



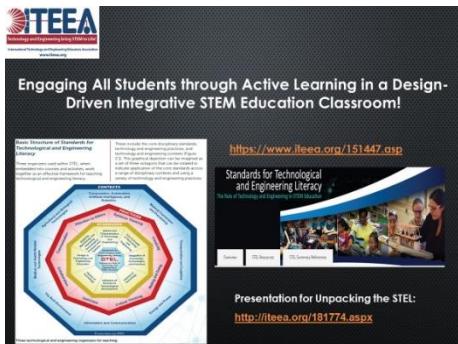
Steven Barbato, DTE  
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ITEC 2020 Virtual Conference  
(201012-ITEC2020-Unpacking\_STEL)

iteea.org

Slides/Narrative [MP4 video available at: [https://www.dropbox.com/s/fa07ccie2urzdlh/2020 ITEC Unpacking STEL\\_S Barbato-Recording.mp4?dl=0](https://www.dropbox.com/s/fa07ccie2urzdlh/2020 ITEC Unpacking STEL_S Barbato-Recording.mp4?dl=0)]



1 - Thank you for attending this session and thank you to the Illinois Technology and Engineering Education Leadership team for allowing us this virtual opportunity to share exciting news about ITEEA with you. I begin with **ITEEA's mission is to advance technological and engineering capabilities for all people and to nurture and promote the professionalism of those engaged in these pursuits. ITEEAA seeks to meet the professional needs and interests of members as well as to improve public understanding of technology, innovation, design, and engineering education and its contributions.**



2 - ITEEAA strives to provide the necessary supports for educators to engage All Students through Active Learning in a Design-Driven Integrative STEM Education Classroom!



3 - In July, 2020, ITEEAA published the new Standards for Technological and Engineering Literacy: The Role of Technology and Engineering in STEM Education – funded by the National Science Foundation (NSF) and Technical Foundation of America (TFA). . ITEEAA's *Standards for Technological Literacy* was published in 2000 and last updated in 2007. In 2016 the executive board of ITEEAA's Council on Technology and Engineering Teacher Education set in motion a plan to update STL. A new set of national technology and engineering standards was developed and published in the summer of 2020. This presentation will un-pack STEL so you can use this in your laboratory-classroom and to advocate for TEE and your program. → Next Page →



## The Importance of Technology and Engineering

- Educators and members of the public realize that K-12 students need to have fundamental literacies in technology and engineering.
- Many students lack technology and engineering experience.
- TEE programs deliver an integrated, design-based approach to teaching and learning.



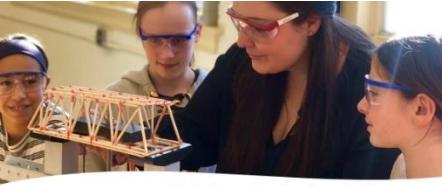
4 - It is becoming more apparent the differences between individuals and groups in society who understand technology and those who do not. The study of technology and engineering is important for ALL students, whether they are moving into college, a career, or simply to help them understand the complex world they will face every day. Organizations such as the National Science Foundation and the National Academies have shown increasing support for TEE. See the *Power Core Standards Within STEL* document on the ITEEA website for more advocacy information

## The Importance of Technology and Engineering Education

• <https://nces.ed.gov/nationsreportcard/tel/>



5 = The National Assessment of Educational Progress Technology and Engineering Literacy Assessment (NAEP TEL) is part of the Nation's Report Card. NAEP TEL was developed in 2014 and assesses eighth graders nationally for their understanding of technology and engineering. See the NAEP TEL website for the assessment framework, videos, animations, and other resources. A program structured on STEL will prepare students for the NAEP TEL.



## Redefining Technology and Engineering

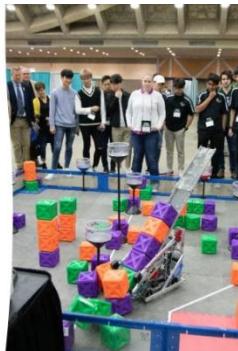


- Technology and engineering education programs deliver an integrated, design-based approach to teaching and learning.
- Formal technology and engineering education courses are not available in all schools.
- Students are graduating with a minimal understanding of one of the most powerful forces shaping society today.

6 - Technology and engineering education is required for graduation in only a few countries, states, or provinces. Typically, it is an elective program in competition for the same students as art, music, business education, and other career and technical education classes. The study of technology and engineering is important for ALL students, whether they are moving into college, a career, or simply to help them understand the complex world they will face every day.

## Three Dimensions of Technology and Engineering Education

- **Knowing:** taking in information, organizing it, and understanding factual and conceptual relationships
- **Thinking:** making sense of information through questioning, analysis, and decision making.
- **Doing:** using technology and engineering in applied ways such as designing, making/building, producing, and evaluating.



7 - Learning about technology and engineering is not just experimenting with tools and materials to make things or do projects. For over eighty years, the field has been defined by three inter-related dimensions: knowing, thinking, and doing. Truly studying technology and engineering means engaging students in all three dimensions.

## Technology and Engineering in STEM

- STEM is a unitary force that must be addressed effectively.
- Technology and engineering are traditionally underrepresented in this disciplinary quartet.
- *Standards for Technology and Engineering Literacy* is designed to help educators better understand technology and engineering education and how to teach it.



8 - Over the past two decades, educators have come to consensus that the best learning occurs holistically rather than in a content silo. In order to better prepare oneself for college or careers, linking technology and engineering with mathematics, science, and other core disciplines will result in a person who is better able to adapt and adjust to rapid technological changes in their lives.

## Focus on the Small “e” in engineering

- STEL does not attempt to encompass the full spectrum of engineering content.
- Engineering (noun) – the disciplinary study of engineering.
- Engineering (verb) – the use of engineering design and application of engineering habits of mind.



9 - One of the unique aspects about technology and engineering education is the use of technological and engineering design as the primary teaching process. This is very different than college engineering classes that prepare students for a career as an engineer. The teaching of engineering design in PreK-12 education helps all students use an informed design process to solve technological problems.



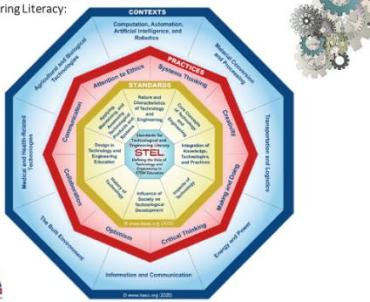
## Features of STEL



- It offers a common set of expectations for what students in technology and engineering STEM laboratory-classrooms should learn through the dimensions of knowing, thinking, and doing.
- It is developmentally appropriate for students.
- It provides a basis for the creation of meaningful, relevant, and articulated curricula at the national, state/provincial, and local levels.
- It promotes interdisciplinary connections with other school subjects in Grades PreK-12.

10 - With the varied ways that technology and engineering education is taught across the world, it was apparent that the new standards should focus on the eight critical power standards that all students should know and be able to do. The STEL benchmarks are written with active verbs to target specific developmental levels of the cognitive, affective, and psychomotor learning domains from Pre-Kindergarten through 12th grade.

Basic Structure of Standards for Technological and Engineering Literacy:



11 - STEL has three organizers: eight core standards, eight practices, and eight contexts where the standards and practices can be taught. This graphical depiction can be imagined as a set of three octagons that can be rotated to indicate application of the core standards and technology and engineering practices in a variety of contexts. The STEL benchmarks are written with active verbs to target specific developmental levels of the cognitive, affective, and psychomotor learning domains.

## STEL Core Disciplinary Standards

Based on the concept of power standards, *Standards for Technological and Engineering Literacy* presents eight core disciplinary standards with 142 benchmarks, linked to Grades Pre-Kindergarten through 12. What students should know and be able to do in order to be technologically and engineering literate.



## Format of the Core Standards

Each core disciplinary standard follows this format:

- Number and title of the standard
- A narrative explaining the standard's intent
- Grade-level material for Grades PreK-2, 3-5, 6-8, and 9-12
- Key ideas
- Benchmarks that detail the particular knowledge, skills, and dispositions that students must attain in order to meet the standard



## Benchmarks

- Identify the fundamental content elements needed for students to meet each standard.
- Objectives written with active verbs that outline the knowledge, skills, and dispositions that enable students to meet each of the standards at the PreK-2, 3-5, 6-8, and 9-12 grade bands.
- Followed by supporting sentences that provide further detail, clarity, and examples.



12 - The original ITEEA standards from 2007 had 288 benchmarks associated with 20 standards. This wide structure made it more difficult for teachers to know what to teach in their classrooms. Based on research, STEL contains just eight standards and 142 benchmarks that indicate the most fundamental aspects of technological and engineering literacy that a person should know and understand by their graduation from high school.

## Technology and Engineering Practices

Student-centered practices that reflect the skills and abilities students will use to successfully apply core disciplinary standards in the different contexts.



13 - The organization of the STEL standards is easy to follow. Students must study all eight standards to maximize their understanding of technology and engineering. Curriculum developers and teachers should understand the standards and benchmarks for all grade levels and should not assume students have studied technology and engineering in previous grades.

14 - The standards and benchmarks have been carefully written to connect the cognitive, affective, and psychomotor domains of learning to the knowing, thinking, and doing dimensions of technology. Each benchmark has examples of use at the different levels from Pre-K to 12th grade.

15 - STEL also includes eight technology and engineering practices that are the personal qualities and attributes all students must develop in order to connect their knowledge and skills learned in the core standards. Based on research and contemporary educational initiatives such as the Engineering Habits of Mind and 21<sup>st</sup> Century Skills, these practices are written to link technology and engineering standards and contexts.

Teachers can help students develop these practices within their lessons, thereby providing students with lifelong personal skills that maximize their technological and engineering literacy.

## TEE Standards and Practices

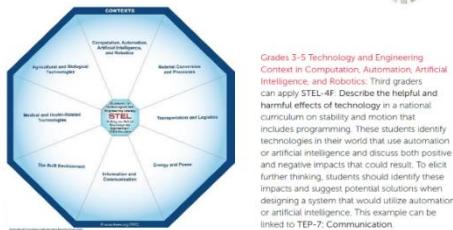
- All students should study all standards and practices but not necessarily every context.
- Standards and practices are not taught in isolation, there is often overlap.



**16 - The study of technology is not linear. Students that study all eight standards and all eight practices will be equipped to understand new and emerging technologies.**

## Technology and Engineering Contexts

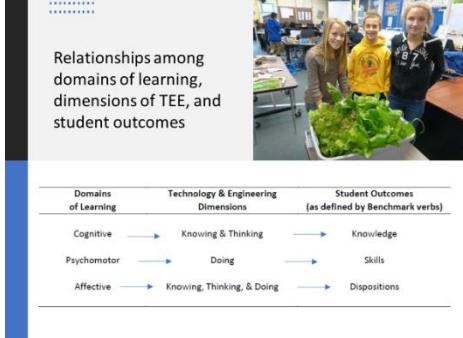
The technology and engineering contexts presented in STEL describe the settings where the core disciplinary standards and benchmarks are best taught or applied.



curriculum developers understand how to apply STEL in a very practical way.

**17 - The eight technology and engineering contexts are the settings where the standards and practices will most likely be taught. These contexts are broader than just traditional course titles. These are the settings where we encounter technology and engineering in our lives and in schools they often include student organization activities, regional engineering competitions, personal interests and hobbies, field trips or even specific activities in a mathematics or science classroom.**

The example given here describes a newer technology and engineering education setting linked to a benchmark from STEL 4 and Practice 7. The inclusion of examples throughout STEL is designed to help teachers and



**18 - STEL has a sound structure that connects the three domains of learning to the three technology and engineering dimensions and the desired student outcomes (as defined by the benchmark verbs).**



**19 - Each standard has a brief narrative and several key ideas to help curriculum developers and teachers with lesson planning. (The third key idea for STEL-1 is that the study of technology and engineering involves the ability to understand, use, assess, and create technological products, systems, and ways of thinking.)**

## Grade Band Descriptions & Benchmarks



with students and general themes worldwide. STEL standards are designed to be used once globally or if other societies have similar needs.

To demonstrate their understanding of the influence of society on technological development, students in Grades 9-12 need to be able to:

**STEL-9R** Analyze how an invention or innovation was influenced by historical events and the circumstances in which they are evaluated, including how the social and environmental drivers create historical contexts and how these contexts influence the level of acceptance. For example, over the past century, the development of new technologies, such as the automobile, has had a significant impact on society as a result of people seeking more efficient ways to travel and communicate.

**STEL-9S** Evaluate a technological innovation based on various perspectives as part of a decision process that recognizes multiple factors and among competing factors. Technological innovations often have both intended and unintended consequences. A technology can be compromised or rejected if it is perceived to be unsafe or get something else than is desired. Students should be able to evaluate the potential risks and benefits of the new and unique products contribute to design for compliance and to unauthorized users.

**Grade 9-12**  
Technology is influenced by society's institutions, including government, business, and educational institutions, among others. These organizations impact how people live.

**20 - Each grade band, Prek-2, 3-5, 6-8, and 9-12 has a description of the appropriate level of knowledge, skills, and dispositions that should be covered. Benchmarks start with action verbs so they can be easily converted to instructional objectives.**

## Recommendations for Using STEL



The benchmarks specify how students progress toward technological and engineering literacy and what students need to know and be able to do in order to meet the standards.



## Convert Benchmarks to Instructional Objectives



The ABCD method of writing objectives : A is for audience, B is for behavior, C is for conditions, and D is for degree of mastery

**STEL**

To demonstrate their understanding of the influence of society on technological development, students in Grades 9-12 should be able to:

**STEL-SH** Evaluate a technological innovation that arose from a specific society's unique need or want.

**Objective**

Given a country, the student will evaluate a technological innovation that arose from a specific society's unique need or want and has been adopted by most of the people in that country.

**22 - Converting STEL Benchmarks to Instructional Objectives can be accomplished using the ABCD method of writing objectives : A is for audience, B is for behavior, C is for conditions, and D is for degree of mastery.**  
The benchmarks have a leading statement that focuses on the student (audience) and an action verb that focuses on the behavior. The condition and degree of mastery is left to the curriculum developer and teacher. Developing curriculum and lesson plans from STEL benchmarks really is that easy.

## Cat® VR & AR



- Cat® Training that incorporates Virtual Reality (VR)  
[Cat® Safety VR program:](#)
  - Hands-on demos
  - Successful program: workers who are trained on VR systems were more likely to remember their training compared to those who learn in a traditional classroom setting.
    - Real scenarios
  - Cat® Augmented Reality (AR)
    - Changes how equipment is serviced
    - Detailed visual instructions
    - Virtual step-by-step directions of how to perform tasks such as machine maintenance and safety checks



**23 -** I was informed when being asked to prepare this unpacking STEL presentation that Caterpillar was a keynote session sharing their exploration and use of VR and AR. What does Caterpillar currently do with virtual reality (VR) and augmented reality (AR)? Caterpillar provides training, equipment, and resources that enable a safe and effective learning environment. They provide hands on demos with their VR program that has proven more successful than instruction that takes place in a traditional classroom setting.

CAT incorporates both virtual and augmented reality into trainings. Some examples include safely entering and performing maintenance in a mine, maintenance procedures for service technicians on site, and apps that allow for specific parts of a machines to be analyzed.

In this example video linked to the slide, CAT is using augmented reality to take a better look at 3D models of equipment. Teachers can use augmented reality in the classroom to better engage students and allow them more hands on, visual opportunities and examples. This extremely engaging context matches up well to deliver on several STEL standards with the associated practices.

## Caterpillar Foundation

- Project Graduation - goal to improve graduation rates
- Building the next generation of skilled workers - goal to improve skills of and graduate students
- Volunteering and giving back to the community

ITEEA's Bring STEM To Life!  
User-Centered Design – Informed Design Approaches  
<https://www.iteea.org/STEMCenter/EbD/gobabygo.aspx>  
<https://www.iteea.org/REACH.aspx>



24 - The Caterpillar Foundation and Caterpillar's Innovation & Technology Development share similar goals aligned with ITEEA's mission.

The foundation includes partnerships with schools, innovative ideas and products, concerns for the safety and well-being of trainees and students, and community involvement. They are encouraging the next generation of workers to pursue careers in the areas of Science, Technology, Engineering and Math (STEM.)

STEL provides a USER-CENTERED DESIGN approach. Examples include the ITEEA REACH Challenge and GoBabyGo project Challenge through the free download in Engineering byDesign. See the links on the slide for accessing these resources.



## Cat® VR & AR



### STEL Contexts:

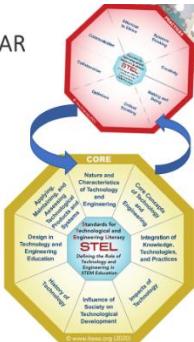
1. Computation, Automation, Artificial Intelligence, and Robotics
2. Material Conversion and Processing
3. Transportation and Logistics
4. Energy and Power
5. Information and Communication
6. The Built Environment
7. Medical and Health-Related Technologies
8. Agricultural and Biological Technologies



be the impact on society and systems of condensed rush hour windows. The preparation of smart signal systems in many cities has reduced vehicle bottlenecks. This activity links to TEP-1: Systems Thinking.



## Cat® VR & AR



### STEL Core Disciplinary Standards:

1. Nature and Characteristics of Technology and Engineering
2. Core Concepts of Technology and Engineering
3. Integration of Knowledge, Technologies, and Practices
4. Impacts of Technology
5. Influence of Society on Technological Development
6. History of Technology
7. Design in Technology and Engineering Education
8. Applying, Maintaining, and Assessing Technological Products and Systems.



25 - STEL - Page 105: Technology and Engineering **Context 5 (TEC-5)**: Information and Communication

- “Information and communication technologies also include the areas of computer-aided design (CAD), video production, podcasting, graphic design, virtual reality, augmented reality, and the internet.”

**Grades 9-12 Technology and Engineering Context in Information and Communication: STEL-1N:** Explain how the world around them guides technological development and engineering design in an information technology unit from a national curriculum during a challenge to unjam urban traffic using spreadsheets and animation software. The context for teaching this lesson could

and controlling technology, is used to control resources and to ensure that technological processes operate effectively and efficiently. Assessment of products and systems is the process of asking questions and examining events to uncover deeper patterns or problems. The end goal of assessment is to improve the process or system. Example benchmarks: **Ex: Grades 6-8: STEL-1J.** Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.

26 - STEL Page 29 - Standard 2: Core Concepts of Technology and Engineering **A process is a systematic sequence of actions used to produce and output.**

Beginning students may use trial-and-error or tinkering, but as students advance they need to learn more formal technology and engineering processes. The Informed Design is the process of applying knowledge and creative skills in the development of a product. The processes of making models, as well as modeling in virtual and augmented environments, is used to demonstrate concepts and to try out visions and ideas. Maintenance is the process of working with the parts of a system or the system as a whole to ensure proper functioning and to prevent unnecessary errors. Management, which is the process of planning, organizing,

STEL Benchmark Crosswalk to NGSS and CCSS Benchmarks: Valid Matches			
Grade Band	STEL Benchmark	NGSS (2013)	CCSS Math
Pre-K-2	<b>STE1</b> Nature and Characteristics of Technology and Engineering	K-ETS1-1 Ask questions based on observations to find answers about the natural world and the designed world.	K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more" of that attribute; describe the difference.
Pre-K-2	<b>STE1</b> Explain the tools and techniques that people use to make things.	K-ETS1-2 Explain how structures make it easier or harder to move objects from one place to another.	K.MD.3 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many are in each category, and how many more or less are in one category than in another.
Pre-K-2	<b>STE1</b> Demonstrate that creating can be done by anyone.	ETS1.A Create a situation that people want to change or create can be described as a problem that is solved through engineering.	K.G.5 Model shapes in the world by building shapes and structures (e.g., sticks and clay bats) and drawing shapes.



<https://www.iteea.org/File.aspx?id=175089&v=48757a07>

27 - The STEL resources webpage has a link to the STEL Benchmark Crosswalk to the NGSS and CCSS Benchmarks by grade band and benchmark provide an approved list of the Next Generation Science Standards (NGSS), Common Core State Standards for Mathematics and English Language Arts.

#### STEL Benchmark Crosswalk to NGSS and CCSS Benchmarks: Valid Matches STEL 7 Design in Technology and Engineering Education

Grade Band	STEL Benchmark	NGSS (2013)	CCSS Math
6-8	<b>7S</b> Create solutions to problems by identifying and applying human factors in design.	MS-ETS1-2 Apply scientific principles and the engineering design process to solve problems related to a system of objects in the environment.	MS-ETS1-2 Conduct short research projects that involve solving a problem by applying scientific and engineering ideas about technologies.
6-8	<b>7T</b> Assess design quality based upon established criteria and constraints of design.	MS-ETS1-3 Evaluate and refine a complex design solution to meet specified criteria for success based on the criteria and restrictions at the time that it was created.	MS-ETS1-3 Write arguments to support claims that the requirements meet the criteria specified for a design.
6-8	<b>7U</b> Evaluate the strengths and weaknesses of different design solutions.	MS-ETS1-4 Develop a system for monitoring and evaluating solutions, identifying what was successful and what could be improved; document results leading to greater success and inform design decisions.	MS-ETS1-4 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to units, dimensions, and/or safety concerns.
6-8	<b>7V</b> Improve essential skills necessary to successfully design.	MS-ETS1-5 Determine the Design Solution: The iterative process of determining the best design solution and modifying what is learned from the process so that final results leads to greater success and inform design decisions (MS-ETS1-4).	MS-ETS1-5 Acknowledge new information about conditions or criteria when overruling quality or safety issues in view of the evidence presented.

#### STEL Benchmark Crosswalk to NGSS and CCSS Benchmarks: Valid Matches STEL 7 Design in Technology and Engineering Education

Grade Band	STEL Benchmark	NGSS (2013)	CCSS Math
9-12	<b>7X</b> Document trade-offs in the technology and engineering design process to produce the optimal design.	HS-ETS1-2 Design a solution to a complex real-world problem by defining the problem; determine criteria and constraints for solutions that account for the trade-offs needed among multiple criteria; and identify trade-offs that need to be made between safety and other considerations.	HS-ETS1-2 Evaluate reports based on data.
9-12	<b>7Y</b> Optimize a design by adjusting variables to improve qualities within criteria and constraints.	HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that consider the impact of the solution on existing systems, including cost, safety, and performance measures, as well as possible social, cultural, and environmental impacts.	HS-ETS1-3 Decide if a specific design for a system or process results from a given design generating process, e.g., using simulations.
9-12	<b>7Z</b> Apply principles of human-centered design.	ETS1.A: Defining and Delimiting Engineering Problems: Criteria must be clear and quantitative, so that it is possible to know when one has been met; criteria may include constraints, such as taking issues or costs into account, and must be quantified and quantified to the extent possible to determine exactly how well a given design meets them.	ETS1.A: Integrate and evaluate multiple sources of information to determine qualitative and quantitative information about complex phenomena in the natural world (e.g., how Earth's features have changed over time due to plate collisions).

Standard 1: Nature and Characteristics of Technology and Engineering <a href="https://www.iteea.org/File.aspx?id=175128&amp;v=1ace7ee6">https://www.iteea.org/File.aspx?id=175128&amp;v=1ace7ee6</a>					
Essential: The study of technology and engineering requires knowledge of the natural world and the human-made world. The study of technology and engineering as a human activity is transdisciplinary. The study of technology and engineering involves the ability to understand, use, assess, and create products, systems, and ways of thinking.					
Item	Benchmark	Cognitive	Affective	Performance	Knowledge Dimension
P-2	Evaluate the natural world and human-made world.	Understand			General
P-2	Evaluate the tools and techniques that people use to help them do things.	Understand			General
P-2	Describe the uses of scientists, engineers, technologies, and other who contribute to society.	Understand			General
P-2	Compare how things found in nature differ from those in the human-made, noting differences and similarities in how they are produced and used.	Understand			General
P-2	Compare how the natural world can contribute to the human-made world to foster innovation.	Understand			General
P-2	Identify and explain how the natural world and human-made world are related to creating and maintaining technological systems.	Understand			General
H	Design and build solutions by safely using tools, materials, and skills.	Practicing			General
H	Develop innovative products and systems that solve problems and extend human capabilities.	Practicing			General
K	Compare and contrast the contributions of sciences, engineering, mathematics, and technology to the development of technological systems.	Understand			General
M	Develop and demonstrate creative thinking by generating a claimed result, creativity, which can result in both intended and unintended innovation.	Practicing			General
M	Apply scientific and engineering concepts to the design, development, and use of devices or processes or the development of new approaches.	Practicing			General
N	Identify and evaluate ways to use them to guide technological development and engineering design.	Understand			General
O	Assess similarities and differences among scientific, mathematical, and technological ways of knowing and learning, and the ways that they relate to a product or system design.	Evaluate	Responding		General
P	Develop a plan for a particular development and predict future effects.	Evaluate	Responding		General
Q	Conduct research to inform inventions and innovations that address specific needs and wants.	Understand			General
S	Develop and implement a plan that incorporates knowledge from science, technology, and other disciplines to design or improve a technological product or system.	Practicing			General

28 - This is an excerpt for grade band 6-8 for STEL 7: **Design in Technology and Engineering Education** Benchmark Crosswalk to the NGSS and CCSS Benchmarks provide an approved list of the Next Generation Science Standards (NGSS), Common Core State Standards for Mathematics and English Language Arts.

[*Speaker-Share STEL 7 Benchmarks if time allows*] When thinking about how to approach and incorporate new contexts to teach technological and engineering literacy and engage all students, such as VR and AR into your lessons, units and curriculum, this crosswalk provides you with not only the ability to introduce these innovative tools, but also connect them to Bona fide standards in other core disciplines as well!

29 - This is an excerpt for grade band 9-12 for STEL 7: **Design in Technology and Engineering Education** Benchmark Crosswalk. The Link to teaching the VR and AR Caterpillar type of educational delivery can be connected to every aspect of the 8 core standards and practices.

30 - STEL Benchmark Verb Matrix lists the standards, key ideas, benchmarks, and level within the relevant domains of learning as well as the type of knowledge. The key is using this easy to access resource and applying the best action verbs for the teaching and learning experience you are delivering.



#### Accessing STEL

- STEL is Available in the following formats:
- Downloadable/Viewable PDF (**FREE**)
  - Downloadable/Printable PDF
  - EPub Edition
  - Print Edition
  - Interactive Website (coming soon)

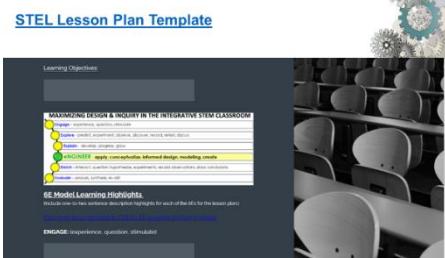
#### STEL Lesson Plan Template

- Online and fillable
- Suitable for all subjects
- Efficient writing and alignment with STEL

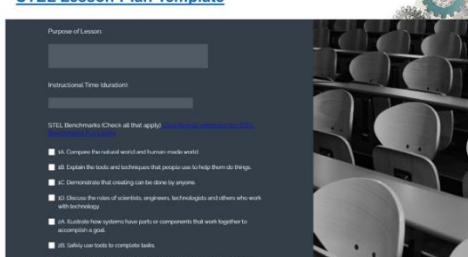
Teachers can select their context area and grade band and then they are provided with a list of appropriate STEL benchmarks. Once chosen, the lesson plan is automatically populated with matching academic standards and benchmarks followed by a section to match the standards to the cognitive, affective, and psychomotor domain. These online tools and more on the ITEEA website will help make lesson plan writing more efficient and better aligned with STEL.



#### STEL Lesson Plan Template



#### STEL Lesson Plan Template



Additional support materials will be provided on the ITEEA website in the coming year.

31 - STEL is available in many different formats on the ITEEA.org website. In addition, we are working on projects to develop additional resources and curriculum.

32 - [We are currently working on an interactive APP that will include the STEL Lesson Plan Template](#). This will include:

- Online and fillable fields
- Suitable for all subjects to use STEL – Try leading your school PLC-professional learning community on STEM using this tool
- This lesson planning tool will provide an efficient writing and alignment with STEL-

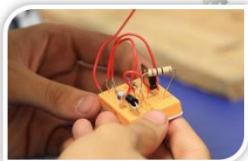
Teachers can select their context area and grade band and then they are provided with a list of appropriate STEL benchmarks.

33 - The 6e lesson format is integrated into the tool that is a value-added component that applies the engineering step to the 5e model.

34 - Additional support materials will be provided on the ITEEA website in the coming year.

#### Additional STEL Resources

- Benchmark Crosswalks to other standards
- Marketing resources,
- Benchmark compendiums by grade band
- Benchmark verb matrix connecting to the domains of learning
- And more...



Visit [www.iteea.org/stel.aspx](http://www.iteea.org/stel.aspx)



35 - Multiple resources are available on the ITEEAA STEL website. The *Benchmark Crosswalk* links STEL benchmarks to *Next Generation Science Standards*, *Common Core State Standards mathematics*, and *Common Core State Standards English language arts*. Marketing materials include an FAQ document, videos, presentations, handouts, and other materials. The *Benchmark Verb Matrix* aligns the STEL benchmark verbs to the cognitive, affective, and psychomotor domains. Please check the STEL website frequently for additional resources.



#### Call to Action



TECHNOLOGY is the modification of the natural environment, through human designed products, systems, and processes, to satisfy needs and wants.

ENGINEERING is the use of scientific principles and mathematical reasoning to optimize technologies in order to meet needs that have been defined by criteria under given constraints.

TECHNICAL AND ENGINEERING LITERACY is the ability to understand, use, create, and assess the human-designed environment that is the product of technology and engineering activity

36 - [Review the key terms and ideas in STEL so you can be an ambassador of design-based learning]: It is now time for a call to action! We are at a critically important juncture in our field. It is a must that we all understand and optimize our ability to assure that all students become technologically and engineering literate. We must individually understand and apply technology as a modification of the natural environment through human design products, systems, and processes, to satisfy human wants and needs. Engineering as the use of scientific principles and mathematical reasoning to optimize technologies in order to meet needs that have been defined by current criteria under giving constraints. And the most important part of connecting technological and engineering

literacy as the ability to understand, use, create, and assess the human design environment that is the product of technology and engineering activity.



#### STEL Collaborations

- Help move your school system toward a PreK-12 technology and engineering program for all students.
- Show your colleagues the logical and authentic connections between and across the individual STEM disciplines.
- TEE should serve as a bridge to STEM careers.



37 - Be a leader inside and outside your classroom. STEL does bring greater clarity as to what technology and engineering education is and how it fits into the education of all students. We are asking for your help in promoting technology and engineering education, through the adoption of STEL, in your district, the state, and our country.

Learn more today at [www.iteea.org](http://www.iteea.org).



38 - Now, the challenge is for educators like yourself to take these and run with them. We encourage you share your STEL connected lessons to the 8 core standards, 8 practices and habits of mind through the wide range of contexts and benchmarks to bring STEM to life for all students! ITEEAA is the premiere organization providing information and support for technology and engineering education. STEL is a project of ITEEAA that was developed with support from the National Science Foundation and The Technical Foundation of America. You are our pathway to assure all children have the opportunity to become technologically and engineering literate. We appreciate your active participation in the Illinois conference and ITEEAA! I hope you can join us for our virtual 2021

conference being held March 24-27. See our website for more details. Thank you.