Maryland State STEM Standards of Practice Framework Grades 6-12

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Maryland State Department of Education

Preparing World-Class Students

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STEM Education

STEM education is an approach to teaching and learning that integrates the content and skills of science, technology, engineering, and mathematics. STEM Standards of Practice guide STEM instruction by defining the combination of behaviors, integrated with STEM content, which are expected of a proficient STEM student. These behaviors include engagement in inquiry, logical reasoning, collaboration, and investigation. The goal of STEM education is to prepare students for post-secondary study and the 21st century workforce.

STEM education removes the artificial barriers that isolate content and allows for an integrated instructional approach. The curriculum allows students to develop life skills and apply content knowledge within a real world context. STEM education is active and focuses on a student-centered learning environment. Students engage in questioning, problem solving, collaboration, and hands-on activities while they address real life issues. In STEM education, teachers function as classroom facilitators. They guide students through the problem-solving process and plan projects that lead to mastery of content and STEM proficiency. STEM proficient students are able to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems while applying the rigor of science, technology, engineering, and mathematics content in a seamless fashion. STEM proficient students are logical thinkers, effective communicators and are technologically, scientifically, and mathematically literate.

STEM Education Pipeline

Elementary School

The development of STEM proficient students begins in elementary schools. In the elementary grades, students apply the rigor of science, technology, engineering, and mathematics content and the STEM Standards of Practice while engaged in learning activities that investigate the natural world. Students explore technology and engineering solutions and appropriately apply the concepts of mathematics in order to understand and address real life issues and solve problems or challenges. As students progress through elementary school they will begin to independently integrate the STEM Standards of Practice. They will understand how to apply the roles and views of STEM career professionals and analyze real world STEM issues, problems, or challenges as they incorporate STEM content, skills, and practices and other disciplines such as social studies, performing arts, health, and creative movement.

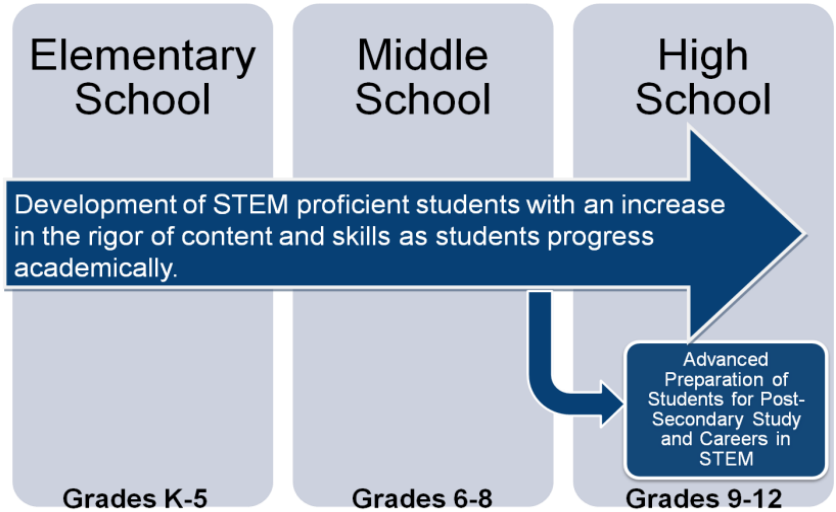
Middle School

STEM education in middle school builds upon the foundational skills developed by students throughout elementary school. STEM essential skills and knowledge are further developed through guided instruction by the middle school teacher. Teachers facilitate learning activities that intentionally allow for middle school students to analyze and integrate content from science, technology, engineering, and mathematics to investigate global issues, answer complex questions, and develop solutions for challenges and real world problems. Middle school students will ask relevant questions, conduct research, refine questions based on research, and develop new questions that are relevant to understanding problems, global issues, or challenges. Teachers will also facilitate learning activities that allow middle school students to refine critical thinking skills by applying scientific investigation and the engineering design process. By the end of eighth grade, students will be able to independently synthesize multi-disciplinary content to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems.

High School

There are two goals for STEM education in high school. The first goal is on the development of STEM proficient students. All students will continue to grow in their STEM proficiency as they progress from grades 9-12. Students demonstrate independence and become more focused and sophisticated in their approach to answering complex questions, investigating global issues, and developing solutions for challenges and real world problems. STEM proficient students graduate with the basic skills and knowledge required to pursue post-secondary study or work in any field.

The second goal for STEM education in high school is on the advanced preparation of students for post-secondary study and careers in science, technology, engineering, or mathematics. High school provides a unique opportunity for students to explore different career paths and college majors through advanced coursework, career academies, magnet programs, STEM academies, specialized STEM programs, internships, and dual enrollment opportunities. Specific programs to address the needs for advanced preparation of students shall be determine by individual schools systems.



Overview:

In September 2008, Governor Martin O'Malley convened a P-20 STEM Task Force to discuss the state of STEM education in Maryland. As a result of the task force work, specific recommendations were made aimed at establishing Maryland as a global leader in the development of its workforce of the future, STEM-based research, and economic development infrastructure. The task force's recommendations were included in Maryland's application for a Race to the Top Grant. The grant describes twelve STEM-related projects, including developing STEM-based curriculum. The curriculum development process began in 2011 when Maryland State Department of Education staff specialists joined with stakeholders from across the state to define STEM education and develop STEM Standards of Practice. A total of 961 stakeholders reviewed and provided input on the STEM Standards of Practice via an on-line survey and face-to-face meetings. Stakeholders included representatives from all 24 Maryland local school systems, businesses and governmental agencies, colleges and universities, and other members of the community. In April 2012, the Maryland State Board of Education accepted the Maryland State STEM education definition and STEM Standards of Practice.

The development of the Maryland State STEM Standards of Practice Frameworks began in 2012 when the Office of STEM Initiatives convened multidisciplinary design teams. Design teams consisted of Maryland educators representing grades K-12 and higher education. The design teams identified what students should know and do to demonstrate proficiency with each STEM Standard of Practice by the end of grades K, 2, 5, 8, and 12. The Maryland State Department of Education staff and other stakeholders reviewed and refined the work of the design team. This document represents the culminating work of the design team and other stakeholders in identifying the essential skills and knowledge of STEM proficient students.

The purpose for the Maryland State STEM Standards of Practice Frameworks is to lay a foundation of STEM Education for all students. The Frameworks provide teachers and students a consistent approach to implementing STEM education and will provide guidance for teachers as they develop STEM centric units or lessons that focus on answering complex questions, investigating global issues, and developing solutions for challenges and real world problems.

How to Read the Frameworks

The Maryland State STEM Standards of Practice Framework Grades 6-12 is written for grade bands 6-8 and 9-12. The Framework is comprised of seven practices. Below each Practice title is a STEM proficient student statement explaining what a STEM proficient student will demonstrate to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems. Each STEM Standard of Practice list two or more student proficiencies, which are represented with uppercase letters (e.g.: A, B). A student proficiency statement is the behavior students are to demonstrate while engaged in STEM tasks. The essential skills and knowledge are in a bulleted form below each student proficiency. The essential skills and knowledge are not inclusive of all skills and knowledge students may demonstrate while engaging in STEM activities or tasks rather they are possible scaffolds students can employ.

Formatting Notes:

Black Print – Essential skills and knowledge identified by Maryland educators. These statements are intended to help teachers develop common understanding and valuable insights into what a student must know and be able to do to demonstrate proficiency with each STEM Standard of Practice.

Blue Print - Glossary terms

Purple Print – Essential skills and knowledge from other Maryland State Curriculum Standards

Abbreviations:

The Maryland State STEM Standards of Practice Framework Grades 6-12 integrates essential skills and knowledge from different Maryland curriculum standards. Throughout the Framework you will see references such as CCSS W.11-12.7 (read “Common Core State Standards Writing, Grades 11-12, Standard 7). A complete list of abbreviations for this document is in Appendix A.

Appendices A, B, & C

Appendix A contains a list of abbreviations used in the document. Appendix B is the glossary and Appendix C is a list of references used for the glossary.

Implementation of the Maryland State STEM Standards of Practice Frameworks

The Maryland State STEM Standards of Practice cross all grade levels and disciplines. Instruction in STEM education is a shared responsibility within a school. Therefore, all classroom teachers, supporting teaching staff, and special area teachers (e.g.: special education, gifted and talented, enrichment programs, afterschool programs, summer programs) can use the Maryland State STEM Standards of Practice Frameworks to engage students in STEM activities and tasks that develop STEM proficiency. Students should be given the opportunity to practice the essential skills and knowledge described while learning content. Implementation could occur through projects/themes that span multiple disciplines or through appropriate content-based infusion.

Limitations of the Frameworks

1. The Maryland State STEM Standards of Practice Framework sets the foundation for curriculum development by identifying process standards that are designed to be used with content standards.
2. The Maryland State STEM Standards of Practice are holistic in nature and have equal importance towards the development of STEM proficient students. The Framework is not intended to convey a hierarchical or sequential order for essential skills and knowledge, proficiencies, or standards.
3. The Maryland State STEM Standards of Practice Framework are written in grade bands to give school systems flexibility in the incorporation of STEM Standards of Practice in various content areas. Teachers should promote the development of the essential skills and knowledge over the course of grades K-5, 6-8, and 9-12.
4. The Maryland State STEM Standards of Practice Framework is a curriculum guide for educators. Teachers will need to plan accommodations, interventions, or enrichments required for special need students, English language learners, or gifted and talented students. Individual school systems can determine the appropriate modifications to meet the needs of their diverse populations.

Maryland State STEM Standards of Practice

1. Learn and Apply Rigorous Science, Technology, Engineering, and Mathematics Content

STEM proficient students will learn and apply rigorous content within science, technology, engineering, and mathematics disciplines to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Demonstrate an understanding of science, technology, engineering, and mathematics content.

B. Apply science, technology, engineering, or mathematics content to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

2. Integrate Science, Technology, Engineering, and Mathematics Content

STEM proficient students will integrate content from science, technology, engineering, and mathematics disciplines as appropriate to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Analyze interdisciplinary connections that exist within science, technology, engineering, and mathematics disciplines and other disciplines.

B. Apply integrated science, technology, engineering, mathematics content, and other content as appropriate to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

3. Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify, analyze, and synthesize appropriate science, technology, engineering, and mathematics information (text, visual, audio, etc.).
B. Apply appropriate domain-specific vocabulary when communicating science, technology, engineering, and mathematics content.
C. Engage in critical reading and writing of technical information.
D. Evaluate and integrate multiple sources of information (e.g.: quantitative data, video and multimedia) presented in diverse formats.
E. Develop an evidence-based opinion or argument.
F. Communicate effectively and precisely with others.

4. Engage in Inquiry

STEM proficient students will engage in inquiry to investigate global issues, challenges, and real world problems.

A. Ask questions to identify and define global issues, challenges, and real world problems.
B. Conduct research to refine questions and develop new questions.

5. Engage in Logical Reasoning

STEM proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Engage in critical thinking.
B. Evaluate, select, and apply appropriate systematic approaches (scientific and engineering practices, engineering design process, and/or mathematical practices).
C. Apply science, technology, engineering, and mathematics content to construct creative and innovative ideas.
D. Analyze the impact of global issues and real world problems at the local, state, national, and international levels.

6. Collaborate as a STEM team

STEM proficient students will collaborate as a STEM team to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify, analyze, and perform a STEM specific subject matter expert role.
B. Share ideas and work effectively with a STEM focused multidisciplinary team to achieve a common goal.
C. Listen and be receptive to ideas of others.
D. Analyze career opportunities that exist in a variety of STEM fields relevant to the STEM focused multidisciplinary team's goal.

7. Apply Technology Strategically

STEM proficient students will apply technology appropriately to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify and understand technologies needed to develop solutions to problems or construct answers to complex questions.
B. Analyze the limits, risks, and impacts of technology.
C. Engage in responsible/ethical use of technology.
D. Improve or create new technologies that extend human capability.

STEM Standard of Practice 1: **Learn and Apply Rigorous Science, Technology, Engineering, and Mathematics Content**

STEM proficient students will learn and apply rigorous content within science, technology, engineering, and mathematics disciplines to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Demonstrate an understanding of science, technology, engineering, and mathematics content

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Interpret, explain, and summarize concepts presented in science, technology, engineering, and mathematics courses (see *science, mathematics, engineering, and technology standards*). • Describe how scientific, technological, engineering, and mathematics concepts apply to real world situations. • Construct new knowledge from prior knowledge.	• Interpret, explain, and summarize concepts presented in science, technology, engineering, and mathematics courses (see *science, mathematics, engineering, and technology standards*). • Describe how scientific, technological, engineering, and mathematics concepts apply to real world situations. • Construct new knowledge from prior knowledge. • Perform proficiently on learning activities and assessments.

STEM Standard of Practice 1: **Learn and Apply Rigorous Science, Technology, Engineering, and Mathematics Content**

STEM proficient students will learn and apply rigorous content within science, technology, engineering, and mathematics disciplines to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Apply science, technology, engineering, or mathematics content to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Employ higher order thinking skills in the application of content knowledge. • Identify and understand science, technology, engineering, or mathematics content needed to develop answers to complex questions, investigate global issues, or develop solutions to real world problems. • Examine ways science, technology, engineering, or mathematics content knowledge is used to extend human potential.	• Identify and understand science, technology, engineering, or mathematics content needed to develop answers to complex questions, investigate global issues, or develop solutions to real world problems. • Employ higher order thinking skills in the application of content knowledge. • Apply science, technology, engineering, or mathematics content to discuss the ethical implications and responsibilities in our society. • Connect the most recent science, technology, engineering, or mathematics content with efforts to extend human potential.

STEM Standard of Practice 2: **Integrate Science, Technology, Engineering, and Mathematics Content**

STEM proficient students will integrate content from Science, Technology, Engineering, and Mathematics disciplines as appropriate to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Analyze interdisciplinary connections that exist within science, technology, engineering, and mathematics disciplines and other disciplines.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify the science, technology, engineering, and mathematics content required to answer complex questions, investigate global issues, and develop solutions for challenges and real world problem • Use graphic organizers (e.g. KWL models, concept maps) to evaluate the interdisciplinary connections between multiple contents required to answer complex questions, develop solutions for real world problems, or investigate global issues. • Draw conclusions between prior knowledge in multiple contents (e.g., ELA, Social Studies, Visual Arts, Physical Education) and the science, mathematics, technology, and engineering related to a complex question, real world problem, or global issue.	• Examine the content and skills from subject-specific disciplines (e.g.: chemistry, government, algebra I) required to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems. • Evaluate the relationships among subject-specific disciplines represented in complex questions, global issues, or real world problems. • Justify the use of content and skills from subject-specific disciplines when answering complex questions, investigating global issues, and developing solutions for challenges and real world problems.

STEM Standard of Practice 2: **Integrate Science, Technology, Engineering, and Mathematics Content**

STEM proficient students will integrate content from Science, Technology, Engineering, and Mathematics disciplines as appropriate to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Apply integrated science, technology, engineering, mathematics content, and other content as appropriate to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Synthesize and employ content knowledge from science, technology, engineering, mathematics, and other disciplines necessary to generate resolutions to global issues, solutions to real world problems, and/or answers to complex questions. • Evaluate whether the appropriate disciplines were applied in addressing the global issue, real world problem, or complex question.	• Synthesize and employ content knowledge from science, technology, engineering, mathematics, and other disciplines necessary to generate resolutions to global issues, solutions to real world problems, and/or answers to complex questions. • Adapt or extend concepts from science, technology, engineering, mathematics, and other disciplines to formulate creative answers or solutions to complex questions and real world problems. • Evaluate whether the appropriate disciplines were applied in addressing the global issue, real world problem, or complex question.

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify, analyze, and synthesize appropriate science, technology, engineering, and mathematics information (text, visual, audio, etc.).

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify and select the necessary information from science, technology, engineering, and mathematics to answer a complex question, investigate a global issue, or develop solutions to real world problems. • Paraphrase to state or compose an unbiased summary that includes a central idea and tracks its development throughout a range of diverse science, technology, engineering, and mathematical sources related to the exploration of a complex question, real world problem, or global issue (*See CCSS RI.6-8.2*). • Create new understandings from a range of diverse science, technology, engineering, and mathematics sources related to the exploration of a complex question, real world problem, or global issue.	• Examine and select information from science, technology, engineering, and mathematics sources required to answer complex questions, investigate global issues, or develop solutions for challenges and real world problems. • Evaluate selected information for reliability, bias, currency, validity, and accuracy. • Interpret recorded data/information to create new understandings, and knowledge (*CCSS W.11-12.7*). • Synthesize gathered information from a range of diverse science, technology, engineering, and mathematics sources to form a coherent understanding of complex questions, global issues, challenges, or real world problems.

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Apply appropriate domain-specific vocabulary when communicating science, technology, engineering, and mathematics content.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify and define domain-specific vocabulary related to a complex question, global issue, challenge or real world problem. • Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in specific scientific or technical contexts (CCSS RST.6-8.4). • Select and use the appropriate domain-specific vocabulary when communicating to a particular audience. (e.g.: use of technical language, mathematical symbols) • Use appropriate academic or domain-specific words when drawing inferences from a range of science, technology, engineering, and mathematics content. (adapted from *CCSS RI1. 8.1*)	• Distinguish between academic vocabulary and domain-specific vocabulary. • Define and explain domain-specific vocabulary represented in print, non-print, and digital sources. • Analyze the meaning, use, and effect of domain-specific vocabulary, phrases, and symbols represented in print, non-print, and digital sources (adapted from *CCSS RST.11-12.4*). • Apply a wide range of domain-specific vocabulary to precisely communicate information to technical audiences.

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

C. Engage in critical reading and writing of technical information.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Demonstrate comprehension of STEM related text related to answering a complex question, investigating a global issue, or developing solutions to real world problem. (e.g.: explain the central ideas, drawing inferences, drawing conclusions, verifying or adjusting predictions, make new predictions, paraphrasing and summarizing) (adapted from *CCSS RI.6-8.1*). • Among multiple pieces of evidence determine, select, and state the piece of evidence that confirms the meaning of technical information (adapted from *CCSS RI.6-8.1*). • Use an objective tone and clarity of information when composing technical writings. • Compose technical writings (e.g.: include graphics, block style paragraphs, precise-informative headings, numbering for sequential texts, and bullets to identify options) that include evidence, appropriate vocabulary and structure applicable for the identified purpose and audience. • Apply the revision and editing stages of the writing process with an aim to eliminate vague language and repetition (e.g.: reduce phrases and overworked modifiers like "really" and "very") (adapted from *CCSS W.6-8.1.e*).	• Demonstrate the behaviors of a strategic reader (*CCSS RI.11-12.1*). • Evaluate available evidence for thoroughness, completeness, and relevance (*CCSS RI.11-12.1*). • Summarize a text by including the appropriate key ideas, issues, and specific details (*CCSS RI.11-12.2*). • Draw evidence from informational and technical texts to support analysis, reflection, and research. • Attend to audience knowledge, interest, and concerns when writing technical information (adapted from *CCSS W.11-12.1b*). • Create models (e.g.: replicas, computer simulations, diagrams), technical drawings, and/or graphical images to communicate technical information. • Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience (*CCSS WHST.11-12.4*).

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

D. Evaluate and integrate multiple sources of information (e.g.: quantitative data, video, multimedia).

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify the components of multiple diverse (print, non-print, digital, etc.) STEM sources of information (references) to include: Author, Date of Publication, Edition/Revision, Publisher, intended audience, objective tone, primary or secondary source, and validation by other reliable sources. • Summarize, compare, draw conclusions about, and synthesize significant ideas found in print and non-print texts, including digital media (*CCSS RI.6-7.2*). • Assess the value of one medium versus another for the presentation of a specific topic related to the exploration of a complex question, global issue, or real world problem (adapted from *CCSS RI.8.7*). • Organize and use informational sources from diverse media and formats to help answer complex questions, develop solutions for real world problems, or investigate global issues (adapted from *CCSS RI.6-8.7*).	• Identify and analyze print, non-print, and digital sources for explicit details that are necessary for addressing a question, investigating a global issue, or solving a problem. • Compare, draw conclusions, and connect significant details and ideas between and among different media formats (*CCSS RST.11-12.7*). • Evaluate selected information for reliability, bias, currency, validity, and accuracy. • Synthesize gathered information to form coherent understanding of a question, issue, challenge, or problem.

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

E. Develop an evidence-based opinion or argument.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Introduce claim(s) about topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically (*CCSS WHST.6-8.1a*). • Support claims(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources (*CCSS WHST.6-8.1b*). • Use words, phrases, and clauses to clarify the relationships between claims, counterclaims, and reasons from a range of diverse science, technology, engineering, and mathematical sources related to the exploration of a complex question, real world problem, or global issue (adapted from *CCSS RI.7-8.6*). • Identify ambiguous claims or arguments related to a complex question or real world problem. • Design and use a decision analysis model (e.g.: decision matrices, decision trees, SWOT, Pareto chart) to identify, clearly represent, and formally assess important aspects of an evidence based opinion or argument. • Cite specific data and sources to support an evidence-based opinion.	• Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claim(s), and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence (*CCSS WHST.11-12.1a*). • Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases (*CCSS WHST.11-12.1b*). • Analyze and evaluate connections among evidence, inferences, and claims in an argument (*CCSS RI.11-12.8*). • Reconcile inconsistencies in competing explanations. • Analyze strengths and weaknesses of technical processes, experimental procedures, design products, arguments, and opinions. • Cite specific data, sources, or resources to support or refute an argument.

STEM Standard of Practice 3: **Interpret and Communicate Information from Science, Technology, Engineering, and Mathematics**

STEM proficient students will interpret and communicate information from science, technology, engineering, and mathematics to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

F. Communicate effectively and precisely with others.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Select and use an appropriate model to represent the STEM concepts related to a complex question or real world problem being explored (e.g.: mathematical models, prototypes, simulations). • Use a variety of current communication tools (e.g.: e-mail, discussion boards, portfolios, online surveys, collaborative data collection tools) to gather information, share ideas, and respond to complex questions (*MTLSS 4.A.1.a*). • Identify the main ideas under discussion and apply higher order questions that yield a deeper analysis of those ideas (*CCSS.SL6-8.1a*). • Conduct focused research as necessary to prepare for discussions (*CCSS.SL6-8.1a*). • Access prior knowledge to extend the topic under discussion. (*CCSS.SL6-8.1a*). • Adopt the behaviors of effective speakers as appropriate to task, purpose, and audience (*CCSS.SL.6-8.4*).	• Identify the purpose for communicating, the intended audience, and the proposed message (adapted from *SFS 3.1.3*). • Choose the appropriate form of media for a given purpose (*CCSS SL.11-12.2*). • Employ mathematical expressions, graphs, diagrams, tables, or other models to communicate understandings of a real world problem, question, challenge, or global issue. • Organize information, ideas, evidence, and claims clearly, concisely, and logically with attention to the audience, purpose, and a range of formal and informal tasks (*CCSS SL.11-12.4*). • Apply appropriate non-verbal communication to contribute to meaning and enhance a presentation (*CCSS SL.11-12.4*). • Refine the behaviors of an effective speaker as appropriate to the task, audience, and purpose (*CCSS.SL.11-12.4*).

STEM Standard of Practice 4: **Engage in Inquiry**

STEM proficient students will engage in inquiry to investigate global issues, challenges, and real world problems.

A. Ask questions to identify and define global issues, challenges, and real world problems.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Dissect a real world problem, challenge, or global issue into smaller pieces to identify the essential components. • Develop factual questions to define essential components related to the global issue, challenge, or real world problem. • Develop researchable questions to: a. identify, define, and clarify all parts of a real world problem challenge, or global issue. b. probe the assumptions related to a real world problem, challenge, or global issue. c. probe implications and consequences of solutions to real world problems, challenges, or global issues. • Refine researchable questions as necessary to further identify and clarify a real world problem, challenge, or global issue being explored.	• Generate probing questions to: a. clarify the real world problem, challenge, or global issue. b. specify and prioritize requirements, criteria, and/or constraints of a problem or challenge. c. identify implications and consequences of solutions to real world problems and challenges or resolutions to global issues. d. challenge evidence, assumptions, arguments, or data. • Formulate researchable questions about the global issue, problem, or challenge based on significance, personal interest, available resources, and research. • Select and refine a researchable question to investigate. • See *MD SLM 1.0*

STEM Standard of Practice 4: **Engage in Inquiry**

STEM proficient students will engage in inquiry to investigate global issues, challenges, and real world problems.

B. Conduct research to refine questions and develop new questions.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**

• Investigate and research information from primary and secondary sources to answer factual and researchable questions.
• Use accurate records or logs to evaluate if evidence based answers to factual and researchable questions
  ○ help or support the question?
  ○ inspire/suggest the development of new questions?
• Refine questions based on research.
	• Create and use criteria to determine the scope of an information need (*MD SLM 9-12 1.0 B.2.a*)
	• Collect and analyze evidence from reliable primary and secondary sources to support the investigation.
	• Describe and attend to factors that may affect the understanding of questions, problems, or global issues.
	• Refine or create new questions based on research.
	• See *MD SLM 2.0* and *3.0*.

STEM Standard of Practice 5: **Engage in Logical Reasoning**

STEM proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Engage in critical thinking

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Break down a complex question, challenge, problem, or global issue into parts to discover its nature and relationships. • Identify and employ a line of reasoning (e.g.: deductive, inductive, analogical, cause/effect, conditional) to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems. • Employ critical thinking strategies (e.g.: problem solving, decision making, conceptualizing) to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems. • Reflect on one's assumptions and thinking, for the purpose of gaining a deeper understanding of a complex question, global issue, or real world problem.	• Break down a complex question, challenge, problem, or global issue into parts to discover its nature and relationships. • Employ a line of reasoning (e.g.: inductive, deductive, computational thinking) to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems. • Develop a plan of action or strategy for resolving, answering, or solving a global issue, complex question, and/or real world problem. • Determine and evaluate criteria and constraints as it relates to answering a complex question, investigating a global issue, or developing solutions for challenges and real world problems. • Reflect on and apply findings, results, and outcomes to propose viable solutions or answers to a global issue, complex question, and/or real world problem.

STEM Standard of Practice 5: **Engage in Logical Reasoning**

STEM proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Evaluate, select, and apply appropriate systematic approaches (scientific and engineering practices, engineering design process, and/or mathematical practices).

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Define and differentiate between systematic and intuitive approaches. • Understand the iterative nature of systematic approaches. • Justify how systematic approaches can be combined. • Identify a systematic approach (e.g.: engineering design process, *Scientific and Engineering Practices*, computer programming methodology, *Standards for Mathematical Practices*) used to develop solutions to problems or challenges, construct answers to complex questions, or investigate global issues. • Compare and contrast systematic approaches to develop solutions to problems or challenges, construct answers to complex questions, or investigate global issues. • Select and use the appropriate systematic approach(es) throughout the process of answering complex questions, investigating global issues, and developing solutions to real world problem.	• Select or create a systematic iterative approach(es) necessary for developing solutions to problems or challenges, constructing answers to complex questions, or investigating global issues. • Apply a systematic approach(es) (e.g.: *Scientific and Engineering Practices*, *Standards for Mathematical Practices*, *the Engineering Design Process*) throughout the process of answering complex questions, investigating global issues, and developing solutions to real world problems. • Monitor and evaluate progress toward answering questions and developing solutions for challenges and problems. • Analyze and evaluate results to assess how well the selected approach addressed the global issue, complex question, challenge, and/or real world problem.

STEM Standard of Practice 5: **Engage in Logical Reasoning**

STEM proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

C. Apply science, technology, engineering, and mathematics content to construct creative and innovative ideas.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Understand that STEM professionals employ creativity and imagination to "think outside the box" as they construct creative ideas and develop innovative solutions to complex questions and real world problems. • Utilize brainstorming strategies to creatively solve real world problems, answer complex questions, or investigate global issues. • Create visual images or forms from observation, memory, and imagination to convey ideas and personal meaning relative to the exploration of a complex question or a real world problem (e.g.: prototypes, technical drawings, artistic expressions) (*Visual Arts 3.1.c).*	• Explain how STEM professionals employ divergent and convergent thinking to construct creative and innovative ideas. • Employ brainstorming strategies to develop creative solutions for problems and challenges, resolutions for global issues, and answers for complex questions. • Identify or construct alternative perspectives on an idea, product, or topic. • Create models (e.g.: replicas, computer simulations, diagrams), visual images (e.g.: technical sketches, paintings), dramatic performances, or musical arrangements to communicate ideas, conclusions, or findings to diverse audiences.

STEM Standard of Practice 5: **Engage in Logical Reasoning**

STEM proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

D. Analyze the impact of global issues and problems at the local, state, national, and international levels.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Describe the global issues in terms of the societal, environmental, political, economical, and ethical impacts on the local community. • Explain the global constraints on a creative answer or solution to a complex question, challenge, or real world problem. • Develop creative answers or solutions, which make allowances for global constraints, to complex questions or real world problems.	• Identify and describe the implications of actions, statements, and reasoning for a global issue, complex question, and/or real world problem. • Determine personal, environmental, political, economic ethical, sustainability, and/or social factors that lead to constraints on decisions and products as they relate to the investigation and/or learning activity. • Assess the personal, environmental, political, economic, ethical, and/or social impacts of a global issue as it relates to an investigation, product, and/or learning activity.

STEM Standard of Practice 6: **Collaborate as a STEM Team**

STEM proficient students will collaborate as a STEM team to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify, analyze, and perform a STEM specific subject matter expert role.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Determine the STEM team's goal within the context of answering a complex question, investigating a global issue, or developing solutions for challenges or real world problems. • Identify individual knowledge and skills that are beneficial to reaching the STEM team's goal. • Identify the subject matter experts needed to accomplish the STEM team's goal. • Apply the knowledge and skills related to the duties of the assigned or selected subject matter expert role within a STEM team. • Demonstrate knowledge and skills of multiple subject matter expert roles.	• Determine the STEM team's goal within the context of answering a complex question, investigating a global issue, or developing solutions for challenges or real world problems. • Identify the subject matter experts (e.g.: statistician, biologist, electrical engineer) needed to accomplish the STEM team's goal. • Describe the expectations including knowledge and skills required for each subject matter expert. • Select a subject matter expert role to perform on a STEM team. • Apply the knowledge and skills related to the duties of the selected subject matter expert role on a STEM team. • Demonstrate knowledge and skills of multiple subject matter expert roles.

STEM Standard of Practice 6: **Collaborate as a STEM Team**

STEM proficient students will collaborate as a STEM team to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Share ideas and work effectively with a STEM focused multidisciplinary team to achieve a common goal.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Demonstrate the ability to accept divergent views and be sensitive to one's biases when sharing ideas and working effectively within a STEM team. • Apply self-monitoring strategies to establish and adjust appropriate tone, body language, and vocabulary when sharing ideas and working effectively within a STEM team (adapted from *CCSS SL.6-8.1b*). • Perform a team management's role (e.g.: facilitator, reporter, recorder, etc.) as a contributing member of a STEM team. • Recognize and expand on the work of others. • Identify and resolve conflicts using skills such as consensus, comprise, avoidance, and accommodation (*MCDF 6-8 1B.4*). • Use constructive criticism when necessary to meet the goals of the team.	• Develop and follow group rules and procedures. • Develop personal and group performance evaluations. • Evaluate individual and group performance and plan improvements using explicit criteria (*MCDF 9-12 1.B.3*). • Prioritize tasks and establish benchmarks. • Assess progress on tasks and meeting benchmarks. • Collaborate on reprioritizing and adjusting tasks and benchmarks as necessary. • Perform the role of a project manager or other leadership role for a specified task. • Demonstrate the ability to support group decisions, respect dissenting positions, and/or use consensus (*MCDF 9-12 1.B.4).* • Understand and use appropriate professional persuasive techniques and conflict-resolution skills (*CCSS SL.11-12.1d).* • Analyze consequences of personal actions on group effectiveness (adapted from *SFS 5.1.1.8*). • Identify purposes, goals, and resources of groups for specific situations (*SFS 5.2.2*).

STEM Standard of Practice 6: **Collaborate as a STEM Team**

STEM proficient students will collaborate as a STEM team to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

C. Listen and be receptive to ideas of others.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Apply critical listening strategies to determine the speaker's argument and claims (e.g.: paraphrasing, clarifying, perception checking, summarizing, empathy) (adapted from *CCSS SL.6-8.3*). • Demonstrate collegiality when asking and responding to questions and comments (*CCSS 6-8 SL1.c*). • Value and support the contributions of others by paraphrasing or summarizing new information being shared (*CCSS SL.6-8.1c*).	• Demonstrate the behavior of a strategic listener. • Paraphrase, summarize, justify, and synthesize information and ideas during discussion (*CCSS SL.11-12.1d*). • Monitor discussion for clarity, relevancy, and dissemination of ideas and information (*CCSS SL.11-12.1c*). • Analyze and evaluate the strength of a speaker's evidence, inferences, assumptions, argument, and rhetoric (*CCSS SL.11-12.3*). • Recognize bias, fallacious reasoning, and factual evidence (*CCSS SL.11-12.3*).

STEM Standard of Practice 6: **Collaborate as a STEM Team**

STEM proficient students will collaborate as a STEM team to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

D. Analyze career opportunities that exist in a variety of STEM fields relevant to the STEM focused multidisciplinary team's goal.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify the career that aligns with the subject matter expert role performed in learning activities. • Examine various STEM career opportunities through interviews, informational texts, field trips, etc. as related to the learning activity. • Complete tasks in a simulated STEM work environment related to the learning activities. • Compile artifacts for reflection on STEM careers related to the STEM projects experienced (e.g.: e-portfolio, design notebook). • Develop a high school plan that includes STEM related courses and potential career pathways of study (e.g.: information technology, computer science, and engineering) (adapted from *MCDF 3.A.1, MCDF 3.A.3*).	• Identify STEM careers that relate to the content topic, learning activity, or subject matter expert role. • Analyze the relationship between identified STEM careers and content topics, learning activities, or subject matter expert role. • Examine specific skills (e.g.: educational requirements, technical skills) needed for identified STEM careers. • Analyze the connection between STEM careers and the humanities (e.g.: history, literature, philosophy, art). • Predict the future needs of careers in the STEM fields. • Review one's high school plan, including post-secondary options and make modification on an annual basis (*MCDF 9-12 3.A.1*).

STEM Standard of Practice 7: **Apply Technology Strategically**

STEM proficient students will apply technology appropriately to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

A. Identify and understand technologies needed to develop solutions to problems or construct answers to complex questions.

Grades 6-8	**Grades 9-12**
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify and justify technologies needed to develop solutions to problems or construct answers to complex questions • Select and apply appropriate technologies needed to develop solutions to problems or construct answers to complex questions • Analyze how simple machines and/or other technological tools are used to develop solutions to problems or construct answers to complex questions (e.g., building of the pyramids, trans-continual railroad, & cotton gin). • Use simple machines and/or other technological tools to create new technologies to develop solutions to problems or construct answers to complex questions	• Identify available technological tools. • Select or create the necessary and appropriate technological tool(s) to develop solutions to problems or construct answers to complex questions. • Justify the application of selected or created technological tool(s). • Apply the necessary and appropriate technological tool(s) to develop solutions to problems or construct answers to complex questions. • Evaluate the quality and effectiveness of selected or created technological tool(s).

STEM Standard of Practice 7: **Apply Technology Strategically**

STEM proficient students will apply technology appropriately to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

B. Analyze the limits, risks, and impacts of technology.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Identify and predict the limitations, risks, and impacts of existing technologies. • Analyze the positive and negative effects of technology (e.g.: trade-off analysis, benefit-risk analysis). • Evaluate technology trends and potential effects of technological developments. • Correlate technological advances to advances in science, engineering, and mathematics.	• Describe factors that may expand or limit the development or use of technologies (e.g.: resources, societal concerns). • Explain how the transfer of technology from one society to another affects culture, society, economics, and politics of both societies (*ITEA, STL 4-K*). • Correlate technological advances to advances in science, engineering, and mathematics. • Evaluate and predict the limitations, risks, and impacts of existing and future technologies. • Analyze the positive and negative effects of technology (e.g.: trade-off analysis, benefit-risk analysis). • Evaluate technology trends and potential effects of technological developments.

STEM Standard of Practice 7: **Apply Technology Strategically**

STEM proficient students will apply technology appropriately to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

C. Engage in responsible/ethical use of technology.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Adhere to the safety guidelines, policies, and intended use of technological tools (e.g.: copyright protections, cyber safety and ethics, school and school district technology use policy). • Discriminate between responsible and irresponsible uses of technology. • Analyze the consequences of irresponsible use of technology. • Employ the behaviors of a digital citizen.	• Adhere to safety guidelines and policies when using technological tools. • Understand the intended use of technological tools. • Discriminate between responsible and irresponsible use of technology. • Analyze the consequences of irresponsible use of technology. • Employ the behaviors of a digital citizen and observe intellectual property rights (adapted from *MD SLM 9-12 4.0 A.3.a*). • Practice digital etiquette when sharing findings and conclusions (*MD SLM 9-12 5.0 A.2.b).*

STEM Standard of Practice 7: **Apply Technology Strategically**

STEM proficient students will apply technology appropriately to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.

D. Improve or create new technologies that extend human capability.

Grades 6-8	Grades 9-12
Essential Skills and Knowledge	**Essential Skills and Knowledge**
• Construct a new way to use an existing technology for the exploration of a complex question, global issue, or real world problem. • Recommend ways to improve technological tools. • Design and construct technological tools necessary to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems.	• Identify or develop a new way to use existing technology. • Recommend ways to improve technological tools. • Design and construct technological tools necessary to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems.

Appendix A

Abbreviations

Grades 6-8

CCSS W.6-8: Common Core State Standards Writing Grades 6-8

CCSS RI.6-8: Common Core State Standards Reading Informational Text Grades 6-8

CCSS SL.6-8: Common Core State Standards Speaking and Listening Grades 6-8

CCSS L.6-8: Common Core State Standards Language Grades 6-8

CCSS RL.6-8: Common Core Reading Literature Grades 6-8

Science: Maryland State Curriculum Science Grades 6 - 8

MTLSS – Maryland Technology Literacy Standards for Students Grades 6-8

MCDF – Maryland Career Development Framework – Grades 6-8

Visual Arts: Grades 6-8

Grades 9-12

CCSS W.11-12 - Common Core State Standards Writing Grades 11-12

CCSS RI.11-12 - Common Core State Standards Reading Informational Text Grades 11-12

CCSS SL.11-12 - Common Core State Standards Speaking and Listening Grades 11-12

CCSS RST.11-12 - Common Core State Standards for Reading in Science and Technical Subjects Grades 11-12

CCSS WHST.11-12 – Common Core State Standards for Writing in History/Social Studies, Science, and Technical Subjects Grades 11-12.

MCDK 9-12 – Maryland Career Development Framework Grades 9-12

SFS – Maryland High School Assessment Skills for Success Core Learning Goals

MD SLM 9-12 – Maryland State Curriculum for School and Library Media Grades 9-12

ITEA, STL - International Technology Education Association Standards for Technological Literacy, 3rd Edition

Appendix B

Glossary

Academic Vocabulary - Terms necessary for understanding ideas across curricular areas.

Argument - A purpose for writing using reasons or evidence to support a claim or opinion.

Benchmarks - Any standard or reference by which others can be measured or judged.

Claims/Alternate or Opposing –

a. Statement or thesis which is presented in a way so that another person could reasonably disagree; therefore claims can be "proven" only by providing opinion and/or research for support.

b. Alternate or opposing claims are ideas that directly contradict the original claim and are also presented in a way so that another person could reasonably disagree.

Complex Question - An open-ended question that promotes higher order thinking skills and requires students to synthesize information from multiple sources to develop answers.

Computational Thinking – A problem solving process that includes (but is not limited to) the following characteristics:

- Formulating problems in a way the enables us to use a computer and other tools to help solve them.
- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Automating solutions through algorithmic thinking
- Identifying, analyzing, and implementing possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- Generalizing and transferring this problem solving process to a wide variety of problems

Constraint - A limit to the design process. Constraints may be such things as appearance, funding, space, materials, and human capabilities.

Convergent Thinking - Thinking that brings together information focused on solving a problem.

Creative thinking or ideas - The ability or power used to produce original thoughts and ideas based upon reasoning and judgment.

Criteria - A desired specification (element or feature) of a product or system.

Critical Thinking - The ability to acquire information, analyze and evaluate it, and reach a conclusion or answer by using logic and reasoning skills.

Currency - The state of being current or up-to-date.

Digital citizen - A person who using technology and the Internet effectively and responsibly.

Divergent Thinking - Thinking that moves away in diverging directions so as to involve a variety of aspects and which sometime leads to novel ideas and solutions.

Domain-specific vocabulary - Vocabulary specific to a particular field of study.

Evidence - Facts, figures, details, quotations, or other sources of data and information that provide support for claims or an analysis that can be evaluated by others; should appear in a form and be derived from a source widely accepted as appropriate to a particular disciplines, as in details or quotations from a text in the study of literature and experimental results in the study of science.

Fallacious Reasoning - Unsound reasoning or errors in argument or use of deception.

Higher Order Thinking Skills - Higher order thinking skills include critical, logical, reflective, metacognitive, and creative thinking. They are activated when individuals encounter unfamiliar problems, uncertainties, questions, or dilemmas.

Inference - A logical guess based on evidence and prior knowledge.

Innovation - An improvement of existing technological product, system, or method of doing something.

Iterative - Describing a procedure or process that repeatedly executes a series of operations until some condition is satisfied. An iterative procedure may be implemented by a loop in a routine.

New - Unfamiliar or novel to the student.

Opportunity Cost - The foregone benefit of the next best alternative when an economic decision is made. If the class chooses to go to the library to work on their computer skill instead of having recess, then opportunity cost of the choice is having recess.

Optimize - An act, process, or methodology used to make a design or system as effective or functional as possible within the giving criteria and constraints.

Primary Source - An original or direct source of information (i.e., diary/journal, a survey/interview, letters, photos, documents, autobiographies, and observations) characterized as Informational Text in Common Core State Standards.

Prior Knowledge - Information that a student knows before a lesson/ instruction / research / exploration.

Proficient(ly)- A student performance that meets the criterion established in the Standards as measured by a teacher or assessment.

Relevant Ideas - Any thoughts, conceptions, or notions pertinent to a learning activity.

Researchable Question - A clear and concise question that has a means of which to be answered through investigation. Researchable questions include questions that aid in specifying and prioritizing requirements and/or constraints of a problem or challenge.

Researchable questions include questions that help to generate a problem statement.

Rhetoric - The skill or art of speaking or writing effectively for a specific purpose *(i.e., narration, definition, classification, and compare/contrast).*

Secondary Source - Information on a topic written by someone who did not participate or experience the topic first-hand.

Strategic reader - Someone who effectively constructs meaning from text *(i.e., previews, questions, uses prior knowledge, monitors understanding, makes connections, synthesizes).*

Systematic- Performed, disposed or acting in a methodical way.

Technical Audiences - Audience consisting of practitioners in the field of engineering, technology, design, business, and other workforce-related disciplines.

Technological Tool - A device used by humans to complete a task. These tools may include rulers, protractors, computer softwares, CAD programs, etc.

Viable - Practicable; workable

Weigh - Assess the importance of (a contribution) in making a decision.

Appendix C

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"School Improvement in Maryland"—Glossary*

English Language Arts http://www.mdk12.org/instruction/curriculum/reading/glossary.shtml

School Library Media http://mdk12.org/instruction/curriculum/library_media/index.html

Social Studies http://mdk12.org/assessments/vsc/social_studies/bygrade/glossary.shtml

Technology Education http://mdk12.org/instruction/curriculum/technology_education/index.html