WHAT TO LO○○K FOR

A quick guide for observing classroom content and practice

High School Technology Engineering instructional time should focus on four core ideas:

ETS1.
Engineering Design

ETS2.
Materials, Tools and Manufacturing

ETS3.
Technology Systems

ETS4.
Energy and Power Technologies

In a **High School Technology Engineering** class you should observe students engaged with at least one science concept <u>and</u> practice:

Science and Engineering Practices

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data

- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Science Concepts

Engineering Design (ETS1)

•Analyzing a global challenge to specify a design problem that can be improved

•Breaking a complex real world problem into smaller, more manageable problems using scientific and engineering principles.

•Evaluating a solution to a complex real world problem based on prioritized criteria and trade-offs that account for a range of constraints as well as social, cultural, and environmental impacts

•Using drawings, proper scale and proportions in a prototype.

•Communicating solutions that include specifications, performance results, issues and limitations.

Materials, Tools, and Manufacturing (ETS2)

•Determining best manufacturing processes and applications to create parts based on available resources and safety.

•Explaining how computers and robots can be utilized in a manufacturing system.

•Comparing the costs and benefits of custom versus mass production of products.

•Explaining how manufacturing processes transform material properties to meet a specified purpose or function.

Technological Systems (ETS3)

•Using models to explain a technological system where the output of one subsystem becomes the input to another subsystem.

•Using a model to explain how information is transmitted via digital and analog signals and through different media.

• Analyzing a communication problem and determine the best mode of delivery for the mode of communication.

•Explaining the importance of live loads and dead loads when constructing structures.

•Using models to analyze how the forces of tension, compression, torsion, and shear affect the performance of a structure.

•Analyzing how building designs are influenced by thermal conditions.

•Demonstrating how a vehicle or device can be modified to produce a change in lift, drag, friction, thrust, and weight.

Energy and Power Technologies (ETS4)

•Researching ways that humans use energy and power systems to harness resources.

•Using a model to explain differences between open fluid systems and closed fluid systems.

•Comparing and contrasting hydraulic and pneumatic systems.

•Calculating and describing how a hydraulic system multiplies distance and force, and effects directional change.

•Explaining how machines convert energy to do work efficiently and effectively.

NOTES

STE What to Look For The example below features three Indicators from the <u>Standards of Effective Practice.</u> These Indicators are just a sampling from the full set of Standards and were chosen because they create a sequence: the educator plans a lesson that sets clear and high **expectations**, the educator then delivers high quality **instruction**, and finally the educator uses a variety of **assessments** to see if students understand the material or if re-teaching is necessary. This example highlights teacher and student behaviors aligned to the three Indicators that you can expect to see in a rigorous High School Technology Engineering classroom.

Expectations (Standard II, Indicator E)

Plans and implements lessons that set clear and high expectations and also make knowledge accessible for all students.

What is the teacher doing?	**What are the students doing?**
•Creating culturally responsive lessons that engage and sustain student attention	•Identifying a lesson's standards or objectives and how they connect to unit goals
•Focusing attention on scientific language (e.g., linguistic complexity, conventions, and vocabulary)	•Using information from observations to construct an evidence based account for natural phenomena
•Modeling how to evaluate reasoning behind currently accepted explanations or solutions	•Developing a complex model of multiple variables that can be tested

Instruction (Standard II, Indicator A)

Uses instructional practices that reflect high expectations regarding content and quality of effort and work; engage all students; and are personalized to accommodate diverse learning styles, needs, interests, and levels of readiness.

What is the teacher doing?	**What are the students doing?**
•Providing opportunities for students to communicate ideas, ask questions, and make their thinking visible in writing and speaking	•Evaluating questions and arguments (e.g., to determine whether they are testable and relevant)
•Providing opportunities for students to conduct investigations that test models	•Actively incorporating others into discussions about scientific ideas
•Creating activities that require sophisticated analysis (such as finding an equation) to find patterns	•Using detailed statistical analysis or models that can evaluate data sets for consistency

Assessment (Standard I, Indicator B)

Uses a variety of informal and formal methods of assessments to measure student learning, growth, and understanding to develop differentiated and enhanced learning experiences and improve future instruction.

What is the teacher doing?	**What are the students doing?**
•Providing students with feedback aligned to long-term goals	•Reflecting on how they are progressing toward goals
•Conducting frequent checks for student understanding and adjusting instruction accordingly	•Demonstrating learning in multiple ways (e.g., mid-unit quiz, completion of investigation)
•Providing exemplars of work (e.g. historical examples, student work)	•Engaging in challenging learning tasks regardless of learning needs (e.g., linguistic background, disability, academic gifts)