

# Competencies for Secondary Teachers: Industrial Technology Grades 7-12

2014

In addition to the Arkansas Teaching Standards, the teacher of Industrial Technology, grades 7-12, shall demonstrate knowledge and competencies in the following areas:

<p><b>1. Technology and Society</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Units 1-2 Fundamentals of ETE Unit 1 Design Applications I Unit 1 Design Applications II Unit 2</p> <p>ITEEA STLs: Standards 1-7</p>	<p>1.1 Ability to understand the nature of technology, technology and engineering education, and technological literacy</p> <p>1.2 Ability to understand how technology influences culture and history</p> <p>1.3 Ability to understand the impacts of technology on family, social institutions, and the political system</p> <p>1.4 Ability to understand how technology effects various factors (marketing, economics, environment) to influence technological development and innovation</p> <p>1.5 Ability to understand the environmental impact of technological systems and processes</p> <p>1.6 Ability to understand the relationship between science, technology, engineering, and mathematics</p>
<p><b>2. Technological Design and Problem Solving</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Units 2-6 Fundamentals of ETE Unit 1-5 Design Applications I Unit 1-2 Design Applications II Unit 1-2</p> <p>ITEEA STLs: Standards 8-13</p>	<p>2.1 Ability to understand the engineering design process by</p> <ul style="list-style-type: none"> <li>• Identifying the problem and define design criteria and constraints</li> <li>• Generating possible solutions, select, develop, and refine design proposals using analysis and creativity</li> <li>• Evaluating, testing, and optimizing designs, using specifications, design principles, modeling, experimentation, and prototyping</li> <li>• Implementing, documenting, and presenting the solution to a design problem</li> </ul> <p>2.2 Ability to understand the relationship between technology and engineering</p> <p>2.3 Ability to understand how to select the tools, materials, and processes used in the engineering design process</p> <p>2.4 Ability to understand how to apply the engineering design process to systems and problems related to</p> <ul style="list-style-type: none"> <li>• energy, power, and transportation technologies</li> <li>• information and communications technologies</li> <li>• manufacturing and construction technologies</li> </ul> <p>2.5 Ability to understand systems thinking and how to safely operate, maintain, and troubleshoot technological systems</p>
<p><b>3. Energy, Power, and Transportation</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Unit 6 Fundamentals of ETE Unit 5 Design Applications II Unit 1</p> <p>ITEEA STLs: Standards 11, 16, &amp; 18</p>	<p>3.1 Ability to understand the various forms of energy and the relationship between energy, power, and work</p> <p>3.2 Ability to understand and apply safety practices related to working with energy and power technologies</p> <p>3.3 Ability to understand how energy and power are generated, measured, and controlled</p> <p>3.4 Ability to understand the different processes involved in transportation systems and technologies</p> <p>3.5 Ability to understand and apply safety practices related to working with transportation technologies</p> <p>3.6 Ability to understand the components of vehicles and support systems including</p> <ul style="list-style-type: none"> <li>• Propulsion</li> </ul>

	<ul style="list-style-type: none"> <li>• Suspension</li> <li>• Control and guidance</li> </ul> <p>3.7 Ability to understand how to apply mathematical and scientific principles related to energy, power, and transportation technologies</p> <p>3.8 Ability to understand how to apply the concepts of energy, power, and transportation technologies to solve related problems</p>
<p><b>4. Information and Communication Technologies</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Unit 3 Fundamentals of ETE Unit 2 Design Applications I Unit 2</p> <p>ITEEA STLs: Standards 11 &amp; 17</p>	<p>4.1 Ability to understand the major concepts and terminology related to information and communications technologies</p> <p>4.2 Ability to understand information and communication technologies using a systems model that includes inputs, processes, and outputs</p> <p>4.3 Ability to understand the impacts of information and communication technologies on media, society, and culture; including the legal and ethical issues</p> <p>4.4 Ability to understand how to identify and apply the appropriate tools and materials to solving a problem related to information and communications</p> <p>4.5 Ability to understand the importance of current issues and trends in information and communications technologies</p>
<p><b>5. Manufacturing and Construction Technologies</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Units 4 &amp; 5 Fundamentals of ETE Units 3 &amp; 4 Design Applications I Unit 1 Design Applications II Unit 2</p> <p>ITEEA STLs: Standards 19 &amp; 20</p>	<p>5.1 Ability to understand the major concepts and terminology related to manufacturing and construction technologies</p> <p>5.2 Ability to understand manufacturing and construction technologies using a systems model that includes inputs, processes, and outputs</p> <p>5.3 Ability to understand the various tools, materials, and processes used in manufacturing and construction</p> <p>5.4 Ability to understand the concepts of automated systems used in manufacturing and construction systems</p> <p>5.5 Ability to understand the designs, specifications, costs, and functions used in manufacturing and construction</p> <p>5.6 Ability to understand and apply industry safety practices related to working with manufacturing and construction technologies</p>
<p><b>6. Pedagogical and Professional Studies</b></p> <p>AR Engineering and Technology Education Frameworks: Introduction to ETE Unit 7 Fundamentals of ETE Unit 6 Design Applications I Unit 3 Design Applications II Unit 3</p> <p>ITEEA STLs: Standards 1-7</p>	<p>6.1 Ability to understand how to develop a project-based curriculum centered on state and national standards</p> <p>6.2 Ability to understand how to choose, design, adapt, and implement instructional strategies that are central to the study of technology and engineering</p> <p>6.3 Ability to understand how to operate, service, and maintain equipment in the technology and engineering laboratory</p> <p>6.4 Ability to understand how to create a safe laboratory environment for students, including instruction in the appropriate practices and procedures in the use of tools, materials, and processes</p> <p>6.5 Ability to understand how to evaluate and assess students, both formally and informally, in a project-based learning</p>

	<p>environment</p> <p>6.6 Ability to understand the relationship between technology and engineering education, industry, and advisory committees</p> <p>6.7 Ability to understand the relationship of classroom learning experiences and student organizations</p> <p>6.8 Ability to understand the importance of personal professional development, including membership in professional associations and organizations</p> <p>6.9 Ability to understand the impact of educational policy, funding, and legislation</p> <p>6.10 Ability to understand the importance of collaboration with faculty across all subject areas to provide students with authentic, integrated learning experiences</p>
<p><b>7. Disciplinary Literacy</b></p>	<p><u>Reading in Science and Technical Subjects, Grades 7-12</u>            Reading competencies for literacy in science and technical subjects for grades 7-12 include the ability to read informational texts in science and technical subjects closely and critically to analyze the key ideas and details as well as craft and structure with the purpose of integrating knowledge and ideas both within and across texts by</p> <p>7.1 Citing specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account</p> <p>7.2 Determining the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms</p> <p>7.3 Following precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyzing the specific results based on explanations in the text</p> <p>7.4 Determining 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 7-12 text and topics Analyzing how the text structures information or ideas are organized into categories or hierarchies, demonstrating understanding of the information or ideas</p> <p>7.5 Analyzing the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved</p> <p>7.6 Integrating and evaluating multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem</p> <p>7.7 Evaluating the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information</p> <p>7.8 Synthesizing information from a range of sources (e.g., texts,</p>

	<p>experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible</p> <p>7.9 Reading and comprehending a variety of scientific and technical documents appropriate for instruction within the 7-12 text complexity band</p> <p><u>Writing in History/Social Studies, Science, and Technical Subjects, Grades 7-12</u></p> <p>Writing competencies for literacy in history/social studies, science, and technical subjects for grades 7-12 will be demonstrated by</p> <p>7.10 Writing arguments focused on discipline-specific content by</p> <ol style="list-style-type: none"> <li>a. Introducing precise, knowledgeable claim(s), establishing the significance of the claim(s), distinguishing the claim(s) from alternate or opposing claims, and creating an organization that logically sequences the claim(s), counterclaims, reasons, and evidence</li> <li>b. Developing 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.</li> <li>c. Using words, phrases, and clauses as well as varied syntax to link the major sections of the text, creating cohesion, and clarification of the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</li> <li>d. Establishing and maintaining a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li> <li>e. Providing a concluding statement or section that follows from or supports the argument presented</li> </ol> <p>7.11 Writing informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes by</p> <ol style="list-style-type: none"> <li>a. Introducing a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting(e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension</li> <li>b. Developing the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic</li> <li>c. Using varied transitions and sentence structures to link the major sections of the text, creating cohesion, and</li> </ol>
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	<p>clarifying the relationships among complex ideas and concepts</p> <p>d. Using precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; conveying a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers</p> <p>e. Providing a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic)</p> <p>7.12 Producing clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience</p> <p>7.13 Developing and strengthening writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience</p> <p>7.14 Using technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information</p> <p>7.15 Conducting short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation</p> <p>7.16 Gathering relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrating information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation</p> <p>7.17 Drawing evidence from informational texts to support analysis, reflection, and research</p> <p>7.18 Writing routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences</p>
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