

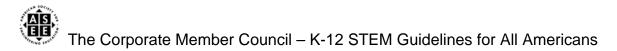
Dimension 1: Engineering Design	Declarative (Understands)	Procedural (Will be or is able to)
DesignThe following topics are the initial ideas that lead to this dimension for all Americans:• Problem-Solving National Science Standards (ITA) 9C/P. 102 and G/P. 103; Atlas of Science Literacy (Project 2061) Chapter 3; National Math Standards P. 52• Creativity and assessment STL Chapter 5, Standard 8, P. 97, Standard 9, P. 104• Research Abilities National Science Standards Teaching 	<ul> <li>(Understands)</li> <li>All Americans will develop an understanding of engineering design.</li> <li>All Americans will understand that: <ul> <li>Engineers design and conduct experiments, as well as analyze and interpret data as it relates to product design.</li> <li>Applying iteration is a part of the engineering design process.</li> <li>That engineers create and evaluate alternative design solutions.</li> <li>That not all problems can be solved with engineering design.</li> <li>Optimal solutions depend on outcomes and perspectives. For example, engineers, funding sources, project managers, and political and others are potential influences on outcomes or solutions.</li> </ul> </li> <li>Understand that engineering is the application of many fields of study to the</li> </ul>	
Reasoning Atlas of Science Literacy P. 16-17, P. 127	problem solving process. "Atlas p17 9-12 SFAA 3A/H4"	



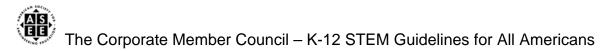
Dimension 2: Connecting Engineering to Science, Technology, and Mathematics	Declarative (Understands)	Procedural (Will be or is able to)
The following topics are the initial ideas that lead to this dimension: • Technological Literacy • How things Work	All Americans will develop an understanding of the essential concepts of and how to apply science, technology, and mathematics as they pertain to engineering. All Americans will develop the	All Americans will be able to apply concepts of science, technology, and mathematics to engineering processes and problems.
	<ul> <li>Understanding of selected concepts from established science, technology, and mathematics standards. Through multiple experiences, students will</li> <li>a. Understand properties of materials and how conditions affect those properties "Atlas p29 9-12 SFAA p21"</li> <li>b. Understand mathematical concepts, such as, numeration, algebraic equations, and probability and estimation. "Atlas p21 6-8 2C/2"</li> <li>Understanding that engineering solutions rely upon the knowledge of science, technology, and mathematics and prior results to define and provide understanding of engineering problems. "Engineering: An Introduction for High School p124"</li> <li>Understand how scientific and mathematical models are used to communicate and test design ideas and processes "Atlas p29 9-12 SAFF p21"</li> <li>Understand mathematical concepts are essential to modeling. "Atlas p29 2C/2"</li> </ul>	All Americans will Apply their knowledge of science, technology, engineering, and mathematics to define, analyze, and solve problems Apply contemporary engineering tools in the application of science, mathematics and technology to define analyze, model and prototype solutions to problems. Analyze a device and explain the principles of math and science used in the design.



Dimension 3: Nature of Engineering	Declarative (Understand)	Procedural (Will be or is able to)
The following topics are the initial ideas that lead to this dimension:	All Americans will understand the characteristics and broad scope of engineering practice.	All American will be creative and innovative in their thought process and actions.
<ul><li>Engineering Careers</li><li>Engineering Practice</li></ul>	All Americans will know that	All Americans will be able to:
Links: Atlas of Science and Literacy (3A): The Nature of Technology- Technology and Science, pp. 55-78	<ul> <li>Engineering is the application of knowledge of the human made world, of physical and natural science, and of mathematics for the benefit of human kind.</li> <li>An engineer is a person who is trained in and uses mathematical, scientific and technological knowledge to solve practical problems.</li> <li>Engineering, society, and the natural world are in relationships that influence each other over time.</li> <li>Engineering has continually improved the quality of life, added business value, and significantly influenced the global economy.</li> </ul>	<ul> <li>Use a logical process for inquiry, solving practical problems, critical thinking, and innovation.</li> <li>Explain what engineers do</li> <li>Explain how engineers solve problems</li> <li>Explain the need for diversity in engineering solutions.</li> </ul>



Dimension 4: Communication and Teamwork	Declarative (Understands)	Procedural (Will be or is able to)
The following topics are the initial ideas that lead to this dimension:	All Americans will understand that engineers need to communicate effectively as individuals and as members of a team.	Americans will be able to use effective communication and teamwork skills to acquire information and convey outcomes to a variety of stakeholders.
<ul><li>Multidisciplinary Teamwork</li><li>Communication</li></ul>	Americans will understand that:	Americans will be able to
Links Technology Standards (ITEA) 17 Atlas of Science Literacy, V2, Project 2061, Communication Skills pp. 110-111	<ul> <li>Complex problems, such as those faced by engineers, are often better solved by teams rather than by individuals.</li> <li>Effective individual and group communication skills are learned attributes.</li> <li>Roles of team members are an important aspect in learning to work collaboratively and cooperatively.</li> <li>Communication of ideas is effective when appropriate media is used and knowledge of your audience considered.</li> <li>Multidisciplinary and cross-functional teams bring a variety of skills and perspectives that enhance the engineering design and problem solving processes.</li> </ul>	<ul> <li>Use appropriate communication procedures, including oral presentations and written documentation using guidelines and style standards.</li> <li>Communicate effectively using multiple media.</li> <li>Practice interpersonal and group dynamic skills, such as: cooperate with others, advocate, influence, resolve conflict, and negotiate.</li> <li>Function on multidisciplinary and cross-functional teams.</li> </ul>



Dimension 5: Engineering and Society	Declarative (Understand)	Procedural (Will be or is able to)
The following topics are the initial ideas that lead to this dimension:	All Americans will understand that engineering is an ethical human endeavor intended to address the needs of a global	All Americans will be able to investigate and analyze the impact of engineering on a global society.
Human Factor	society.	
• Attitude		Americans will be able to:
Links: - Standard 4,5, 6 Technology Standards (ITEA) - Atlas of Science and Literacy (3A): The Nature of Technology- Technology and Science, pp. 55-78 Atlas of Science and Literacy (4-6): NES (std F): Science and Technology in Local Challenges, pp. 140-141	<ul> <li>Americans will understand that:</li> <li>Engineering is a human endeavor that has been practiced as long as humans have had needs.</li> <li>Results and use of engineered products and systems impact global, economic, cultural, environmental, and societal contexts in both expected and unexpected ways.</li> <li>Engineering itself is neither positive nor negative, but the use of engineered outcomes can have desirable and undesirable consequences.</li> <li>Development and use of engineered products and systems affect the way people of different cultures live, the kind of work they do, and the decisions they have to make.</li> </ul>	<ul> <li>Investigate and analyze the impact of engineering from multiple perspectives, such as, economic, environmental, social, political, ethical, health and safety.</li> <li>Investigate and explain the positive and negative results of engineering.</li> <li>Explain that ethical considerations are important in the development, selection, and use of engineered products and systems.</li> </ul>

# K-12 Engineering/Engineering Technology Guidelines Meeting Attendees

# Attendees 2007

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