



Career and Technical Education and Common Core State Standards

Building a Student Pathway that is Rigorous and Relevant

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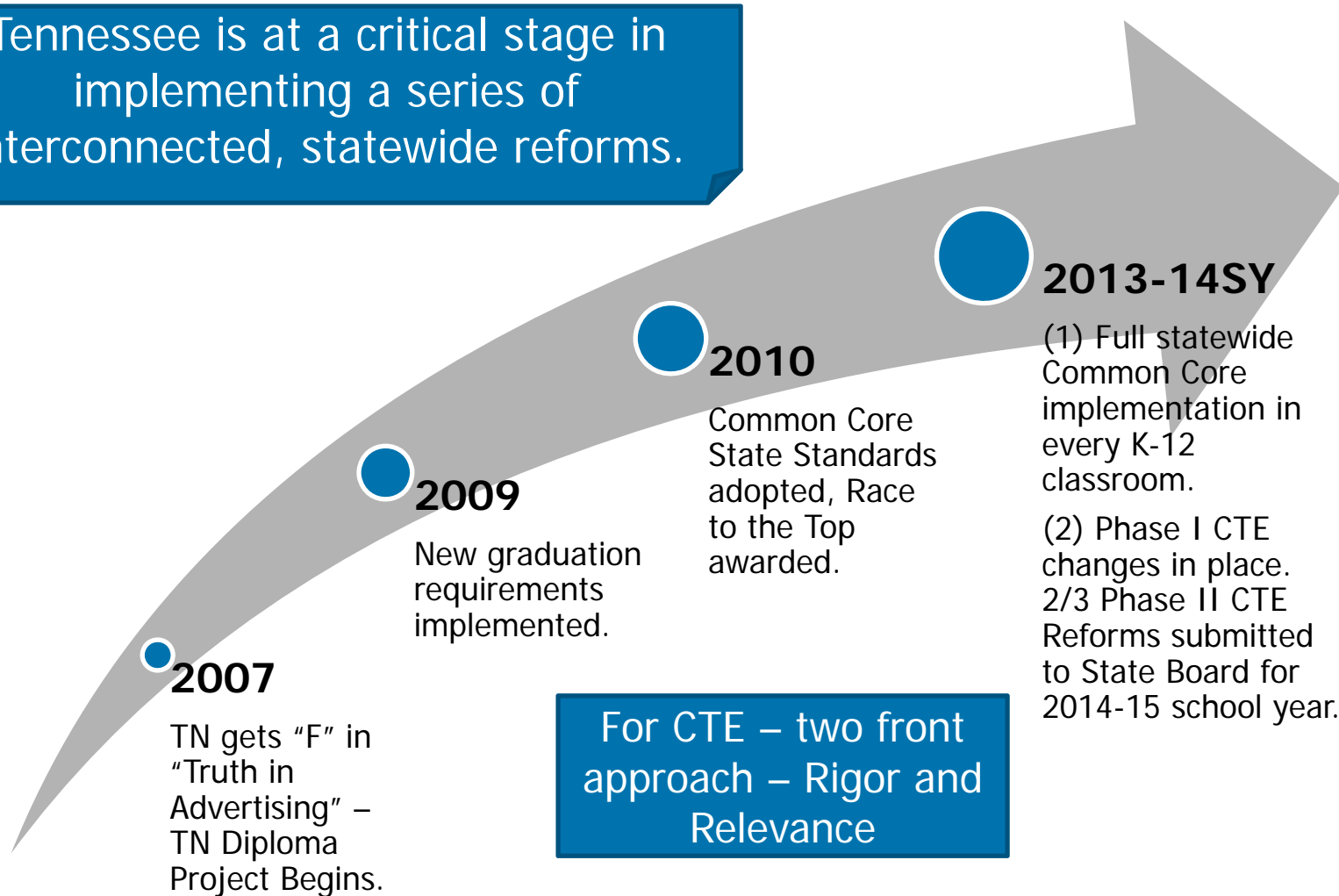
Takeaways

By the end of this session, participants will be able to:

- Understand CTE's approach to building student pathways which are rigorous, relevant, and learner focused
- Describe CTE's professional development model
- Break down CTE standards into knowledge and skills including CCSS alignment
- Walk through examples of lesson plans, writing prompts, and activities
- Create an action plan for sharing this information with individuals preparing to enter the classroom

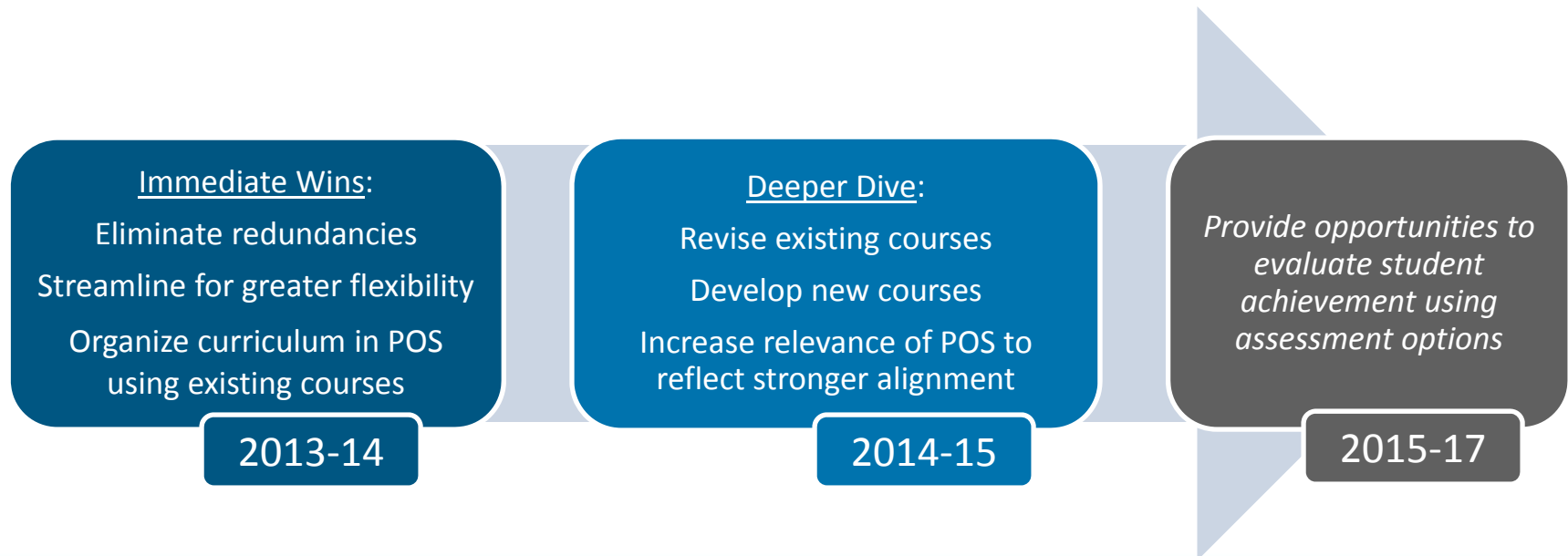
CTE Standards Reform: Setting the Context

Tennessee is at a critical stage in implementing a series of interconnected, statewide reforms.

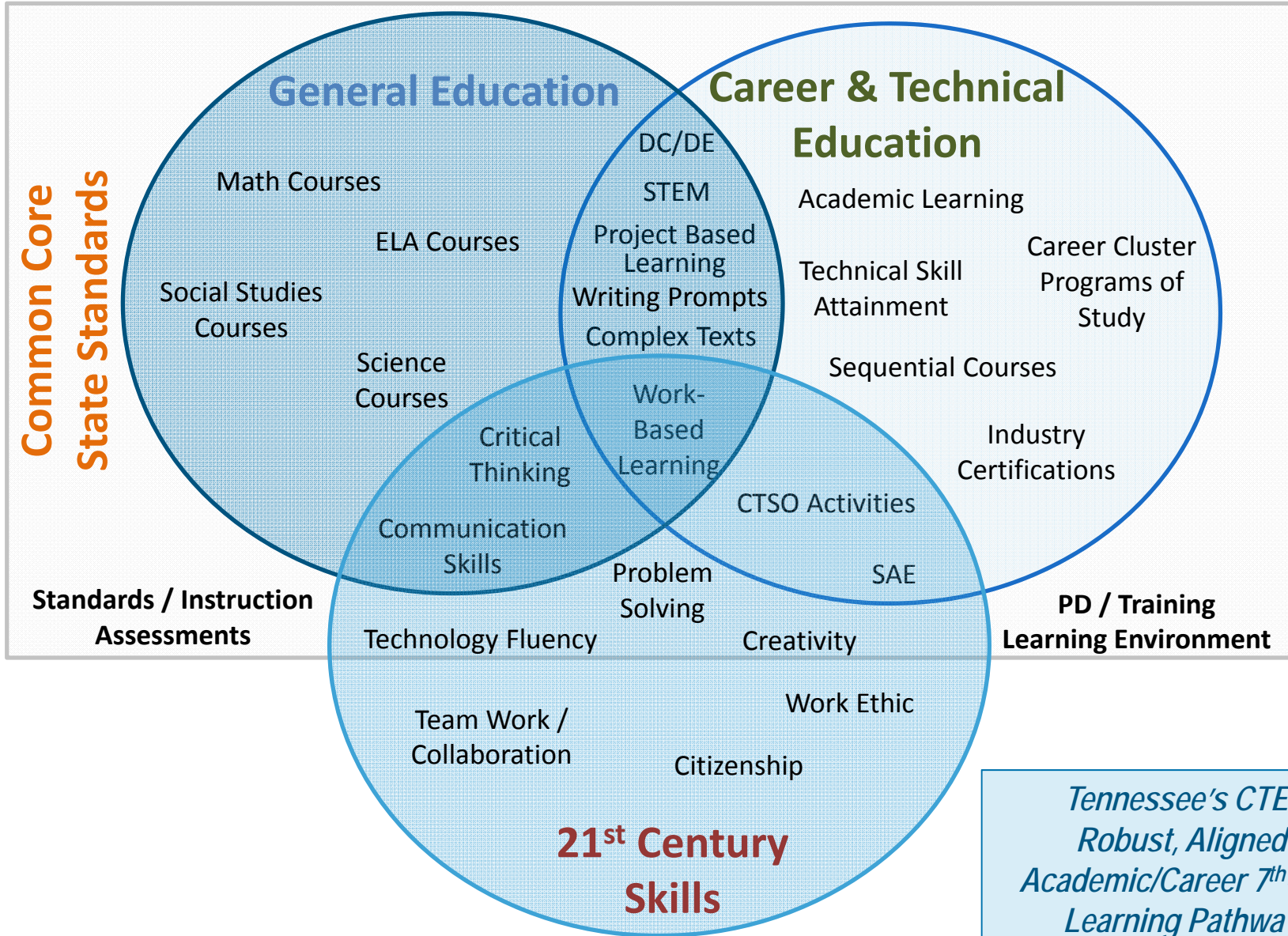


Multi-Phased Approach: Overview

Phase	Goal	Implementation
Phase I	Streamline our existing courses and programs of study	2013-2014 SY
Phase II	Add relevant new courses and new programs of study, revise courses to align to higher student expectations	2014-2015 SY
<i>Phase III</i>	<i>Measure success of students with rigorous assessment options for all courses</i>	<i>2015-2017 SY</i>



**Common Core
State Standards**



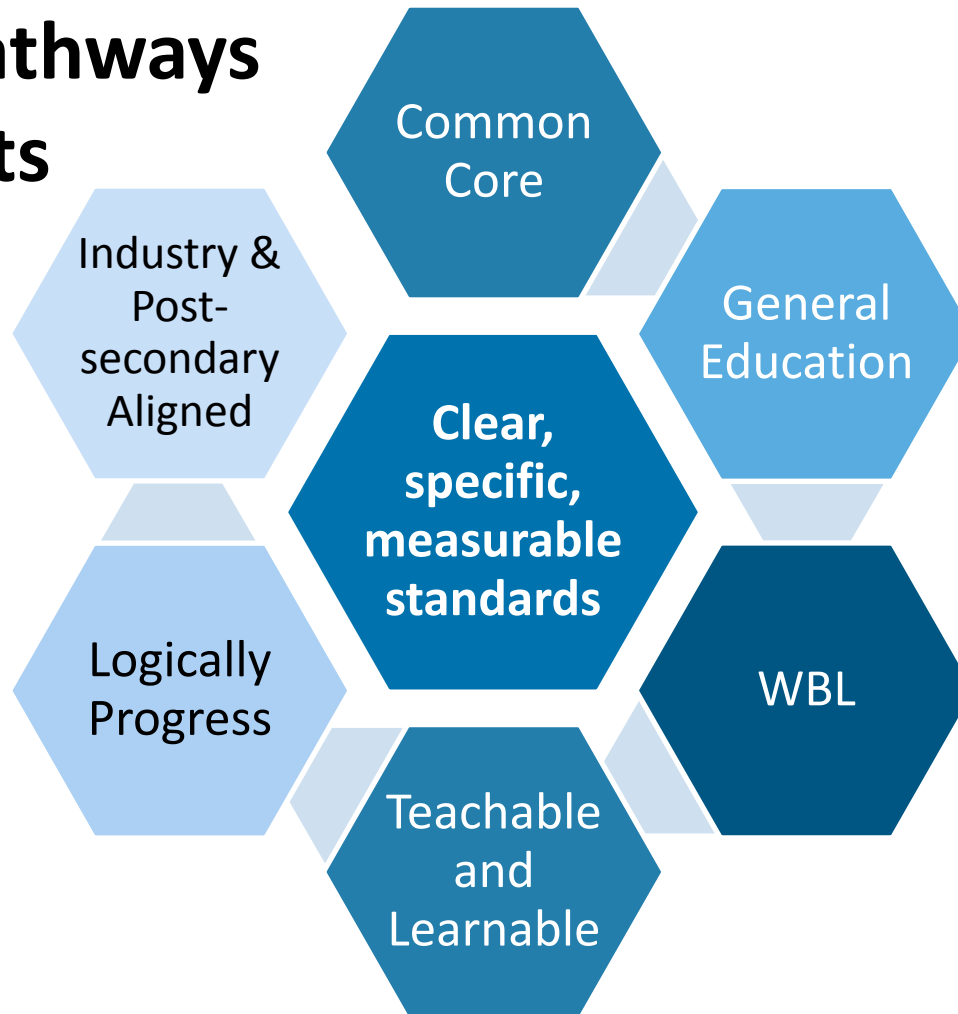
*Tennessee's CTE:
Robust, Aligned
Academic/Career 7th-16th
Learning Pathway*



Phase II CTE Course Standards Reform: Overview

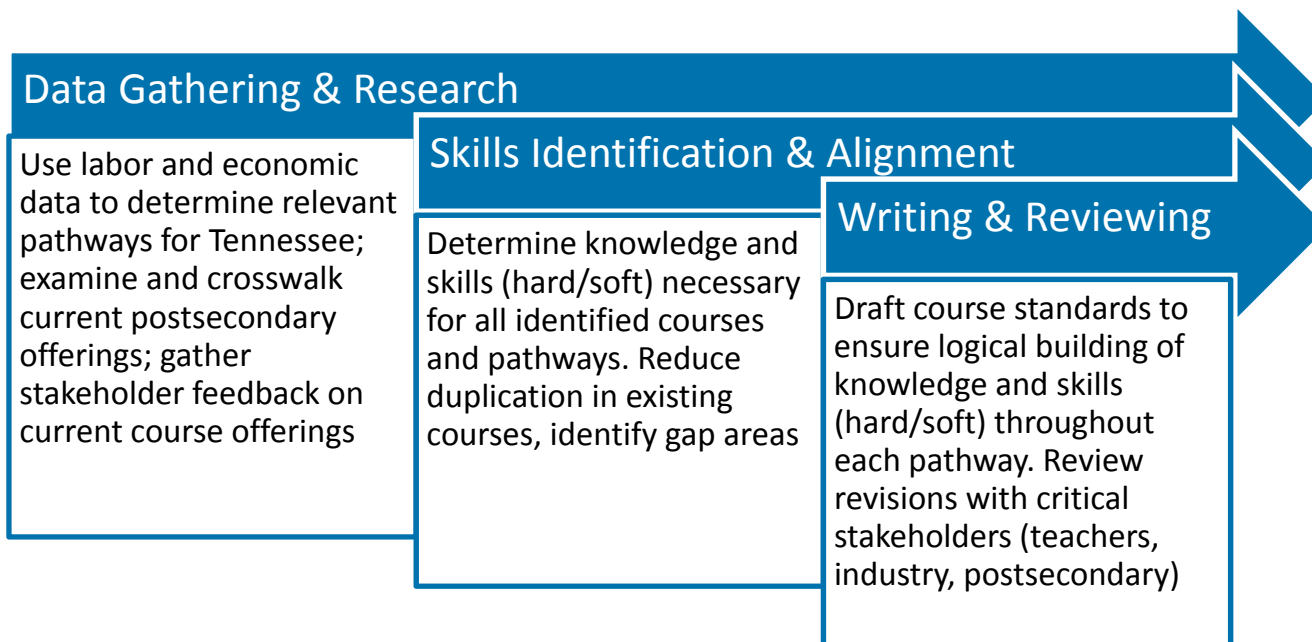
CTE Standards Reform: Process Overview

Building Pathways for Students



Course Standards Revision Process: Overview

1. **Data Gathering and Research:** Determine needs and opportunities of state and the strengths of existing CTE course offerings.
2. **Skills Identification and Alignment:** Determine specific knowledge/skills needed for students to be successful in identified courses and pathways.
3. **Writing and Reviewing:** Craft revised course standards and vet recommendations with key stakeholders.





Phase II Course Standards Reform: Deeper Dive

Course Standards Reform: Look and Feel

The new standards are best thought of as a framework for student learning and a roadmap for teachers to design quality lessons at a pace appropriate for the learning context of a specific classroom.

The standards outline what students should know and do upon completion of the course in order to achieve proficiency in the subject matter...

...and be sufficiently prepared to pursue all the options available to them when they graduate from their chosen Program of Study

Course Standards Reform: Look and Feel



Mechatronics I

Primary Career Cluster:	Manufacturing
Consultant:	Bethany King Wilkes, (615) 532-2844, Bethany.Wilkes@tn.gov
Course Code(s):	TBD
Prerequisite(s):	Algebra I (6109/3102), Geometry (6111/3108), Physical Science (3202), Principles of Manufacturing (3922), and Digital Electronics (3925)
Credit:	1
Grade Level:	11
Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Manufacturing courses.
Programs of Study and Sequence:	This is the third course in the Mechatronics program of study.
Necessary Equipment:	Refer to the Teacher Resources page below.
Aligned Student Organization(s):	SkillsUSA: http://www.tnskillsusa.com Brandon Hudson, (615) 532-2804, Brandon.Hudson@tn.gov Technology Student Association (TSA): http://www.tnbsa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer appropriate placement. For more information, please visit http://www.tn.gov/education/cte/wbl/ .
Available Student Industry Certifications:	If a student successfully completes both Mechatronics I and II, he or she is eligible to sit for Level 1 Siemens Certified Mechatronic Systems Assistant certification.
Dual Credit or Dual Enrollment Opportunities:	There are currently dual enrollment opportunities with specific community colleges, such as Motlow State Community College.
Teacher Endorsement(s):	232, 233, 470, 477, 537, 551, 552, 582, 596
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/Manufacturing.shtml

Course Description

Mechatronics I is an applied course in the manufacturing cluster for students interested in learning more about careers as a mechatronics technician, maintenance technician, electromechanical technician, and manufacturing engineer. This first of two courses covers basic electrical and mechanical components of mechatronics systems as well as their combined uses with instrument controls and embedded software

designs. Upon completion of this course, proficient students are able to describe and explain basic functions of physical properties and electrical components within a mechatronic system. They can logically trace the flow of energy through a mechatronic system and can communicate this process to others. They know how to effectively use technical documentation such as data sheets, schematics, timing diagrams, and system specifications to troubleshoot basic problems with equipment. Finally, they develop strategies to identify, localize, and correct malfunctioning components and equipment. Standards in this course are aligned with Tennessee Common Core State Standards in English Language Arts & Literacy in Technical Subjects and Tennessee Common Core State Standards in Mathematics.⁹

Program of Study Application

This course is the third course in the Mechatronics program of study. For more information on the benefits and requirements of implementing this program in full, please see the program of study description documents found on the Manufacturing website at <http://www.tn.gov/education/cte/Manufacturing.shtml>.

Course Standards

Mechatronics Overview

- 1) Drawing on various media, including visual, quantitative, and written resources, trace the historical development of the four facets (mechanical systems, electronic systems, computers, and control systems) of a mechatronic system and explain their chief applications in modern society, citing specific textual evidence. (TN CCSS Reading 1, 2)
- 2) Citing specific evidence from a textual description or actual observation of a mechatronic system, describe the flow of electrical and mechanical energy in the system. Create a computational model to represent the transfer of energy from one component to others in a system. (TN CCSS Reading 1, 7)

Safety

- 3) Accurately read and interpret safety rules, including but not limited to rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA), state and national code requirements. Apply them accordingly while working on electrical and mechanical components and explain why certain rules apply. (TN CCSS Reading 3)

Electronics

- 4) Demonstrate understanding of the specific roles of various electrical components discerned in a circuit schematic by correctly predicting the effects of changing selected parameter values. For example, predict the effect of halving a resistor's value. Compare and contrast these roles and explain how electronic designs vary within a given system or module. (TN CCSS Reading 3, 9)
- 5) Create, measure, and analyze basic direct current (DC) circuits prescribed by schematics using Ohm's law, Kirchhoff's law, and Watt's law to predict and verify circuit behavior. Apply understanding of these laws to troubleshoot simple circuits, and document the steps required to remedy the trouble. (TN CCSS Reading 3, 4; TN CCSS Writing 4; TN CCSS Math N-Q, A-REI, A-SSE, F-IF)



Side-by-Side: The New Look and Feel

Old course standards often relied on vague wording and multiple competencies to convey student expectations, providing little guidance for how teachers should approach instruction...



Old: Family and Consumer Sciences (FACS)

5.0 Apply nutrition and food principles that enhance individual and family wellbeing across the life span.

- 5.1** Analyze factors that influence personal and family nutrition and meal management across the life span.
- 5.2** Examine basic nutrition needs and results of dietary practices across the lifespan.
- 5.3** Demonstrate table service and dining etiquette.
- 5.4** Acquire 100 % mastery of safety and sanitation standards necessary to ensure a safe environment for laboratory experiences.
- 5.5** Select and prepare nutritious foods applying the current federal dietary and safety and sanitation guidelines.

New: Introduction to Human Studies

- 4.** Cite specific textual evidence from U.S. Food and Drug Administration and U.S. Department of Health and Human Services to analyze necessary dietary practices and specific recommendations for physical health, including dietary guidelines and meal plans. Research the importance of balanced nutrition on human development and productivity, and the correlation to mental health and wellness. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 7, 9; FACS 14)



...while new standards are “meatier,” outlining concrete expectations without limiting teacher flexibility to design tasks appropriate for his/her students.

What Do the New Standards Outline?

...key critical thinking, literacy, and evidence-based writing skills that are part of the Common Core State Standards framework expected to operate in *every* classroom

Principles of Plant Science and Hydroculture (Agriculture)

Research current and emerging plant biotechnologies and construct an argumentative essay to support a claim supporting or opposing the use of a specific biotechnology in horticulture. Justify and debate ethical, legal, and economic issues surrounding plant biotechnology. (CCSS Reading 2, 8; CCSS Writing 1, 7)

Standards are annotated with the specific Common Core-aligned standards to which they correspond...

Family Studies (Human Services)

Form a hypothesis about how a specific community may have changed in response to major historical events (such as World War II). Compare and contrast census records to analyze demographic trends in the community over time and present findings in an informative essay. (TN CCSS Reading 1; TN CCSS Writing 2, 4, 6; TN US History 6-10; FACS 6)

...as well as relevant alignment to Tennessee general education courses and national standards

Example from STEM: From General Competencies to Integrated “Meaty” Standards

Old Standard and Competencies: Principles of Engineering

- 11.0** Students will explore careers available in the engineering and manufacturing areas.
 - 11.1** Investigate possible career paths for engineers and engineering technicians.
 - 11.2** Examine potential roles and responsibilities of an engineer or engineering technician.

New Standards: Principles of Engineering and Technology

- 5.** As a team, develop a written explanation of how society benefits from the contributions of engineers in at least three different engineering disciplines. Provide detailed descriptions of each discipline and describe the specific benefits derived from each. For example, describe how civil engineers improve the efficiency and safety of transportation networks through construction of bridges, highways, and other public infrastructures. Documents should contain links to relevant websites to illustrate the ideas presented. (CCSS Reading 1, 2; CCSS Writing 2, 6, 7, 8)

Example from Health Science: From General Competencies to Integrated “Meaty” Standards

Old Standard and Competencies: Medical Therapeutics

8.0 The student will apply academic concepts relate to other careers in the therapeutic pathway, including education requirements, licensure, and scope of practice then connect and perform related skills.

8.1 Research various careers in: medicine and sub-specialties, surgical technology, public health careers and veterinary medicine including their scope of practice.

8.2 Examine the routine procedures preformed in a therapeutic pathway setting, such as the following:

- Obtain medical history and complete all necessary forms
- Position/drape patients
- Donning and removing sterile gloves
- Preparation of an operative site on humans and animals
- Identification of equipment and instruments used in medical and veterinarian office
- Identify companion animal breeds/species.
- Basic surgical instruments

8.3 Employ principles of infection control in its relation to standard precautions.

New Standards: Medical Therapeutics

2. Investigate and compare the range of skills, competencies, and professional traits required for careers in the therapeutic field. Compare findings to current individual strengths and identify opportunities for personal development. Translate real-time and projected labor market data into narratives to identify local and national employment opportunities and determine areas of growth within therapeutic health fields. (TN CCSS Reading 2, 7; TN CCSS Writing 4, 6, 8, 9)

Example from Business Management: From General Competencies to Integrated “Meaty” Standards

Old Standard and Competencies: Personal Finance

4.0 Investigate opportunities available for saving and investing.

4.2 Evaluate methods of saving.

- a. Certificates of Deposit
- b. Interest bearing savings account
(Passbook savings)
- c. Individual Retirement Account (IRA) – Roth and traditional
- d. Pension plans
- e. Education savings plans

New Standards: Personal Finance

15. Compare savings and investment strategies, including savings accounts, payroll deduction options, stocks, certificates of deposits, bonds, real estate, mutual funds, precious metals, and company retirement plans. Design a diversified savings and investment plan that includes two strategies compatible with personal goals. Include time value of money in analysis. (TN CCSS Reading 4, 5; TN CCSS Writing 4, TN CCSS Mathematics S IC1)

Example from Agriculture: From General Competencies to Integrated “Meaty” Standards

Old Standard and Competencies: Landscaping and Turf Management

- 6.0 Investigate different aspects of management of turf grasses.
 - 6.1 Evaluate the functions and components of a turf grass.
 - 6.2 Evaluate different turf grasses as ... to particular hardiness zones.
 - 6.3 Determine site selection and preparation for turf grass establishment.
 - 6.4 Evaluate the methods of lawn installation.
 - 6.5 Determine ph and nutrient needs...establishment and maintenance
 - 6.6 Identify equipment ...
 - 6.7 determine pest control methods for the maintenance of turf grasses
 - 6.8 Evaluate special needs in the management of residential, commercial and sports turf.

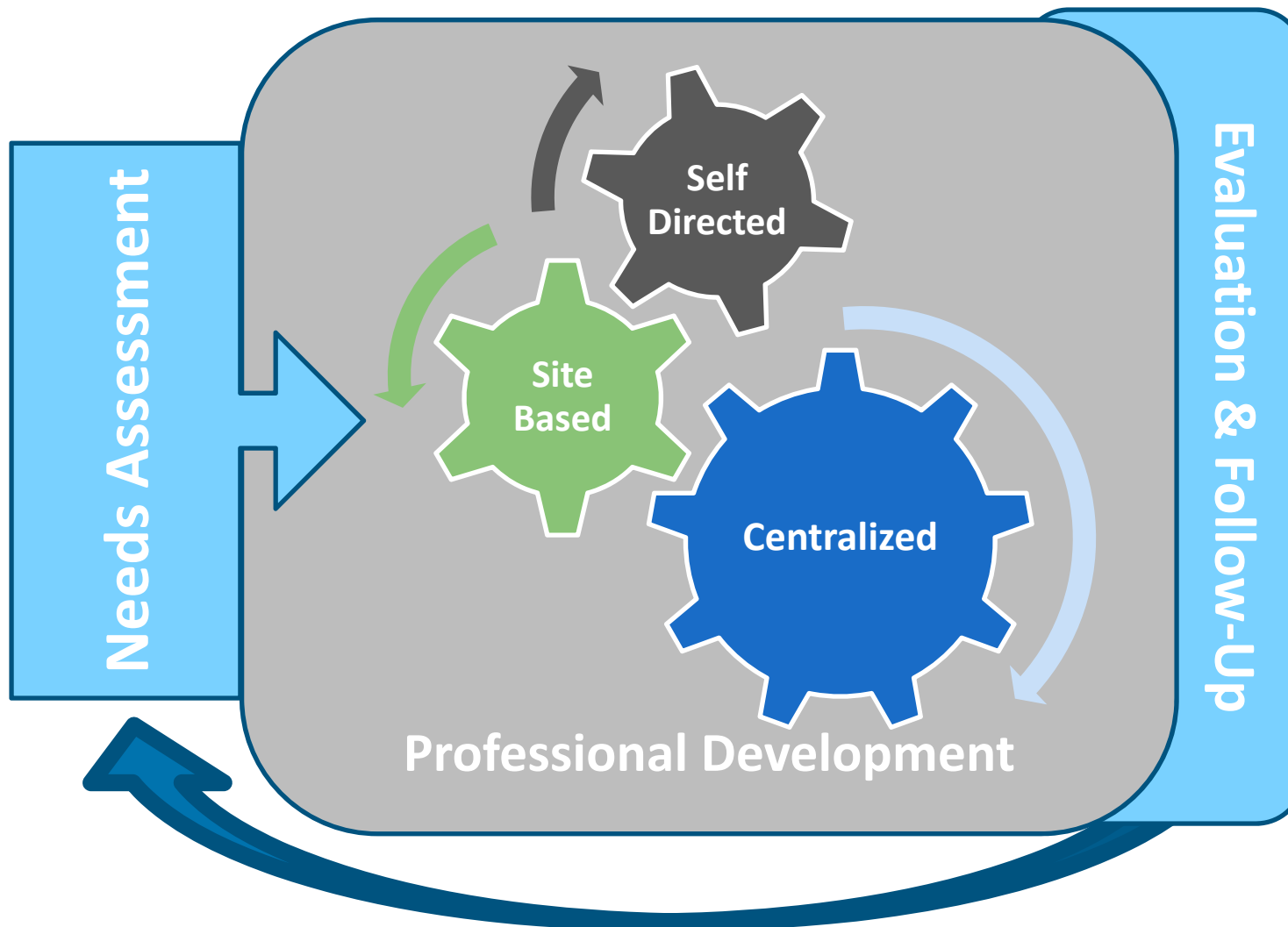
New Standards: Landscaping and Turf Science

- 7. Cite specific textual evidence to compare and contrast the functions and components of turf grasses of common turf grass species. Demonstrate the ability to visually identify and distinguish between turf grass species and cultivars and compose an argument justifying their applications for specific uses. (CCSS Reading 1; CCSS Writing 1, 9)
- 8. Describe methods for the establishment and maintenance of turf grasses, including soil preparation, installation, water, nutrient and pH needs, and fertilizing techniques, attending to appropriate ratios and calculations. Draw conclusions about the importance of site selection, site preparation, and consideration of hardiness zones in the selection of turf grass species and cultivars. (CCSS Reading 3, 9)

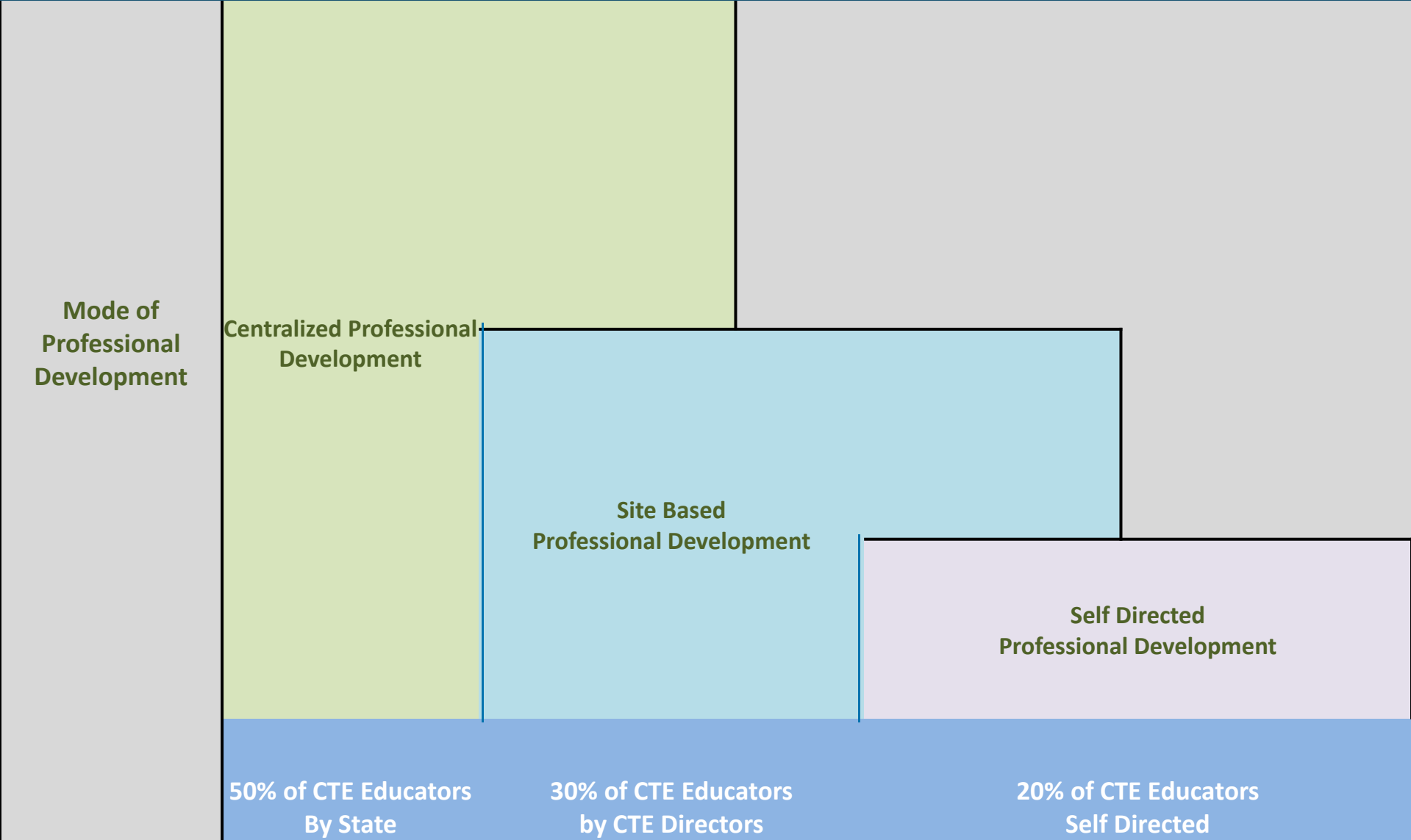


Comprehensive Support for Teachers
Professional Development: Continuous Cycle

CTE Professional Development Process



CTE Professional Development Model



CTE Professional Development Process

Our commitment shapes our offerings

Teachers

- ❖ TDOE CTE Common Core coaches - statewide
- ❖ TDOE Common Core State Standards (CCSS) trainings - statewide
- ❖ Regional Phase II teacher course/CCSS standards trainings
- ❖ Personalized Phase II teacher workshops
- ❖ Direct communications
- ❖ Teacher email lists
- ❖ New teacher trainings
- ❖ Annual Institute for CTE Educators
- ❖ CTE aligned CCSS CTSO activities, lessons, and competitive events
- ❖ FAQs, webinars, resource documents (online content)

CTE Directors

- ❖ CTE Leadership Council
- ❖ Common Core Leadership 101
- ❖ Common Core Leadership 202
- ❖ Regional Phase II course/CCSS standards trainings and facilitation PD
- ❖ New CTE Director trainings
- ❖ Weekly CTE Director Updates
- ❖ Monthly CTE Director Study Council sessions
- ❖ Regional CTE CORE consultants
- ❖ FAQs, webinars, resource documents (online content)

Common Core State Standards and CTE Professional Development

Integrated General Ed/CTE CCSS Training Approach and Integrated General Ed/CTE CCSS Resources and Tools

Trained-Facilitators:

- CTE CCSS Coaches
- CTE Leadership Council
- CTE CORE Consultants
- CTE Career Cluster Consultants
- Divisional Staff

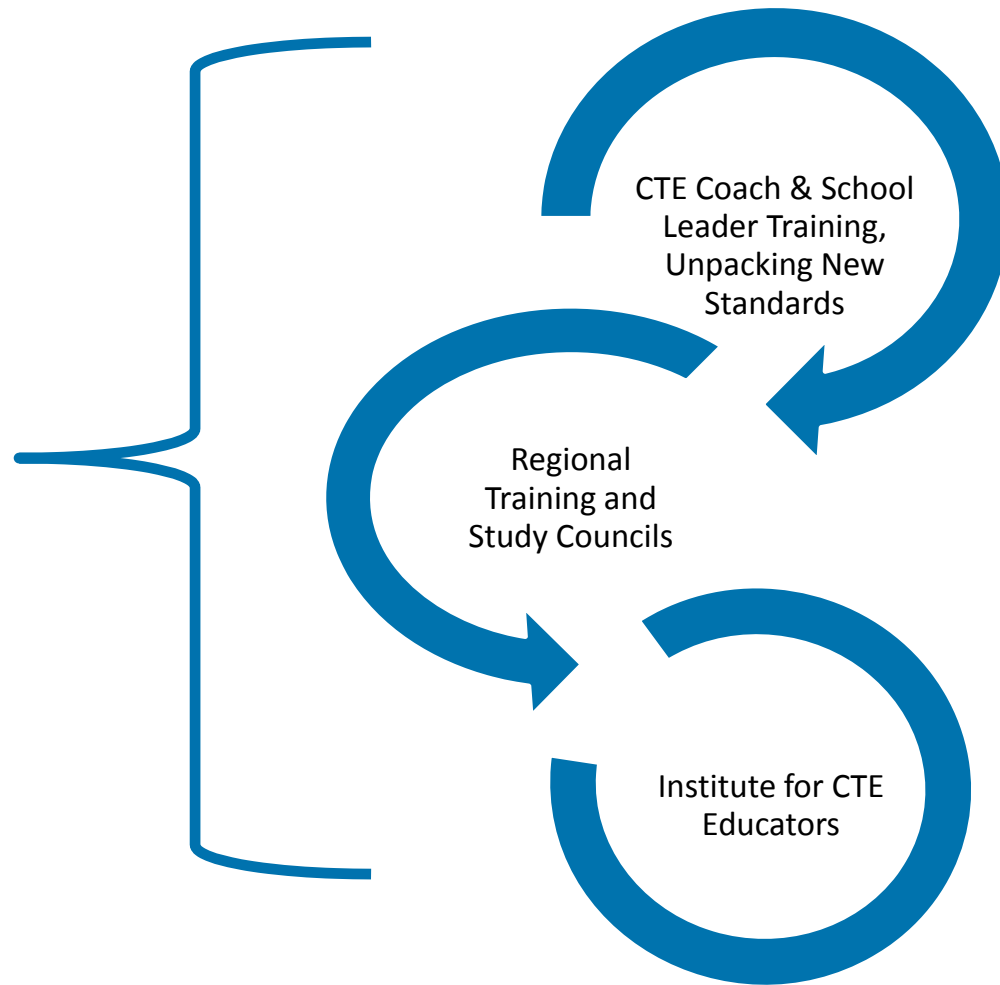
TOTAL = 61

Trained:

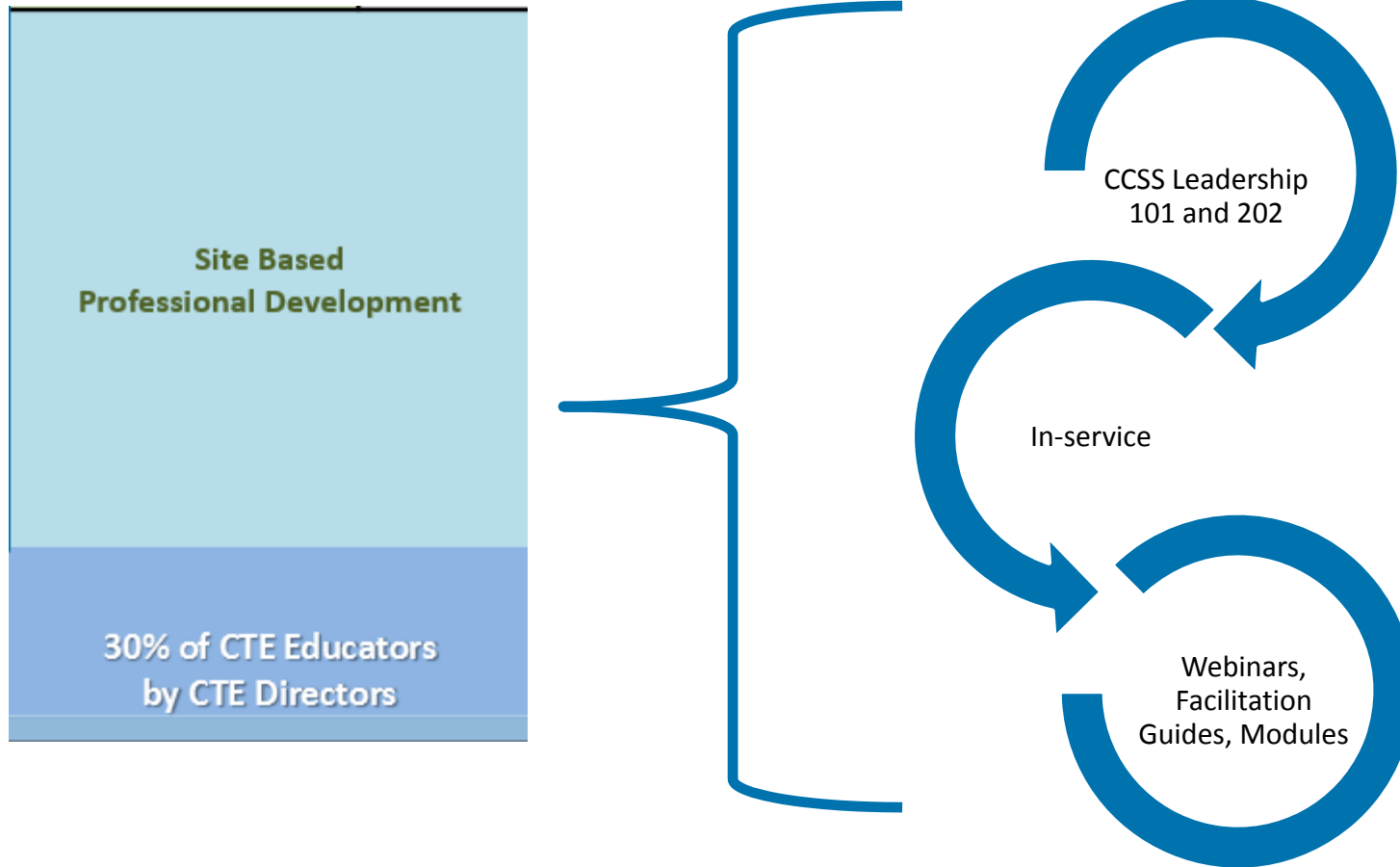
- CTE Directors
- CTE Teachers
- General Ed/CTE Teachers

TOTAL=1,227 and growing

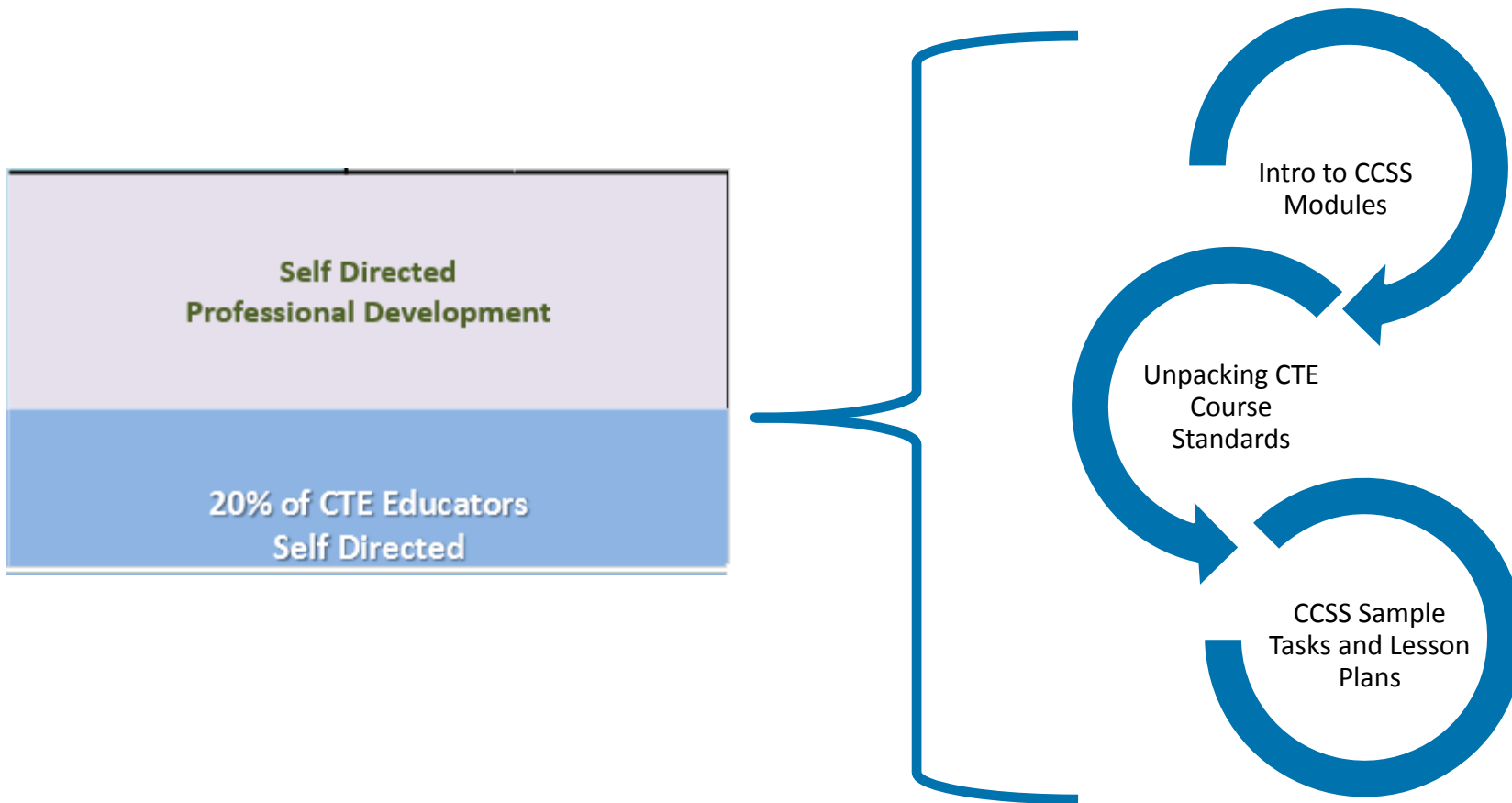
Common Core State Standards and CTE Professional Development



Common Core State Standards and CTE Professional Development



Common Core State Standards and CTE Professional Development





Resources

Process for Unpacking a Standard: CCSS

Step 2: Once you have identified the knowledge and skills within the standard, reference the aligned Common Core State Standards in Technical Subjects and relevant general education standards (if applicable) listed at the end of the standard.

Example: Agriscience

Standard 7) Critique the dynamics of biomass and energy flow in ecosystems by analyzing the major components of a food chain. Analyze the structure of the relationships among the concepts of carrying capacity, species populations, and organism interactions within multiple ecosystems and natural habitats. (TN CCSS Reading 5; TN CCSS Writing 1, 9; TN Biology I 2, 3; TN Biology II 2, 3)

Process for Unpacking a Standard: CCSS

Step 2 Continued: These referenced standards will assist you in creating strong objectives, understanding how to present information to students and what additional types of information should be used to support conceptual understanding of the knowledge and skills identified in the CTE standard.

Example: Agriscience (Standard 7)

- **TN CCSS Writing 9:** Draw evidence from informational texts to support analysis, reflection, and research.
- **TN Biology I 2:** All life is interdependent and interacts with the environment.
- (3210.2.4 Investigate an outdoor habitat to identify the abiotic and biotic factors, plant and animal populations, producers, consumers, and decomposers.)

Process for Unpacking a Standard: Add to Chart

Step 2 Continued: Once the knowledge and skills are identified in the standard, the teacher can place these into a knowledge and skills chart.

Standard	Knowledge	Skills
<p>Critique the dynamics of biomass and energy flow in ecosystems by analyzing the major components of a food chain. Analyze the structure of the relationships among the concepts of carrying capacity, species populations, and organism interactions within multiple ecosystems and natural habitats. (TN CCSS Reading 5; TN CCSS Writing 1, 9; TN Biology I 2, 3; TN Biology II 2, 3)</p>	<p>Biomass and Energy Flow</p> <ul style="list-style-type: none"> • Define types • Identify sources and cycles <p>Food Chain</p> <ul style="list-style-type: none"> • Structure • Components: Producers, consumers, decomposers • Species <p>Carrying Capacity</p> <ul style="list-style-type: none"> • Species Population • Define habitats • Organism Interactions in multiple habitats 	<ul style="list-style-type: none"> • Critique (using evidence) • Analyze the structure of relationships among concepts

Let's try this process for the following standard utilizing your Common Core Poster

15) Research major development trends in the food science industry by analyzing documents authored by for-profit companies and lobbying organizations, defining the question each seeks to address. Compare and contrast the use of advanced technologies in food production, such as but not limited to biotechnology, irradiation, and genetically modified organisms (GMOs), citing specific textual evidence. Summarize technology principles, process effects, and consumer concerns, referencing the extent to which reasoning and evidence presented for each supports specific claims. (TN CCSS Reading 2, 6, 8)

Common Core State Standards and CTE Professional Development

Integrated CTE and CCSS: CTSO Events

Food Science and Safety – FFA Agricultural Issues Forum CTE Common Core State Standards Aligned Lesson

This resource is best for:

Teachers of:	Food Science and Safety*	Career Cluster:	Agriculture, Food, and Natural Resources
Addressing Standard(s):	Food Science Trends and Issues: 15*	Grade-Band:	9-10, 11-12
In alignment with CTSO:	FFA – The National FFA Organization www.tnffa.org	CTSO Event:	Agriculture Issues Forum

*This lesson can also be adapted for use in other courses with other standards requiring research and presentation of the pros and cons of issues in an informative/explanatory manner. In standards requiring that students present two sides of an issue and then argue for one side of the issue, this lesson can be taken a step further in an argumentative manner to accommodate that aspect of the standard.

Learning Objective: The goal of this activity is to develop a student’s ability to research and present both sides of an issue, in this case controversial advanced food technologies, while practicing the skills necessary to become proficient in the Common Core State Standards for Literacy in Technical Subjects. Teachers can use this activity to develop an understanding of food science trends and controversial issues in food technology to meet Standard 15 in the course. Discussions in class, reading, researching, and writing exercises are coordinated in class to help students construct a technical meaning of their research in a way that “sticks.”

The following should be used during this teaching:

- Essays should be evaluated using the 2013-14 Tennessee 9-12 ELA Informative/ Explanatory Rubric, found at <http://www.tncore.org/sites/www/Uploads/TNCORE/Rubrics/InfExpRubric-Gr9-12-Literacy.pdf>

CTSO Competition Overview: The purpose of the Agricultural Issues Forum CDE is to provide an opportunity to expose students to the selection, research, planning, and presentation of an agricultural issue. The competitive event guidelines needed for this activity are:

- Agriculture Issues: You can download the [CDE Handbook](#) on www.tnffa.org or reference the National CDE rules at www.ffa.org.

Common Core State Standards and CTE Professional Development

Integrated CTE and CCSS Lesson Plans/Tasks

What key insights should students take from these texts?

1. Individuals who earn a postsecondary degree have a higher earning potential than those who do not.
2. The cost of postsecondary education is rising, forcing more individuals to rely on student loans to pay for their education.
3. Impacts of borrowing money to pay for education, including the effects of the borrowing on your personal finances if you do not finish with a degree

Text-Dependent Questions

1. What happened to Kevin Wanek? Cite evidence from the text in your summary of his story.
2. What argument does Damask make about individuals that drop out of college?
3. What has happened to the number of student loan borrowers over the past six years? What evidence in the text can you point to that has attributed to this change?
4. Compare and contrast the lifetime earnings of individuals with different levels of education. Cite evidence from the text in your summary.

Writing Mode	Writing Prompt
Argumentative	Write an argumentative essay in which you make a claim to support or oppose using student loans as a way to pay for a bachelor's degree. Be sure to cite evidence from the text, develop your claim and counterclaim, and include strengths and limitations for each.
Informational/Explanatory	Summarize the central idea of Damask's article, citing evidence from the text for the main points that support the central idea.

Next Steps

- What are you taking back to your program?
- What do you see as your role in preparing teachers for the CCSS aligned classroom?
- What can you do as an instructor to assist teachers in effectively developing and utilizing high quality resources?
 - Lesson plans
 - Text dependent questions
 - CCSS alignment

Contact Us!

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