

TENNESSEE CAREER AND TECHNICAL EDUCATION TEXTBOOK SCREENING INSTRUMENT
Sections I & III Reviews

Book:	Engineering Fundamentals	Publisher:	Goodheart-Willcox
ISBN:	978-1-63126-285-2	Year:	2018
Levels/Course:	Basal	Category:	5924

BEFORE YOU BEGIN

ALIGNMENT TO THE TENNESSEE CAREER AND TECHNICAL EDUCATION STANDARDS:

Tennessee's Career and Technical Education Standards (hereafter, "the standards") represent a significant shift in the definition of student proficiency within career and technical education environments. Evaluators of materials should understand that the standards replace the proficiency frameworks of years past in three major respects:

- 1) A shift to clear, specific, and measurable expectations for student learning. The standards articulate deep knowledge and skill attainment, departing from the competency-based structure of years past.
- 2) Increased focus on rigor in literacy and mathematics within technical contexts. The new standards align to all Tennessee State Standards for English Language Arts and Literacy in Technical Subjects and, where appropriate, select Tennessee State Standards in Mathematics.
- 3) Sequential progression of knowledge and skills within and across courses. The new standards build on each other both within course content and across course levels, arranged within programs of study that culminate in capstone and/or work-based learning experiences for students.

Evaluators of materials must be well versed in the standards for the course(s) aligned to the materials in question, how the content fits into the progressions in the content standards, and the expectations of the standards with respect to conceptual understanding, fluency, and technical application. Aligned courses in the Architecture & Construction Career Cluster:

ORGANIZATION OF THIS DOCUMENT

SECTION II: ADDITIONAL ALIGNMENT CRITERIA AND INDICATORS OF QUALITY

Section II includes additional criteria for alignment to the standards as well as indicators of quality.

SECTION III: FOCUS AREA (optional)

Section III allows reviewers to capture qualitative observations on an additional area of focus, if presented in the materials.

*For the purposes of this document, Tennessee CTE students are considered to be enrolled in course "levels" (i.e., Level 1, Level 2, Level 3, and Level 4) due to variation in the *grade* level at which students may take a course. For example, a tenth-grade student may be enrolled in a Level 1 course. For this reason, reviewers are asked to evaluate materials on the basis of their alignment to particular *course levels*, not *grade levels* or *grade bands*.

**This percentage is a guide. Reviewers should not attempt to compute percentages based on counting pages or counting lessons. Reviewers will use their professional judgment to determine how students are meant to spend their time to determine focus and provide evidence for their decision.

Section II(1). ADDITIONAL ALIGNMENT CRITERIA	SCORE	JUSTIFICATION/NOTES
<p>A. Materials are aligned to relevant national and/or industry standards where appropriate. For example, <i>Mechatronics I</i> materials routinely make reference to and reinforce connections with national industry certification standards from companies like Siemens.</p>	<p>1</p>	<p>The book does not introduce the different systems of units, such as the international system (SI) of units (metric) and the English system of units, or other derived systems of units such as the American standard system of units, or the Imperial units. In the reviewer's opinion, it is imperative in an Engineering Fundamentals textbook to address the different systems of units used in the United States and other parts of the world. Although the book does a great job in making reference to many standardizing organizations in each field of engineering such as SAE, ASTM, ISO, NIMS, ANSI, and IEEE, there is a tendency in the book to be too broad in descriptions in figure captions. For example, the book introduces ISO and ANSI in chapter 6, but in Figure 6-14 on page 107, the figure caption is very broad and does not reinforce the idea mentioned in the text that the symbols are</p>

		<p>developed by ISO. As another example, the book shows an example of the impact of ASTM on materials engineering on page 162, but for other well-known organizations, such as IEEE, which is mentioned on page 220, the book does not show any examples of how the organization impacted the field. It merely mentions what does the acronym IEEE stand for on. The caption for the supporting figure (Figure 11-2 on page 221) does not add any information and is confusing to the reader, and can mislead the non-expert reader (please see the Additional Comment below).</p>
<p>B. Materials are aligned to discipline-specific content or pedagogical frameworks frequently used by professionals in associated industries. For example, Differentiating Instruction materials routinely make reference to and reinforce connections with instructional strategies that meet the educational needs of the student, as specified in the standards.</p>	<p>2</p>	<p>Discipline-specific content is well-presented and established in the textbook and aligns to the core course standards and objectives. The principles, professional aspects, and applications of each major engineering field are presented in a separate chapter</p>

<p>C. Connections are made to discipline-specific professional societies and organizations, and their value is clearly communicated in the materials. For example, <i>School Counseling</i> materials routinely make reference to and reinforce connections with the American School Counselor Association (ASCA).</p>	2	<p>The textbook does an excellent job in connecting the student and introducing professional societies in each respective field. For example, the book introduces the Society of Automotive Engineers (SAE) and the American Society of Mechanical Engineers (ASME) in the Mechanical Engineering chapter. Other well-known societies in each engineering field are introduced such as IEEE and others.</p>
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Additional Comment Section II(1):

Some figure captions throughout the book need to be more specific, in a few cases, they are too simplified to the extent that the idea is lost or even can mislead the student to understand the wrong idea. For example, the caption for Figure 11-2 on page 2

Section II(2). SEQUENCE AND PROGRESSION OF STANDARDS	SCORE	JUSTIFICATION/NOTES
<p>A. Connections are made within a course between knowledge and skills, where these connections are appropriate and natural, as set forth by the standards.</p>	2	<p>The skills are well-connected to the knowledge presented.</p>
<p>B. Materials are vertically coherent with previous courses and these connections are made clear in the materials. The connections are explicit to the other materials in the course.</p>	2	<p>This is the first course in the Engineering program of study, the material is properly coherent with that.</p>

<p>C. For materials in a series, content progressions reflect the progressions as seen in the standards. These progression connections are clearly indicated in the materials. Any discrepancies in content progressions enhance the required learning in each course and are clearly aimed at helping students meet the standards as written.</p>	2	The content progression reflect that in the standards.
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Section II(3). TEACHER SUPPORTS	SCORE	JUSTIFICATION/NOTES
<p>A. Materials support teachers in ways such as the following: planning (including ideas for pacing), sample lessons, laboratory applications, projects, vocabulary, and instructional strategies.</p>	1	<p>The book states on page xiii that the following materials are provided with the textbook:</p> <ul style="list-style-type: none"> - The textbook itself - The companion website - The instructor resources CD - Online instructor resources. <p>The textbook states on page xiii that the following instructor support materials are included: answer keys, lesson plans, correlation charts, and Examview assessment suite. No reference is made to other support materials such as projects and instructional strategies.</p> <p>It must be noted here, that the publisher provided no access to the reviewers to the teacher support materials</p>

		(neither the teacher support CD nor the online instructor support material). Therefore, this review is only based on the textbook, the companion website, and the information provided about the teacher support materials listed on page xiii in the textbook.
B. Materials include teacher-directed materials that explain the role of the practice activities in the classroom and in students' content development. Problems and activities present opportunities for students to make use of and exhibit the skills as they work on mastery of content.	1	The publisher provided no access to the reviewers to the teacher support materials (neither the teacher support CD nor the online instructor support material). Therefore, this review is only based on the textbook, the companion website, and the informati
C. Opportunities and resources are provided for teachers to conduct independent study to enhance their own understanding and knowledge of course topics. Materials provide avenues to seek and identify quality professional development in a manner that will support student learning.	1	The publisher provided no access to the reviewers to the teacher support materials (neither the teacher support CD nor the online instructor support material). Therefore, this review is only based on the textbook, the companion website, and the informati

Section II(4). USABILITY	SCORE	JUSTIFICATION/NOTES
A. Materials can be accessed in a variety of formats and media, including but not limited to printed textbooks, digital storage devices, online applications, and cloud-based forums.	2	The book material is professionally written in an easy-to-understand language in a way that conveyed the information in the most compact and easiest form possible in the vast majority of the book.
B. Materials are clear and easy to read for students, teachers, and parents. The design and graphics do not distract from the course content and are appropriately placed.	2	The vast majority of the design and figures reinforce the ideas mentioned in the text (except for a few cases, see comments for section II(1).A. The language is simple to understand.
C. Materials include supports for all learners, e.g., ELs, students who are below grade level, advanced students.	2	The language is simplified enough for the ESL learners to understand.
D. Materials are culturally and politically sensitive to the full range of potential users, and do not advance unwarranted opinions that are not factually based. All materials strive to present content, not beliefs.	2	

Please note any concerns with sensitivity below:

The book presents materials that are based on factual evidence. No material is presented that is based on beliefs.

Section II(5). ASSESSMENTS	SCORE	JUSTIFICATION/NOTES
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<p>A. Materials include aligned assessments at regular intervals throughout the text(s), or as supplements to the primary instructional materials. Aligned assessments may include end-of-chapter quizzes, unit test modules, and practice exams.</p>	<p>2</p>	<p>All chapters have end-of-chapter questions of different types. Additional questions are presented in the companion website.</p>
<p>B. Materials offer ideas and guidance on measuring student progress throughout the duration of the aligned course(s). Formative, interim, and summative assessment strategies are all presented to inform instructional strategy and improvement.</p>	<p>2</p>	<p>The reviewer stresses that the book and its companion website, together, satisfy the requirements here. The book alone does not fully satisfy this point.</p>
<p>C. Materials include assessment accommodations for diverse learners, including sample items that capture multiple measures of student proficiency.</p>	<p>1</p>	<p>The book authors did an excellent work in providing a book material and a companion website that include aligned assessments and a good range of question types and difficulties. However, more assessment materials can be added to the printed book to accommodate for students who find difficulty navigating the world wide web, and for students who might not be able to go to the companion website because of reasons such as not having access to the internet at home.</p>

Please use the space below to leave any additional notes about Section II not previously captured:

SECTION III (optional): FOCUS AREA

Use this section to capture qualitative observations on an additional area of focus, if presented in the materials. A sample focus area for the Health Informatics program of study is provided in the following. If applicable, fill in the blank table with observations and notes.

III. EXAMPLE: FOCUS IN Health Information Systems	NOTES
A. Materials include coverage of major parameters most frequently reported in health databases.	<i>[Insert reviewer evaluation here.]</i>
B. Materials draw clear connections between policy and procedures and the legal ramifications of health informatics.	<i>[Insert reviewer evaluation here.]</i>
III. FOCUS AREA:	NOTES
Safety	Although the book content excellently matches the majority of the course standards, and aligns with the course objectives, there is much room for improvement in the book content in addressing safety at work, and in the classroom. For example, safety at work and compliance with OSHA regulations are only briefly mentioned in a few lines later in the textbook in chapter 10, and then as late in the book as chapter 15. Safety at work is not mentioned anywhere in the first 153 pages of the book (on page 129, the book talks about the safety of the products to the end-users, but It does not address safety at work for the workers). In addition to that, the

book tends to omit emphasize tools for safety concerns and regulations, such as supporting the text material with figures, or activities related to the subject. Safety considerations are embedded within the text under subtitles within a section, and not in a separate section to emphasize their importance.

Safety is always an important part of any engineering education, and in the reviewer's opinion it is recommended that it is addressed in a separate section in the opening chapter of the book, which can also include reference to safety considerations in the later chapters in the book.

The book falls shy in addressing safety considerations in the classroom, for example, no reference is made to the rules of the National Science Teachers Association (NSTA).

In conclusion, the book with its companion website, is an excellent textbook for Principles of Engineering and Technology, it aligns with about 85% of the course standards, and rigidly satisfies the course objectives with the needed rigor level. However, there is room for improvement in the book content, in particular, in two areas: addressing safety at work and in the classroom, and addressing the different systems of units used by engineers.

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Appendix A, Career and Technical Education: Programs of Study by Course