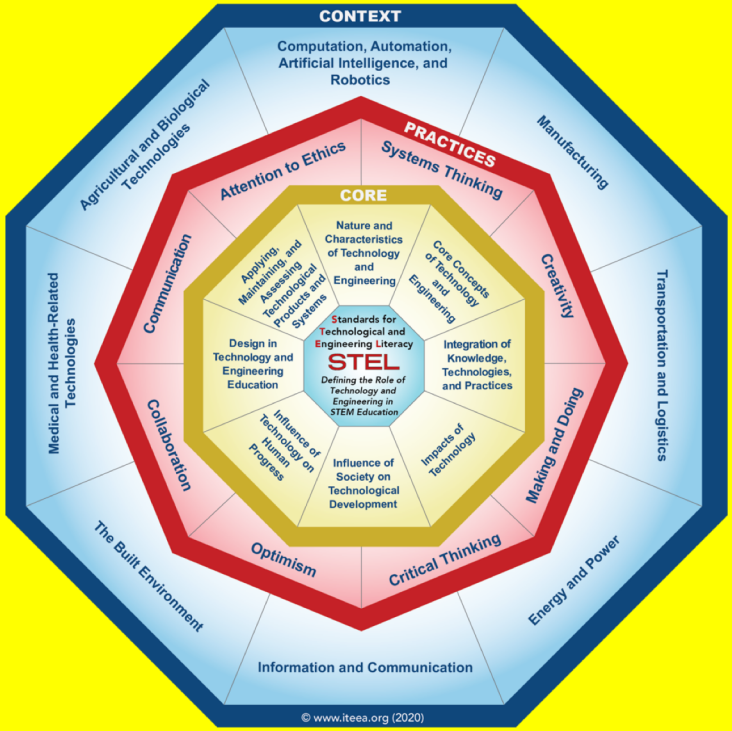
N.Y.S. Technology and Engineering Educators' Association
2020 Conference
Onondaga Community College



ITEEA's Standards for Technological & Engineering Literacy(STEL's)

Presenter: Chuck Goodwin, DTE

Draft Framework of the
N.Y.S. M-S-T
Learning Standards
1994

ACKNOWLEDGEMENTS

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The Mathematics, Science, and Technology Standards

The standards provide specificity beyond the Regents Goals.

Under the *Compact* the roles and responsibilities of local school districts also change. The State sets the goals and direction for education through standards, which provide specificity beyond the Regents Goals. To ensure that students achieve standards, local school districts will be given the authority and discretion to determine how best to organize and deliver their educational program.

Students must achieve the following standards in order to be literate in mathematics, science, and technology. An elaboration of the standards appears in Chapter III.

Standard 1
Analysis, Inquiry, and Design

Students will have knowledge, skills, and attitudes that empower them to use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and design solutions.

Standard 2
Systems

Students will acquire an understanding of the basic concepts of systems and their uses in the analysis and interpretation of interrelated phenomena in the real world, within the context of mathematics, science, and technology.

Standard 3
Information Resources

Students will use a full range of information systems, including computers, to process information and to network with different school and community resources, such as libraries, people, museums, business, industry, and government agencies.

Standard 4
Science

Students will demonstrate knowledge of science's contributions to our understanding of the natural world, including the physical setting, the living environment, and the human organism, and will be aware of the historical development of these ideas.

Standard 5
Technology

Students will acquire the knowledge and skills related to the tools, materials, and processes of technology to create products, services, and environments in the context of human endeavors such as bio-related technologies (agriculture, health), manufacturing, construction (shelter and other structures), transportation, and communication.

Standard 6
Mathematics

Students will understand and use basic mathematical ideas, including logic, number sense and numeration concepts, operations on numbers, geometry, measurement, probability and statistics, algebra, and trigonometry; and be familiar with their uses and application in the real world through problem solving, experimentation, validation, and other activities.

Standard 7
Connecting Themes

Students will understand the relationships among mathematics, science, and technology, identify common themes connecting them, and apply these themes to other areas of learning and performance.

Standard 8
Interdisciplinary Problem Solving

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Standard 9
Preparation for the Future

Students will develop habits of mind and social and career-related skills in mathematics, science, and technology education classes that will enable them to work productively with others, achieve success in a postsecondary school setting, enter the workplace prepared to achieve success in different jobs, and possess skills necessary for lifelong learning and continuing advancement.

The Premise For Creating the NYS MST Learning Standards

The study of mathematics, science and technology is critical, so that ALL students are able to:

Use various ways of asking questions, seeking answers, and designing solutions while applying a full spectrum of problem solving strategies.

Think in terms of systems and learn to analyze problems holistically

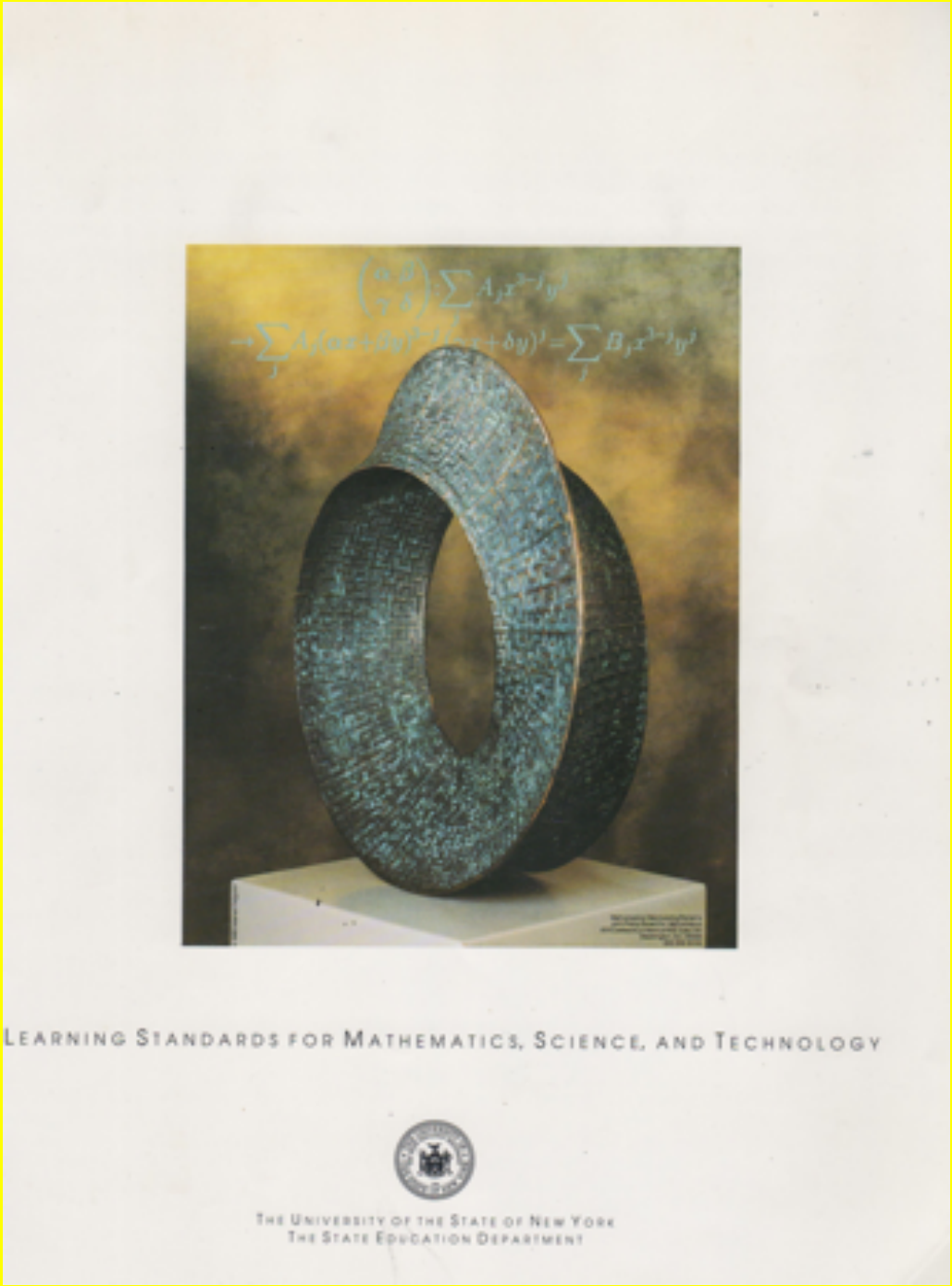
Process information by retrieving, analyzing, and synthesizing

Use, apply, and make informed decisions on the products and processes of Mathematics, Science and Technology for health, security, communication, transportation, environmental stewardship, work, and for pleasure and human development.

Be better prepared for jobs and careers, the vast majority of which will involve one or more of these disciplines.

NYS MST Learning Standards
Approved in 1996 & 2000 with
Seven Standards Including

- Standard 3 – Mathematics
- Standard 4 – Science
- Standard 5 - Technology



Learning Standards for Mathematics, Science, and Technology at Three Levels

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

Standard 2: Students will access, generate, process, and transfer information using appropriate technologies.

Standard 3: Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.

Standard 4: Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Standard 5: Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.

Standard 6: Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.

Standard 7: Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Each standard has its own set of:

- **Key Ideas:** Engineering Design, Technological Sys., Impacts of Technology, Tools, Resources, Processes, History & Evolution of Tech.
- **Performance Indicators:** What students should be able to do to demonstrate their learning.
- **Sample Tasks:** Suggested classroom activities you can try or modify

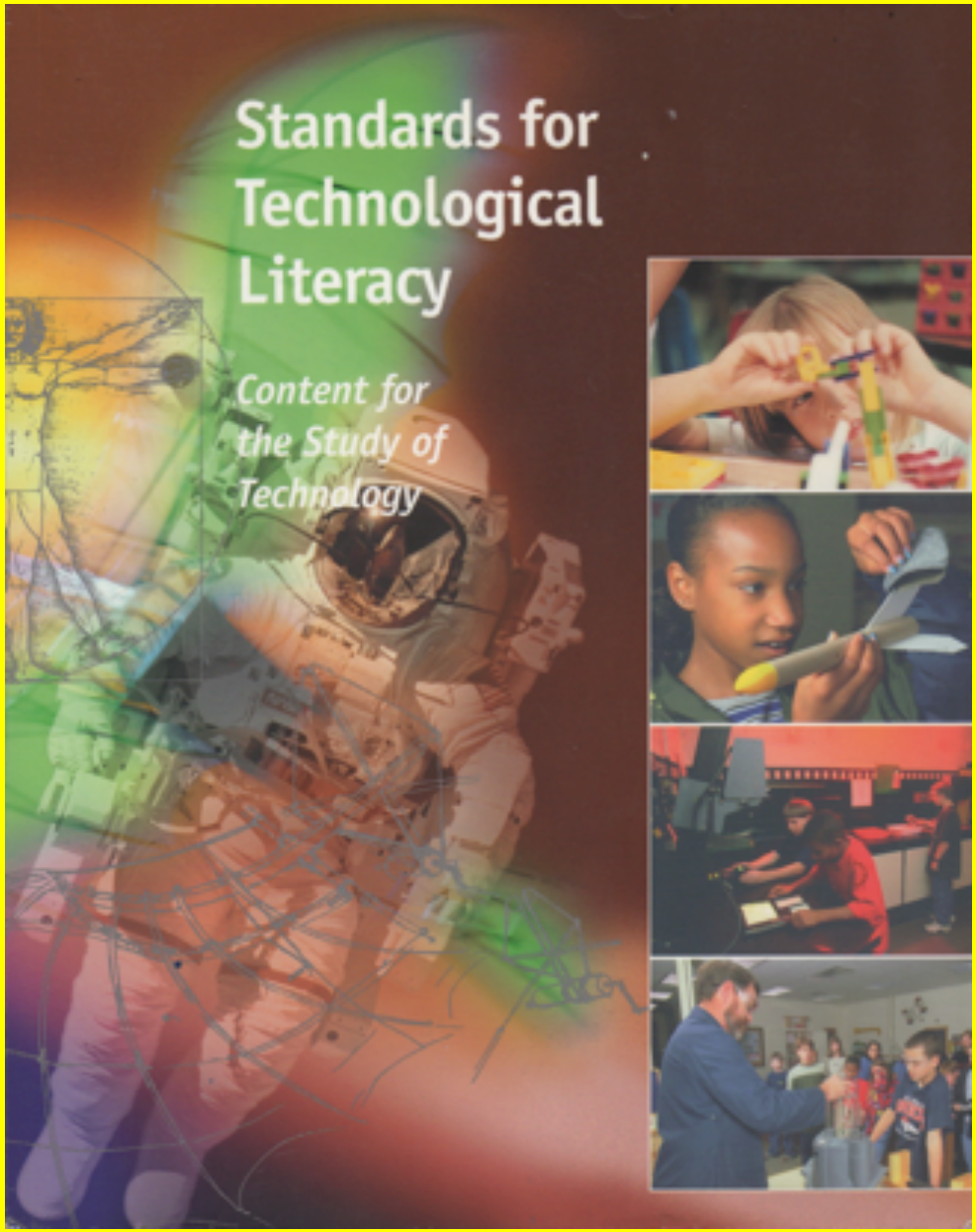

Standards for Technological Literacy
Content for the Study of Technology

Figure 1. Listing of Technological Literacy Content Standards

Chapter 3: Students will develop an understanding of The Nature of Technology. This includes acquiring knowledge of:

- Standard 1. The characteristics and scope of technology,
- Standard 2. The core principles of technology, and
- Standard 3. Important relationships between technology and other fields.

Chapter 4: Students will develop an understanding of Technology and Society. This includes learning about:

- Standard 4. The cultural, social, economic, and political effects of technology,
- Standard 5. The effects of technology on the environment,
- Standard 6. The role of society in the development and use of technology, and
- Standard 7. The influence of technology on history.

Chapter 5: Students will develop an understanding of Design. This includes knowing about:

- Standard 8. The elements of the design process,
- Standard 9. The engineering approach to technological problem solving, and
- Standard 10. The role of troubleshooting, research and development, invention and innovation, and experimentation in technology.

Chapter 6: Students will develop Abilities for a Technological World. This includes the ability to:

- Standard 11. Apply the design process,
- Standard 12. Use and maintain technological products and systems, and
- Standard 13. Assess the impact of products and systems.

Chapter 7: Students will develop an understanding of The Designed World. This includes selecting, using, and knowing about:

- Standard 14. Medical technologies,
- Standard 15. Agricultural and related biotechnologies,
- Standard 16. Energy and power technologies,
- Standard 17. Information and communication technologies,
- Standard 18. Transportation technologies,
- Standard 19. Manufacturing technologies, and
- Standard 20. Construction technologies.

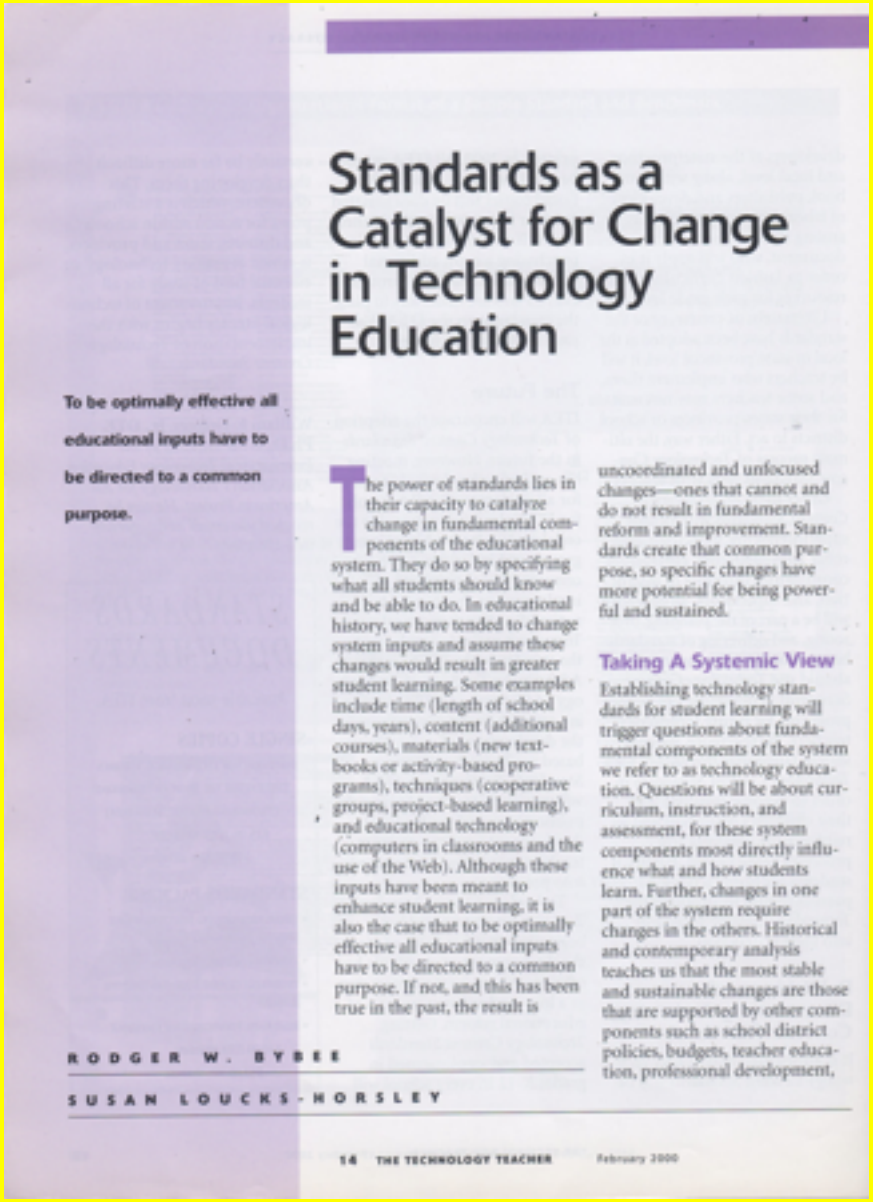
Standards as a Catalyst For Change!?

Assessments as a Catalyst For Change?

Pre-service exposure and instruction as a Catalyst For Change?

Inservice Exposure and instruction as a Catalyst For Change?

- Conferences
- Supts. Programs
- Regional Assoc. Online Programs



Standards as a Catalyst for Change in Technology Education

To be optimally effective all educational inputs have to be directed to a common purpose.

RODGER W. BYBEE

SUSAN LOUCKS-HORSLEY

The power of standards lies in their capacity to catalyze change in fundamental components of the educational system. They do so by specifying what all students should know and be able to do. In educational history, we have tended to change system inputs and assume these changes would result in greater student learning. Some examples include time (length of school days, years), content (additional courses), materials (new textbooks or activity-based programs), techniques (cooperative groups, project-based learning), and educational technology (computers in classrooms and the use of the Web). Although these inputs have been meant to enhance student learning, it is also the case that to be optimally effective all educational inputs have to be directed to a common purpose. If not, and this has been true in the past, the result is uncoordinated and unfocused changes—ones that cannot and do not result in fundamental reform and improvement. Standards create that common purpose, so specific changes have more potential for being powerful and sustained.

Taking A Systemic View

Establishing technology standards for student learning will trigger questions about fundamental components of the system we refer to as technology education. Questions will be about curriculum, instruction, and assessment, for these system components most directly influence what and how students learn. Further, changes in one part of the system require changes in the others. Historical and contempoeary analysis teaches us that the most stable and sustainable changes are those that are supported by other components such as school district policies, budgets, teacher education, professional development,

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feature article

Jackson's Mill to Chinsegut: the journey to *STEL*

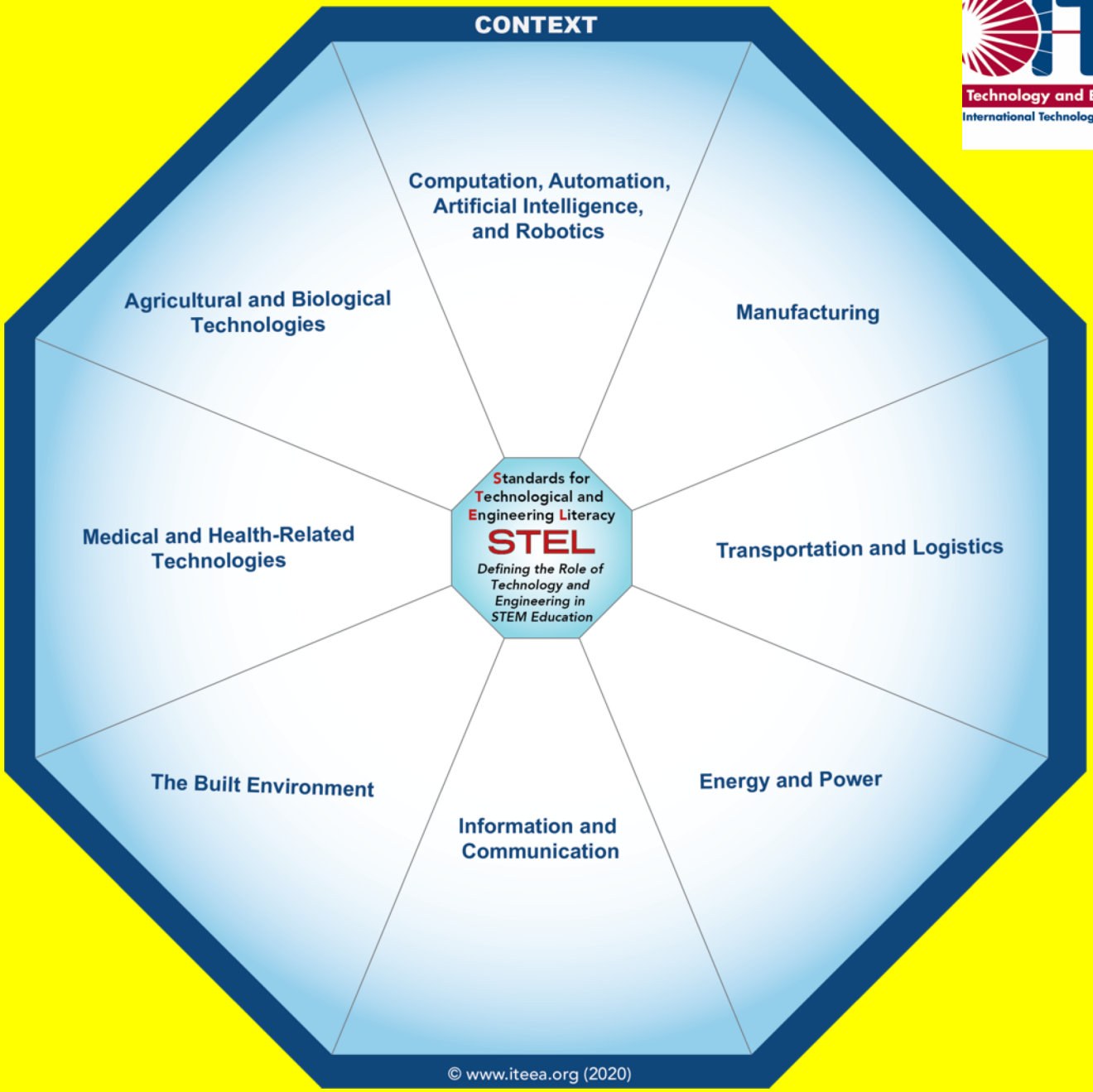
Standards for Technological and Engineering Literacy is designed to provide a refined focus for the future of T&E education.

by Thomas Loveland, DTE, Tyler S. Love, Trena Wilkerson, and Patricia Simmons

Introduction

In 1981, twenty-one industrial arts educators convened at Jackson's Mill, WV to develop an agreed-upon rationale and direction for the future of industrial arts. However, the route to achieve this goal was not as clear, as they had to "live the challenge of inquiry, assimilation, compromise, and consensus" (Snyder & Hales, 1981, p. ii). What resulted was a 66-page report known as *Jackson's Mill Industrial Arts Curriculum Project*, which served as the impetus for the American Industrial Arts Association's (AIAA) name change to the International Technology Education Association (ITEA) in 1985.

With the beginnings of the Excellence Reform Movement, launched by *A Nation at Risk: The Imperative for Educational Reform* and published by the National Commission on Excellence in Education (1983), content became the primary curricular focus in U.S. public education to better prepare students for an increasingly competitive global economy. This content focus drove the development of standards to guide American education. The passage of the Federal Goals 2000 Educate America Act led to the development of many national standards, including mathematics (NCTM, 1989) and science education (AAAS, 1989; National Research Council, 1996). To address this national focus on content and guiding standards, ITEA leaders began a six-year effort to develop a rationale and structure, and later content standards for technology



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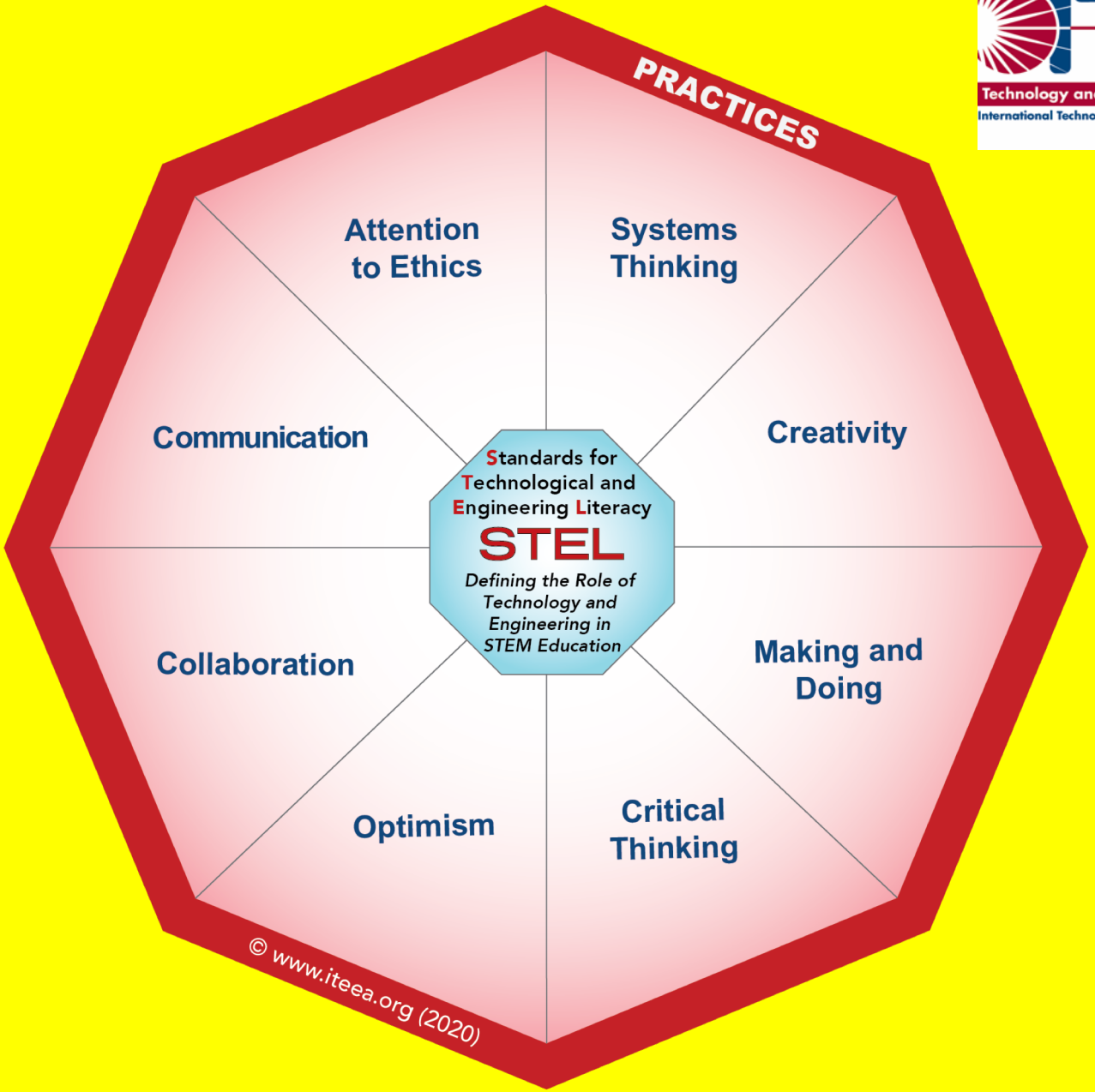

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Next Generation Science Standards Practices

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