tools
CONTENT STANDARDS: 1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S #6: Technology Operations and Concepts]. 2. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].

PERFORMANCE STANDARDS:
 1. Select and use applications effectively and productively [NET-6b]. 2. Operate and maintain systems in order to achieve a given purpose [STL-12k].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing-4].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Select and use	Applications
Use	Effectively and productively
Operate and maintain	Systems
Achieve	[Desired] purpose
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. What software applications can help more successful and productive in school?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Word processing, spreadsheet, desktop publishing and presentation software are important tools to help you.</p>	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define different types of applications. • Explain and demonstrate how to use applications effectively. • Differentiate between social applications and applications useful for schoolwork. • Explain the proper techniques for maintaining an efficient computer. • Predict future developments in the field of Application design and use. 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Guide students through activity to identify Computer Applications.
- Facilitate classroom discussion about Computer Applications.
- Provide students with examples of Applications.
- Discuss and demonstrate the benefits and limitations of each Applications.
- Stimulate prior learning with class discussions
- Facilitate discussions about internet safety specific to Application use and sharing.
- Engage students in a web quest to create a timeline of historical computer App events
- Demonstrate Application design and use.

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Identifying computer Apps relative to their specific functions and utilization.
- Tech Journal entries
- Written response
- Performance assessment
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line

SUBJECT:

Grade 7: Computers & Robotics

TOPIC:

Computer Systems and Operations - Cloud-Based Computer Applications

CONTENT STANDARDS:

1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S # 6: Technology Operations and Concepts].
2. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].

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PERFORMANCE STANDARDS:

1. Transfer current knowledge to learning of new technologies [NET-6d].
2. Use information provided in manuals, protocols, or by experienced people to see and understand how things work [STL-12h].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Transfer	Current knowledge
Learn	New technologies
Use	Information
Use	Manuals, protocols, experienced people
See and understand	How things work
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. How is cloud-based computing different from networked or standalone computers?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Cloud-based computing makes it possible to access information and do work almost anywhere?</p>	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Explain what they have learned or experienced about computers. • Explain and demonstrate how to properly use computers for schoolwork. • Create documents using information researched online. • research, understand and explain information in technical manuals and user guides as well as online services specializing in computers and their use. • Demonstrate the ability to ask professionals in the school or at various companies and information services about the functioning of computers. • Create a presentation about future ideas for technology and what they want to learn about technology. • Present their understanding of how the components in a computer system technically work. 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Inquire as to current knowledge base for students.
- Model proper computer use, systems operations and maintenance.
- Exhibited samples of exemplary models
- Demonstrate the various manuals available and how to utilize them properly.
- Guide students through research and interviewing skills for asking technical questions.
- Stimulate prior learning with class discussions

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Writing about existing knowledge/
- Performance assessment base on document output
- Student participation using rubric
- Quiz/Test

SUBJECT Computers & Robotics – Grade 7
TOPIC: Digital Citizenship - On-Line Safety, Internet Security and Cyber-Bullying
CONTENT STANDARDS: 1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship]. 2. Students will develop an understanding of the cultural, social, economic, and political effects of technology [ITEEA STL #4].

PERFORMANCE STANDARDS:
 1. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity [NETS-5b]. 2. Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences [STL-4e].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS:	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Exhibit	Positive attitude
Use	Technology
Support	Collaboration, learning and productivity
Scrutinize	Technology
Judge	Good or bad
Analyze	Desirable or undesirable consequences
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What behaviors place you at risk when using technologies and the Internet? 2. What is cyberbullying? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Guard and protect your private information. Always refrain from disparaging others on Internet. 2. Cyberbullying is the use of the Internet and related technologies to harm other people, in a deliberate, repeated, and hostile manner 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define appropriate computer behavior and non-bullying behavior • Recognize safe computing and ways to collaborate effectively • Summarize potential bad behavior when on the internet • Identify undesirable results from improper use of internet technology • Describe how to correct improper behavior and maintain good internet skills 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital citizenship.
- Model and practice proper digital behavior
- Stimulate prior learning with class discussions
- Video and web resources
- Demonstrate computer software
- Present examples of positive and negative use of information
- Present a variety of articles for students to learn of the impact of human, cultural, and societal issues relating to legal and ethical technological behavior

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Exhibit explaining responsible use of technology
- Observations of students using technology

SUBJECT:

Grade 7 Computers & Robotics

TOPIC:

Digital Citizenship - Digital Responsibility and Ethics

CONTENT STANDARDS:

1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship].
2. Students will develop an understanding of the cultural, social, economic, and political effects of

technology [ITEEA STL #4].

PERFORMANCE STANDARDS:

1. Advocate and practice safe, legal, and responsible use of information and technology [NETS-5a].
2. Demonstrate personal responsibility for lifelong learning [NETS-5c].
3. The development and use of technology poses ethical issues [STL-4f].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS:	
Skills - Be able to:	Concepts - Need to know about:
Advocate and Practice	Safe, legal, responsible use of information and technology
Demonstrate	Personal responsibility
Appreciate	Lifelong learning
Explain	Ethical use of technology
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is responsible and ethical use of technology? 2. What is Digital Citizenship? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Responsible and ethical users of computers and technology consider and follow rules of copyright, privacy, safety, and avoid piracy. 2. Good Digital Citizens are responsible technology users. 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define ethics • Define computer ethics • Define digital citizenship • Recognize and describe safe and ethical computing • List several ethical issues related to computers and the internet • Demonstrate how to use digital information in a safe and responsible manner • Use presentation software to explain digital citizenship practices 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital citizenship.
- Model and practice
- Stimulate prior learning with class discussions
- Present a variety of products and ask students to analyze their properties
- Present examples of positive and negative use of information
- Present a variety of articles for students to learn of the impact of human, cultural, and societal issues relating to legal and ethical technological behavior.
- Observations of students using technology

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Feedback from discussions
- Comments and reactions to videos and/or guest speakers

SUBJECT:

Grade 7: Computers & Robotics

TOPIC:

Research and Information Fluency - Internet Research & Digital Literacy

CONTENT STANDARDS:

1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency].
2. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving [ITEEA STL #10].

PERFORMANCE STANDARDS:

1. Plan strategies to guide inquiry [NETS-3a]
2. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media [NETS-3b].
3. Many technological problems require research and a multidisciplinary approach [STL-10].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Plan	Strategies
Guide	Inquiry
Locate	Information from a variety of sources and media
Organize	Information from a variety of sources and media
Analyze	Information from a variety of sources and media
Evaluate	Information from a variety of sources and media
Synthesize	Information from a variety of sources and media
Ethically use	Information from a variety of sources and media
Research	Technological problems
Apply	Multidisciplinary approach
Cite	textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. What methods can we use to conduct research?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. The best way to conduct research is to organize your ideas, locate information sources, analyze the data, synthesize the meaning, evaluate research results and present findings to others.</p>	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define research and digital literacy • Conduct research project • Explain acceptable research methods including source citing. • Describe how to OAES (organize, analyze, evaluate and synthesize) information. • Utilize and compare a variety media sources • Apply a multidisciplinary approach to technological problem solving. 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion on digital literacy through the importance of research
- Model and practice digital literacy
- Stimulate prior learning with class discussions
- Demonstrate computer software and internet
- Discuss how information relates to essential questions
- Lead a class discussion on selecting specific information in order to answer essential questions
- Lead a class discussion on organizing information from multiple sources
- Discuss refocusing inquiry based on findings
- Demonstrate how to choose relevant print, non-print, and electronic sources
- Model using keywords to locate information in print and non-print sources
- Lead a class discussion on the quality of the final product

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Completion of research project
- Student participation using rubric
- Proper formatting and citation
- Acquisition and use of vocabulary
- Appropriate visuals
- Quiz/test

SUBJECT:

Grade 7: Computers & Robotics

TOPIC:

**Research and Information Fluency –
Perspectives and Applications of Automation & Robotics**

CONTENT STANDARDS

1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency].
2. Students will develop the abilities to assess the impact of products and systems [ITEEA STL #13].

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PERFORMANCE STANDARDS:
<ol style="list-style-type: none"> 1. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks [NETS-3c]. 2. Process data and report results [NETS-3d]. 3. Interpret and evaluate the accuracy of the information obtained and determine if it is useful [STL-13i].
<p>Reading Standards for Literacy in Science and Technical Subjects 6-8</p> <p>Distinguish among facts, reasoned judgment based on research findings, and speculation in a text [Integration of Knowledge and Ideas # 8].</p> <p>Writing Standards for Literacy in Science and Technical Subjects 6-8</p> <p>Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].</p>

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Evaluate	Information sources and digital tools
Select	Information sources and digital tools
Evaluate	Appropriateness to specific tasks
Process	Data
Report	Results
Obtain	Information
Interpret	Accuracy of information

Evaluate	Accuracy of information
Determine	Usefulness
Distinguish in text	Facts, reasoned judgment based on research findings, and speculation
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

ESSENTIAL QUESTIONS - Teacher's guiding questions:

1. What is the history of automation & robotics?
2. How do you know that information on the Internet is true, accurate and even useful?

BIG IDEAS - Student's statements of enduring ideas:

1. Automation and robotics serve us in many ways and extend human capabilities.
2. Always look for credible sources, synthesize the difference between fact and opinion, verify the source of the information and be aware that information is sometimes meant to mislead.

<u>LEARNING OBJECTIVES</u> <i>The student will be able to:</i>
<ul style="list-style-type: none">• Provide examples of historical perspective of automation and robotics• Provide examples of societal impacts of automation and robotics• Use presentation software to explain automation and robotics• Determine possible sources• Select the best sources• Find information within sources• Extract relevant information
<u>INSTRUCTIONAL STRATEGIES</u> <i>Based on our department philosophy for student learning, teachers will:</i>
<ul style="list-style-type: none">• Facilitate a classroom discussion about digital literacy.• Model and practice• Demonstrate web evaluation criteria• Demonstrate web-search strategies• Lead a class discussion on selecting materials based on accuracy, detail, format, illustrations, special features, level of material and purpose• Guide the organization of information from multiple sources
<u>ASSESSMENTS / COMMON STUDENT EXPERIENCES</u> <i>Students will demonstrate mastery of the learning objectives through:</i>
<ul style="list-style-type: none">• Exhibit responsible use of technology• Student participation using rubric• Research activity checklist• Completion of research project• Proper formatting and citation• Acquisition and use of vocabulary• Appropriate visuals• Quiz/test

SUBJECT: Grade 7: Computers & Robotics
TOPIC: Communication and Collaboration - Presentation and Publication
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2: Communication and Collaboration].2. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study [ITEEA STL #3].3. Students will develop an understanding of and be able to select and use information and communication technologies [ITEEA STL #17].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media [NETS-2a].2. Technological systems often interact with one another [STL-3d].3. Communication technology is the transfer of messages among people and/or machines over distances through the use of technology [STL-17f].4. Information and communication technologies include the inputs, processes, and outputs associated with sending and receiving information [STL-17].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Interact	Peers, experts and others
Collaborate	Peers, experts and others
Publish	Digital media
Employ	Digital environments and media
Interact	Technological systems
Transfer	Messages over distances
Use	Technology
Input, process and output	Information
Send and receive	Information
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is collaboration? 2. How can you use technology to transfer messages over great distance? 3. When sending and receiving information, what are the input, process and output stages of the system used? <p>BIG IDEAS - <i>Student's</i> statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Collaboration is working together to complete a task or solve a problem. 2. Interacting with technological systems in the cloud can be done via laptop, handheld devices or standalone PCs. 3. The input stage is when the user enters data to a device, the process stage occurs either with the cloud saving environment or when utilizing other sites and the output can be either saving to the cloud site again or producing an end product (i.e. a report or other form of communication). 	

LEARNING OBJECTIVES

The student will be able to:

- Define collaboration
- Participate in and contribute to a collaborative project
- Define cloud computing and its advantages
- Compare the cloud to network and stand alone computing.
- Utilize cloud computing resources to create and store data and documents
- Utilize the cloud to collaborate with peers
- Explain and differentiate the various Input, Process and Output aspects of a cloud based transaction

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Stimulate prior learning with class discussions
- Facilitate a classroom discussion about collaboration
- Facilitate a classroom discussion about cloud computing
- Model and practice
- Demonstrate computer software and applications
- Develop projects and scenarios that foster collaboration
- Establish computer lab protocols for cloud-based computing

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Collaborative projects
- Proper creation and storage on cloud

SUBJECT: Grade 7: Computers & Robotics
TOPIC: Communication and Collaboration - Digital Imaging, Video Production and Animation
CONTENT STANDARDS <ol style="list-style-type: none">1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2: Communication and Collaboration].2. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study [ITEEA STL #3].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Communicate information and ideas effectively to multiple audiences using a variety of media and formats [NETS-2b].2. Contribute to project teams to produce original works or solve problems [NETS-2d].3. Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields [STL-3h].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts [Integration of Knowledge and Ideas # 7].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS:	
Skills - Be able to:	Concepts - Need to know about:
Communicate	Information and ideas
Reach	Multiple audiences
Use	Variety of media and formats
Contribute	Project teams
Produce	Original works
Solve	Problems
Share	Ideas, knowledge and skills
Innovate	Technology
Integrate charts, graphs, photographs, videos, or maps	Print and digital texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How can you reach multiple audiences with information and ideas you have compiled using a variety of media and formats? 2. How can you best contribute to a project team in order for your team to produce an original work or solve a problem? 3. How can innovation result from the sharing of ideas, knowledge and skill across and within fields of study? <p style="text-align: center;">BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Using digital video, various animation techniques, and presentations can be hosted on the Internet or social media for access to all. 2. I can best contribute to a Project Team by doing my fair share of research while utilizing the digital media available to me in an ethical fashion. 3. The benefit of sharing knowledge across platforms and fields of study allows all participants to bring their strongest skills to the group which can lead to innovation. 	

<u>LEARNING OBJECTIVES</u> <i>The student will be able to:</i>
<ul style="list-style-type: none">• Communicate ideas effectively to multiple audiences• Define various media and information formats• Contribute effectively to a Project Team work environment Share knowledge, skills and information to foster innovation within the group
<u>INSTRUCTIONAL STRATEGIES</u> <i>Based on our department philosophy for student learning, teachers will:</i>
<ul style="list-style-type: none">• Facilitate a classroom discussion about digital imagining, video production and animation.• Model and practice proper collaborative skills and cloud based learning• Stimulate prior learning with class discussions• Present a variety of digital images• Demonstrate computer software applications relevant to video production and animation• Create projects and activities that incorporate digital imagining and animation
<u>ASSESSMENTS / COMMON STUDENT EXPERIENCES</u> <i>Students will demonstrate mastery of the learning objectives through:</i>
<ul style="list-style-type: none">• Exhibiting responsible use of technology including video production equipment• Student participation using rubric• Projects• Proper file formats• Proper storage and output

SUBJECT: Grade 7: Computers & Robotics
TOPIC: Creativity and Innovation - CAD, 3D Modeling, App Design and Computer Programming
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].2. Students will develop an understanding of the attributes of design [ITEEA STL #8].3. Students will develop an understanding of engineering design [ITEEA STL #9].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Use models and simulations to explore complex systems and issues [NETS-1c].2. Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other [STL-8k].3. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions [STL-9h].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Use	Models and simulations
Explore	Complex systems and issues
Understand	Attributes of design
Understand	Engineering design
Explain	Design requirements
Model, test, evaluate and modify	Ideas, designs and products
Transform	Ideas into practical solutions
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS -Teacher’s guiding questions:</p> <ol style="list-style-type: none"> 1. How does modeling help you solve problems? 2. What are the attributes of design? 3. How can you transform ideas into a practical solutions? <p>BIG IDEAS - Student’s statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Modeling helps you visualize and test your ideas. 2. The design process includes 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, and communicating processes and results. 3. Design solutions require many possible ideas that are modified and tested. 	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define modeling and simulation • Explain the system approach to design • Explain aspects of the Engineering Design Process (EDP) • Explain how to compare criteria and constraints, create models and prototypes and test and evaluate design ideas • Exhibit methods for transforming an idea into a designed solution 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about the EDP
- Model and practice the various steps of the EDP through the lessons delivered
- Stimulate prior learning with class discussions
- Create projects and activities that engage students in engineering design
- Engage students in a reverse engineering activity
- Present a variety of products and ask students to analyze their properties
- Demonstrate computer software applications useful for design

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Student participation using rubric
- Engineering activities
- Design activity checklist
- Load testing (or other evaluation) of students projects
- Participation in collaborative engineering challenges
- Exhibition of drawings executed using design software

SUBJECT: Grade 7: Computers & Robotics
TOPIC: Creativity and Innovation - Lab Safety and Applications of Technology
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. [ISTE NET-S #1: Creativity and Innovation]2. Students will develop an understanding of the core concepts of technology [ITEEA STL #2].3. Students will develop the abilities to apply the design process [ITEEA STL #11].4. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].5. Students will develop an understanding of and be able to select and use manufacturing technologies [ITEEA STL #19].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Apply existing knowledge to generate new ideas, products, or processes [NETS-1a].2. Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time [STL-2h].3. Make a product or system and document the solution [STL-11].4. Select and safely use tools, products, and systems for specific tasks [STL-12e].5. Manufacturing systems use mechanical processes that change the form of materials through the processes of separating, forming, combining, and conditioning them [STL-19f].6. Manufacturing systems may be classified into types, such as customized production, batch production, and continuous production [STL-19o].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6]

UNWRAPPED PERFORMANCE STANDARDS

Skills - Be able to:	Concepts - Need to know about:
Apply	Knowledge
Generate	Ideas, products or processes
Use resources	Tools, machines, materials, information and people
Make	Product or system
Select and safely use	Tools, products and systems
Document	Results
Use	Mechanical (manufacturing) processes
Change and form	Materials
Separate, form , combine and condition	Materials
Classify	Manufacturing systems
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

ESSENTIAL QUESTIONS - Teacher's guiding questions:

1. What is manufacturing?
2. What methods and machines are used to transform materials into a useful product?
3. How do you know which tools or equipment to use for specific tasks? How do you use them appropriately and safely?

BIG IDEAS - Student's statements of enduring ideas:

1. Manufacturing uses tools and processes to change the form of materials into a finished product.
2. Mechanical processes can change material through separating, forming, combining and conditioning.
3. Tools and equipment can only be used safely with proper training.

LEARNING OBJECTIVES

The student will be able to:

- Define manufacturing
- Compare various manufacturing systems
- Describe different manufacturing modes
- Design products and select appropriate materials and resources
- Use tools and machines properly and safely
- Create products
- Document processes

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion on manufacturing.
- Model and practice
- Stimulate prior learning with class discussions
- Create activities that engage students in manufacturing systems and processes
- Supply and prepare appropriate material resources
- Maintain all tools and equipment

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Completion of models and prototypes
- Completion of products
- Safe utilization of tools and equipment in the manufacturing lab

SUBJECT:

Grade 7: Computers & Robotics

TOPIC:

**Critical Thinking, Problem Solving, and Decision Making -
NXT Programming, Control Systems and Processes**

CONTENT STANDARDS:

1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. [ISTE NET-S #1: Creativity and Innovation].
2. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources [ISTE NET-S #4: Critical Thinking, Problem Solving, and Decision Making].
3. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving [ITEEA STL #10].

PERFORMANCE STANDARDS:

1. Use models and simulations to explore complex systems and issues [NETS-1c].
2. Collect and analyze data to identify and/or make informed decisions [NETS-4c].
3. Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system [STL-10f].
4. Some technological problems are best solved through experimentation [STL-10h].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS

Skills - Be able to:	Concepts - Need to know about:
Use	Models and simulations
Collect and analyze	Data
Identify	Solutions
Make	Informed decisions
Explore	Complex systems and issues
Troubleshoot	Problems
Identify	Malfunctions in a technological system
Apply	Experimentation
Solve	Technological problems
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

ESSENTIAL QUESTIONS - Teacher's guiding questions:

1. How do we use computer simulations to help solve problems?
2. What steps are used to troubleshoot a problem?

BIG IDEAS - Student's statements of enduring ideas:

1. Computer simulations allow for the creation and testing of ideas and processes in a safe, inexpensive and creative virtual environment.
2. Troubleshooting involves identification of the problem, exploring possible solutions, and learning as you go.

LEARNING OBJECTIVES

The student will be able to:

- Utilize computer simulations to test ideas, create solutions and collect data
- Define troubleshoot and explain how it is used
- Identify the types of malfunctions one can expect when designing
- Explain how to correct these malfunctions
- Identify the best way to use experimentation when solving technological problems

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about Troubleshooting and computer simulation
- Model and practice how to identify malfunctions and correct them
- Stimulate prior learning with class discussions
- Engage students in design challenges
- Demonstrate computer software
- Create worksheets and handouts
- Update software as applicable

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Engagement with computer simulations
- Completion of an experimentation exercise to highlight malfunctions in a technological system

SUBJECT:

Grade 7: Computers & Robotics

TOPIC:
Critical Thinking, Problem Solving, and Decision Making - Simple Machines & Mechanical Systems

CONTENT STANDARDS:

1. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources [ISTE NET-S #4: Critical Thinking, Problem Solving, and Decision Making].
2. Students will develop an understanding of the core concepts of technology [ITEEA STL #2].
3. Students will develop an understanding of and be able to select and use energy and power technologies [ITEEA STL #16].

PERFORMANCE STANDARDS:

1. Use multiple processes and diverse perspectives to explore alternative solutions [NETS-4d].
4. Tools are used to design, make, use, and assess technology [STL-2i].
2. Energy can be used to do work, using many processes [STL-16f].
3. Energy cannot be created nor destroyed; however, it can be converted from one form to another [STL-16j].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Use	Multiple process and diverse perspectives
Explore	Alternative solutions
Use	Tools
Design, make and assess	Technology
Define	Energy and work
Use	Many processes
Convert	Energy from one form to another
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How do multiple processes and alternative solutions lead to good design? 2. What are simple machines and how do they work? 2. What are energy and work? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Good designs come from understanding the problem and trying multiple solutions. 2. Simple machines make it easier to do work (reducing the amount of effort). 3. Energy is a measurable force used to make someone or something perform a task that is work. 	

<u>LEARNING OBJECTIVES</u> <i>The student will be able to:</i>
<ul style="list-style-type: none">• Define processes and solutions that enable work to happen• Explain how tools design, make, use, and assess technology• Identify and describe a variety of ways to apply energy to the task of making• Explain how to convert energy to work
<u>INSTRUCTIONAL STRATEGIES</u> <i>Based on our department philosophy for student learning, teachers will:</i>
<ul style="list-style-type: none">• Model and practice the use of technological tools, multiple processes• Stimulate prior learning with class discussions• Facilitate a classroom discussion about solutions to various problems• Prepare materials and components• Create presentations• Design challenges and activities
<u>ASSESSMENTS / COMMON STUDENT EXPERIENCES</u> <i>Students will demonstrate mastery of the learning objectives through:</i>
<ul style="list-style-type: none">• Exhibit responsible use of technology and multiple processes to find a solution to a problem• Student participation using rubric• Building and testing a technology to successfully convert energy to work



**Bristol Public Schools
Office of Teaching & Learning**

DEPARTMENT: Middle School Engineering & Technology

COURSE: Grade 8 - Computers & Engineering

DEPARTMENT PHILOSOPHY:

Engineering and Technology in the Bristol Public Schools prepares students to use technology and appreciate its role and contribution in our society. Recognizing that students learn in different ways, technology teachers will employ a variety of instructional methods to facilitate student learning.

Engineering and Technology courses provide students with opportunities to discover and learn about a variety of contemporary technologies. As students explore these technologies, they learn to work independently and cooperatively toward a common goal, and to view technology from personal, societal, and career perspectives. Hands-on learning occurs in laboratory settings that employ methods of research and development, design, engineering, problem-solving, and material science.

Engineering and Technology courses employ computational thinking framework as an organizational strategy to deliver engineering and computer instruction. Students formulate problems, organize, analyze, and represent data, break down tasks into manageable parts, develop a series of ordered steps to achieve a desired outcome, and organize resources.

The Engineering and Technology Department utilizes standards from a wide range of disciplines, including ISTE, ITEEA, NSTA and CCSS. This promotes and encourages collaboration, critical thinking and creativity through interdisciplinary experiences.

Program Goals:

- Encourage students to pursue advanced technical study;
- Provide experiences for students to develop and demonstrate technological skills and knowledge;
- Employ instructional methods and interdisciplinary activities that stimulate student interest in technology;
- Emphasize the ethical and safe use of tools and technology;
- Engage students with real-world problem solving experiences.

Student Goals:

- Achieve skills and knowledge for success in post secondary technology programs;
- Become responsible, technologically literate citizens and consumers;
- Work cooperatively as a team member toward a common goal;
- Explore, understand and evaluate different aspects of technology;
- Competently use a variety of technologies, tools, materials and technical processes.

Course Description: Grade 8 - Computers & Engineering

Engineering shapes our world and helps meet the needs of individuals and society. Engineers use their knowledge of mathematics, science and art to provide practical solutions to technological problems. Students in the 8th grade Technology program will engage in a variety of activities that develop their understanding of engineering principles and concepts. The students will explore the role of engineers in our society and within the context of the design-problem solving process.

Participation in this course will expand the technological experiences of middle school students and actively engage them in hands-on engineering/problem-solving activities that lead to multiple solutions. Students will be challenged to utilize the design process as they engineer solutions to simulated and real-world problems. Students will employ the techniques of brainstorming, research and development, troubleshooting, invention, innovation, modeling, prototyping and testing.

Students will investigate a wide range of contemporary technologies and use a variety of laboratory equipment, including: computers, Computer Assisted Design (CAD), and design simulation software, to design construct, test, and evaluate prototypes and models. Students will share their ideas and communicate their design solutions through a variety of verbal, written, graphic and/or electronic means.

Throughout the design process, students will continuously apply their reading, writing, math and science skills. Students will be expected to use appropriate vocabulary and terminology in discussions with their teachers and classmates about their engineering design solutions.

Throughout their technology experiences, students will learn to select and apply tools, materials, and other technological resources as they solve problems and create design solutions. Greater attention will be focused on the use technological processes with strict adherence to accuracy and tolerances.

Planning for a future that will most certainly involve technology, students will review career opportunities in a variety of engineering and related technological fields. Opportunities for technological study in high school and college will also be explored. Laboratory activities will be executed in a team-oriented environment that encourages creative thinking.

Instructional topics for this **45 day** experience will include:

Computer Systems and Operations

- Computer Systems and Productivity Tools
- Cloud-Based Computer Applications

Bristol Public Schools

Digital Citizenship

- On-Line Safety, Internet Security and Cyber-Bullying
- Digital Responsibility and Ethics

Research and Information Fluency

- Information Fluency, Internet Research & Digital Literacy
- History, Applications, Design Fundamentals and Careers in Engineering

Communication and Collaboration

- Cloud-Based Computer Collaboration, Presentation and Publication
- Digital Imaging, Video Production and Animation

Creativity and Innovation

- CAD, 3D Modeling, App Design and Computer Programming
- EDP - Engineering Design Process, Design Criteria and Constraints
- Lab Safety, Manufacturing and Engineering Technology

Critical Thinking, Problem Solving, and Decision Making

- Architectural & Mechanical Design, Planning and Construction/Fabrication
- Testing, Data Collection, Analysis and Presentation

This curriculum references the following standards:

- **International Technology and Engineering Education Association - Standards for Technological Literacy (STL)**
- **International Society for Technology in Education - National Educational Technology Standards for Students (NET-S)**
- **Common Core State Standards for Literacy in Science and Technical Subjects (CCSS)**

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Computer Systems and Operations - Computer Systems and Productivity Tools
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S #6: Technology Operations and Concepts].2. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Troubleshoot systems and applications [NET-6c].2. Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it [STL-12m].3. Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision [STL-12n].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing-4].

UNWRAPPED PERFORMANCE STANDARDS:	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Troubleshoot	Applications
Diagnose	Systems
Use	Tools, materials, machines and knowledge
Repair	Systems
Troubleshoot, analyze and maintain	Systems
Ensure	Proper function and precision
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How are systems and application problems diagnosed? 2. How do we maintain systems to ensure proper function and operation? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Troubleshooting allows you to investigate problems 2. We can ensure proper function and precision by keeping tools and components in working order, and by running period diagnostic tests. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Explain troubleshooting • Describe how to diagnose problems with systems and applications • Explain the tools, machines and knowledge needed to diagnose a system • Describe how to analyze and troubleshoot • Describe how to properly maintain systems to avoid later troubleshooting and diagnosis 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Guide students through activity to diagnose and troubleshoot
- Discuss and demonstrate how to diagnose and analyze systems problems.
- Stimulate prior learning with class discussions
- Present a variety of situations that may need diagnosis and ask students to analyze their properties
- Engage students in web research to assist with troubleshooting
- Demonstrate how to run diagnosis scans using computer software

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Discussion of diagnosis and analysis related to system problems
- Participation in a team diagnosis project
- Tech Journal entries
- Written response
- Performance assessment
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line

SUBJECT:

Grade 8: Computers & Engineering

TOPIC:

Computer Systems and Operations - Cloud-Based Computer Applications

CONTENT STANDARDS:

1. Students demonstrate a sound understanding of technology concepts, systems, & operations [ISTE NET-S # 6: Technology Operations and Concepts].
2. Students will develop the abilities to use and maintain technological products and systems

[ITEEA STL #12].

PERFORMANCE STANDARDS:

1. Transfer current knowledge to learning of new technologies [NET-6d].
2. Use computers to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate [STL-12p].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS:	
Skills - Be able to:	Concepts - Need to know about:
Transfer	Current knowledge
Learn	New technologies
Use	Computers
Access	Data and information
Retrieve	Data and information
Organize	Data and information
Process	Data and information
Maintain	Data and information
Interpret	Data and information
Evaluate	Data and information
Communicate	Data and information
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. In what ways can computers help you to access, organize and process information?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Computers make it possible to create spreadsheets, charts, graphs, presentations and multimedia presentations, videos and more.</p>	

<u>LEARNING OBJECTIVES</u> <i>The student will be able to:</i>
<ul style="list-style-type: none">• Create presentation documents using computer skills• Create spreadsheets, databases and apply formatting techniques to modify page layouts and digital presentations• Use computers to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate
<u>INSTRUCTIONAL STRATEGIES</u> <i>Based on our department philosophy for student learning, teachers will:</i>
<ul style="list-style-type: none">• Demonstrate how students prior knowledge can be linked to aid in learning new information• Model proper techniques utilizing exhibits of exemplary models that show this link• Explain the differences between and among various computer software applications• Demonstrate the various features and commands needed to access, retrieve, organize, process, maintain, interpret, and evaluate data• Guide students through exercises designed to stimulate prior learning with class discussions
<u>ASSESSMENTS / COMMON STUDENT EXPERIENCES</u> <i>Students will demonstrate mastery of the learning objectives through:</i>
<ul style="list-style-type: none">• Identifying computer software• Written response• Performance assessment base on document output• Student participation using rubric• Quiz/Test

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Digital Citizenship - On-Line Safety, Internet Security and Cyber-Bullying
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship].2. Students will develop an understanding of the role of society in the development and use of technology [ITEEA STL #6].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Advocate and practice safe, legal, and responsible use of information and technology [NETS-5a].2. New technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies [STL-6d].3. Meeting societal expectations is the driving force behind the acceptance and use of products and systems [STL-6g].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS:	
Skills - Be able to:	Concepts - Need to know about:
Advocate and Practice	Safe, legal, responsible use of information/technology.
Examine	Demands, values and interests
Differentiate	Individual, business and societal interests
Identify	Societal expectations as driving force
Understand	Acceptance and use of products and systems
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS -Teacher's guiding questions:</p> <p>1. How do we use information technology safely, legally, and responsibly?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Avoid inappropriate websites, sexting and cyberbullying and protect your private information.</p>	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Advocate and practice safe, legal, and responsible use of information and technology • Identify the demands, values and interests of individuals, businesses and society as a whole that have led to the development of new technologies. • Define and explain the driving forces behind acceptance and use of products and. 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about safe and responsible computer and web use.
- Model and practice legal and responsible internet behavior
- Stimulate prior learning with class discussions
- Video and web resources
- Present examples of positive and negative use of information
- Present a variety of articles for students to learn of the demands, values and interests of individuals, businesses and society as a whole that have led to the development of new technologies.

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Exhibit explaining responsible use of technology
- Observations of students using technology

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Digital Citizenship - Digital Responsibility and Ethics
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior [ISTE NET-S # 5: Digital Citizenship].2. Students will develop an understanding of the cultural, social, economic, and political effects of technology [ITEEA STL #4].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Demonstrate personal responsibility for lifelong learning [NETS-5c].2. Exhibit leadership for digital citizenship [NETS-5d].3. Ethical considerations are important in the development, selection, and use of technologies [STL-4j].
Reading Standards for Literacy in Science and Technical Subjects 6-8
Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics [Craft and Structure # 4].
Writing Standards for Literacy in Science and Technical Subjects 6-8
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience [Production and Distribution of Writing # 4].

UNWRAPPED PERFORMANCE STANDARDS:	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Demonstrate	Personal responsibility.
Appreciate	Lifelong learning
Exhibit	Leadership
Demonstrate	Digital citizenship
Understand	Cultural, social, and political effect of technology
Consider	Ethical development, selection and use of technology
Determine	the meaning of symbols, key terms, and other domain-specific words and phrases
Use vocabulary	In specific and technical contexts
Produce	clear and coherent writing appropriate to task, purpose, and audience
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is responsible and ethical use of technology? 2. What is Digital Citizenship? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Responsible and ethical users of computers and technology consider and follow rules of copyright, privacy, safety, and avoid piracy. 2. Good Digital Citizens are responsible technology users. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define computer ethics as it pertains to digital citizenship • Recognize and describe safe and ethical computing • Recognize and describe lifelong learning • Demonstrate how to use digital information in a safe and responsible manner • Demonstrate how to ethically select and use technology 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about ethics.
- Model and practice
- Facilitate a classroom discussion about lifelong learning
- Observe students using technology ethically

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Poster/collage rubric
- Design activity checklist
- Student generated Time-Line
- Student participation using rubric
- Feedback from discussions
- Comments and reactions to videos and/or guest speakers

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Research and Information Fluency - Information Fluency, Internet Research and Digital Literacy
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency].2. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving [ITEEA STL #10]

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Plan strategies to guide inquiry [NETS-3a].2. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media [NETS-3b].3. Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace [STL-10i].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts -Need to know about:
Plan	Strategies
Guide	Inquiry
Locate	Information from a variety of sources and media
Organize	Information from a variety of sources and media
Analyze	Information from a variety of sources and media
Evaluate	Information from a variety of sources and media
Synthesize	Information from a variety of sources and media
Ethically use	Information from a variety of sources and media
Apply	Research and development
Research	Devices and systems for the marketplace
Cite	textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. What methods can we use to conduct research?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. The best way to conduct research is to organize your ideas, locate information sources, analyze the data, synthesize and evaluate your research results and then present findings to others.</p>	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Explain how they would do digital research • Conduct research project organize the best method for research and the best method for organizing data collected • Explain acceptable research methods including source citing. • Describe how to OAES (organize, analyze, evaluate and synthesize) information. • Utilize and compare a variety media sources • Explain the use and practice of research and development in various industries. 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion on digital literacy through the importance of research
- Model and practice ethical digital literacy
- Stimulate prior learning with class discussions
- Demonstrate computer software and internet
- Discuss how information relates to essential questions
- Lead a class discussion on the methods of research and development to be used in class
- Lead a class discussion on the quality of the final product

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Completion of research project
- Student participation using rubric
- Proper formatting and citation
- Acquisition and use of vocabulary
- Appropriate visuals
- Quiz/test

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Research and Information Fluency - Engineering Design Fundamentals
CONTENT STANDARDS: 1. Students apply digital tools to gather, evaluate, and use information [ISTE NET-S #3: Research and Information Fluency]. 2. Students will develop an understanding of engineering design [ITEEA STL #9].

PERFORMANCE STANDARDS:
 1. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks [NETS-3c]. 2. Process data and report results [NETS-3d]. 3. Established design principles are used to evaluate existing designs, to collect data, and to guide the design process [STL-9i]. 4. Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly [STL-9j].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text [Integration of Knowledge and Ideas # 8].
Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Evaluate	Information sources and digital tools
Select	Information sources and digital tools
Evaluate	Appropriateness to specific tasks
Process	Data
Report	Results
Use	Design principles
Evaluate	Designs
Collect	Data
Apply	Creativity and resourcefulness
Visualize and think	Abstract
Distinguish in text	Facts, reasoned judgment based on research findings, and speculation
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <p>1. What is engineering all about?</p> <p>BIG IDEAS - Student's statements of enduring ideas:</p> <p>1. Engineering involves identifying a problem, brainstorming ideas, developing solutions, testing and evaluating those potential ideas and sharing your solutions with others.</p>	
LEARNING OBJECTIVES	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Explain the use and value of digital research tools • Utilize web-search strategies • Use presentation software to explain a design idea • Process data and report results • Use Design Principles to collect data and present ideas • Explain the concept of an abstract idea as it pertains to design 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about digital literacy.
- Model and practice
- Demonstrate web evaluation criteria
- Demonstrate web-search strategies
- Lead a class discussion on selecting materials based on accuracy, detail, format, illustrations, special features, level of material and purpose
- Guide the organization of information from multiple sources

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology for digital research
- Student participation using rubric
- Research activity checklist
- Completion of research project
- Proper formatting and citation
- Acquisition and use of vocabulary
- Appropriate visuals
- Quiz/test

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Communication and Collaboration - Presentation and Publication
CONTENT STANDARDS: 1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2: Communication and Collaboration]. 2. Students will develop an understanding of and be able to select and use information and communication technologies [ITEEA STL #17].

PERFORMANCE STANDARDS:
 1. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media [NETS-2a]. 2. Communicate information and ideas effectively to multiple audiences using a variety of media and formats [NETS-2b]. 3. The design of a message is influenced by such factors as intended audience, medium, purpose, and the nature of the message [STL-17j]. 4. Information and communication systems can be used to inform, persuade, entertain, control, manage, and educate [STL-17n].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS:	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Interact	Peers, experts and others
Collaborate	Peers, experts and others
Publish	Digital media
Employ	Digital environments and media
Communicate	Information and ideas
Reach	Multiple audiences
Use	Variety of media and formats
Design	Messages
Elaborate on	Audience, medium, purpose, and nature of messages
Use information and communication systems to	Inform, persuade, entertain, control, manage and educate
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What factors should be considered when communicating a message? 2. How can we collaborate with others to exchange ideas and information? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. The audience, the medium used, the purpose of the message and the nature of the message all influence how the message is designed. 2. Cloud-based applications make collaboration possible using digital media and environment. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Define collaboration • Publish ideas and communicate information using multiple media • Explain the factors that influence message design • Utilize information and communication systems 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Stimulate prior learning with class discussions
- Facilitate a classroom discussion about message design and distribution
- Model and practice good communication skills
- Demonstrate computer software and applications
- Develop projects and scenarios that foster communication
- Establish computer lab protocols for computer use and communication of ideas

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Collaborative projects
- Proper creation of communication media

SUBJECT:

Grade 8: Computers & Engineering

TOPIC:

Communication and Collaboration - Digital Imaging, Video Production and Animation

CONTENT STANDARDS:

1. Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others [ISTE NET-S #2:

Communication and Collaboration].

2. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study [ITEEA STL #3].

PERFORMANCE STANDARDS:

1. Communicate information and ideas effectively to multiple audiences using a variety of media and formats [NETS-2b].
2. Contribute to project teams to produce original works or solve problems [NETS-2d].
3. Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli [STL-17q].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts [Integration of Knowledge and Ideas # 7].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Communicate	Information and ideas
Reach	Multiple audiences
Use	Variety of media and formats
Contribute	Project teams
Produce	Original works
Solve	Problems
Communicate	Technological knowledge and processes
Use	Symbols, measurement, conventions, icons, graphic images, and language
Incorporate	Variety of visual, auditory and tactile stimuli
Integrate charts, graphs, photographs, videos, or maps	Print and digital texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. How can you communicate with multiple audiences? 2. How do you contribute to a project team to produce an original project? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Using different types of media in many formats helps you communicate with multiple audiences. 2. In a successful team, all members contribute. 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • Utilize a variety of computer software applications to communicate ideas and information • Reach multiple audiences through a variety of media and formats • Participate actively in project team collaborations • Use symbols, measurement, conventions, icons, graphic images and specific language while incorporating a variety of visual, auditory and tactile stimuli. • 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about communication and collaboration.
- Model and practice
- Stimulate prior learning with class discussions
- Present a variety of digital examples
- Demonstrate computer software applications
- Create projects and activities

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Projects
- Proper file formats
- Proper storage and output

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Creativity and Innovation - CAD, 3D Modeling, App Design and Computer Programming
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].2. Students will develop an understanding of the attributes of design [ITEEA STL #8].3. Students will develop an understanding of engineering design [ITEEA STL #9].

PERFORMANCE STANDARDS:
<ol style="list-style-type: none">1. Use models and simulations to explore complex systems and issues [NETS-1c].2. The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved [STL-8j].3. Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum [STL-9g].4. A prototype is a working model used to test a design concept by making actual observations and necessary adjustments [STL-9k].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS:	
<u>Skills</u> - Be able to:	<u>Concepts</u> - Need to know about:
Use	Models and simulations
Explore	Complex systems and issues
Check and critique	Designs
Refine and improve	Ideas
Brainstorm	Solutions
Present	Ideas in an open forum
Create	Prototypes and working models
Test	Design concepts
Make	Observations and adjustments
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What are the benefits of using models and simulations? 2. What is the role brainstorming in the design process? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. Models and simulations help you visualize solutions and possible designs in a safe and inexpensive manner. 2. Brainstorming stimulates the flow of ideas in a nonjudgmental process 	
<u>LEARNING OBJECTIVES</u>	
<i>The student will be able to:</i>	
<ul style="list-style-type: none"> • List the steps in the Engineering Design Process (EDP) • Successfully check and redesign • Brainstorm effectively • Create models and prototypes • Test and evaluate design ideas • Refine products and solutions • Define innovation • Write computer programs 	

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about models and prototypes.
- Model and practice brainstorming and testing and evaluating
- Stimulate prior learning with class discussions
- Create projects and activities that engage students in brainstorming group work
- Demonstrate computer software applications

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Student participation using rubric
- Design process brainstorming activities
- Design activity checklist
- Fabrication of models and prototypes

SUBJECT:

Grade 8: Computers & Engineering

TOPIC:

Creativity and Innovation - Lab Safety and Applications of Technology

CONTENT STANDARDS:

1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].
2. Students will develop an understanding of the core concepts of technology [ITEEA STL #2].
3. Students will develop the abilities to apply the design process [ITEEA STL #11].
4. Students will develop the abilities to use and maintain technological products and systems [ITEEA STL #12].
5. Students will develop an understanding of and be able to select and use transportation technologies [ITEEA STL #18].

PERFORMANCE STANDARDS:

1. Apply existing knowledge to generate new ideas, products, or processes [NETS-1a].
2. Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing [STL-2k].
3. Make a product or system and document the solution [STL-11i].
4. Select and safely use tools, products, and systems for specific tasks [STL-12e].
5. The use of transportation allows people and goods to be moved from place to place [STL-18d].
6. Transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control, and support, that must function together for a system to work effectively [STL-18g].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS

Skills - Be able to:	Concepts - Need to know about:
Apply	Knowledge
Generate	Ideas, products or processes
Use	Tools and machines
Extend	Human capabilities
Hold, lift, carry, fasten, separate and compute	Materials
Make	Product or system
Document	Solution
Select and safely use	Tools, products and systems
Use	Transportation systems
Move	Goods and people
Define	Transportation systems and subsystems
Explain	Structural propulsion, suspension, guidance, control, and support
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

ESSENTIAL QUESTIONS - Teacher's guiding questions:

1. How do you operate tools and equipment safely?
2. In what ways does Technology help meet human needs?

BIG IDEAS - Student's statements of enduring ideas:

1. Following safety rules and guidelines for equipment and machinery keep me safe from injury.
2. Technology extends human capabilities

LEARNING OBJECTIVES

The student will be able to:

- Describe different transportation modes
- Design products and define manufacturing
- Select appropriate materials and resources
- Use tools and machines properly and safely
- Create products
- Document processes
- Define transportation
- Compare various transportation systems

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion regarding transportation and manufacturing.
- Model and practice
- Stimulate prior learning with class discussions
- Create activities that engage students in transportation and manufacturing
- Supply and prepare appropriate material resources
- Demonstrate the safe use and applications of all tools and equipment
- Maintain all tools and equipment

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Completion of models and prototypes
- Completion of products and vehicles
- Select and use appropriate material resources
- Demonstrate the safe use and applications of all tools and equipment
- Assist classmates and the teacher with maintaining all tools and equipment

SUBJECT: Grade 8: Computers & Engineering
TOPIC: Critical Thinking, Problem Solving, and Decision Making - Engineering Design Process
CONTENT STANDARDS: <ol style="list-style-type: none">1. Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology [ISTE NET-S #1: Creativity and Innovation].2. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources [ISTE NET-S #4: Critical Thinking, Problem Solving, and Decision Making].3. Students will develop an understanding of engineering design [ITEEA STL #9].

PERFORMANCE STANDARDS;
<ol style="list-style-type: none">1. Use models and simulations to explore complex systems and issues [NETS-1c].2. Identify and define authentic problems and significant questions for investigation [NETS-4a].3. Expressing ideas to others verbally and through sketches and models is an important part of the design process [STL-9b].4. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions [STL-9h].
Reading Standards for Literacy in Science and Technical Subjects 6-8 Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1]. Writing Standards for Literacy in Science and Technical Subjects 6-8 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS:	
Skills - Be able to:	Concepts - Need to know about:
Use	Models and simulations
Explore	Complex systems and issues
Identify and define	Authentic problems and significant questions
Express	Ideas verbally
Create	Sketches and models
Model, test, evaluate and modify	Ideas and solutions
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas

<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What is the Engineering Design Process? 2. What tools and resources are used when solving design problems? <p style="text-align: center;">BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. The design process includes 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, and communicating processes and results. 2. Sketching, modeling, prototyping, CAD software, Internet recourses are useful when developing solutions to problems.

LEARNING OBJECTIVES

The student will be able to:

- Utilize computer simulations to test ideas, create solutions and collect data
- Define CAD and use a variety of CAD software applications
- Create detailed CAD drawings and designs, generate graphic and print output of CAD designs and Create 3-D models of objects and products.
- Identify and define authentic problems and significant questions for investigation.
- Express ideas to others verbally and through sketches and models
- Model, test, evaluate and modify ideas into practical solutions

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Facilitate a classroom discussion about CAD, modeling and testing and evaluating.
- Model and practice
- Stimulate prior learning with class discussions
- Engage students in design challenges
- Demonstrate computer software
- Create worksheets and handouts
- Update software as applicable

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Engagement with computer simulations
- Completion of CAD assignments
- Completion of 3-D modeling assignments
- Proper storage and retrieval of files
- Proper output

SUBJECT:

Grade 8: Computers & Engineering

TOPIC:

Critical Thinking, Problem Solving, and Decision Making - Architectural Planning and Design

CONTENT STANDARDS:

1. Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources [ISTE NET-S #4: Communication and Collaboration].
2. Students will develop an understanding of the core concepts of technology [ITEEA STL #2].
3. Students will develop an understanding of and be able to select and use construction technologies [ITEEA STL #20].

PERFORMANCE STANDARDS:

1. Use multiple processes and diverse perspectives to explore alternative solutions [NETS-4d].
2. Systems thinking involves considering how every part relates to others [STL-2n].
3. The selection of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function [STL-20f].
4. Infrastructure is the underlying base or basic framework of a system [STL-20j].

Reading Standards for Literacy in Science and Technical Subjects 6-8

Cite specific textual evidence to support analysis of science and technical texts [Key Ideas and Details # 1].

Writing Standards for Literacy in Science and Technical Subjects 6-8

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently [Production and Distribution of Writing # 6].

UNWRAPPED PERFORMANCE STANDARDS	
Skills - Be able to:	Concepts - Need to know about:
Use	Multiple processes and diverse perspectives
Consider	Relationships of parts
Apply	Systems thinking
Design	Structures
Consider	Building laws and codes, style, convenience, cost, climate, and function
Define	Infrastructure
Describe	Underlying base or basic framework of a system
Cite	Textual evidence
Support	Analysis of science and technical texts
Use technology and the Internet to produce, publish and present clearly and efficiently	The relationships between information and ideas
<p>ESSENTIAL QUESTIONS - Teacher's guiding questions:</p> <ol style="list-style-type: none"> 1. What considerations need to be made when designing a structure? 2. What is the purpose of technological system? <p>BIG IDEAS - Student's statements of enduring ideas:</p> <ol style="list-style-type: none"> 1. When designing a structure, building laws and codes, style, convenience, cost, climate, and function must be considered. 2. Systems have parts or components that work together to accomplish a goal. 	

LEARNING OBJECTIVES

The student will be able to:

- Explore alternative solutions using multiple and diverse perspectives
- Understand how a system works
- Understand the relationships of parts of a system
- Explain and differentiate factors affecting the design of structure
- Define and explain the impact of infrastructure on a system

INSTRUCTIONAL STRATEGIES

Based on our department philosophy for student learning, teachers will:

- Model and practice utilizing multiple perspectives of an issue
- Stimulate prior learning with class discussions
- Facilitate a classroom discussion about structures and infrastructure
- Prepare materials and components
- Create presentations
- Design challenges and activities

ASSESSMENTS / COMMON STUDENT EXPERIENCES

Students will demonstrate mastery of the learning objectives through:

- Exhibit responsible use of technology
- Student participation using rubric
- Building and testing a variety of machines using design principles and diverse perspectives
- Building a structure or structural model
- Reporting on the effects of infrastructure on design