



# WISCONSIN STANDARDS for **Agriculture, Food and Natural Resources**



Wisconsin Department of Public Instruction  
Tony Evers, PhD, State Superintendent

Madison, Wisconsin



This publication is available from:

Career and Technical Education Team  
Wisconsin Department of Public Instruction  
125 South Webster Street  
Madison, WI 53703  
(608) 266-8960  
[cte.dpi.wi.gov](http://cte.dpi.wi.gov)

Bulletin No. 13082

© May 2013 Wisconsin Department of Public Instruction

The Department of Public Instruction does not discriminate on the basis of sex, race, color, religion, creed, age, national origin, ancestry, pregnancy, marital status or parental status, sexual orientation or disability.



Printed on Recycled Paper.



## Table of Contents

<b>Section I: Wisconsin’s Approach to Academic Standards</b>	<b>3</b>
Forward	
Acknowledgements	
Purpose of the Document	
A Guide to Wisconsin Career and Technical Education & Agriculture, Food and Natural Resources	
Aligning for Student Success	
<b>Section II: Wisconsin’s Approach to Career and Technical Education and Agriculture, Food and Natural Resources (AFNR)</b>	<b>13</b>
What is Contemporary Career and Technical Education?	
Delivering CTE through Career Clusters and Pathways	
The Importance of Career and Technical Education	
The Importance of AFNR in Wisconsin and our communities	
Work-Based Learning in AFNR	
Student Organizations in AFNR	
<b>Section III: Wisconsin Common Career Technical Standards</b>	<b>31</b>
Why Common Career Technical Standards	
Wisconsin Common Career Technical Standards	
<b>Section IV: Wisconsin Standards for Agriculture, Food and Natural Resources</b>	<b>53</b>
Wisconsin Standards for Agriculture, Food and Natural Resources	
<b>Section V: Connecting CTE and the Common Core State Standards</b>	<b>111</b>
Connecting CTE to the Common Core State Standards	
Connecting AFNR to the Common Core State Standards	
Reaching Every Student; Reaching Every Discipline	
Reaching Every Discipline: Wisconsin’s Approach to Disciplinary Literacy	
Common Core State Standards for Literacy in All Subjects	
Standards for Mathematical Practice	
<b>Section VI: Wisconsin’s Guiding Principles for Teaching and Learning</b>	<b>159</b>
Guiding Principles for Teaching and Learning	
Research Briefs for Guiding Principles for Teaching and Learning	



This page intentionally left blank.



## **Section I**

---

### Wisconsin's Approach to Academic Standards



This page intentionally left blank.



## Foreword

Career and Technical Education (CTE) has significant value for all students – from introducing them to the world of work to providing specific technical skills. CTE helps students to find relevance, application and understanding of the core subjects.

Career and Technical Education needs to be recognized for the numerous ways it adds value to our students' education and success. As we strive to prepare every Wisconsin student to be college and career ready, it is CTE that provides our greatest opportunity for creating a skilled, knowledgeable and productive future workforce. CTE programs are critical for a student to develop contemporary knowledge and skills for the world of work or for postsecondary coursework. In many schools, CTE also provides articulated courses and work-based learning opportunities, as well as Career and Technical Student Organization connections for students.

To clearly identify what students should know and be able to demonstrate as productive workers, the Wisconsin Department of Public Instruction created the **Wisconsin Standards for Agriculture, Food and Natural Resources**. This resource provides a framework for aligning agriculture, food and natural resources curriculum, instruction and assessment.

The standards within this resource will strengthen CTE's multiple pathways for students to become college and career ready while still in high school. We need to ensure students are exposed to a variety of career development experiences from kindergarten through 12th grade. By adopting the standards within this resource, agriculture, food and natural resources programs will continue offering relevant, rigorous and authentic learning experiences that meet the students' needs and future ambitions. Career and Technical Education should be part of any comprehensive effort to improve student achievement and success while preparing college and career ready graduates. This continued commitment has great economic implications for our future!

Tony Evers, PhD  
State Superintendent





## Acknowledgements

A special thanks to the Career and Technical Education (CTE) Standards Revision Leadership Teams for taking on this important project that will shape the classrooms of today and tomorrow. These workgroups are comprised of specific content area work teams; a stakeholder subgroup, representing administrators, counselors, directors of instruction; and DPI CTE Team members who took on the daunting task of reviewing each content area, as well as the Wisconsin Common Career Technical Standards.

Thanks to the many staff members across the division and other teams at DPI who have also contributed their time and talent to this project.

Finally, a special thanks to Wisconsin educators, businesspeople, parents and citizens who provided comment and feedback to drafts of these standards.

### Wisconsin Standards for Agriculture, Food and Natural Resource Standards Leadership Team

**Lori Berget**

*Agriscience Instructor*  
Black Hawk High School

**Glenda Crook**

*Agriscience Instructor*  
Lodi High School

**Paul Larson**

*Agriscience Instructor*  
Freedom High School

**Mark Strohschein**

*Agriscience Instructor*  
Green Bay East High School

**Jen Bos**

*Agriscience Instructor*  
Shell Lake High School

**Laura Hasselquist**

*Agriscience Instructor*  
Chippewa Falls High School

**Candice Olson**

*Agriscience Instructor*  
Badger High School

**Becky Wirkus**

*Agriscience Instructor*  
Stratford High School

**Tim Buttles**

*Agriculture Education  
Professor*  
UW-River Falls

**Roger King**

*Agriscience Instructor*  
Holmen High School

**Rachel Sauvola**

*Agriscience Instructor*  
New Richmond High School

**Mark Zidon**

*Agriculture Education  
Professor*  
UW-Platteville

**Sandy Cordes**

*Agriscience Instructor*  
Manawa Little Wolf High  
School

**Craig Kohn**

*Agriscience Instructor*  
Waterford High School

**Brenda Scheil**

*Agriscience Instructor*  
New Auburn High School

### CTE Stakeholder Subgroup Leadership Team

**Todd Fischer**

*School Counselor*  
Howards Grove High School

**Natalie Killion**

*School Counselor*  
Green Bay Preble High School

**Lori Krueger**

*School Counselor*  
Appleton North High School

**Eric Larsen**

*Curriculum Services Coordinator*  
CESA 8



**Jared Schaffner**  
*Principal*  
Onalaska High School

**Blia Schwahn**  
*Hmong Community Liaison*  
Eau Claire School District

**Brian Seguin**  
*Director of Instruction*  
School District of the  
Menomonie Area

**Sherri Torkelson**  
*CTE Director*  
CESA 4

**Brenda Vogds**  
*Principal*  
Kettle Moraine School District

#### **DPI Career and Technical Education Leadership Team**

**Janice Atkinson**  
*Health Sciences Education*  
Consultant

**Sara Baird**  
*Career Pathways Education*  
Consultant

**Timothy Fandek**  
*Marketing, Management and*  
*Entrepreneurship Education*  
Consultant

**Jeff Hicken**  
*Agriculture, Food and Natural*  
*Resources Education*  
Consultant

**Brent Kindred**  
*Technology and Engineering*  
Education Consultant

**Kevin Miller**  
*Dual Enrollment Education*  
Consultant

**Diane Ryberg**  
*Family and Consumer Sciences*  
Education Consultant

**David Thomas**  
*Business and Information*  
Technology Education  
Consultant

**Jennifer Wegner**  
*Assistant Director*  
Career and Technical  
Education Team

**Sharon Wendt**  
*Director*  
Career and Technical  
Education Team

#### **Other Department of Public Instruction Leaders**

- Sheila Briggs, Assistant State Superintendent, Division of Academic Excellence
- Sue Grady, Executive Assistant, Office of the State Superintendent
- Rebecca Vail, Director, Content and Learning Team
- Emilie Amundson, Director, Common Core State Standards Implementation Team

#### **Additional Acknowledgements**

The following individuals and groups contributed to the completion of this project through feedback and vetting of one or more sections of the document or standards.

- Wisconsin Association of Agricultural Educators (WAAE)
- Wisconsin FFA Foundation Business and Industry Partners
- Wisconsin Technical College System Agriculture Deans
- Wisconsin Agriculture Educational Workforce Development Council



## Purpose of the Document

Career and Technical Education (CTE) programs include planned courses of high-quality academic content and technical competencies and skills which focus on programs of study and prepare students for successful college and career readiness.

The aim of this guide is to improve CTE for students and for communities. To assist Wisconsin educators and stakeholders in understanding and implementing the **Wisconsin Standards for Career and Technical Education**, the Wisconsin Department of Public Instruction (DPI) has developed standards in the areas of Agriculture, Food and Natural Resources; Business and Information Technology; Family and Consumer Sciences; Health Science; Marketing, Management and Entrepreneurship; and Technology and Engineering. These materials are intended to provide direction in the development of course offerings and curriculum in school districts across Wisconsin.

This publication provides a vision for student success and guiding principles for teaching and learning. Program leaders will find the guide valuable for making decisions about:

- program structure and integration;
- curriculum redesign;
- staffing and staff development;
- scheduling and student grouping;
- facility organization;
- learning spaces and materials development;
- resource allocation and accountability; and
- collaborative work with other units of the school, district and community.



## A Guide to Wisconsin Career and Technical Education & Agriculture, Food and Natural Resources Standards

Wisconsin Career and Technical Education (CTE) programs (Agriculture, Food and Natural Resources; Business and Information Technology; Family and Consumer Sciences; Health Science; Marketing, Management and Entrepreneurship; and Technology and Engineering) have a rich history and foundation of preparing young adults for the next steps in their lives—postsecondary education and the world of work. Through ties to business, industry and the community, CTE programs provide perspectives and partnerships necessary to educate the entire student. Along with CTE's relationships, the standards outlined in this document set a new direction for the knowledge and skills necessary for successful transition to postsecondary programs leading to and/or direct entry into high-wage, high-demand and highly skilled careers. When paired with the Common Core State Standards, Wisconsin students now have access to increasingly rigorous and relevant content to ensure college and career readiness.

Each set of Career and Technical Education standards contains two distinct sections:

1. **Wisconsin Common Career Technical Standards**
2. Standards for the specific discipline

### **The Shift from Model Academic Standards (1998) to State Standards (2013)**

The Model Academic Standards published in 1998 were developed in such a way as to highlight what every student should know and be able to do in a particular content area by the end of grade 4, 8 or 12. In focusing on every student, these standards did not necessarily lend themselves to providing a proficiency level or mastery of industry expectations in a specific career pathway particularly for the purpose of career and technical education.

This new set of standards provides CTE programs an opportunity to develop a single course for exploring a career pathway; as well as developing programs and pathways which include a sequence of courses that have an expectation of proficiency and mastery of skills for students who concentrate in CTE. These standards also serve as a framework to align existing course content to identify gaps and inform curricular decisions. However, the full scope of a set of standards should not be used as a measure of a course or program's completeness. Rather, distinctive conversations and informed decisions with involvement of multiple stakeholders, including business/industry and postsecondary representation, should be made regarding what is and what is not covered in a course, a sequence of courses or a program. Where one district may focus, due to local and community needs or other influences, on a single pathway, another may fully develop multiple pathways. These standards provide a foundation for a variety of applications in each of Wisconsin's districts.

The standards also shift from looking at knowledge and skills acquired by the end of certain grade levels to grade bands of knowledge and skills that should be acquired during a student's route through each level of their education. Grade bands of PK-5, 6-8 and 9-12 align to typical elementary, middle and high school levels.

- Grade band PK-5 performance indicators represent knowledge and skills that should be integrated throughout the elementary curriculum. Career and technical education teachers in districts can be an excellent resource to assist in the development of curriculum and activities.
- Career and technical education should be part of the core curriculum for all middle school students. Awareness, exploration and building foundational skills for career pathways occur in middle school. The performance indicators in grade band 6-8 these foundational skills with an emphasis on career development.
- Career and technical education at the high school level must go beyond awareness and exploration. Students should be developing specific knowledge and skills that are transferrable to other coursework, a job-site or postsecondary options. Performance indicators for grades 9-12 align specifically to industry standards and expectations for career clusters and pathways.



### **Wisconsin Common Career Technical Standards**

In working with business, industry and education professionals from around the state in the development of standards for each of the individual CTE areas, discussions around common elements, skills, knowledge and dispositions led to the identification of a set of **Wisconsin Common Career Technical Standards**. At relatively the same time, national level conversations were also taking place. As part of the “Common Career Technical Core” outlined by the National Association of State Directors of Career and Technical Education Consortium (NASDCTEc), a set of Career Ready Practices emerged. These Career Ready Practices can easily be seen within the **Wisconsin Common Career Technical Standards**.

### **Standards for Agriculture, Food and Natural Resources**

The learning priorities and performance indicators contained within each set of discipline standards consists of knowledge and skills specific to the respective disciplines and their related jobs and careers. These are, of course, critical as students develop and pursue their career goals.

The educators and stakeholders writing the **Wisconsin Standards for Agriculture, Food and Natural Resources** took direction from many resources including, but not limited to:

- Career Clusters Knowledge and Skill Statements
- National Agriculture, Food and Natural Resources Career Cluster Content Standards
- Wisconsin Model Academic Standards for Agriculture (1998)



## Aligning for Student Success

To build and sustain schools that support every student in achieving success, educators must work together with families, community members and business partners to connect the most promising practices in the most meaningful contexts. Currently, statewide initiatives focus on high school graduation, Response to Intervention (RtI) and the *Common Core State Standards for English Language Arts, Disciplinary Literacy and Mathematics*. Now the release of the **Wisconsin Standards for Career and Technical Education** brings to light another set of important academic standards for school districts to implement. While these initiatives are often viewed as separate efforts, each of them is connected to a larger vision of every child graduating college and career ready. The graphic below illustrates how these initiatives function together for a common purpose. Here, the vision and set of guiding principles form the foundation for building a supportive process for teaching and learning rigorous and relevant content. The following sections articulate this integrated approach to increasing student success in Wisconsin schools and communities.

### Relationship Between Vision, Principles, Process, Content



### A Vision: Every Child a Graduate

In Wisconsin, we are committed to ensuring every child is a graduate who has successfully completed a rigorous, meaningful, 21st century education that will prepare him or her for careers, college and citizenship. Though our public education system continues to earn nation-leading graduation rates, a fact we can be proud of, one in ten students drop out of school, achievement gaps are too large and overall achievement could be even higher. This vision for every child a graduate guides our beliefs and approaches to education in Wisconsin.

### Guided By Principles

All educational initiatives are guided and impacted by important and often unstated attitudes or principles for teaching and learning. *The Guiding Principles for Teaching and Learning* emerge from research and provide the touchstone for practices that truly affect the vision of every child a graduate prepared for college and career. When made transparent, these principles inform what happens in the classroom, direct the implementation and evaluation of programs and most importantly, remind us of our own beliefs and expectations for students.

### Ensuring a Process for Student Success

To ensure that every child in Wisconsin graduates prepared for college and career, schools need to provide high quality instruction, balanced assessment and collaboration reflective of culturally responsive practices. The Wisconsin Response to Intervention (RtI) framework helps to organize the components of a system designed to support student learning. Below, the three essential elements of high quality instruction, balanced assessment and collaboration interact within a multi-level system of support to ensure each student receives what he or she needs to access higher levels of academic and behavioral success.

At the school or district level, programs, initiatives and practices related to high quality instruction, balanced assessment and collaboration can be more powerful when organized or braided to function systemically to support all students. The focus must be on a comprehensive approach to student learning.



### **Connecting to Content: The Common Core State Standards**

Within this vision for increased student success, rigorous, internationally benchmarked academic standards provide the content for high quality curriculum and instruction and for a balanced assessment system aligned to those standards. With the adoption of the CCSS, Wisconsin has the tools to build world-class curriculum, instruction and assessments for greater student learning. The CCSS articulate what we teach so that educators can focus on how instruction can best meet the needs of each student. When implemented within a multi-level system of support, the CCSS can help to ensure that every child will graduate prepared for college, work and a meaningful life.

### **Wisconsin's Vision for RtI**





## **Section II**

---

### Wisconsin's Approach to Career and Technical Education and Agriculture, Food and Natural Resources Education



This page intentionally left blank.



## What is Contemporary Career and Technical Education?

There are multiple components to consider when developing contemporary Career and Technical Education (CTE) programs. The standards outlined in this document provide an important foundation to prepare individuals for a wide range of careers. Effective CTE programs are dynamic and require utilization of varied resources and involvement from multiple stakeholders. The discussion that follows highlights the multi-faceted nature of CTE and outlines the critical components that drive the development of effective CTE programs.

### A National Vision for CTE

The National Association of State Directors of Career and Technical Education Consortium (NASDCTEc) has identified five guiding principles that should drive the development of quality CTE programs. Wisconsin supports these principles as spelled out in the NASDCTEc's *Reflect, Transform, Lead: A New Vision for Career and Technical Education*. These principles provide that Career and Technical Education is:

- critical to ensuring that the United States leads in global competitiveness;
- actively partnering with employers to design and provide high-quality, dynamic programs;
- preparing students to succeed in further education and careers;
- delivered through comprehensive programs of study aligned to The National Career Clusters framework; and
- a results-driven system that demonstrates a positive return on investment.

### CTE in Wisconsin

Career and Technical Education is both a collection of educational programs or content areas as well as a system of preparing students to be career and college ready. Contemporary CTE programs are delivered primarily through six specific content areas; these include:

- Agriculture, Food and Natural Resources
- Business and Information Technology
- Family and Consumer Sciences
- Health Science
- Marketing, Management and Entrepreneurship
- Technology and Engineering

Not all Wisconsin school districts offer programs in all of these content areas, but all should be offering CTE through a systemic approach that prepares students to be college and career ready.

At the elementary level, CTE content and concepts should be integrated throughout the curriculum. Teachers can effectively use CTE concepts in instruction and activities to develop foundational skills and also create a connection to the world of work. At the middle and high school levels, all students should have access to CTE courses and programs while also participating in activities prescribed by the Wisconsin Comprehensive School Counseling Model. High quality CTE programs incorporate rigorous academic and technical standards, as well as critical workplace skills – such as problem solving, communication and teamwork – to ensure career and college success for students. The Program of Study components provide a framework for building and maintaining a high quality, contemporary CTE program, but one can also recognize such quality programs by the presence of three distinct and crucial elements – rigorous academics and technical skill attainment, work-based learning and Career and Technical Student Organizations (CTSOs). The diagram and description that follows on the next page illustrates the quality components of Career and Technical Education programs.



### Rigorous Academics and Technical Skill Attainment

CTE programs prepare students for high-skill, family-sustaining jobs that typically require high levels of core academic skills as well as various technical skills. Consequently, CTE students must be held to high academic standards; often this includes course and performance expectations exceeding typical graduation requirements. CTE students benefit from a source of relevance for their academic instruction. They see the connection between their academic knowledge and skill instruction and their future occupational and career goals.

Of course, at the heart of CTE is the attainment of technical skills that are required for potential high-skill, high-wage jobs. Where circumstances and resources allow, CTE programs provide opportunities for high school students to attain the highest level of skills possible within their desired career pathway. This is done through courses taught by high school CTE teachers and/or through partnerships with neighboring districts, employers, technical colleges and postsecondary institutions or other organizations.

Some of the specific means of achieving rigorous academics and technical skill attainment include:

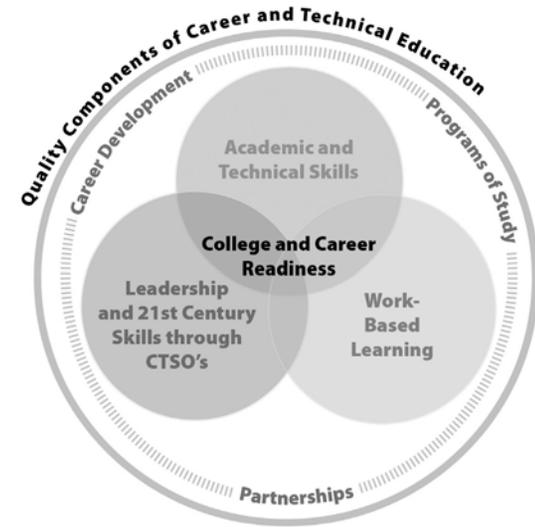
- *Partnerships/Advisory Committees* – These typically include representatives of area businesses within the given program’s career area as well as representatives from related postsecondary training and education programs. They may also include parents, students and program alumni. They can provide recommendations on program changes and improvements, as well as serve as advocates for the program.
- *Transcripted or Dual Enrollment Options* – Opportunities such as these allow students to earn both high school and college credit concurrently. Various options are available for CTE students include advanced standing and transcripted coursework taught at the student’s high school, as well as Youth Options and Advanced Placement (AP) courses.
- *Equivalency Credit Options* – These provide opportunities for students to earn credits required for high school graduation through CTE courses proven to have sufficient academic content.
- *Work-Based Learning* – See separate section below
- *Career and Technical Student Organizations* – See separate section below

### Work-Based Learning

A vital part of comprehensive career and technical education programs is a structured work-based learning experience. One goal of education is preparing students to successfully enter the workforce. The best way to achieve this goal is for students to spend time in a work setting. Many factors will influence the work-based learning options that can be offered.

**Work Place Visits, Employer/Employee Dialogues and Job Shadowing** – At the very least, students should participate in work place visits and tours as well as hear presentations and have a dialogue with employers and employees to see how their school-based learning is relevant to the work place. Job shadowing – during which students spend several hours observing one or more employees at a work place – is an even better way to expose students to the work place.

**Paid Work Experience** – Ideally, students will have opportunities for paid work experience in a job related to their program of study and connected with one or more courses in which the student is currently enrolled. Such experiences should include a training agreement that spells out the expectations for everyone involved including the student, employer, teacher and parents. One of the critical elements of the training agreement is a list of the skills and knowledge the student is expected to develop through their paid work experience. Examples of structured, existing work experience programs in Wisconsin are the Employability Skills Certificate, State Certified Skills Coop programs and Youth Apprenticeship.





**Leadership Certificate** – An option for many students includes the Wisconsin Youth Leadership Certificate. This certificate is comprised of leadership skills and attitudes that are honed through community and school volunteer or service experiences, leadership positions and volunteer or unpaid workplace encounters.

The more time students spend in the workplace and the broader the experiences, the better prepared they will be. These students will also be better prepared to plan and make decisions about their futures. Work-based learning allows students to put into action the knowledge and skills learned at school.

**Career and Technical Student Organizations**

Career and Technical Student Organizations (CTSOs) are the third critical element found in the best contemporary CTE programs. Through CTSOs, students match their skill level against those of other students and established industry standards. In addition, CTSOs allow students to develop civic responsibility, leadership and 21<sup>st</sup> century skills.

Wisconsin has six state and nationally recognized CTSOs that are intra-curricular in that they are connected directly to the classroom through curriculum, activities and community resources. All CTSOs include leadership development elements and competitive events where students demonstrate technical and leadership skills. CTSOs prepare young people to become productive citizens and leaders in their communities and their careers. This is done through school activities as well as regional, state and national leadership conferences and competitions. Students grow and develop through these events and receive recognition for the work they have done and the skills they have developed. CTSOs provide an exceptional extension of CTE instruction. Wisconsin’s recognized CTSOs include:

					
An Association of Marketing Students	An Association of Technology and Engineering Students	An Association of Business and Information Technology Students	An Association of Health Science Students	An Association of Family and Consumer Students	An Association of Agricultural Education Students

**The Powerful Outcomes of Quality CTE**

Beyond the technical knowledge and skills developed by CTE students, the overall outcomes of students who have enrolled in a CTE course – and in particular students who have taken a sequence of courses in a CTE program of study (called CTE concentrators) – are exceptionally positive. Approximately two-thirds of Wisconsin students have taken at least one CTE course. These students have a higher graduation rate (84.2%) than students who have not taken a CTE course (81.8%). CTE concentrators have an even higher graduation rate (95.7%). In addition, within a year after graduation, CTE concentrators report overwhelming positive outcomes with approximately 95% either working, attending postsecondary education or engaged in training programs.\*



### **CTE and Programs of Study – Expanding Student Opportunities**

Such positive outcomes as those noted above show how CTE programs expand student opportunities. To support quality CTE programs, it is critical to foster partnerships, implement Programs of Study and promote career development through academic and career planning. CTE students develop a strong base of academic knowledge and skills that better prepare them to enter nearly any postsecondary program and pursue any career pathway compared to students who have not taken CTE courses. The relevance created by CTE and programs of study opens up additional opportunities and prepares students to pursue those opportunities when they graduate from high school. Students who select and pursue a program of study through CTE, based on identified career goals, will be in the best position for all job and career opportunities that arise in their future, including those they have never considered or those not yet in existence. ***Quality CTE programs are at the forefront of preparing college and career ready graduates.***

---

\*Statistics from 2011 Wisconsin Career and Technical Education Enrollment Report (CTEERS) data.



## Delivering Career and Technical Education through Career Clusters and Pathways

### Career Clusters Framework

One of the keys to improving student achievement is providing students with relevant contexts for studying and learning. Career Clusters do exactly this by linking school-based learning with the knowledge and skills required for success in the workplace. The National Career Clusters Framework was developed by the National Association of State Directors for Career and Technical Education Consortium (NASDCTEc). This framework is comprised of 16 Career Clusters and related 79 Career Pathways to help students of all ages explore different career options and better prepare for further education and career. Each Career Cluster represents a distinct grouping of occupations and industries based on the knowledge and skills they require. They provide an important organizing tool for schools to develop more effective programs of study (POS) and curriculum.

#### **CTE is delivered through comprehensive programs of study aligned to the National Career Clusters framework**

*“Programs of Study aligned to the National Career Clusters framework...should be the method of delivery of all CTE. A rigorous and comprehensive program of study delivered by qualified instructors is a structured sequence of academic and CTE courses that leads to a postsecondary credential. We must be willing to take bold steps necessary to jumpstart dramatic change in our nation’s education and workforce preparation systems. The dichotomous silos of academics versus CTE must be eliminated and their supporting infrastructures must be re-imagined to meet the needs of the economy. As the lines of economies blur, so too must the lines that currently separate CTE and academic education.”*

*~Reflect, Transform, Lead: A New Vision for Career and Technical Education, NASDCTEc*

In Wisconsin, the Career Clusters and Pathways have been embraced by CTE programs to provide a context for learning the skills specific to a career. Furthermore, the nationally recognized 10 components framework (see the Wisconsin Program of Study Implementation Guide for details) delineates promising practices necessary to fully implement programs of study. Programs of Study are designed to produce higher levels of achievement in a number of measurable arenas, including academic and technical attainment, high school completion, postsecondary transitions to career and education and attainment of a formal postsecondary credential. They also contribute to increased student proficiency in vital areas such as creativity and innovation, critical thinking and problem solving.

### Delivering CTE through Career Clusters

Delivering CTE through Career Clusters and Pathways means acknowledging three sets of standards (nationally-developed **Common Career Technical Core**, **Wisconsin Common Career Technical Standards** and the **Wisconsin Standards for Career and Technical Education**), their relationship to each other and how they can be used collectively to deliver quality instruction. It means shifting the way we approach curriculum and instruction to allow for a strategic approach for implementing these standards in a school or district. This section will outline the relationship that exists between these standards.

In our ever-changing society, many CTE programs are transitioning from helping students prepare for an entry-level job to helping students prepare for a career. As part of that transition, national organizations, such as the NASDCTEc, individual states and even industry-based organizations, have created different sets of standards for student learning in CTE programs. The result is an assortment of standards that vary in quality and specificity from one state to the next. In response, Wisconsin has made a concerted effort to outline these standards and their use for educators as they develop curriculum and programs of study.

Educating students is about the preparation for postsecondary options along with transferable skills that balance current business and industry needs and future career trends. CTE brings students, educators and employers together to develop and strengthen the relationship between what is being taught in the classroom and its application in the workplace. Having a skilled workforce and a vibrant economy depends on CTE programs that can deliver high quality



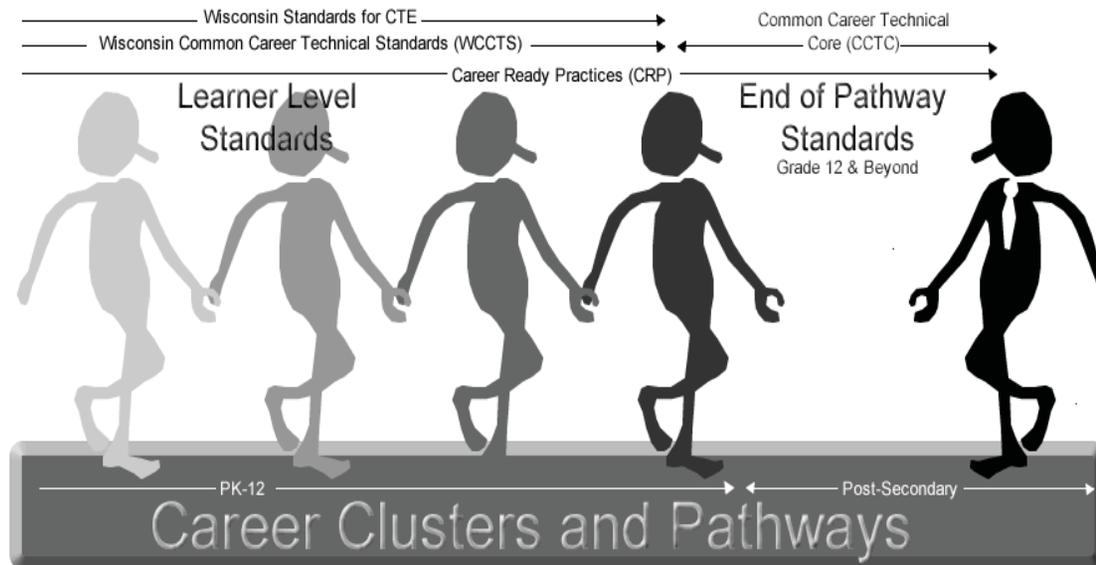
education and training. Because of this, understanding each of the following sets of standards and how they can impact classroom instruction is imperative and will need to be a priority for Wisconsin's CTE educators.

### Common Career Technical Core

Recognizing the need for more consistency in today's global marketplace, in the spring of 2010, NASDCTE united around a vision to develop a shared set of standards that meet a quality benchmark for students in CTE programs, regardless of where they live or which delivery system they use. The **Common Career Technical Core (CCTC)** has been developed to align with other college and career ready standards efforts, such as the Common Core State Standards in English Language Arts and Mathematics, while also articulating industry expectations for each of the 16 Career Clusters. The CCTC begins with a set of overarching **Career Ready Practices (CRP)** that apply to all programs of study. The **Career Ready Practices** include 12 statements that address the knowledge, skills and dispositions that are important to becoming career ready.

While the Common Core State Standards for English Language Arts and Mathematics define the academic knowledge and skills students need to succeed, there are additional standards that individuals must achieve if they are to be truly career ready. For example, employability skills such as team work and time management, as well as the career specific skills, have not been referenced in the Common Core State Standards. These are skills that individuals must possess in order to be successful in the workplace. These skills make up the **Career Ready Practices** outlined in the CCTC.

The nationally-developed **Common Career Technical Core** contains standards developed for each cluster and pathway. These standards are meant to showcase the knowledge and skills students should have at the **end of the pathway**. These standards provide a mechanism for districts and states to collaborate to provide seamless educational opportunities for students across a **program of study** beginning at the secondary level. Most programs of study will require postsecondary or industry-developed skills beyond what is provided at the secondary level.



*As depicted in this graphic, there is a continuum or progression that students travel in their PK-12 career. The path begins with learner-level standards such as the Wisconsin Common Career Technical Standards and the Wisconsin Standards for CTE. As students graduate from high school and move seamlessly into postsecondary options, the focus moves to the end-of-pathway standards such as the Common Career Technical Core (CCTC-national). The Career Ready Practices (CRP-national) act as overarching concepts that students need to know and be able to do throughout their educational experiences.*



**Wisconsin Common Career Technical Standards**

The development of the **Wisconsin Common Career Technical Standards (WCCTS)** occurred at the state level at the same time as the national **Common Career Technical Core (CCTC)**. The Wisconsin standards writing teams identified six areas that have been further developed into standards that should be addressed across all six CTE content areas. These standard areas are Career Development; Creativity, Critical Thinking, Communication and Collaboration; Environment, Health and Safety; Global and Cultural Awareness; Information, Media and Technology; and Leadership. The intended outcome of the WCCTS revolves around creating a set of standards that transcend CTE across the state and across all CTE content areas. To read more about the WCCTS, see Wisconsin’s Approach to Common Career Technical Standards in Section III of this document. The WCCTS, along with the **Wisconsin Standards for CTE** form a strong foundation by which students move toward the completion of a program of study. The WCCTS and the Career Ready Practices in the CCTC correlate as shown below:

6 Wisconsin Common Career Technical Standards*					
<p><b>Career Development</b> Has a focus on personal and social, academic, career content and employability skills</p>	<p><b>Creativity, Critical Thinking, Communication and Collaboration</b> Has a focus on creativity and innovative problem solving, critical thinking used to formulate and defend judgments, to communicate and collaborate to accomplish tasks and develop solutions</p>	<p><b>Environment, Health &amp; Safety</b> Has a focus on interrelationships of health, safety and environmental systems and the impacts of these systems on organizational performance for continuous improvement</p>	<p><b>Global &amp; Cultural Awareness</b> Has a focus on solutions and initiatives related to global issues and the benefits of working in diverse settings on diverse teams</p>	<p><b>Information, Media and Technology</b> Has a focus on information and media literacy to improve productivity, solve problems and create opportunities</p>	<p><b>Leadership</b> Has a focus on applying leadership skills in real-world, family, community and business and industry applications</p>
12 Career Ready Practices**					
Attend to personal health and financial well-being	Apply appropriate academic and technical skills	Consider environmental, social and economic impacts of decisions	Work productively in teams while using cultural global competence	Employ valid and reliable research strategies	Act as a responsible and contributing citizen and employee
Plan education and career paths aligned to personal goals	Communicate clearly and effectively with reason			Use technology to enhance productivity	Model integrity, ethical leadership and effective management
	Demonstrate creativity and innovation				
	Utilize critical thinking to make sense of problems and persevere in solving them				

\*See Section III

\*\*See <http://www.careertech.org/career-technical-education/cctc/>

**Wisconsin Standards for Career and Technical Education (CTE)**

The **Wisconsin Standards for Career and Technical Education** are sets of standards in each of the six content areas of Agriculture, Food and Natural Resources; Business and Information Technology; Family and Consumer Sciences; Health Science; Marketing, Management and Entrepreneurship; and Technology and Engineering. The **Wisconsin Standards for CTE** are written at the **learner level** and provide instruction and assessment at the PK-12 level, that, when coupled with postsecondary education and training, leads to the mastery of end-of-pathway standards. Therefore, the **Wisconsin Standards for CTE** align to **Career Clusters and Pathways** and provide an excellent foundation for students **toward meeting the end-of-pathway** expectations.



### **In Summary**

Career Clusters and Pathways provide an organizational structure for developing Programs of Study while building connections to current labor market information and future workforce demands. As noted previously, Programs of Study used within CTE help to create relevance for students in all subject areas. This relevance translates into improved student engagement in the learning process and more in-depth comprehension and skill development. Further, the **Wisconsin Common Career Technical Standards (WCCTS)** and the **Career Ready Practices** serve as the foundation for career readiness that ensures students have flexibility to change career paths as their interests, passions and circumstances change while considering with changes in the current and projected job market. In our dynamic and unpredictable world, Career Clusters and Pathways, along with **Wisconsin Standards for CTE** to include the WCCTS, provide a measure of stability and certainty on which to build a successful future.



## The Importance of Career and Technical Education

By meeting the current needs and anticipating the future demands of the economy, CTE is critical to our nation's economic success.† Quality CTE programs have planned course sequences of high-quality academic core content and technical skills that provide students with skills necessary for successful transition to postsecondary education or work in addition to a desire for life-long learning in global society.

CTE has grown and evolved to become a focus in schools, workforce and government. The importance and need for career and technical education in our society should be at the forefront of career decision making for the following reasons:

- CTE organizes both academics and career education into a practical program for workforce preparation, elevating the level of rigorous, challenging and applicable coursework leading to more informed preparation.
- CTE in schools promotes the wide variety of postsecondary options to help individuals choose and recognize pathways that will provide the most successful level and type of training for their future goals in postsecondary education, military or work, while understanding the need for lifelong learning and career development.
- CTE provides opportunities to develop 21<sup>st</sup> century and employability skills, exposure to work and mentoring from employers and connections with postsecondary education.
- CTE creates a positive, thoughtful learning environment for self-discovery, innovation and leadership to more lifelong career satisfaction and success.
- CTE recognizes the diverse needs, behaviors, backgrounds, environments and preferences of students by creating an approach for individual guidance and preparation for goals, plans and dreams.
- CTE is dynamic, flexible and responsive to the changes and advances of technology, education, the workforce and the economy by incorporating methods, ideas and resources to keep CTE relevant and contemporary.

CTE has a positive impact on student achievement and transitions. Programs help students find their passion, boost their confidence and empower them to succeed. Because CTE demonstrates a positive return on investment, CTE is a trusted, long-standing partner with the employer community.†

---

† "Reflect, Transform, Lead: A New Vision for Career Technical Education." National Association of State Directors of Career Technical Education Consortium (NASDCTEc), 2010.



## The Importance of Agriculture, Food and Natural Resources in Wisconsin and our communities

For almost a century, Agricultural Education has existed in American high schools as an official subject. While agricultural education was initially needed to train students for the rapid technological advancements in production agriculture, today fewer than 2% of Americans have farming as a career. However, agricultural education is as appropriate today as it was in the early 1900s because...

### **AFNR is relevant and engaging**

Many of today's major issues are agricultural, biotechnological or environmental in their nature and easily fit the content of an agricultural classroom. From sustainability to organic foods to biofuels to climate change to cloning and genomics, agricultural education is at the forefront of today's most pressing issues. Agricultural education is inherently a hands-on subject with strong emphasis in problem-based and inquiry-based techniques. With labs that include suturing, gardening, genetic testing, environmental testing and others, agricultural education enables students to use their knowledge rather than simply repeat it.

### **AFNR is important to the economy**

According to the U.S. Secretary of Education Arne Duncan, students in the United States ranked 21st out of 30 in science literacy among students from developed countries and 25th out of 30 in mathematics literacy.£ By most measurable standards, the United States is falling behind other developed nations in preparing students for a rapidly developing world. A subject such as agricultural education can help to reverse this decline due to its interdisciplinary focus on science, technology, engineering and mathematics (STEM). American agriculture employs one fifth of the country, while it provides over \$59 billion to the Wisconsin economy.€ Through close and long-lasting connections to businesses and organizations in this industry, agricultural education has not only increased the likelihood of gainful employment after high school and college, but also provides increased opportunities for students before graduation through sponsorships, scholarships, internships and other forms of industry support.

### **AFNR prepares for college and careers**

As part of Career and Technical Education, postsecondary preparation is inherent in agricultural education. It is the mission of all agricultural educators to help students identify their own personal career ambitions and to determine which postsecondary institution will best meet the students' own needs for whatever career path they choose. The agricultural, food and renewable natural resources sectors of the U.S. economy will generate an estimated 54,400 annual openings for individuals with baccalaureate or higher degrees in food, renewable energy and environmental specialties between 2010 and 2015.^ Without agricultural education, students would lose a key opportunity to prepare themselves for the challenging world of academia that awaits them after high school.

### **AFNR goes beyond the classroom**

Agricultural education is able to reach beyond the four walls of a classroom through its intra-curricular component, the National FFA Organization. Through involvement in the FFA, students are encouraged to take their classroom lessons into the real world through Supervised Agricultural Experiences – a high school equivalent to college internships. As much as any other subject, students in agricultural education have the opportunity to apply their knowledge to real-world scenarios in areas that are specific to their interests, abilities and future career paths. Through the National FFA Organization and as part of Career and Technical Education, agricultural education plays a very specific role in teaching students to conduct themselves as professionals in and out of the workplace. Agriculture education provides necessary training in the areas of resumes, cover letters, job interview, public speaking and parliamentary procedure for many professions—everything from forest managers and veterinarians to biotechnicians and agriculture journalists. This specific level of training creates the personal level of professionalism to become an effective employee and contributing member of society.



### **AFNR is interdisciplinary and collaborative**

Agricultural education provides specific examples of connections between all content areas in high school. Though agricultural education lessons are saturated in science and math content, it also encompasses content in communication, social studies, art and technological literacy. Agricultural education led the development of an updated agriculture/science equivalent credit process. This process allows students to take an agriculture course and earn an equivalent science credit which counted for graduation and also credit requirement into the UW-System. By providing students with the opportunities to use agricultural proficiencies in other subject areas, agricultural education simultaneously strengthens students' performance in all other subjects.

As part of career preparation and through involvement in the National FFA Organization, students in agricultural education develop strong abilities to work with others through collaboration and leadership. For a student to succeed after high school, they must have the ability to use their knowledge and skills in collaboration with the knowledge and skills of others in an interdependent manner. Agricultural education consistently provides specific and regular opportunities for students to become more productive citizens and employees through regular collaboration.

### **AFNR creates students who care**

Today, over 800,000 students participate in formal agricultural education instructional programs offered in grades seven to adult throughout the 50 states and three U.S. territories.<sup>f</sup> Agricultural education has an inherent mission to not only prepare students to be successful in their careers but also to be active and caring members of the community and country. Through lessons and opportunities in community service, sustainability, animal welfare, education, leadership and more, agricultural education creates opportunities for students to develop into the kinds of citizens who lead by example and act on principle because of their training both in and out of the classroom.

### **In summary**

Agricultural education is an interdisciplinary STEM subject that provides multifaceted opportunities for students to become prepared for their careers and for their postsecondary education through hands-on lessons in the classroom and industry-based opportunities outside of their schools. Agricultural education has an explicit mission to develop students into the leading members of society who have an interest and motivation to care for the welfare of their neighbors, communities, nation and environment. Agricultural education has the potential to elevate the performance of students in the United States while simultaneously ensuring a more sustainable future with more opportunities for all.

£ Educate to Innovate, <http://www.whitehouse.gov/issues/education/k-12/educate-innovate>

€ The Economic Impacts of Agriculture in Wisconsin Counties, Steven Dellar and David Williams, March 2011

^ Employment Opportunities for College Graduates in Food, renewable Energy and the Environment, [www.csrees.usda.gov/nea/education/part/education\\_part\\_employment.html](http://www.csrees.usda.gov/nea/education/part/education_part_employment.html)

f The National Council for Agricultural Education. (2012) Overview of Agricultural Education, <https://www.ffa.org/thecouncil/Pages/ageducation.html>



## Work-Based Learning in Agriculture, Food and Natural Resources Programs

One of the goals of agriculture, food and natural resources programs is to prepare all students to be college and career ready. Providing work-based learning opportunities is an important step to becoming career ready. Engaging work-based learning experiences allow students to apply knowledge and technical skills to real-world projects and problems alongside professionals. Agriculture, food and natural resource students who participate in programs such as the State Certified Cooperative program and Youth Apprenticeship Animal and Plant programs make a significant contribution to student's success in life.

Agriculture, food and natural resource students seek a clear connection between their future career(s) and their class work. The opportunity to explore and experience the world of work is beneficial to career decision-making. These experiences provide students with a firsthand look at what skills and knowledge are needed to be successful in their chosen industry. Work-based learning is a key to a successful economy.

Some work-based education programs provide an opportunity for students to earn postsecondary credits concurrently while earning high school credit. This may occur through local agreements between a high school and college (such as a technical college or university) or through a more comprehensive agreement at the state or national level.

**Today, most career pathways require some form of postsecondary education, whether it is an entry-level job, a management position for a mid-career professional or perhaps even a shift from practicing a profession to teaching others.**

**A particular job might require a certificate, a two-year degree, a four-year degree, a doctorate or even a handful of courses to hone in on a particular piece of knowledge or a skill.<sup>†</sup>**

### Wisconsin Association of FFA and Work-Based Learning

Recognized as integral to the success of work-based learning programs, the Wisconsin Association of FFA organization is an important part in the success of our agriculture, food and natural resource students. Through a proven system of developing leadership skills, positive attitudes and a sense of community pride, Wisconsin Association of FFA serves as a vehicle to transition students into careers. FFA prepares students for future careers by introducing them to the agriculture and business culture. FFA emphasizes respect for the dignity of work, high standards, ethics and high quality skills. It is an extremely effective instructional tool that connects our agriculture, food and natural resource classrooms with college and careers.

### Work-Based Learning Options and Implementation in Agriculture, Food and Natural Resources

#### *Job Shadowing*

Job shadowing is a career exploration strategy. As such, it is most appropriate at the middle school level. Middle school is the time for students to explore the broad range of occupations so that later on they will be able to narrow their career interests. High school students who have not narrowed their career interests by tenth grade may also find job shadowing to be a useful activity.

#### *Supervised Agricultural Experience*

An agricultural education program is made up of three integrated parts: Classroom instruction, FFA and Supervised Agricultural Experience (SAE). Students with an SAE learn by doing. With help from their agricultural teachers, students develop an SAE project based on one or more SAE categories:

- *Entrepreneurship*: Own and operate an agricultural business (e.g. a lawn care service, a pay-to-fish operation, holiday poinsettia production and sales.)
- *Placement*: Get a job or internship on a farm or ranch, at an agriculture-based business or in a school or laboratory.



- *Research and Experimentation*: Plan and conduct a scientific experiment. (e.g. Determine whether the phases of the moon affect plant growth or test and determine the efficacy of different welding methods.)
- *Exploratory*: Explore careers in agriculture by attending an agriculture career fair or creating a report or documentary on the work of a veterinarian.

#### *Service Learning*

Service-learning is a teaching method that engages students in solving problems within their schools and communities as part of their academic studies. In Wisconsin, service-learning is defined as “a teaching and learning method which fosters civic responsibility and links classroom learning and applied learning in communities.” The strongest service-learning experiences occur when the service is intentionally immersed in ongoing learning and is a natural part of the curriculum that extends into the community.

#### *Local Cooperative Education Program*

Local Co-op involves paid work for a local credential that adds value for programs. Students can earn a high school credit for their co-op experience and possible postsecondary credit. The number of required work hours is determined by the local school district and the program is administered by the local school district. Typically a local co-op is one year in length and can include all Career and Technical Education content areas.

#### *School Based Enterprise*

School-based enterprises (SBE) are effective educational tools in helping to prepare students for the transition from school to work or college. For many students, they provide the first work experience; for others, they provide an opportunity to build management, supervision and leadership skills. SBE activities help students increase their skills in management, problem solving, business operations, time management and working in teams.

#### *Youth Leadership Skill Standards Program*

The Youth Leadership Certificate is a set of competencies to recognize a student’s mastery and exhibition of leadership skills valued by employers, communities and organizations. The certificate earned by the student will be issued by the State of Wisconsin and becomes a part of the student’s portfolio and resume.

#### *Employability Skills Certificate Program*

The Employability Skills Certificate Program is a set of competencies developed for all students in order to recognize a student’s mastery of employability skills valued by employers, to help students explore career interests and to provide a state credential of student mastery.

#### *State Certified Cooperative Education Skill Standards Program*

Wisconsin's Cooperative Education Skill Standards Certificate Program is designed in partnership with business, industry and labor representatives and educators around the integration of school-based and work-based learning and appropriate career development experiences. The program is designed to provide paid work experience for junior and senior high school students which contribute substantially to their educational and occupational development. Students learn technical tasks and employability skills validated by business and industry representatives in cooperation with high school, technical college and university instructors.

#### *Wisconsin Youth Apprenticeship*

Wisconsin's Youth Apprenticeship program is a part of a statewide School-to-Work initiative supported by the Wisconsin Department of Workforce Development (DWD). It is designed for high school students who want hands on learning in an occupational area at a worksite along with classroom instruction. The program is for high school juniors and seniors requiring a minimum of 900 hours (450 each year) of paid experience. In mentored on-the-job



training, the mentor serves as a guide and sponsor of the Youth Apprentice and encourages the student's progress in the workplace. The DWD issues a Certificate of Occupational Proficiency to students who successfully complete the program.

The Youth Apprenticeship area has several choices for Agriculture, Food and Natural Resource students to choose from including; Agriculture, Food and Natural Resource –Animal; and Agriculture, Food and Natural Resource –Plant and STEM.

### **In Closing**

Career and Technical Education programs use contemporary concepts and strategies to prepare students who are college and career ready. Today's 21<sup>st</sup> century workplace requires people with the leadership, teamwork and communication skills to perform effectively. Work-based learning programs have proven successful in developing these skills in students of all ages and backgrounds.

† [http://careerreadynow.org/docs/CRPC\\_4pagerB.pdf](http://careerreadynow.org/docs/CRPC_4pagerB.pdf)



## Career and Technical Student Organizations in Agriculture, Food and Natural Resource Programs



Wisconsin Association of FFA has mentored students for over 85 years. College and career-focused students build skills through FFA competition, conferences and supervised agricultural experiences. FFA is affiliated at the local, state and national organization levels. It is an integral component of the middle and high school agricultural education program which also includes classroom instruction and work-based learning, including Supervised Agricultural Experience (SAE).

### Wisconsin FFA Mission

FFA is dedicated to making a positive difference in the lives of young people by developing their potential for premier leadership, personal growth and career success through agricultural education.

FFA enhances the preparation for college and careers by providing intra-curricular programs that integrate into classroom instruction, applying learning in the context of agriculture and business, connecting to business and the community and promoting competition. FFA student members leverage their FFA experience to become academically-prepared, community-oriented, professionally-responsible, experienced leaders.

### Attributes and Values

FFA develops competent and assertive agricultural leadership, increases awareness of the global and technological importance of agriculture and its contribution to our well-being, strengthens the confidence of agriculture students in themselves and their work, promotes the intelligent choice and establishment of an agricultural career, encourages achievement in supervised agricultural experience programs, encourages wise management of economic, environmental and human resources of the community, develops interpersonal skills in teamwork, communications, human relations and social interaction. Builds character and promotes citizenship, volunteerism and patriotism, promotes cooperation and cooperative attitudes among all people and promotes healthy lifestyles.



### College and Career Ready

To be prepared for both college and careers, Wisconsin FFA members take advantage of the programs of study in agribusiness systems; animal systems; biotechnology systems; environmental services systems; food products and processing systems; natural resources systems; plant systems; and power, structural and technical systems.

FFA and the National Council for Agricultural Education have worked closely with the National Association of State Directors of Career and Technical Education Consortium's (NASDCTEc) Career Clusters Project with the development of National Curriculum Standards and Career Cluster Programs of Study. All FFA career development events align with these career clusters, enabling teachers to better incorporate FFA into their curriculum and courses.

### Wisconsin FFA Career Development Events

Career opportunities abound within today's agriculture industry. Career Development Events (CDEs) help students develop the abilities to think critically, communicate clearly and perform effectively in a competitive job market. There are 24 industry recognized CDEs, covering job skills in everything from communications to mechanics. Some events allow students to compete as individuals, while others allow them to compete in teams. FFA's career development events directly contribute to every student being college and career ready when they graduate from high school.



Wisconsin FFA members have the opportunity to experience the career development events program at a variety of levels. Many local chapters conduct practice or mock competitions prior to attending the Regional Career Development Contest. Regional contests range from 400 – 1400 students and are located throughout Wisconsin. The next level of competition is the State Career Development Contest where over 1,800 FFA members have the opportunity to compete, network and broaden their professional interests. The highest level of competition is the National FFA Career Development Contest held in conjunction with the National FFA Convention where over 56,000 students, advisors, businesspersons and alumni gather for several days of competitions, leadership training, industry tours and a career exposition.

### **Leadership Opportunities**

Wisconsin FFA members have a variety of different leadership opportunities at the local, state and international level. At the local level, students can demonstrate leadership through officer roles, events and more. Sectional leadership workshops, state officer positions and leadership conferences are excellent opportunities at the state level. At the national level, interactive leadership workshops, the Washington Leadership Conference and the Agriculture Career Network connect students to leadership roles.

Wisconsin FFA leadership conferences are targeted, highly-focused learning experiences for students and advisors. These conferences bring members into the larger FFA community while providing unique opportunities to extend classroom learning. Each of FFA's conferences connects with and is validated by corporate professionals to engage students in learning industry-related trends and content. These conferences focus on leadership development and college and career preparation through a variety of engaging workshops and speakers.

### **Community Service Opportunities**

Wisconsin FFA members have a unique opportunity to engage their high school peers, family and community members to reach one common goal that makes a difference in the lives of others. FFA provides the foundation for students to champion community service projects with local businesses and charitable organizations. Successful "Day of Service" projects benefiting Second Harvest Food Bank and Madison City Parks, as examples, happen during the State FFA Convention in June.

Wisconsin FFA members can explore a variety of career fields earlier and attain specialized knowledge and skills as their interests grow. Members have more opportunities to experience FFA's benefits. They can begin competing and enhancing their skills earlier, making them more competitive in a global marketplace.

### **In Summary**

Career and Technical Student Organizations, like FFA, provide valuable opportunities for students to develop leadership skills, presents chances to get involved in communities and give back and showcases students' skills and abilities through competition. These opportunities, along with related classroom instruction, support young men and women in preparing for their future endeavors.



## **Section III**

---

### Wisconsin Common Career Technical Standards



This page intentionally left blank.



## Wisconsin's Approach to Common Career Technical Standards

With the release of the Wisconsin Standards for Career and Technical Education (CTE), Wisconsin CTE teachers have access to the foundational knowledge and skills needed to educate students for successful entry into hundreds of high-wage, high-demand occupations and careers. Vetted by business, industry and education professionals, these standards guide Wisconsin schools, teachers and community partners toward development and continuous improvement of world class CTE courses and programs.

The learning priorities and performance indicators contained within each set of CTE standards consists of knowledge and skills specific to the respective disciplines and its related jobs and careers. These are, of course, critical as students develop and pursue their career goals. In addition, knowledge and skills exist that are common to the pursuit of jobs and careers in any field. It is this set of common career knowledge and skills that are contained in the *Wisconsin Common Career Technical Standards*.

The Wisconsin Common Career Technical Standards (WCCTS) include the CTE related knowledge and skills that all students should have to be college and career ready and they provide a foundation on which the discipline-specific CTE standards are built. In some cases, discipline-specific standards will be similar to the WCCTS, but those discipline-specific standards will have a depth or nature that is specific to that discipline and its related jobs and careers.

These WCCTS, which are included as an additional section in each of the discipline-specific CTE standards documents, have been developed from a broad collection of potential standards using a “workplace” lens. In other words, when determining common standards for all CTE areas, their relevance to being successful and valued as an employee in a wide range of career clusters and pathways has been considered. From this perspective, six areas for the WCCTS emerged: **Creativity, Critical Thinking, Communication and Collaboration; Career Development; Environment, Health and Safety; Global and Cultural Awareness; Information, Media and Technology; and Leadership.**

Numerous existing sets of standards and standards-related documents have been used in developing the Wisconsin Common Career Technical Standards. These include:

- 21<sup>st</sup> Century Skills
- Career Cluster Essential Knowledge and Skills Statements
- Wisconsin Employability Skills Certificate
- Wisconsin Youth Leadership Skill Certificate
- National Career Development Association Career Development Standards
- Wisconsin Comprehensive School Counseling Model
- NASDCTEc Common Career Technical Core Initiative

In addition to the Wisconsin Common Career Technical Standards, personal financial literacy and entrepreneurial knowledge and skills are an important part of a student's education. These areas were not included as part of the WCCTS since all Wisconsin educators and schools use the Model Academic Standards for Personal Financial Literacy and *Wisconsin's Vision for Entrepreneurial Education* which adapts the *National Content Standards for Entrepreneurs*. Educators should reference these two sets of standards for inclusion in CTE curriculum where appropriate.

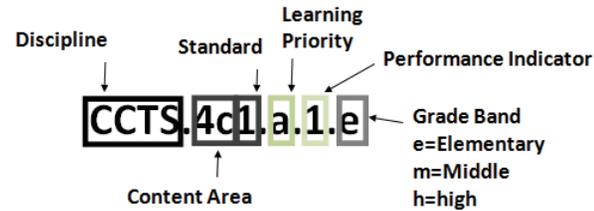
As with all the standards, the Wisconsin Common Career Technical Standards may be taught and integrated through a variety of classes and experiences. Each district, school and program area should determine the means by which students meet these standards. Through the collaboration of multiple stakeholders, these foundational standards will set the stage for high-quality, successful, contemporary CTE courses and programs throughout Wisconsin's PK-12 systems.



## Standard Structure

The Wisconsin Standards for Career and Technical Education, including the Wisconsin Common Career Technical Standards, each follow a similar structure.

### Standard Coding



**Performance Indicator by Grade Band:**  
 Measurable degree to which a standard has been developed and/or met

### Standard Formatting

**Discipline** →

**Content Area** →

**Standard:** Broad statement that tells what students are expected to know or be able to do →

**Learning Priority:** Breaks down the broad statement into manageable learning pieces →

Wisconsin Common Career Technical Standards (WCCTS)			
Content Area: 4C/Creativity, Critical Thinking, Communication and Collaboration			
Standard: 4C1: Students will think and work creatively to develop innovative solutions to problems and opportunities.			
Performance Indicators (By Grade Band)			
Learning Priority	PK-5	6-8	9-12
4C1a: Develop original solutions, products, and services to meet a given need.	4C1a.1a: Recognize that there can be multiple ways to solve a problem.	4C1a.4m: Analyze elements of a problem to develop creative solutions.	4C1a.7h: Develop original ways to solve a given problem.
	4C1a.2e: Explain how human needs and desires drive Innovation.	4C1a.5m: Explain how a recently developed product or service fulfills a human need or desire.	4C1a.8h: Design a product or service that could fulfill a human need or desire.
	4C1a.3e: Explain how a solution to one problem may or may not work for a related problem or situation.	4C1a.6m: Describe how past experiences can inform current problem solving.	4C1a.9h: Apply past experiences to current problems in developing innovative solutions.

### Grade Bands

Grade bands of PK-5, 6-8 and 9-12 align to typical elementary, middle and high school levels.

- Grade band PK-5 performance indicators represent knowledge and skills that should be integrated throughout the elementary curriculum. Career and technical education teachers in districts can be an excellent resource to assist in the development of curriculum and activities.
- Career and technical education should be part of the core curriculum for all middle school students. Awareness, exploration and building foundational skills for career pathways occur in middle school. The performance indicators in grade band 6-8 these foundational skills with an emphasis on career development.
- Career and technical education at the high school level must go beyond awareness and exploration. Students should be developing specific knowledge and skills that are transferrable to other coursework, a job-site or postsecondary options. Performance indicators for grades 9-12 align specifically to industry standards and expectations for career clusters and pathways.



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: 4C/Creativity, Critical Thinking, Communication and Collaboration

**Standard: 4C1:** Students will think and work creatively to develop innovative solutions to problems and opportunities.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>4C1.a:</b> Develop original solutions, products and services to meet a given need.	<b>4C1.a.1.e:</b> Recognize that there can be multiple ways to solve a problem.	<b>4C1.a.4.m:</b> Analyze elements of a problem to develop creative solutions.	<b>4C1.a.7.h:</b> Develop original ways to solve a given problem.
	<b>4C1.a.2.e:</b> Explain how human needs and desires drive innovation.	<b>4C1.a.5.m:</b> Explain how a recently developed product or service fulfills a human need or desire.	<b>4C1.a.8.h:</b> Design a product or service that could fulfill a human need or desire.
	<b>4C1.a.3.e:</b> Explain how a solution to one problem may or may not work for a related problem or situation.	<b>4C1.a.6.m:</b> Describe how past experiences can inform current problem solving.	<b>4C1.a.9.h:</b> Apply past experiences to current problems in developing innovative solutions.
<b>4C1.b:</b> Work creatively with others to develop solutions, products and services.	<b>4C1.b.1.e:</b> Recognize that an individual's background and experiences influence their perspective of problems and solutions.	<b>4C1.b.4.m:</b> Explain how multiple people can develop better solutions than an individual.	<b>4C1.b.7.h:</b> Incorporate the skills and experiences of others to develop a new solution to a problem.
	<b>4C1.b.2.e:</b> Participate with a group to develop new ideas.	<b>4C1.b.5.m:</b> Explain how multiple people and perspectives can develop better ideas than an individual.	<b>4C1.b.8.h:</b> Work as part of a team to design a product or service that could fulfill a human need or desire.
	<b>4C1.b.3.e:</b> Explain the value of multiple perspectives in solving problems and recognizing opportunities.	<b>4C1.b.6.m:</b> Explain how multiple people and perspectives can improve an existing product or process better than an individual.	<b>4C1.b.9.h:</b> Work as part of a team to improve an existing product or process.



<b>Standard: 4C2:</b> Students will formulate and defend judgments and decisions by employing critical thinking skills.			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>4C2.a:</b> Develop effective resolutions for a given problem, decision or opportunity using available information.	<b>4C2.a.1.e:</b> Differentiate between problems and symptoms.	<b>4C2.a.5.m:</b> Analyze symptoms to identify the root cause of a problem.	<b>4C2.a.11.h:</b> Determine the information needed to address an identified problem.
	<b>4C2.a.2.e:</b> Explain problems, decisions and opportunities faced by individuals and communities.	<b>4C2.a.6.m:</b> Develop multiple resolutions for a given problem, decision or opportunity.	<b>4C2.a.12.h:</b> Contrast the benefits and drawbacks of various proposed resolutions to a given situation.
	<b>4C2.a.3.e:</b> Explain the negative aspects of making decisions without adequate information and/or thought.	<b>4C2.a.7.m:</b> Identify problems that became worse due to poorly thought out or poorly informed solutions.	<b>4C2.a.13.h:</b> Predict how an action could result in unintended consequences, both positive and negative.
	<b>4C2.a.4.e:</b> Describe the concept of systems thinking.	<b>4C2.a.8.m:</b> Explain how implementation of a solution or action may affect one or more corresponding systems.	<b>4C2.a.14.h:</b> Analyze the impact of a decision using a systems thinking model.
		<b>4C2.a.9.m:</b> Explain how different resolutions may be appropriate under different circumstances.	<b>4C2.a.15.h:</b> Determine the best resolution for a problem, decision or opportunity based on given criteria.
		<b>4C2.a.10.m:</b> Explain the process for choosing an action or making a decision.	<b>4C2.a.16.h:</b> Defend an action taken or a decision implemented.
<b>4C2.b:</b> Develop and implement a resolution for a new situation using personal knowledge and experience.	<b>4C2.b.1.e:</b> Describe how past experience relates to new situations.	<b>4C2.b.3.m:</b> Analyze problems to determine what past experiences might be related and relevant.	<b>4C2.b.5.h:</b> Apply past experience to develop a course of action for a new situation.
	<b>4C2.b.2.e:</b> Describe how knowledge learned in one class can be used in other classes and situations.	<b>4C2.b.4.m:</b> Analyze a problem to determine how it relates to existing knowledge.	<b>4C2.b.6.h:</b> Use existing knowledge to develop a resolution for a new situation, problem or opportunity.



**Standard: 4C3:** Students will communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.

	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>4C3.a:</b> Communicate thoughts and feelings with others using verbal and non-verbal language.	<b>4C3.a.1.e:</b> Discuss a shared experience with others.	<b>4C3.a.5.m:</b> Conduct a shared dialogue with others on a common problem or task.	<b>4C3.a.9.h:</b> Develop a mutually acceptable response to a question or problem.
	<b>4C3.a.2.e:</b> Identify a person's emotions based on expressions and body language.	<b>4C3.a.6.m:</b> Predict how a person's emotions may influence his/her communication.	<b>4C3.a.10.h:</b> Distinguish between what a person says and what their expressions and body language indicate.
	<b>4C3.a.3.e:</b> Describe various ways people communicate with each other without using words.	<b>4C3.a.7.m:</b> Explore non-verbal and non-written means of communication.	<b>4C3.a.11.h:</b> Communicate effectively in the presence of a language barrier.
	<b>4C3.a.4.e:</b> Demonstrate effective listening skills.	<b>4C3.a.8.m:</b> Implement effective listening skills in resolving a situation.	<b>4C3.a.12.h:</b> Utilize effective listening skills in creating consensus in a group.
<b>4C3.b:</b> Work collaboratively with others.	<b>4C3.b.1.e:</b> Describe various ways of generating ideas in a group setting.	<b>4C3.b.4.m:</b> Use idea generating practices as part of a group.	<b>4C3.b.7.h:</b> Participate in group processes to generate consensus.
	<b>4C3.b.2.e:</b> Complete an assignment as part of a group.	<b>4C3.b.5.m:</b> Describe ways to facilitate group collaboration.	<b>4C3.b.8.h:</b> Lead group processes to generate consensus.
	<b>4C3.b.3.e:</b> Compare the impact of face-to-face discussion with the use of technology for communication.	<b>4C3.b.6.m:</b> Demonstrate the use of various tools to communicate effectively with an individual or a group.	<b>4C3.b.9.h:</b> Incorporate the use of technology to productively plan, implement and evaluate a solution, process or procedure.
<b>4C3.c:</b> Use interpersonal skills to resolve conflicts with others in an ethical manner.	<b>4C3.c.1.e:</b> Compare and contrast ways of resolving conflicts with another person.	<b>4C3.c.4.m:</b> Resolve a conflict with another person with assistance.	<b>4C3.c.7.h:</b> Resolve conflicts productively with individuals as they arise.
	<b>4C3.c.2.e:</b> Describe ways of resolving conflicts within a team or group.	<b>4C3.c.5.m:</b> Contribute to resolving conflicts that occur within a team or group.	<b>4C3.c.8.h:</b> Lead a team or group through a conflict resolution process to reach a productive outcome.
	<b>4C3.c.3.e:</b> Explain ways in which an act might be considered ethical or unethical.	<b>4C3.c.6.m:</b> Explore the ethical considerations of a current or historical action or decision.	<b>4C3.c.9.h:</b> Defend personal ethics applied to common conflicts that arise during group interactions and team activities.



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: CD/Career Development

**Standard: CD1:** Students will consider, analyze and apply an awareness of self, identity and culture to identify skills and talents.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>CD1.a:</b> Identify person strengths, aptitudes and passions.	<b>CD1.a.1.e:</b> Identify individual likes and dislikes related to utilizing skills and abilities.	<b>CD1.a.2.m:</b> Assess personal strengths, aptitudes and passions related to potential future careers.	<b>CD1.a.3.h:</b> Evaluate various occupations and career pathways to identify personal, academic and career goals based on personal strengths, aptitudes and passions.
<b>CD1.b:</b> Demonstrate effective decision-making, problem solving and goal setting.	<b>CD1.b.1.e:</b> Recognize consequences of decisions and choices.	<b>CD1.b.3.m:</b> Develop effective coping skills for dealing with problems.	<b>CD1.b.5.h:</b> Use a decision-making and problem-solving model.
	<b>CD1.b.2.e:</b> Define a goal and describe why it is important to have goals.	<b>CD1.b.4.m:</b> Identify long and short-term goals.	<b>CD1.b.6.h:</b> Develop an action plan to set and achieve realistic goals.
<b>CD1.c:</b> Interact effectively with others in similar and diverse teams.	<b>CD1.c.1.e:</b> Identify when it is appropriate to listen and when it is appropriate to speak.	<b>CD1.c.5.m:</b> Distinguish between appropriate and inappropriate behavior in a team setting.	<b>CD1.c.9.h:</b> Assess cultural differences and work effectively with people from a range of social and cultural backgrounds.
	<b>CD1.c.2.e:</b> Recognize personal boundaries, rights and privacy needs.	<b>CD1.c.6.m:</b> Conduct oneself in a respectable manner which acknowledges the personal boundaries, rights and privacy of others.	<b>CD1.c.10.h:</b> Critique different ideas and values while leveraging social and cultural differences to increase innovation, new ideas and quality of work.
	<b>CD1.c.3.e:</b> Demonstrate cooperative behavior in groups.	<b>CD1.c.7.m:</b> Display cooperative behavior and identify personal strengths and assets in groups.	<b>CD1.c.11.h:</b> Evaluate how the personal strengths and assets of others contribute to a cooperative group atmosphere.
	<b>CD1.c.4.e:</b> Describe what it means to show respect and appreciation for individual and cultural differences.	<b>CD1.c.8.m:</b> Show respect and appreciation for individual and cultural differences in groups.	<b>CD1.c.12.h:</b> Assess how respect and appreciation for individual and cultural differences impacts group processes.
<b>CD1.d:</b> Apply a range of relevant decision-making strategies.	<b>CD1.d.1.e:</b> Define what a decision is and how decisions can be made.	<b>CD1.d.3.m:</b> Evaluate the positive and negative implications of personal decisions.	<b>CD1.d.5.h:</b> Predict the outcome of various decisions on personal, social and career success.
	<b>CD1.d.2.e:</b> Demonstrate when, where and how to seek help with solving problems and making decisions.	<b>CD1.d.4.m:</b> Apply decision-making strategies to personal and team interactions.	<b>CD1.d.6.h:</b> Evaluate the impact of personal decision-making strategies on specific outcomes.



**Standard: CD2:** Students will identify the connection between educational achievement and work opportunities in order to reach personal and career goals.

	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>CD2.a:</b> Apply academic experiences to the world of work, inter-relationships and the community.		<b>CD2.a.1.m:</b> Practice balancing school, studies, co-curricular activities, leisure time and family life.	<b>CD2.a.3.h:</b> Evaluate how performance and connections within the learning community enhance future opportunities.
		<b>CD2.a.2.m:</b> Describe a diverse range of opportunities available beyond high school.	<b>CD2.a.4.h:</b> Determine those opportunities that best support attainment of a specific career goal.
<b>CD2.b:</b> Assess attitudes and skills that contribute to successful learning in school and across the life span.	<b>CD2.b.1.e:</b> Set realistic expectations for work and achievement.	<b>CD2.b.4.m:</b> Assess changes due to influences and shifts in regional, national and global economies related to career opportunities.	<b>CD2.b.7.h:</b> Interpret and analyze the impact of current education, training and work trends on life, learning and career plans.
	<b>CD2.b.2.e:</b> Establish challenging academic goals.	<b>CD2.b.5.m:</b> Apply academic information from a variety of sources to enhance career preparedness and lifelong learning.	<b>CD2.b.8.h:</b> Assess education and training opportunities to acquire new skills necessary for career advancement.
	<b>CD2.b.3.e:</b> Explore local and regional labor market and job growth information.	<b>CD2.b.6.m:</b> Research local and regional labor market and job growth information to analyze career opportunities.	<b>CD2.b.9.h:</b> Analyze local and regional labor market and job growth information to select a career pathway for potential advancement.



<b>Standard: CD3: Students will create and manage a flexible and responsive individualized learning plan to meet their career goals.</b>			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>CD3.a:</b> Investigate the world of work in order to gain knowledge of self in order to make informed career decisions.	<b>CD3.a.1.e:</b> Locate, evaluate and interpret career information.	<b>CD3.a.5.m:</b> Demonstrate the ability to use technology to retrieve and manage career information that inspires educational achievement.	<b>CD3.a.10.h:</b> Analyze how career plans may be affected by personal growth, external events and changes in motivations and aspirations.
	<b>CD3.a.2.e:</b> Discuss and explain behaviors and decisions that reflect interests, likes and dislikes.	<b>CD3.a.6.m:</b> Build an ongoing awareness of personal abilities, skills, interests and motivation and determine how these fit with chosen career pathway.	<b>CD3.a.11.h:</b> Apply academic and employment readiness skills in work-based learning situations such as internships, shadowing and/or mentoring experiences.
	<b>CD3.a.3.e:</b> Give examples of positive personal characteristics (e.g., honesty, dependability, responsibility, integrity and loyalty).	<b>CD3.a.7.m:</b> Develop an individual learning plan to enhance educational achievement and attain career goals based on a career pathway.	<b>CD3.a.12.h:</b> Evaluate changes in local, national and global employment trends, societal needs and economic conditions related to career planning.
	<b>CD3.a.4.e:</b> Identify career opportunities of interest; match personal interests and aptitudes.	<b>CD3.a.8.m:</b> Choose career opportunities that appeal to personal career goals.	<b>CD3.a.13.h:</b> Recognize how chance opportunities integrate with learning and career goals.
		<b>CD3.a.9.m:</b> Use assessment results in educational planning including career awareness.	<b>CD3.a.14.h:</b> Implement an individual learning plan to maximize academic ability and achievement.
<b>CD3.b:</b> Examine and evaluate opportunities that could enhance life and career plans and articulate plan to guide decisions and actions.	<b>CD3.b.1.e:</b> Describe why people work and how aspects of the work environment affect lifestyle.	<b>CD3.b.2.m:</b> Describe educational levels (e.g., work-based learning, certificate, two-year, four-year and professional degrees) and performance skills needed to attain personal and career goals.	<b>CD3.b.4.h:</b> Implement strategies for responding to transition and change with flexibility and adaptability.
		<b>CD3.b.3.m:</b> Demonstrate openness to exploring a wide range of occupations and career pathways.	<b>CD3.b.5.h:</b> Evaluate the relationship between educational achievement and career development.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>CD3.c:</b> Employ career management strategies to achieve future career success and satisfaction.	<b>CD3.c.1.e:</b> Explain how good nutrition, adequate rest and physical activity affect energy levels and productivity in school and at work.	<b>CD3.c.3.m:</b> Identify work values and needs.	<b>CD3.c.5.h:</b> Determine how principles of equal opportunity, equity, respect, inclusiveness and fairness, affect career planning and management.
	<b>CD3.c.2.e:</b> Demonstrate the ability to seek assistance (e.g., with problems at school or work) from appropriate resources, including other people.	<b>CD3.c.4.m:</b> Define adaptability and flexibility in the world of work.	<b>CD3.c.6.h:</b> Discuss how adaptability and flexibility, especially when initiating or responding to change, contributes to career success.
<b>Standard: CD4:</b> Students will identify and apply employability skills.			
<b>CD4.a:</b> Identify and demonstrate positive work behaviors and personal qualities needed to be employable.	<b>CD4.a.1.e:</b> Identify behaviors that demonstrate self-discipline, self-worth, positive attitude and integrity.	<b>CD4.a.3.m:</b> Demonstrate self-discipline, self-worth, positive attitude and integrity.	<b>CD4.a.6.h:</b> Evaluate how self-discipline, self-worth, positive attitude and integrity displayed in a work situation affect employment status.
		<b>CD4.a.4.m:</b> Demonstrate flexibility and willingness to learn new knowledge and skills.	<b>CD4.a.7.h:</b> Assess how flexibility and willingness to learn new knowledge and skills affect employment status.
			<b>CD4.a.8.h:</b> Apply communication strategies when adapting to a culturally diverse environment.
	<b>CD4.a.2.e:</b> Describe positive work-qualities typically desired in each of the career cluster's pathways.	<b>CD4.a.5.m:</b> Identify positive work-qualities typically desired in each of the career cluster's pathways.	<b>CD4.a.9.h:</b> Use positive work-qualities typically desired in each of the career cluster's pathways.
			<b>CD4.a.10.h:</b> Manage work roles and responsibilities to balance them with other life roles and responsibilities.
<b>CD4.b:</b> Demonstrate skills related to seeking and applying for employment to find and obtain a desired job.	<b>CD4.b.1.e:</b> Identify the qualities employers may seek in a candidate.	<b>CD4.b.2.m:</b> Identify the components of a job description.	<b>CD4.b.5.h:</b> Use multiple resources to locate job opportunities.
		<b>CD4.b.3.m:</b> Use technology to assist in career exploration and job-seeking activities.	<b>CD4.b.6.h:</b> Prepare a resume, cover letter, employment application.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
		<b>CD4.b.4.m:</b> Compare and contrast personal attributes with employment needs and trends.	<b>CD4.b.7.h:</b> Employ critical thinking and decision-making skills to exhibit qualifications to a potential employer in an interview.
<b>CD4.c:</b> Identify and exhibit traits for retaining employment.	<b>CD4.c.1.e:</b> Recognize the appropriate behavior and communication skills necessary in adult interactions.	<b>CD4.c.2.m:</b> Demonstrate the behavior and etiquette appropriate to interactions with adults.	<b>CD4.c.4.h:</b> Model behaviors that demonstrate reliability and dependability.
		<b>CD4.c.3.m:</b> Distinguish between appropriate behaviors in a social vs. professional setting.	<b>CD4.c.5.h:</b> Maintain appropriate dress and behavior for the job to contribute to a safe and effective workplace/jobsite.
			<b>CD4.c.6.h:</b> Complete required employment forms and documentation.
			<b>CD4.c.7.h:</b> Summarize key activities necessary to retain a job in an industry.
<b>CD4.d:</b> Develop positive relationships with others.	<b>CD4.d.1.e:</b> Define what it means to be respectful and non-judgmental.	<b>CD4.d.3.m:</b> Interact with others in a respectful and non-judgmental manner.	<b>CD4.d.5.h:</b> Participate in co-curricular and community activities to enhance the school experience.
	<b>CD4.d.2.e:</b> Define cooperation.	<b>CD4.d.4.m:</b> Use cooperative behavior in helping peers accomplish goals and tasks.	<b>CD4.d.6.h:</b> Evaluate the best method to assist co-workers in accomplishing goals and tasks.
			<b>CD4.d.7.h:</b> Examine the skills required to enable students to successfully transition to post-secondary opportunities.
			<b>CD4.d.8.h:</b> Use a systematic approach to academic and career planning for students to achieve their learning, socio-cultural and work goals.



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: EHS/Environment, Health and Safety

**Standard: EHS1:** Students will identify the importance and interrelationships of health, safety and environmental systems and evaluate the impacts of these systems on organizational performance for continuous improvement.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>EHS1.a:</b> Assess the interdependency among natural and human-built systems, including social, ecological and economic health.	<b>EHS1.a.1.e:</b> Recognize and describe various types of natural and human-built systems.	<b>EHS1.a.5.m:</b> Describe the process of change, flow of energy and the importance of diversity in natural and human-built systems.	<b>EHS1.a.9.h:</b> Assess systems dynamics, including constant change and carrying capacity within social, ecological and economic systems.
	<b>EHS1.a.2.e:</b> Describe how social, ecological and economic systems have benefits and consequences.	<b>EHS1.a.6.m:</b> Compare ways in which social, ecological and economic systems have been managed.	<b>EHS1.a.10.h:</b> Evaluate the societal, ecological and economic costs and benefits of allocating resources in various ways.
			<b>EHS1.a.11.h:</b> Identify strategies to maintain societal, ecological and environmental health.
	<b>EHS1.a.3.e:</b> Describe how personal choices impact natural and human-built systems.	<b>EHS1.a.7.m:</b> Analyze the impact of personal choices regarding natural and human-built systems on future actions.	<b>EHS1.a.12.h:</b> Evaluate the impact of personal choices on the interactions or interdependency between natural and human-built systems.
	<b>EHS1.a.4.e:</b> Identify and give examples of short-term and long-term solutions to a problem.	<b>EHS1.a.8.m:</b> Evaluate the advantages and disadvantages of short-term and long-term solutions and the impacts on social, ecological and economic environments.	<b>EHS1.a.13.h:</b> Assess how the human-built environment can be designed or modified to promote ecological and economic health and provide a better quality of life.
<b>EHS1.b:</b> Engage in systems thinking and inquiry processes that identify problems while analyzing the impacts of decisions made now and in the future.	<b>EHS1.b.1.e:</b> Engage in a decision-making process that includes selecting and using data, suggesting possible alternatives, predicting consequences and defending the decision.	<b>EHS1.b.3.m:</b> Evaluate consequences of a variety of approaches on social, ecological and environmental systems.	<b>EHS1.b.5.h:</b> Formulate a plan of action that addresses a current issue that considers the impact on social, economic and ecological systems now and in the future.
	<b>EHS1.b.2.e:</b> Identify questions that require skilled investigation to solve current social, economic and ecological problems.	<b>EHS1.b.4.m:</b> Plan investigations to collect information, make predictions and offer explanations about the social, economic, and ecological questions asked.	<b>EHS1.b.6.h:</b> Communicate the results of an investigation of current issues' effects on social, economic and ecological systems.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>EHS1.c:</b> Develop solutions to social, economic and ecological problems without compromising the ability of future generations to meet their needs.	<b>EHS1.c.1.e:</b> Identify examples of how personal actions can influence social, economic and ecological systems.	<b>EHS1.c.4.m:</b> Give examples of education, economic and governmental institutions' and individuals' influence on social, economic and ecological systems.	<b>EHS1.c.7.h:</b> Analyze political, educational, economic and governmental influences on systems and identify the roles individuals play within the systems.
	<b>EHS1.c.2.e:</b> Identify local or regional social, economic and ecological issues.	<b>EHS1.c.5.m:</b> Explain the political, legal or economic reasons for resolving local, state and national social, economic or ecological issues.	<b>EHS1.c.8.h:</b> Explain the factors that contribute to the development of social, economic and ecological systems issues and policies.
	<b>EHS1.c.3.e:</b> Identify short-term and long-term solutions to a problem.	<b>EHS1.c.6.m:</b> Develop a plan for personal contribution toward improving or maintaining some part of the social, economic or ecological system.	<b>EHS1.c.9.h:</b> Formulate a plan to maintain or improve some part of the local or regional social, economic or ecological system.
<b>EHS1.d:</b> Implement personal and jobsite safety rules and regulations to maintain and improve safe and healthful working conditions and environments.	<b>EHS1.d.1.e:</b> Identify health and safety considerations in the classroom along with individual responsibility for maintaining conditions.	<b>EHS1.d.4.m:</b> Identify the relationships between school and community conditions with regard to personal and environmental health and safety.	<b>EHS1.d.7.h:</b> Assess workplace conditions with regard to personal and environmental health and safety.
	<b>EHS1.d.2.e:</b> Identify different types of jobs and how safety and health systems operate.	<b>EHS1.d.5.m:</b> Recognize and use systems in school and in the community that protect and enhance personal, environmental health and safety.	<b>EHS1.d.8.h:</b> Identify different workplace systems that protect and enhance personal and environmental health and safety.
	<b>EHS1.d.3.e:</b> Explain the origin of rules and laws to promote health and safety in school and work.	<b>EHS1.d.6.m:</b> Discuss employee rights and responsibilities and how to apply them in a workplace setting.	<b>EHS1.d.9.h:</b> Describe employee rights and responsibilities to maintain workplace health and safety, including compliance with rules and laws.



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: GCA/Global and Cultural Awareness

**Standard: GCA1:** Students will propose solutions and initiatives related to global issues.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>GCA1.a:</b> Evaluate the effects of diversity encountered through interactions with people in or from other parts of the community, state, nation and world.	<b>GCA1.a.1.e:</b> List ways in which people are different from one another.	<b>GCA1.a.4.m:</b> Explain reasons people are different based on where in the world they live.	<b>GCA1.a.7.h:</b> Interpret how differences will affect people's interactions in their own communities and when traveling to other regions and countries.
	<b>GCA1.a.2.e:</b> List ways in which communities are different from one another.	<b>GCA1.a.5.m:</b> Describe reasons why communities develop differently.	<b>GCA1.a.8.h:</b> Explain the differences between communities located near one another as well as between nations.
	<b>GCA1.a.3.e:</b> Identify historical examples of large ethnic groups emigrating to a new country or community.	<b>GCA1.a.6.m:</b> Describe the effects of diverse groups moving into the same community.	<b>GCA1.a.9.h:</b> Predict the effects of a new group of people moving into an existing community.
<b>GCA1.b:</b> Explain how events in one part of the world affect nations, communities and individuals in other parts of the world.	<b>GCA1.b.1.e:</b> Summarize events taking place in various parts of the world.	<b>GCA1.b.4.m:</b> Explain how an event in one part of the world caused an effect in another part of the world.	<b>GCA1.b.7.h:</b> Predict how a recent global event could affect community and self.
	<b>GCA1.b.2.e:</b> Discuss how personal differences can contribute to conflict between individuals.	<b>GCA1.b.5.m:</b> Describe how personal conflicts can lead to larger scale conflicts between groups of people.	<b>GCA1.b.8.h:</b> Describe events where conflicts escalated to become national or global conflicts.
	<b>GCA1.b.3.e:</b> Summarize challenges and crises taking place in various parts of the world.	<b>GCA1.b.6.m:</b> Explain how diversity can affect challenges and crises.	<b>GCA1.b.9.h:</b> Describe how diversity has impacted local, national or global challenges.
<b>GCA1.c:</b> Explain how diverse groups of people can work together to overcome local, national, regional and global crises.	<b>GCA1.c.1.e:</b> Identify ways in which diversity has led to innovation and opportunity.	<b>GCA1.c.4.m:</b> Discuss examples of diverse groups working together to make the world better.	<b>GCA1.c.7.h:</b> Explain how diverse groups could work collectively to resolve a local problem or challenge.
	<b>GCA1.c.2.e:</b> Give examples of nations collaborating.	<b>GCA1.c.5.m:</b> Discuss examples of diverse nations collaborating to make the world better.	<b>GCA1.c.8.h:</b> Analyze how diversity has contributed to successful resolution of global challenges.
	<b>GCA1.c.3.e:</b> Describe how diverse groups of people can work together.	<b>GCA1.c.6.m:</b> Explain how diverse nations can accomplish tasks a single nation could not.	<b>GCA1.c.9.h:</b> Predict how diverse nations may work together in addressing current global challenges and issues.



**Standard: GCA2:** Students will assess the benefits and challenges of working in diverse settings and on diverse teams.

	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>GCA2.a:</b> Work effectively with diverse individuals in a variety of settings and contexts.	<b>GCA2.a.1.e:</b> Identify different ways people learn.	<b>GCA2.a.3.m:</b> Explain how people differ in the way they see the world and their experiences.	
	<b>GCA2.a.2.e:</b> List ways in which people are different from one another.	<b>GCA2.a.4.m:</b> Describe ways to collaborate in the presence of language, personality and cultural differences.	<b>GCA2.a.6.h:</b> Collaborate with others in the presence of language, personality and cultural differences.
		<b>GCA2.a.5.m:</b> Demonstrate mutual respect and open dialogue with individuals representing diverse cultures, beliefs and lifestyles.	<b>GCA2.a.7.h:</b> Collaborate with diverse individuals to accomplish tasks in personal, school, work and community contexts.
<b>GCA2.b:</b> Develop innovative solutions and initiatives as part of a diverse team.	<b>GCA2.b.1.e:</b> List differences between self and others on a team.	<b>GCA2.b.4.m:</b> Describe the value of traits, beliefs and experiences of others that differ from self.	<b>GCA2.b.7.h:</b> Develop ideas for using awareness of diversity to create new opportunities.
	<b>GCA2.b.2.e:</b> Identify benefits of working with someone with a diverse background or set of experiences.	<b>GCA2.b.5.m:</b> Demonstrate ability to learn from and work collaboratively with individuals representing diverse cultures, beliefs and lifestyles.	<b>GCA2.b.8.h:</b> Synthesize the experiences of a diverse group to develop innovative solutions to a given problem.
	<b>GCA2.b.3.e:</b> Identify how groups comprised of individuals from diverse backgrounds may approach situations differently than those of similar backgrounds.	<b>GCA2.b.6.m:</b> Contrast the capabilities of diverse teams with those of homogeneous teams.	



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: IMT/Information, Media and Technology Skills

**Standard: IMT1:** Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>IMT1.a:</b> Choose appropriate sources of data and information for a given purpose.	<b>IMT1.a.1.e:</b> Give examples of various sources of data and information.	<b>IMT1.a.3.m:</b> Compare and contrast the benefits and drawbacks of various information sources.	<b>IMT1.a.6.h:</b> Justify the selection of various information sources for a given purpose.
	<b>IMT1.a.2.e:</b> Discuss how individual and group biases can affect how information is portrayed.	<b>IMT1.a.4.m:</b> Explain how information can be portrayed differently by groups with varying purposes and perspectives.	<b>IMT1.a.7.h:</b> Explain the level of objectivity for a given source of information.
		<b>IMT1.a.5.m:</b> Use information sources to support an argument, idea or initiative.	<b>IMT1.a.8.h:</b> Model how raw data can be applied differently to support opposing arguments or premises.
<b>IMT1.b:</b> Determine the relevance, validity and timeliness of data and information.	<b>IMT1.b.1.e:</b> Describe the concepts of raw data and information.	<b>IMT1.b.4.m:</b> Distinguish the differences between raw data and information.	<b>IMT1.b.7.h:</b> Use raw data and information appropriately to support an argument, idea or initiative.
	<b>IMT1.b.2.e:</b> Discuss various electronic and non-electronic sources of data and information.	<b>IMT1.b.5.m:</b> Demonstrate ability to gather information from electronic and non-electronic sources.	<b>IMT1.b.8.h:</b> Compare and contrast validity of information from electronic and non-electronic sources.
	<b>IMT1.b.3.e:</b> Describe the concepts of relevance, validity and timeliness as they relate to data and information.	<b>IMT1.b.6.m:</b> Analyze various sources of data and information for relevance, validity and timeliness.	<b>IMT1.b.9.h:</b> Defend a position or decision using relevant, valid and timely data and information.
<b>IMT1.c:</b> Select relevant information necessary for making decisions and solving problems.	<b>IMT1.c.1.e:</b> Explain the concepts of relevance and reliability as they relate to data and information.	<b>IMT1.c.3.m:</b> Evaluate the relevance and reliability of various sources of information.	<b>IMT1.c.5.h:</b> Defend a solution or conclusion using appropriate data and information.
	<b>IMT1.c.2.e:</b> Identify various sources of information.	<b>IMT1.c.4.m:</b> Contrast the appropriateness of data and information from different sources for different purposes.	<b>IMT1.c.6.h:</b> Interpret and select appropriate information to develop a resolution for a given situation.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>IMT1.d:</b> Apply data and information to communicate ideas and create new opportunities.	<b>IMT1.d.1.e:</b> Identify different ways to communicate data and information.	<b>IMT1.d.3.m:</b> Demonstrate how information analysis can be used to identify entrepreneurial opportunities.	<b>IMT1.d.6.h:</b> Defend a proposal for a new product or service based on data and information analysis.
		<b>IMT1.d.4.m:</b> Incorporate information from multiple sources to communicate a new idea or support an argument.	<b>IMT1.d.7.h:</b> Synthesize data and information from multiple sources to identify new trends.
	<b>IMT1.d.2.e:</b> Collect and review data and information from multiple sources.	<b>IMT1.d.5.m:</b> Apply a system for tracking and accessing data and information from multiple sources.	<b>IMT1.d.8.h:</b> Manage and share stored data and information for a specific purpose.
<b>Standard: IMT2:</b> Students will apply information literacy skills to access and evaluate media to design and produce media products.			
<b>IMT2.a:</b> Analyze media messages to determine biases and objectivity.	<b>IMT2.a.1.e:</b> Identify various types of media.	<b>IMT2.a.4.m:</b> Explain the benefits and drawbacks of various forms of media.	<b>IMT2.a.7.h:</b> Defend the selection of various media formats for a given purpose.
	<b>IMT2.a.2.e:</b> Discuss how individual and group biases can affect how information is portrayed.	<b>IMT2.a.5.m:</b> Explain how media content is portrayed differently by groups with varying purposes and perspectives.	<b>IMT2.a.8.h:</b> Compare and contrast the level of objectivity for given media sources.
	<b>IMT2.a.3.e:</b> Discuss how individual and group biases can affect how information is received.	<b>IMT2.a.6.m:</b> Explain how information is manipulated in media depending on the intended audience.	<b>IMT2.a.9.h:</b> Portray information in different ways to account for different audiences.
<b>IMT2.b:</b> Prepare media products in order to communicate a specific message.	<b>IMT2.b.1.e:</b> Identify common principles of graphic design and advertising.	<b>IMT2.b.2.m:</b> Create media products using common principles of graphic design.	<b>IMT2.b.4.h:</b> Create media products to communicate a given message to different audiences.
		<b>IMT2.b.3.m:</b> Explain how various elements of media combine to deliver a desired message.	<b>IMT2.b.5.h:</b> Compare and contrast the elements of media products and how each helps deliver a desired message.



**Standard: IMT3:** Students will use available information and communication technology to improve productivity, solve problems and create opportunities.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>IMT3.a:</b> Adopt new technological tools to increase personal and organizational productivity.	<b>IMT3.a.1.e:</b> Explore and use data management tools.	<b>IMT3.a.5.m:</b> Apply the use of data management tools in daily activities.	<b>IMT3.a.9.h:</b> Adapt and refine technology to continuously improve management of data in daily activity.
	<b>IMT3.a.2.e:</b> Explore and use communication tools.	<b>IMT3.a.6.m:</b> Demonstrate the ability to use electronic communication technology.	<b>IMT3.a.10.h:</b> Integrate technological tools to efficiently create and manage correspondence in daily activity.
	<b>IMT3.a.3.e:</b> Explore and use productivity tools.	<b>IMT3.a.7.m:</b> Apply the use of technological tools for managing calendars, schedules and work flow.	<b>IMT3.a.11.h:</b> Adapt and refine technology to continuously improve personal and organizational productivity.
	<b>IMT3.a.4.e:</b> Discuss how technology can serve as a positive and negative distraction.	<b>IMT3.a.8.m:</b> Explain how technology can detract from personal and organizational productivity.	<b>IMT3.a.12.h:</b> Manage use of technology to reduce negative impacts on productivity.
<b>IMT3.b:</b> Select and use communication and information technology to help solve problems and provide opportunities.	<b>IMT3.b.1.e:</b> Describe the nature of problems and how they can have multiple elements.	<b>IMT3.b.4.m:</b> Apply communication and information technology to the various elements of a problem.	<b>IMT3.b.7.h:</b> Use communication and information technology to effectively solve a given problem.
	<b>IMT3.b.2.e:</b> Discuss the impact of communication and information technology.	<b>IMT3.b.5.m:</b> Explain how communication and information technology have helped address national and global problems.	<b>IMT3.b.8.h:</b> Explain how communication and information technology could help address a current national or global problem.
	<b>IMT3.b.3.e:</b> Describe the nature of opportunities.	<b>IMT3.b.6.m:</b> Use communication and information technology to pursue a new opportunity.	<b>IMT3.b.9.h:</b> Assess the use of communication and information technology to create new opportunities.



## Wisconsin Common Career Technical Standards (WCCTS)

### Content Area: LE/Leadership

**Standard: LE1:** Students will apply leadership skills in real-world, family, community and business and industry applications.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>LE1.a:</b> Implement leadership skills to accomplish team goals and objectives.	<b>LE1.a.1.e:</b> Identify the various roles of leaders within organizations and give examples of positive leadership skills.	<b>LE1.a.5.m:</b> Exhibit skills such as empowerment, risk-taking, communication, focusing on results, decision-making, problem solving and investment in individuals when leading a group in solving a problem.	<b>LE1.a.10.h:</b> Exhibit skills such as compassion, service, listening, coaching, developing others, team development.
	<b>LE1.a.2.e:</b> Create a community of trust, giving space for different opinions and ideas to help students develop plans and prioritize tasks.	<b>LE1.a.6.m:</b> Consider issues related to self, team, community, diversity, environment and global awareness when leading others.	<b>LE1.a.11.h:</b> Demonstrate skills such as enthusiasm, creativity, conviction, mission, courage, concept, focus, principle-centered living and change when interacting with others in general.
	<b>LE1.a.3.e:</b> Describe effective leadership and teamwork skills and identify ways to participate in civic activities in school, family or the community.	<b>LE1.a.7.m:</b> Participate in civic and community leadership and teamwork opportunities to enhance skills to develop leadership potential.	<b>LE1.a.12.h:</b> Exhibit skills such as innovation, intuition, adaptation, life-long learning and coach-ability to develop leadership potential over time.
	<b>LE1.a.4.e:</b> Describe leadership in relation to trust, positive attitude, integrity, willingness and commitment to accept key responsibilities in a group project.	<b>LE1.a.8.m:</b> Explain leadership in relation to trust, positive attitude, integrity, willingness and commitment to accept key responsibilities in a group project.	<b>LE1.a.13.h:</b> Create a sense of trust, positive attitude, integrity, willingness and commitment in order to accept key responsibilities in a group project.
		<b>LE1.a.9.m:</b> Build interest, guide and influence decisions organize efforts and involve members of a group.	<b>LE1.a.14.h:</b> Apply parliamentary procedure to an appropriate situation.
<b>LE1.b:</b> Employ teamwork skills to achieve collective goals and use team members/ talents effectively.	<b>LE1.b.1.e:</b> Work with a group to meet objectives while including all members.	<b>LE1.b.4.m:</b> Involve of all members during group discussions.	<b>LE1.b.7.h:</b> Capitalize on team members' individual talents and skills in a project.
			<b>LE1.b.8.h:</b> Apply conflict management skills to help facilitate solutions.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>LE1.b.2.e:</b> Demonstrate commitment and a positive attitude toward team goals.	<b>LE1.b.5.m:</b> Demonstrate teamwork skills through working cooperatively with group members, group leader and others, both in the school and in the community, to achieve group objective.	<b>LE1.b.9.h:</b> Evaluate and apply teamwork processes that provide team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability and conflict resolution.
	<b>LE1.b.3.e:</b> Outline plans to improve teamwork.	<b>LE1.b.6.m:</b> Demonstrate a positive attitude and a commitment toward achieving team goals.	<b>LE1.b.10.h:</b> Demonstrate the ability to negotiate and adapt effectively to changes in projects and work activities to meet timelines.
<b>LE1.c:</b> Identify the role of community service and service learning in family, community and business and industry.	<b>LE1.c.1.e:</b> Identify the roles and responsibilities of citizenship.	<b>LE1.c.3.m:</b> Analyze the roles and responsibilities of citizenship.	<b>LE1.c.6.h:</b> Assess the roles and responsibilities of citizenship and formulate an activity or event to showcase community service.
	<b>LE1.c.2.e:</b> Describe involvement in a civic activity.	<b>LE1.c.4.m:</b> Select and develop a community service activity/event.	<b>LE1.c.7.h:</b> Plan a community service event, participate in the event and evaluate its impact.
		<b>LE1.c.5.m:</b> Show organizational skills necessary to be a successful leader and citizen and practice those skills in real-life situations.	<b>LE1.c.8.h:</b> Plan and participate in activities that rate skills necessary to be a successful leader and citizen.
			<b>LE1.c.9.h:</b> Advocate for issues on the local, state and international level.
			<b>LE1.c.10.h:</b> Identify components and structure of community-based organizations.
			<b>LE1.c.11.h:</b> Participate in the development of a program of work/strategic plan and work to implement the organization's goals.



This page intentionally left blank.



## **Section IV**

---

### Wisconsin Standards for Agriculture, Food and Natural Resources



This page intentionally left blank.



### Wisconsin Standards for Agriculture, Food and Natural Resources

Curriculum opportunities related to Agriculture, Food and Natural Resources support career growth within the 16 areas identified by the U.S. Department of Education’s Career Clusters and transcend every career setting. Regardless of a student’s future endeavors as an employee and/or as an entrepreneur, the **Wisconsin Standards for Agriculture, Food and Natural Resources** address increased academic, technical and employability knowledge and skills that are critical for students to be college and career ready. Within agriculture related learning priorities across multiple content area standards, the following career pathways are specifically emphasized: Agribusiness systems, Animal systems, Environmental Services systems, Food Products and Processing systems, Plant systems, Power, Structural and Technical systems and Natural Resources systems. The effective delivery of Career and Technical Education through Agriculture, Food and Natural Resources standards can be best observed through quality programs that provide local communities access to the following educational experiences:

- Work-Based Learning Programs such as State Certified Skills Cooperative Education Certificate, Employability Skills;
- Career and Technical Student Organization such as Wisconsin Association of FFA; and
- classroom delivery of learning priorities that document the integration of academic and technical skills.

### Courses in Agriculture, Food and Natural Resources

Middle level and high school programs that are taught by licensed Agriculture teachers provide the ability for students to build their academic capacity through rigorous curriculum offerings. Students that are introduced to basic knowledge and skills at early grade levels can effectively engage in exploratory middle level course work in preparation for a career-focused high school academic plan that leads to college and career readiness through postsecondary options.

Local districts that desire to develop programs of study across career clusters must work to ensure a balanced approach to the multiple aspects of coursework available within Agriculture, Food and Natural Resources. The following area is identified within the National Center for Educational Statistics (NCES) course code:

- Agriculture, Food and Natural Resources -Subject Area 18;

The **Wisconsin Standards for Agriculture, Food and Natural Resources** are broken into eight standard areas: Each of these areas is interdependent on the other; however, for ease of use by classroom teachers, the standards have been set up in this manner. These sections are further delineated as follows:

Agriculture, Food and Natural Resources Standards	
Agriculture Business	Animal Systems
Biotechnology	Environmental Service Systems
Food Production and Processing	Natural Resources
Plant Systems	Power, Structural and Technical Systems

The following chart outlines a curriculum alignment of the content area standards into a variety of course types that may be developed within local school districts.

*Note: The chart identifies the primary standard source (P) for a specific type of course. Additionally, the secondary standard sources (s) may also be used to complement the primary standard source within a type of course. The types of courses listed are not inclusive of all Agriculture, Food and Natural Resource courses. School districts may have a variety of names for these types of courses.*



P=Primary source/s=secondary source

Type of Course	Common Career Technical Standards						AFNR Standards								
	Global Awareness	Life & Career Skills, Career Development, & Employability Skills	Information, Media & Technology	Sustainability, Environmental, & Safety	Leadership	Communication, Creativity, Collaboration, & Critical Thinking	Agriculture Business Systems	Animal Systems	Biotechnology Systems	Environmental Service Systems	Food Production and Processing	Natural Resources	Plant Systems	Power, Structural and Technical Systems	
Agribusiness Management	s	s	s	s	s	s	P	s	s	s	s	s	s	s	
Agricultural Biotechnology	s	s	s	s	s	s	s	s	P	s	s	s	s	s	
Agricultural Entrepreneurship	s	s	s	s	s	s	P	s	s	s	s	s	s	s	
Agricultural Leadership	s	s	s	s	P	s	s	s	s	s	s	s	s	s	
Agricultural Processing	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Agriculture Mechanics and Equipment	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Agriculture Structures	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Agriculture Welding	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Animal Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Aquaculture	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Dairy Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Environmental Science	s	s	s	s	s	s	s	s	s	P	s	P	s	s	
Equine Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Food Product Processing	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Food Science	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Forestry	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Horticulture/Floriculture/Greenhouse Management	s	s	s	s	s	s	s		s	s	s	s	P	s	
Introduction to Agriculture	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
Large Animal Care	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Natural Resource Management	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Plant/Soil Science	s	s	s	s	s	s	s	s	s	s	s	s	P	s	
Small Animal Care	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Turf and Landscape Management	s	s	s	s	s	s	s		s	s	s	s	P	s	
Veterinary Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Wildlife Management	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Workplace Experience (COOP)	s	s	s	s	s	s	P	s	s	s	s	s	s	s	



### Program Structure

The progression of instruction related to the Agriculture, Food and Natural Resource standards should be developed throughout the PK-12 system as reflected by the learning priorities that are identified within the three grade bands featured in this document. The leadership of a Agriculture, Food and Natural Resource licensed teacher at each of the grade levels can be critical to the fluidity of standards development across the PK-12 grade bands, provide flexibility of delivery options, support best practices that are researched based within content instruction, develop additional resources with other academic classroom teachers in related areas of instruction and develop a collaborative relationship with elementary classroom teachers who are teaching fundamental skills to only their own students.

A variety of program structures may be used by local districts to deliver Agriculture, Food and Natural Resource standards to students including, but not limited to the following:

<u>Grades PK-5</u>	<u>Grades 6-8</u>	<u>Grades 9-12</u>
<ol style="list-style-type: none"> <li>1. Foundational skills are incorporated into elementary level course work in multiple disciplines.</li> </ol>	<ol style="list-style-type: none"> <li>1. A dedicated career exploration program that integrates course work that introduces and/or expands upon Agriculture, Food and Natural Resources.</li> <li>2. Exploratory units in foundational elective programs that support career development and skills needed across content areas.</li> <li>3. Elective course options for students in Career and Technical Education subjects, including Agriculture, Food and Natural Resources.</li> </ol>	<ol style="list-style-type: none"> <li>1. An integrated sequence of courses within Agriculture, Food and Natural Resource that develops course work related to Programs of Study in multiple career pathways associated with Career Clusters.</li> <li>2. A balanced Agriculture, Food and Natural Resource Program that supports student career development in:               <ol style="list-style-type: none"> <li>a. Agriculture, Food and Natural Resource;</li> <li>b. Science, Technology, Engineering and Math (STEM);</li> <li>c. Education and Training.</li> </ol> </li> <li>3. A career cluster program that provides dedicated curriculum and resources that feature capstone coursework, postsecondary credit attainment and/or industry connections through certifications.</li> </ol>

### Delivery of Agriculture, Food and Natural Resource courses

Agriculture, Food and Natural Resources courses should be delivered as a coherent sequence within a pathway. Pathway knowledge builds on foundation knowledge and skills. These courses should include differentiated instruction to meet the needs of all learners.

These are multiple ways that students access Agriculture, Food and Natural Resources courses within the K-12 system:

- Face-to-Face Classroom Instruction
- Digital Learning (models may include blended, hybrid and online distance learning at multiple grade levels)
- Transcribed Credit (partnering with local Technical College or University should be strongly considered)



## Youth Options

### Work-Based Learning (State Certified Skill Standards, Youth Apprenticeship, etc.)

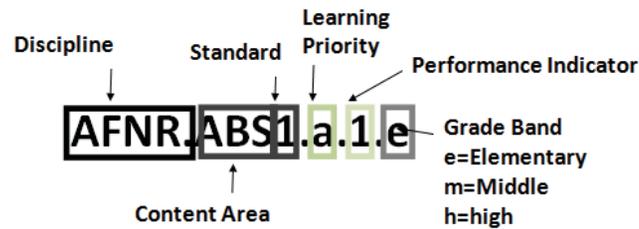
In Wisconsin, each district determines the best setting for courses within the school. When developing a balanced Agriculture, Food and Natural Resource program, consideration should be given to how a local program can support current local, state and national initiatives. Standards associated with a quality program in Agriculture, Food and Natural Resource should be used for program self-evaluation, improvement and goal-setting. Areas of particular interest include quality educators, curriculum instruction and student assessment, parent and community involvement and program planning.



## Standard Structure

The Wisconsin Standards for Career and Technical Education, including the Wisconsin Common Career Technical Standards, each follow a similar structure.

### Standard Coding



### Standard Formatting

- Discipline** →
- Content Area** →
- Standard:** Broad statement that tells what students are expected to know or be able to do →
- Learning Priority:** Breaks down the broad statement into manageable learning pieces →

**Performance Indicator by Grade Band:** Measurable degree to which a standard has been developed and/or met

Agriculture, Food, & Natural Resources (AFNR)			
Content Area: ABS/Agriculture Business Standards			
Standard: ABT1: Students will use economic principles to establish and manage an AFNR enterprise.			
Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ABT1.a: Apply principles of capitalism in the business environment.	ABT1.a.1.e: Become aware of the use of money as a medium for exchange in a capitalistic system.	ABT1.a.2.m: Recognize principles of capitalism as related to AFNR businesses.	ABT1.a.3.h: Differentiate types of ownership and outline the structure of AFNR businesses in a capitalistic economic system.
ABT1.b: Apply principles of entrepreneurship in businesses.	ABT1.b.1.e: Describe the meaning, importance and economic impact of entrepreneurship.	ABT1.b.2.m: Classify the characteristics of successful entrepreneurs in AFNR businesses.	ABT1.a.4.h: Execute supply-and-demand principles in AFNR businesses. ABT1.b.3.h: Demonstrate entrepreneurship, including idea generation, opportunity analysis and risk assessment.

### Grade Bands

Grade bands of PK-5, 6-8 and 9-12 align to typical elementary, middle and high school levels.

Grade band PK-5 performance indicators represent knowledge and skills that should be integrated throughout the elementary curriculum. Career and technical education teachers in districts can be an excellent resource to assist in the development of curriculum and activities. Career and technical education should be part of the core curriculum for all middle school students. Awareness, exploration and building foundational skills for career pathways occur in middle school. The performance indicators in grade band 6-8 these foundational skills with an emphasis on career development. Career and technical education at the high school level must go beyond awareness and exploration. Students should be developing specific knowledge and skills that are transferrable to other coursework, a job-site or postsecondary options. Performance indicators for grades 9-12 align specifically to industry standards and expectations for career clusters and pathways.



## Agriculture, Food, & Natural Resources (AFNR)

### Content Area: ABS/Agriculture Business Standards

**Standard: ABS1:** Students will use economic principles to establish and manage an AFNR enterprise.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>ABS1.a:</b> Apply principles of capitalism in the business environment.	<b>ABS1.a.1.e:</b> Recognize the use of money as a medium for exchange in a capitalistic system.	<b>ABS1.a.2.m:</b> Recognize principles of capitalism as related to AFNR businesses.	<b>ABS1.a.3.h:</b> Differentiate types of ownership and outline the structure of AFNR businesses in a capitalistic economic system.
			<b>ABS1.a.4.h:</b> Execute supply-and-demand principles in AFNR businesses.
<b>ABS1.b:</b> Apply principles of entrepreneurship in businesses.	<b>ABS1.b.1.e:</b> Describe the meaning, importance and economic impact of entrepreneurship.	<b>ABS1.b.2.m:</b> Classify the characteristics of successful entrepreneurs in AFNR businesses.	<b>ABS1.b.3.h:</b> Demonstrate entrepreneurship, including idea generation, opportunity analysis and risk assessment.

**Standard: ABS2:** Students will use appropriate management planning principles in AFNR business enterprise.

<b>ABS2.a:</b> Compose and analyze a business plan for an enterprise.	<b>ABS2.a.1.e:</b> Recognize the importance of setting goals for success of a business.	<b>ABS2.a.3.m:</b> Recognize quality AFNR business plan components that have been developed using the SMART (specific, measurable, attainable, realistic and timely) format.	<b>ABS2.a.5.h:</b> Identify components of business plans and demonstrate how to write such components using the SMART format.
	<b>ABS2.a.2.e:</b> Connect DATCP to consumer safety standards.	<b>ABS2.a.4.m:</b> Identify and observe ethical standards in planning and operating AFNR businesses.	<b>ABS2.a.6.h:</b> Prepare and critique AFNR business plans.
			<b>ABS2.a.7.h:</b> Observe appropriate laws and regulations in planning and operating AFNR businesses.
			<b>ABS2.a.8.h:</b> Use methods of AFNR business enterprise analysis, such as SWOT (strengths, weaknesses, opportunities and threats).
<b>ABS2.b:</b> Read, interpret, evaluate and write a mission statement to guide business goals, objectives and resource allocation.	<b>ABS2.b.1.e:</b> Recognize goals or purposes of a club.	<b>ABS2.b.3.m:</b> Read and interpret mission statements.	<b>ABS2.b.5.h:</b> Identify approaches in creating mission statements for AFNR businesses.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>ABS2.b.2.e:</b> Make the connection between goals, means and outcomes.	<b>ABS2.b.4.m:</b> Identify the meaning and importance of goals and objectives in AFNR business enterprises.	<b>ABS2.b.6.h:</b> Create and disseminate a mission statement for business activities in AFNR.
			<b>ABS2.b.7.h:</b> Prepare short-term, intermediate and long-term goals and objectives that are consistent with the mission statement for an AFNR business.
			<b>ABS2.b.8.h:</b> Evaluate AFNR business goals and objectives and make revisions based on observations.
<b>ABS2.c:</b> Apply appropriate management skills to organize a business.	<b>ABS2.c.1.e:</b> Recognize the roles in a business owners and employees.	<b>ABS2.c.2.m:</b> Identify organizational structures and chains of command in AFNR businesses.	<b>ABS2.c.4.h:</b> Identify management types in AFNR businesses.
		<b>ABS2.c.3.m:</b> Identify appropriate local, state, federal, international and industry regulations for AFNR businesses.	<b>ABS2.c.5.h:</b> Implement management approaches to assure efficiency and profitability.
			<b>ABS2.c.6.h:</b> Prepare and deliver AFNR business presentations that include customers served, sources of inputs and how a business produces goods and services.
			<b>ABS2.c.7.h:</b> Create an organizational chart for an AFNR business.
<b>ABS2.d:</b> Recruit, train and retain appropriate and productive human resources for businesses.	<b>ABS2.d.1.e:</b> Identify types of skills that people can contribute to a business.	<b>ABS2.d.5.m:</b> Identify the meaning and functions of human resources in AFNR businesses.	<b>ABS2.d.9.h:</b> Determine appropriate human resources for AFNR businesses.
	<b>ABS2.d.2.e:</b> Consider how someone might develop skills and grow in a business.	<b>ABS2.d.6.m:</b> Identify usual employee benefits in AFNR businesses.	<b>ABS2.d.10.h:</b> Write job descriptions for specific positions in an AFNR business.
	<b>ABS2.d.3.e:</b> Explain why it is important to get along with others you work with.	<b>ABS2.d.7.m:</b> Explain the meaning and importance of employee relations, including communication.	<b>ABS2.d.11.h:</b> Design a career development and training plan for employees of an AFNR business.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	<b>ABS2.d.4.e:</b> Identify dangers that exist in work places.	<b>ABS2.d.8.m:</b> Identify the meaning and nature of employee compensation.	<b>ABS2.d.12.h:</b> Create a recruitment and evaluation program for employees in an AFNR business.
			<b>ABS2.d.13.h:</b> Establish and maintain appropriate records and reports on human resources.
			<b>ABS2.d.14.h:</b> Determine and follow appropriate regulations in recruiting, hiring and promoting personnel.
			<b>ABS2.d.15.h:</b> Design a legally compliant and competitive compensation plan for AFNR business employees.
			<b>ABS2.d.16.h:</b> Devise a compensation plan to equitably compensate, motivate and recognize productivity of human resources.
<b>Standard: ABS3:</b> Students will use record keeping to accomplish AFNR business objectives while complying with laws and regulations.			
<b>ABS3.a:</b> Prepare and maintain all files needed to accomplish effective record keeping.	<b>ABS3.a.1.e:</b> Describe the income and expenses of a business.	<b>ABS3.a.2.m:</b> Maintain production and agribusiness records.	<b>ABS3.a.3.h:</b> Analyze records to improve efficiency and profitability of an AFNR business.
			<b>ABS3.a.4.h:</b> Apply management information systems in AFNR business financial analysis.
<b>ABS3.b:</b> Implement appropriate inventory management practices.	<b>ABS3.b.1.e:</b> Consider items a business might own or borrow to operate.	<b>ABS3.b.2.m:</b> Monitor inventory to maintain optimal levels and calculate costs of carrying input and output inventory.	<b>ABS3.b.3.h:</b> Use computer technology in inventory management and reporting, including spreadsheets, databases, word processing, networked systems and the Internet.
			<b>ABS3.b.4.h:</b> Apply logistics management strategies.



**Standard ABS4:** Students will apply generally accepted accounting principles and skills to manage cash budgets, credit budgets and credit for AFNR businesses.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>ABS4.a:</b> Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.	<b>ABS4.a.1.e:</b> Create a budget for earning and spending allowance money.	<b>ABS4.a.2.m:</b> Budget resources, as applied to the AFNR business, including capital, human, financial and time.	<b>ABS4.a.5.h:</b> Manage assets, including credit, for agribusiness goal achievement.
		<b>ABS4.a.3.m:</b> Identify financial concepts associated with production and profit.	<b>ABS4.a.6.h:</b> Manage resources to minimize liabilities and maximize profit.
		<b>ABS4.a.4.m:</b> Explain the importance of return on investment for an agribusiness enterprise.	<b>ABS4.a.7.h:</b> Use accounting information to estimate the cost of goods sold and margins on the goods.
			<b>ABS4.a.8.h:</b> Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital.
			<b>ABS4.a.9.h:</b> Analyze reporting requirements for income, property and employment taxes associated with small AFNR businesses.
			<b>ABS4.a.10.h:</b> Use accountants in AFNR business management.

**Standard ABS5:** Students will access accomplishment of goals and objectives by an AFNR business.

<b>ABS5.a:</b> Maintain and interpret financial information (i.e., income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses.	<b>ABS5.a.1.e:</b> Keep track of expenses and deposits on a checkbook ledger.	<b>ABS5.a.4.m:</b> Identify accounting information in AFNR business reporting and management.	<b>ABS5.a.7.h:</b> Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.
	<b>ABS5.a.2.e:</b> Determine the value of a commodity by considering the yield and commodity price.	<b>ABS5.a.5.m:</b> Name and explain the impact of external economic factors on an AFNR business.	<b>ABS5.a.8.h:</b> Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>ABS5.a.3.e:</b> Identify expenses and incomes that might be incurred by a business.	<b>ABS5.a.6.m:</b> Identify information needed for an AFNR business manager to monitor performance on a daily, weekly, monthly, quarterly and annual basis.	<b>ABS5.a.9.h:</b> Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.
			<b>ABS5.a.10.h:</b> Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements.
			<b>ABS5.a.11.h:</b> Interpret business performance data.
			<b>ABS5.a.12.h:</b> Conduct a breakeven analysis for an AFNR business.
			<b>ABS5.a.13.h:</b> Summarize financial data for use in preparing various business financial statements.
			<b>ABS5.a.14.h:</b> Interpret and evaluate financial statements, including income statements, balance sheets and cash-flow analyses.
<b>Standard: ABS6:</b> Students will use industry-accepted marketing principles to accomplish AFNR business objectives.			
<b>ABS6.a:</b> Conduct appropriate market and marketing research.	<b>ABS6.a.1.e:</b> Consider ways of marketing products of a business.	<b>ABS6.a.3.m:</b> Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products and services and to agricultural goods in domestic and international markets.	<b>ABS6.a.5.h:</b> Apply benefit/cost analysis to marketing in AFNR businesses.
	<b>ABS6.a.2.e:</b> Identify agricultural products that consumers purchase.	<b>ABS6.a.4.m:</b> Describe functions in agricultural marketing.	<b>ABS6.a.6.h:</b> Implement and evaluate marketing strategies with agricultural commodities, products and services.
			<b>ABS6.a.7.h:</b> Assess the presence of marketing infrastructure for agricultural commodities.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			<b>ABS6.a.8.h:</b> appropriate modifications to achieve AFNR business goals.
			<b>ABS6.a.9.h:</b> Evaluate alternative marketing strategies, such as value-adding, branding and niche marketing and propose and implement.
<b>ABS6.b:</b> Develop a marketing plan.	<b>ABS6.b.1.e:</b> Identify places that consumers purchase agricultural products.	<b>ABS6.b.2.m:</b> Identify the purpose, components and developmental processes of marketing plans.	<b>ABS6.b.3.h:</b> Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources.
			<b>ABS6.b.4.h:</b> Establish marketing plan goals/objectives, including monitoring, measuring and analyzing goal achievement.
<b>ABS6.c:</b> Develop strategies for marketing plan implementation.	<b>ABS6.c.1.e:</b> Consider how you would convince others to buy your goods if you had a business.	<b>ABS6.c.2.m:</b> Identify and use strategies frequently employed in marketing programs, including those used in niche markets.	<b>ABS6.c.3.h:</b> Determine marketing strategies that are most likely to be effective in an AFNR business.
			<b>ABS6.c.4.h:</b> Revise marketing strategies based on monitoring and measurement information for target customer base.
<b>ABS6.d:</b> Develop specific tactics to market AFNR products and services.	<b>ABS6.d.1.e:</b> Identify the people involved in bring agricultural products to consumers.	<b>ABS6.d.2.m:</b> Identify and maintain needed sales records.	<b>ABS6.d.3.h:</b> Use strategies to follow up sales to provide post-sales service.
			<b>ABS6.d.4.h:</b> Intercept, interpret and process customer complaints, needs and problems with products and services.



<b>Standard: ABS7: Students will create a production system plan.</b>			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>ABS7.a:</b> Prepare a step-by-step production plan that identifies needed resources.	<b>ABS7.a.1.e:</b> Explain what a business flowchart is and how it works.	<b>ABS7.a.2.m:</b> Prepare a flowchart that shows production processes, including the resources needed for each step.	<b>ABS7.a.3.h:</b> Identify and assess alternative production systems and ways products can be produced.
			<b>ABS7.a.4.h:</b> Adapt production processes based on changing product characteristics.
<b>ABS7.b:</b> Develop a production and operational plan.	<b>ABS7.b.1.e:</b> Consider the use of a plan to conduct an activity.	<b>ABS7.b.2.m:</b> Identify the components of a production and operational plan.	<b>ABS7.b.4.h:</b> Evaluate the components of a production and operational plan and then revise an existing plan.
		<b>ABS7.b.3.m:</b> Identify common resources needed to operate a production facility.	<b>ABS7.b.5.h:</b> Develop and implement a product supply and distribution plan that meets the goals and objectives of an AFNR business.
			<b>ABS7.b.6.h:</b> Examine legal and industry requirements for a production facility.
			<b>ABS7.b.7.h:</b> Develop a production facility plan that includes building, equipment, personnel, utilities and logistics components.
<b>ABS7.c:</b> Use appropriate techniques to determine the most likely strengths, weaknesses and inconsistencies in a business plan and relate these to risk management strategies.		<b>ABS7.c.1.m:</b> Examine a business plan to identify inconsistencies and actions to correct inconsistencies.	<b>ABS7.c.2.h:</b> Describe approaches to use in revising a business plan for improved consistency and realism.
			<b>ABS7.c.3.h:</b> Revise business plans as needed to assure internal consistency.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ABS7.d: Manage risk and uncertainty.	ABS7.d.1.e: Identify risks of having a business.	ABS7.d.2.m: Determine the meaning and importance of risk and uncertainty with AFNR enterprises.	ABS7.d.3.h: Describe alternative approaches to reducing risk, including the use of insurance for product liability, property, production or income loss and for personnel life and health.
			ABS7.d.4.h: Prepare a comprehensive risk management and contingency plan for an AFNR business.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: AS/Animal Systems

**Standard: AS1:** Students will examine the components, historical development, global implications and future trends of the animal systems industry.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>AS1.a:</b> Evaluate the development and implications of animal origin, domestication and distribution.	<b>AS1.a.1.e:</b> Identify domesticated animals used in production agriculture and pets by sight and/or sounds.	<b>AS1.a.3.m:</b> Identify the origin, significance, distribution and domestication of animal species.	<b>AS1.a.5.h:</b> Evaluate and describe characteristics of animals that developed in response to the animals' environment and led to their domestication.
	<b>AS1.a.2.e:</b> Recognize products and the animals that the products are derived from.	<b>AS1.a.4.m:</b> Define major components of the animal industry.	<b>AS1.a.6.h:</b> Outline the development of the animal industry and the resulting products, services and careers.
			<b>AS1.a.7.h:</b> Predict adaptations of animals to production practices and environments.
			<b>AS1.a.8.h:</b> Predict trends and implications of future development of the animal systems industry.
<b>Standard: AS2:</b> Students will classify, evaluate, select and manage animals based on anatomical and physiological characteristics.			
<b>AS2.a:</b> Classify animals according to hierarchical taxonomy and agricultural use.	<b>AS2.a.1.e:</b> Identify major animal species by sight and/or sound.	<b>AS2.a.2.m:</b> Explain the importance of the binomial system of nomenclature.	<b>AS2.a.4.h:</b> Explain how animals are classified using Linnaeus's taxonomical classification system.
		<b>AS2.a.3.m:</b> Identify major animal species by common and scientific names.	<b>AS2.a.5.h:</b> Compare and contrast the hierarchical classification of the major agricultural animal species.
			<b>AS2.a.6.h:</b> Classify animals according to the taxonomical classification system.
			<b>AS2.a.7.h:</b> Appraise and evaluate the economic value of animals for various applications in the agriculture industry.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>AS2.b:</b> Apply principles of comparative anatomy and physiology to uses within various animal systems.	<b>AS2.b.1.e:</b> Identify body parts of domestic food animals and pets.	<b>AS2.b.2.m:</b> Identify, diagram and describe characteristics of animal cells, tissues organs and body systems in growth and reproduction.	<b>AS2.b.6.h:</b> Compare and contrast animal cells, tissues organs and body systems and describe their functions.
		<b>AS2.b.3.m:</b> Describe the properties, locations, functions and types of animal tissues.	<b>AS2.b.7.h:</b> Detail the processes and application of meiosis and mitosis in animal growth, development, health and reproduction.
		<b>AS2.b.4.m:</b> Describe the properties, locations, functions and types of animal organs.	<b>AS2.b.8.h:</b> Explain the relationship, importance and uses of animal tissues to growth, performance and health in the agriculture industry.
		<b>AS2.b.5.m:</b> Describe the functions of the animal body systems and system components.	<b>AS2.b.9.h:</b> Compare and contrast organ types, functions and body systems adaptations among and between animal species.
			<b>AS2.b.10.h:</b> Explain how the components and systems of animal anatomy and physiology relate to the production and use of animals.
			<b>AS2.b.11.h:</b> Describe the molecular makeup of animal cells and organs and their importance in animal growth, health, production, reproduction and management.
			<b>AS2.b.12.h:</b> Explain the impact of animal body systems on health, growth and reproduction.
<b>AS2.c:</b> Select animals for specific purposes and maximum performance based on anatomy and physiology.	<b>AS2.c.1.e:</b> Identify a sick animal by sight and/or sound.	<b>AS2.c.2.m:</b> Identify ways an animal's health can be affected by anatomical and physiological disorders.	<b>AS2.c.4.h:</b> Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.
		<b>AS2.c.3.m:</b> Create a program to develop an animal to its highest potential performance.	<b>AS2.c.5.h:</b> Assess an animal to determine if it has reached its optimal performance level based on anatomical and physiological characteristics.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
			<b>AS2.c.6.h:</b> Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.
			<b>AS2.c.7.h:</b> Develop efficient procedures to produce consistently high quality animals, well suited for their intended purposes.
<b>Standard: AS3:</b> Students will provide for the proper health care of animals.			
<b>AS3.a:</b> Prescribe and implement a prevention treatment program for animal diseases, parasites and other disorders.	<b>AS3.a.1.e:</b> Explain basic care of animals and how it affects their health.	<b>AS3.a.4.m:</b> Explain methods of determining animal health and disorders.	<b>AS3.a.8.h:</b> Perform simple health-check evaluations on animals.
	<b>AS3.a.2.e:</b> Identify agriculture careers in animal health (small and large).	<b>AS3.a.5.m:</b> Identify common diseases, parasites and physiological disorders that affect animals.	<b>AS3.a.9.h:</b> Perform diagnostic tests to detect health problems in animals.
	<b>AS3.a.3.e:</b> Identify photos of healthy cats, dogs, other pets and equipment used to keep them healthy.	<b>AS3.a.6.m:</b> Explain characteristics of causative agents and vectors of diseases and disorders in animals.	<b>AS3.a.10.h:</b> Diagnose illnesses and disorders of animals based on symptoms and problems caused by diseases, parasites and physiological disorders.
		<b>AS3.a.7.m:</b> Explain the clinical significance of common considerations in veterinary treatments, such as aseptic techniques.	<b>AS3.a.11.h:</b> Treat common diseases, parasites and physiological disorders of animals.
			<b>AS3.a.12.h:</b> Evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.
			<b>AS3.a.13.h:</b> Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			<b>AS3.a.14.h:</b> Prepare animals, facilities and equipment for surgical and nonsurgical veterinary treatments and procedures.
			<b>AS3.a.15.h:</b> Perform surgical and nonsurgical veterinary treatments and procedures in animal health care.
<b>AS3.b:</b> Identify bio-security threats and provide for the bio-security of agricultural animals and production facilities.	<b>AS3.b.1.e:</b> Define “bio-security” as it relates to the animal industry and its importance to humans.	<b>AS3.b.2.m:</b> Identify and describe zoonotic diseases.	<b>AS3.b.4.h:</b> Explain the health risk of zoonotic diseases to humans and their historical significance and future implications.
		<b>AS3.b.3.m:</b> Explain the importance of biosecurity to the animal industry.	<b>AS3.b.5.h:</b> Implement zoonotic disease prevention methods and procedures for the safe handling and treatment of animals.
			<b>AS3.b.6.h:</b> Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry.
			<b>AS3.b.7.h:</b> Implement a biosecurity plan for an animal production operation.
<b>Standard: AS4:</b> Students will apply principles of animal nutrition to ensure the proper growth, development, reproduction and economic production of animals.			
<b>AS4.a:</b> Formulate feed rations to provide for the nutritional needs of animals.	<b>AS4.a.1.e:</b> Recognize that food and fiber can originate from animals.	<b>AS4.a.2.m:</b> Compare and contrast common types of feedstuffs and the roles they play in the diets of animals.	<b>AS4.a.4.h:</b> Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.
		<b>AS4.a.3.m:</b> Explain the importance of a balanced ration for animals.	<b>AS4.a.5.h:</b> Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			<b>AS4.a.6.h:</b> Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs.
			<b>AS4.a.7.h:</b> Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.
<b>AS4.a:</b> Prescribe and administer animal feed additives and growth promotants in animal production.	<b>AS4.a.1.e:</b> Identify foods fed to domestic food animals and pets.	<b>AS4.a.2.m:</b> Explain the purpose and benefits of feed additives and growth promotants in animal production.	<b>AS4.a.3.h:</b> Discuss how feed additives and growth promotants are administered and the precautions that should be taken.
			<b>AS4.a:</b> Prescribe and administer feed additives and growth promotants.
<b>Standard: AS5:</b> Students will evaluate and select animals based on scientific principles of animal production.			
<b>AS5.a:</b> Evaluate the male and females reproductive systems in selecting animals.	<b>AS5.a.1.e:</b> Identify differences between babies and adults species of pets and production animals.	<b>AS5.a.2.m:</b> Explain the male and female reproductive organs of the major animal species.	<b>AS5.a.3.h:</b> Describe the functions of major organs in the male and female reproductive systems.
			<b>AS5.a.4.h:</b> Select breeding animals based on characteristics of the reproductive organs.
<b>AS5.b:</b> Evaluate animals for breeding readiness and soundness.		<b>AS5.b.1.m:</b> Explain how age, size, life cycle, maturity level and health statuses affect the reproductive efficiency of male and female animals.	<b>AS5.b.2.h:</b> Summarize factors that lead to reproductive maturity.
			<b>AS5.b.3.h:</b> Evaluate and select animals for reproductive readiness.
<b>AS5.c:</b> Describe how selection and geographical regions impact the economic decisions of our livestock business.	<b>AS5.c.1.e:</b> Identify livestock raised in different geographic regions.	<b>AS5.c.2.m:</b> Discuss the importance of efficient and economic reproduction in animals.	<b>AS5.c.3.h:</b> Evaluate reproductive problems that occur in animals.
			<b>AS5.c.4.h:</b> Treat or cull animals with reproductive problems.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>AS5.d:</b> Apply scientific principles in the selection and breeding of animals.	<b>AS5.d.1.e:</b> Explain the selection of animals for “specific traits”.	<b>AS5.d.2.m:</b> Explain genetic inheritance in agricultural animals.	<b>AS5.d.3.h:</b> Explain the advantages of using genetically superior animals in the production of animals and animal products.
			<b>AS5.d.4.h:</b> Select a breeding system based on the principles of genetics and reproductive/economic efficiencies.
<b>AS5.f:</b> Compare and contrast scientific methods associated with animal reproduction.	<b>AS5.f.1.e:</b> Identify ways that animal reproduction is science based.	<b>AS5.f.2.m:</b> Define natural and artificial breeding methods.	<b>AS5.f.6.h:</b> Explain the processes of natural and artificial breeding methods.
		<b>AS5.f.3.m:</b> Explain the use of quantitative breeding values (e.g., EPDs) in the selection of genetically superior breeding stock.	<b>AS5.f.7.h:</b> Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.
		<b>AS5.f.4.m:</b> Explain the advantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.	<b>AS5.f.8.h:</b> Select animals based on quantitative breeding values for specific characteristics.
		<b>AS5.f.5.m:</b> Discuss the uses and advantages and disadvantages of natural breeding and artificial insemination.	<b>AS5.f.9.h:</b> Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.
			<b>AS5.f.10.h:</b> Perform procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices.
			<b>AS5.f.11.h:</b> Explain and demonstrate the materials, methods and processes of artificial insemination.



<b>Standard: AS6:</b> Students will prepare and implement animal handling procedures for the safety of animals, producers and consumers of animal products.			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>AS6.a:</b> Demonstrate safe animal handling and management techniques.	<b>AS6.a.1.e:</b> Demonstrate safe practices around animals.	<b>AS6.a.2.m:</b> Discuss the dangers involved in working with animals.	<b>AS6.a.4.h:</b> Outline safety procedures for working with animals by species.
		<b>AS6.a.3.m:</b> Explain the implications of animal welfare and animal rights for animal agriculture.	<b>AS6.a.5.h:</b> Design programs that assure the welfare of animals and prevent abuse or mistreatment.
			<b>AS6.a.6.h:</b> Interpret animal behaviors and execute protocols for safe handling of animals.
			<b>AS6.a.7.h:</b> Implement quality-assurance programs and procedures for animal production.
<b>AS6.b:</b> Implement procedures to ensure that animal products are safe.	<b>AS6.b.1.e:</b> Identify safety hazards effecting animals.	<b>AS6.b.2.m:</b> Identify animal production practices that could pose health risks or are considered to pose risks by some.	<b>AS6.b.4.h:</b> Discuss consumer concerns with animal production practices relative to human health.
		<b>AS6.b.3.m:</b> Describe how animal identification systems can track an animal's location, nutrition requirements, production progress and changes in health.	<b>AS6.b.5.h:</b> Explain why animal trace-back capability, using individual animal and farm identification systems, is important to producers and consumers.
			<b>AS6.b.6.h:</b> Implement a program to assure the safety of animal products.
			<b>AS6.b.7.h:</b> Implement an animal and/or premises identification program.



**Standard: AS7:** Students will select animal facilities and equipment that provide for the safe and efficient production, housing and handling of animals.

	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>AS7.a:</b> Design animal housing, equipment and handling facilities for the major systems of animal production.	<b>AS7.a.1.e:</b> Identify animal facilities and equipment used in animal husbandry.	<b>AS7.a.2.m:</b> Identify facilities needed to house and produce each animal species safely and efficiently.	<b>AS7.a.4.h:</b> Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility.
		<b>AS7.a.3.m:</b> Identify equipment and handling facilities used in modern animal production.	<b>AS7.a.5.h:</b> Design an animal facility, focusing on animal requirements, efficiency, safety and ease of handling.
			<b>AS7.a.6.h:</b> Explain how modern equipment and handling facilities enhance the safe and economic production of animals.
			<b>AS7.a.7.h:</b> Select equipment and implement animal handling procedures and improvements to enhance production efficiency.
<b>AS7.b:</b> Comply with government regulations and safety standards for facilities used in animal production.		<b>AS7.b.1.m:</b> List the general standards (e.g., environmental, zoning, construction) that must be met in facilities for animal production.	<b>AS7.b.2.h:</b> Evaluate an animal facility to determine if standards have been met.
			<b>AS7.b.3.h:</b> Design a facility that meets standards for the legal, safe, ethical and efficient production of animals.



<b>Standard: AS8:</b> Students will analyze environmental factors associated with animal production.			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>AS8.a:</b> Reduce the effects of animal production on the environment.	<b>AS8.a.1.e:</b> Identify how the food and fiber system uses natural resources.	<b>AS8.a.2.m:</b> Evaluate the effects of animal agriculture on the environment.	<b>AS8.a.3.h:</b> Outline methods of reducing the effects of animal agriculture on the environment.
			<b>AS8.a.4.h:</b> Implement measures to reduce the impact of animal agriculture on the environment.
<b>AS8.b:</b> Evaluate the effects of environmental conditions on animals.		<b>AS8.b.1.m:</b> Identify optimal environmental conditions for animals.	<b>AS8.b.2.h:</b> Describe the effects of environmental conditions on animal populations and performance.
			<b>AS8.b.3.h:</b> Establish and maintain favorable environmental conditions for animal growth and performance.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: BT/Biotechnology Systems

**Standard: BT1:** Students will recognize the historical, social, cultural and potential applications of biotechnology.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>BT1.a:</b> Distinguish major innovators, historical developments and potential applications of biotechnology in agriculture.	<b>BT1.a.1.e:</b> Define biotechnology; identify examples of agricultural products and processes created through biotechnology.	<b>BT1.a.2.m:</b> Define biotechnology and explore the historical impact it has had on agriculture.	<b>BT1.a.5.h:</b> Create a timeline and use it to explain the developmental progression of biotechnology.
		<b>BT1.a.3.m:</b> Investigate current applications of biotechnology in agriculture.	<b>BT1.a.6.h:</b> Research and report on current work being done in agricultural biotechnology.
		<b>BT1.a.4.m:</b> Examine potential future applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.	<b>BT1.a.7.h:</b> Research and report on emerging problems and issues associated with agricultural biotechnology.
<b>BT1.b:</b> Analyze the ethical, legal, social and cultural issues relating to biotechnology.	<b>BT1.b.1.e:</b> List reasons why biotechnology should be regulated by the government.	<b>BT1.b.3.m:</b> Describe the role of agencies that regulate biotechnology.	<b>BT1.b.7.h:</b> Interpret the major regulatory issues related to biotechnology.
	<b>BT1.b.2.e:</b> Identify reasons why people would either support or not support breakthroughs in biotechnology.	<b>BT1.b.4.m:</b> Explore ethical, legal and social biotechnology issues.	<b>BT1.b.8.h:</b> Evaluate the benefits and risks associated with biotechnology.
		<b>BT1.b.5.m:</b> Explore the emergence, evolution and implications of bioethics.	<b>BT1.b.9.h:</b> Examine an ethical dilemma associated with biotechnology by identifying its components.
		<b>BT1.b.6.m:</b> Explain the meaning of intellectual properties as related to biotechnology.	<b>BT1.b.10.h:</b> Examine intellectual properties associated with biotechnology by defining their components.



<b>Standard: BT2: Students will demonstrate laboratory skills as applied to biotechnology.</b>			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>BT2.a:</b> Demonstrate safe and proper laboratory procedures and record keeping using biological materials.	<b>BT2.a.1.e:</b> Recall what you did to complete a scientific experiment.	<b>BT2.a.7.m:</b> Maintain a biotechnology laboratory notebook.	<b>BT2.a.13.h:</b> Analyze strengths of the research based on data and procedures and propose future investigation.
	<b>BT2.a.2.e:</b> Demonstrate how to measure a substance in a scientific experiment.	<b>BT2.a.8.m:</b> Operate basic laboratory equipment and measurement devices.	<b>BT2.a.14.h:</b> Operate advanced laboratory equipment and measurement devices.
	<b>BT2.a.3.e:</b> Recognize that microbes can grow on any surface.	<b>BT2.a.9.m:</b> Demonstrate basic aseptic techniques in the biotechnology laboratory.	<b>BT2.a.15.h:</b> Demonstrate advanced aseptic techniques in the biotechnology laboratory.
	<b>BT2.a.4.e:</b> Demonstrate how to properly follow instructions in an experiment.	<b>BT2.a.10.m:</b> Perform procedures with biological materials according to directions.	<b>BT2.a.16.h:</b> Select an appropriate standard operating procedure for working with biological materials.
	<b>BT2.a.5.e:</b> Recognize that some laboratory chemicals can be very dangerous.	<b>BT2.a.11.m:</b> Identify and describe hazards associated with biological and chemical materials.	<b>BT2.a.17.h:</b> Inventory biological and chemical materials and maintain accurate records of supplies and expiration dates.
	<b>BT2.a.6.e:</b> Explain how to prevent accidents when doing scientific experiments.	<b>BT2.a.12.m:</b> Maintain a safe environment by properly identifying and disposing of laboratory waste.	<b>BT2.a.18.h:</b> Diagram the flow of waste after it leaves the laboratory.
<b>BT2.b:</b> Perform microbiology, molecular biology, enzymology and immunology procedures.	<b>BT2.b.1.e:</b> Recognize that microbes are living organisms like animals and plants.	<b>BT2.b.6.m:</b> Differentiate the types of organisms and demonstrate how to handle them safely.	<b>BT2.b.12.h:</b> Isolate, maintain, quantify and store cell cultures.
	<b>BT2.b.2.e:</b> Describe what all living organisms (including microbes) need to survive.	<b>BT2.b.7.m:</b> Explain the structures of DNA and RNA and how genotype influences phenotype.	<b>BT2.b.13.h:</b> Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
	<b>BT2.b.3.e:</b> State why DNA and proteins are needed by living organisms.	<b>BT2.b.8.m:</b> Extract and purify DNA and RNA.	<b>BT2.b.14.h:</b> Perform electrophoresis techniques and interpret electrophoresis fragmentation patterns.
	<b>BT2.b.4.e:</b> Recognize that biotechnology can be used to improve human health.	<b>BT2.b.9.m:</b> Perform simple enzyme activity assays to detect proteins.	<b>BT2.b.15.h:</b> Perform protein separation techniques and interpret the results.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>BT2.b.5.e:</b> Distinguish between examples of helpful and harmful microbes.	<b>BT2.b.10.m:</b> Describe how antibodies are formed and how they can be used in biotechnology applications.	<b>BT2.b.16.h:</b> Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).
		<b>BT2.b.11.m:</b> Explain reasons for detecting microbes and identify sources of microbes.	<b>BT2.b.17.h:</b> Research and describe the use of biotechnology to detect microbes.
<b>BT2.c:</b> Evaluate the application of genetic engineering to improve products of AFNR systems.	<b>BT2.c.1.e:</b> Recognize that scientists can change the DNA of living organisms.	<b>BT2.c.3.m:</b> Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.	<b>BT2.c.7.h:</b> Diagram the processes and describe the techniques used to produce transgenic eukaryotes.
	<b>BT2.c.2.e:</b> Identify products, medicines and services created by changing the DNA of organisms.	<b>BT2.c.4.m:</b> Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.	<b>BT2.c.8.h:</b> Describe processes by which enzymes are produced through biotechnology.
		<b>BT2.c.5.m:</b> Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.	<b>BT2.c.9.h:</b> Diagram the process by which organisms are genetically engineered for waste treatment.
		<b>BT2.c.6.m:</b> Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of aquatic species.	<b>BT2.c.10.h:</b> Investigate and report on genetic engineering procedures used in the production of aquatic species.
<b>BT2.d:</b> Perform biotechnology processes used in AFNR systems.	<b>BT2.d.1.e:</b> Define hormones.	<b>BT2.d.7.m:</b> Explain the functions of hormones in animals.	<b>BT2.d.13.h:</b> Describe the processes used to produce animal hormones from transgenic organisms.
	<b>BT2.d.2.e:</b> Define fermentation.	<b>BT2.d.8.m:</b> Identify foods produced through fermentation.	<b>BT2.d.14.h:</b> Compare and contrast bioengineering and conventional pathways used in food processing.
	<b>BT2.d.3.e:</b> List a product created by fermentation.	<b>BT2.d.9.m:</b> Explain the process of fermentation.	<b>BT2.d.15.h:</b> Describe the process used in producing alcohol from biomass.
	<b>BT2.d.4.e:</b> Recognize that we can use plants to make fuel.	<b>BT2.d.10.m:</b> Explain the process of transesterification.	<b>BT2.d.16.h:</b> Diagram the process used in producing biodiesel from biomass.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>BT2.d.5.e:</b> Distinguish between renewable and nonrenewable resources.	<b>BT2.d.11.m:</b> Explain biomass and sources of biomass.	<b>BT2.d.17.h:</b> Assess the characteristics of biomass that make it useful for biofuels production.
	<b>BT2.d.6.e:</b> Recognize that we can obtain energy from waste.	<b>BT2.d.12.m:</b> Explain the process of methanogenesis.	<b>BT2.d.18.h:</b> Illustrate the process used in producing methane from biomass.
<b>BT2.f:</b> Use biotechnology to monitor and evaluate procedures performed in AFNR systems.	<b>BT2.f.1.e:</b> Summarize how a plant reproduces.	<b>BT2.f.7.m:</b> Describe the selective plant breeding process.	<b>BT2.f.14.h:</b> Select biotechnology tools used to monitor and direct plant breeding.
	<b>BT2.f.2.e:</b> Identify how animals are kept healthy.	<b>BT2.f.8.m:</b> Describe biotechnology processes applicable to animal health.	<b>BT2.f.15.h:</b> Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
	<b>BT2.f.3.e:</b> Recognize that biotechnology can be used to clean up pollution and waste.	<b>BT2.f.9.m:</b> Give examples of instances in which bioremediation can be applied to clean up environmental contaminants.	<b>BT2.f.16.h:</b> Describe the use of biotechnology in bioremediation.
	<b>BT2.f.4.e:</b> Explain the importance of biodiversity.	<b>BT2.f.10.m:</b> Explain the use of microorganisms in biological waste management and industrial chemical waste treatment.	<b>BT2.f.17.h:</b> Describe the processes involved in bio treatment of biological wastes and industrial chemical wastes.
	<b>BT2.f.5.e:</b> Give examples of human impact on various ecosystems and wild populations.	<b>BT2.f.11.m:</b> Explain the global importance of biodiversity.	<b>BT2.f.18.h:</b> Select biotechnology tools used to measure biodiversity.
	<b>BT2.f.6.e:</b> Describe how they use natural resources in their everyday lives.	<b>BT2.f.12.m:</b> Explain the consequences of agricultural practices on wild populations.	<b>BT2.f.19.h:</b> Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
		<b>BT2.f.13.m:</b> Define industrial biotechnology and describe the benefits and risks associated with its use in the manufacturing of fabrics, plastics and other products.	<b>BT2.f.20.h:</b> Describe the processes used in the production of molecules for use in industrial applications.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: FPP/Food Production and Processing

**Standard: FPP1:** Students will examine components of the food industry and historical development of food products and processing.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>FPP1.a:</b> Evaluate the significance and implications of changes and trends in the food products and processing industry.	<b>FPP1.a.1.e:</b> Identify where food is produced and why it is processed.	<b>FPP1.a.3.m:</b> Discuss the history and describe and explain the components (e.g., processing, distribution, byproducts) of the food products and processing industry.	<b>FPP1.a.5.h:</b> Evaluate changes and trends in the food products and processing industry and be able to predict trends and implications in the food products and processing industry.
	<b>FPP1.a.2.e:</b> Identify and explain environmental and safety concerns about the food supply.	<b>FPP1.a.4.m:</b> Identify the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, irradiation).	<b>FPP1.a.6.h:</b> Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.
<b>FPP1.b:</b> Work effectively with industry organizations, groups and regulatory agencies affecting the food products and processing industry.	<b>FPP1.b.1.e:</b> Explain food production is monitored and inspected.	<b>FPP1.b.3.m:</b> Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.	<b>FPP1.b.5.h:</b> Demonstrate how to interact effectively with organizations, groups and regulatory agencies that affect the food products and processing industry.
	<b>FPP1.b.2.e:</b> Explain the importance and usage of guidelines in food products and processing.	<b>FPP1.b.4.m:</b> Discuss the application of industry standards in the food products and processing industry.	<b>FPP1.b.6.h:</b> Prepare a plan for implementation of industry standards in food products and processing programs.
<b>Standard: FPP2:</b> Students will apply safety principles; recommend equipment and facility management techniques to the food products and processing industry.			
<b>FPP2.a:</b> Manage operational procedures and create equipment and facility maintenance plans.	<b>FPP2.a.1.e:</b> Demonstrate how to properly clean a food preparation work space.	<b>FPP2.a.3.m:</b> Explain the importance of developing and maintaining Sanitation Standard Operating Procedures (SSOP).	<b>FPP2.a.6.h:</b> Develop and evaluate SSOP for a food products and processing company.
	<b>FPP2.a.2.e:</b> Discuss the importance of food processors hygiene expectation (i.e., hair nets, gloves, hand washing, equipment sanitation, etc.).	<b>FPP2.a.4.m:</b> Explain and evaluate the purpose of Good Manufacturing Practices (GMP).	<b>FPP2.a.7.h:</b> Develop a plan to implement GMP for a food products and processing company.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		<b>FPP2.a.5.m:</b> Develop a basic equipment and facility maintenance program.	<b>FPP2.a.8.h:</b> Perform basic equipment and facility maintenance in a food products and processing operation.
<b>FPP2.b:</b> Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters.	<b>FPP2.b.1.e:</b> Describe the dangers associated with food borne illness.	<b>FPP2.b.3.m:</b> Outline procedures to eliminate possible contamination hazards associated with food products and processing.	<b>FPP2.b.5.h:</b> Analyze the effectiveness of a food products and processing company's Critical Control Point (CCP) procedures.
	<b>FPP2.b.2.e:</b> Determine optimum refrigerator and freezer temperatures.	<b>FPP2.b.4.m:</b> Identify and Explain the implementation of the seven principles of HACCP.	<b>FPP2.b.6.h:</b> Design an HACCP program for a food products and processing facility.
<b>FPP2.c:</b> Apply safety and sanitation procedures in the handling, processing and storing of food products.	<b>FPP2.c.1.e:</b> Explain techniques and procedures for the safe handling of food products.	<b>FPP2.c.5.m:</b> Evaluate food product handling procedures.	<b>FPP2.c.9.h:</b> Demonstrate approved food product handling techniques.
	<b>FPP2.c.2.e:</b> Explore the sensory aspects of various foods (taste, touch, smell, etc.).	<b>FPP2.c.6.m:</b> Describe and perform quality-assurance tests on food products.	<b>FPP2.c.10.h:</b> Interpret quality-assurance test results and apply corrective procedures.
	<b>FPP2.c.3.e:</b> Describe the effects food-borne pathogens have on food products and humans.	<b>FPP2.c.7.m:</b> Explain the importance of microbiological tests in food product preparation, listing common spoilage and pathogenic microorganisms.	<b>FPP2.c.11.h:</b> Conduct and interpret microbiological tests for food-borne pathogens and implement corrective procedures.
	<b>FPP2.c.4.e:</b> Explain the importance of record keeping in a food product and processing system.	<b>FPP2.c.8.m:</b> Discuss documentation procedures in a food products and processing system.	<b>FPP2.c.12.h:</b> Demonstrate proper record keeping in a food products and processing system.
<b>FPP2.d:</b> Demonstrate worker safety procedures with food product and processing equipment and facilities.	<b>FPP2.d.1.e:</b> Explain safety standards in the food industry.	<b>FPP2.d.2.m:</b> Outline guidelines for personnel safety in the food products and processing industry.	<b>FPP2.d.3.h:</b> Create a check list of industry-used safety procedures and evaluate school lab safety procedures.



<b>Standard: FPP3: Students will apply principles of science to the food products and processing industry</b>			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>FPP3.a:</b> Apply principles of science to food processing to provide a safe, wholesome and nutritious food supply.	<b>FPP3.a.1.e:</b> Create a timeline showing how food processing evolved over the past century.	<b>FPP3.a.8.m:</b> Design a research project in food science using the scientific method.	<b>FPP3.a.15.h:</b> Conduct research in food science and interpret results to improve food products.
	<b>FPP3.a.2.e:</b> Observe changes in food during processing.	<b>FPP3.a.9.m:</b> Determine the chemical and physical properties of food products.	<b>FPP3.a.16.h:</b> Explain how the chemical and physical properties of foods influence nutritional value and eating quality.
	<b>FPP3.a.3.e:</b> Illustrate which food products provide the essential nutrients in the human diet.	<b>FPP3.a.10.m:</b> Design a daily food guide for a healthful diet.	<b>FPP3.a.17.h:</b> Conduct a test and then compare and contrast the nutritive value of food and food groups.
	<b>FPP3.a.4.e:</b> Discuss common food components (e.g., proteins, carbohydrates, fats, vitamins, minerals).	<b>FPP3.a.11.m:</b> Compare and contrast food constituents and their relative value to product taste, appearance, etc.	<b>FPP3.a.18.h:</b> Analyze food products to identify food constituents.
	<b>FPP3.a.5.e:</b> Examine food labels to identify common food additives (e.g., preservatives, colors, flavors).	<b>FPP3.a.12.m:</b> Describe the purpose of common food additives.	<b>FPP3.a.19.h:</b> Formulate and explain incorporation of additives into food products.
	<b>FPP3.a.6.e:</b> Explain the importance of food labeling to the consumer.	<b>FPP3.a.13.m:</b> Explain the required components of a food label.	<b>FPP3.a.20.h:</b> Prepare and label foods according to the established standards of regulatory agencies.
	<b>FPP3.a.7.e:</b> Describe factors in planning and developing a new food product (i.e., regulation, creativity and economics).	<b>FPP3.a.14.m:</b> Plan and create a new food product.	<b>FPP3.a.21.h:</b> Perform sensory-testing and marketing functions to characterize and determine consumer preference and market potential.



<b>Standard: FPP4:</b> Students will select and process food products for storage, distribution and consumption			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>FPP4.a:</b> Use harvesting, selection and inspection techniques to obtain quality food products for processing.	<b>FPP4.a.1.e:</b> Identify techniques used to sort and classify of food products. (i.e., size, color, maturity, etc.).	<b>FPP4.a.5.m:</b> Discuss factors that affect quality and yield grades of food products.	<b>FPP4.a.9.h:</b> Assign quality and yield grades to food products according to industry standards.
	<b>FPP4.a.2.e:</b> Compare and contrast fresh, frozen, canned or other forms of processed food products.	<b>FPP4.a.6.m:</b> Select raw food products perform quality-control inspections of raw food products for processing.	<b>FPP4.a.10.h:</b> Develop and demonstrate procedures to maintain original food quality and yield.
	<b>FPP4.a.3.e:</b> Identify proper care of production animals and describe accepted animal treatment and harvesting techniques.	<b>FPP4.a.7.m:</b> Compare and contrast industry approved production animal care and treatment.	<b>FPP4.a.11.h:</b> Research and present regulatory-agency-approved or industry-approved techniques for harvesting animals.
	<b>FPP4.a.4.e:</b> Describe the purpose and importance of meat inspection.	<b>FPP4.a.8.m:</b> Explain characteristics of animals in relation to food production.	<b>FPP4.a.12.h:</b> Investigate the role and responsibilities of a USDA meat inspector.
<b>FPP4.b:</b> Evaluate, grade and classify processed food products.	<b>FPP4.b.1.e:</b> Identify and describe foods derived from meat, egg, poultry, fish and dairy products.	<b>FPP4.b.4.m:</b> Discuss desirable qualities of processed meat, egg, poultry, fish and dairy products.	<b>FPP4.b.7.h:</b> Evaluate, grade and classify processed meat, egg, poultry, fish and dairy products.
	<b>FPP4.b.2.e:</b> Identify and describe products derived from fruits and vegetables.	<b>FPP4.b.5.m:</b> Discuss desirable qualities of fruit and vegetable products.	<b>FPP4.b.8.h:</b> Evaluate, grade and classify processed products from fruits and vegetables.
	<b>FPP4.b.3.e:</b> Identify and describe products derived from grains, legumes and oilseeds.	<b>FPP4.b.6.m:</b> Discuss desirable qualities of grain, legume and oilseed products.	<b>FPP4.b.9.h:</b> Evaluate, grade and classify finished products derived from grains, legumes and oilseeds.
<b>FPP4.c:</b> Process, preserve, package and present food and food products for sale and distribution.	<b>FPP4.c.1.e:</b> Identify and explain common weights and measures used in the food products and processing industry.	<b>FPP4.c.7.m:</b> Weigh and measure food products and perform conversions between units of measure.	<b>FPP4.c.13.h:</b> Create a food package while taking into account weight and product requirements.
	<b>FPP4.c.2.e:</b> Explain methods and materials for processing foods for sale as fresh-food products.	<b>FPP4.c.8.m:</b> Demonstrate how fresh foods are prepared for distribution.	<b>FPP4.c.14.h:</b> Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance and weight.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>FPP4.c.3.e:</b> Identify methods of food preservation and give examples of foods preserved by each method.	<b>FPP4.c.9.m:</b> Explain the processes of food preservation methods.	<b>FPP4.c.15.h:</b> Preserve foods using various methods and techniques.
	<b>FPP4.c.4.e:</b> Explain techniques for preparing ready-to-eat food products. ( <i>Various categories of ready to eat food, such as snack food, convince meals, microwaveable meal</i> ).	<b>FPP4.c.10.m:</b> Research the steps involved in the creation of ready-to-eat food products.	<b>FPP4.c.16.h:</b> Create and evaluate ready-to-eat food products.
	<b>FPP4.c.5.e:</b> Explain materials and methods of food packaging and presentation.	<b>FPP4.c.11.m:</b> Explain the science behind packaging materials in storing processed foods and raw food products.	<b>FPP4.c.17.h:</b> Applying science principles analyze the foods stored in various packaging, to determine which materials retain desirable food qualities.
	<b>FPP4.c.6.e:</b> Identify and explain methods used to store food.	<b>FPP4.c.12.m:</b> Determine appropriate methods and conditions for storing raw and processed food products based on their characteristics.	<b>FPP4.c.18.h:</b> Compare and contrast foods stored under varying conditions for quality, shelf life and intended use.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: ESS/Environmental Service Systems

**Standard: ESS1:** Students will use analytical procedures to plan and evaluate environmental service systems while assessing the impact of policies and regulations on environmental service systems.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>ESS1.a:</b> Analyze and interpret samples.	<b>ESS1.a.1.e:</b> Identify items to sample and basic tools to use during sampling and testing procedures.	<b>ESS1.a.3.m:</b> Determine the appropriate sampling techniques needed, explain the importance of unbiased sampling and collection of samples.	<b>ESS1.a.5.h:</b> Determine appropriate sampling techniques, analyze and interpret samples and generate statistical analysis report(s) and prepare valid chemical laboratory samples according to instructions.
	<b>ESS1.a.2.e:</b> Actively participate in basic sampling and measuring procedures with one activity connected to the indoors and one to the outdoors.	<b>ESS1.a.4.m:</b> Identify basic laboratory equipment and environmental monitoring instruments and explain their uses.	<b>ESS1.a.6.h:</b> Demonstrate proper use, maintenance and calibration of lab and monitoring equipment according to standard operating procedures.
<b>ESS1.b:</b> Interpret laws affecting environmental service systems.	<b>ESS1.b.1.e:</b> Be able to identify a law connected to the environment.	<b>ESS1.b.2.m:</b> Identify laws associated with Wisconsin environmental service systems.	<b>ESS1.b.3.h:</b> Identify purposes of Wisconsin laws associated with environmental service systems.
<b>Standard: ESS2:</b> Students will apply scientific principles to environmental service systems.			
<b>ESS2.a:</b> Apply meteorology principles to environmental service systems.	<b>ESS2.a.1.e:</b> Explain the rain cycle in a format that correlates to grade level.	<b>ESS2.a.5.m:</b> Identify components and structural layers of the earth's atmosphere.	<b>ESS2.a.9.h:</b> Differentiate the types of weather systems and patterns along with basic monitoring of meteorological conditions with accurately documented data.
	<b>ESS2.a.2.e:</b> Describe weather conditions and identify factors that influence quality of water and air.	<b>ESS2.a.6.m:</b> Explain how meteorological conditions influence air quality.	<b>ESS2.a.10.h:</b> Illustrate and monitor the formation of acid precipitation and explain its impact on the environment.
	<b>ESS2.a.3.e:</b> Decide on indicators that may signal a change in weather and the general climate of an area.	<b>ESS2.a.7.m:</b> Explain and recognize signs of climate change within Wisconsin.	<b>ESS2.a.11.h:</b> Report on consequences of climate change and its impact on Wisconsin and globally.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	<b>ESS2.a.4.e:</b> Compare and contrast how the earth's energy changes.	<b>ESS2.a.8.m:</b> Explain the Earth's balance of energy.	<b>ESS2.a.12.h:</b> Explain the basics and contributing factors of the greenhouse effect and how it alters the earth's balance of energy including greenhouse gasses.
<b>ESS2.b:</b> Apply soil science and microbiology principles to environmental service systems.	<b>ESS2.b.1.e:</b> Describe soil and compare and contrast different soil types.	<b>ESS2.b.7.m:</b> Explain the process of soil formation through weathering.	<b>ESS2.b.13.h:</b> Differentiate rocks relating chemical composition of mineral matter in soils to the parent material with a connection to environmental service systems.
	<b>ESS2.b.2.e:</b> Identify the basic make-up of soil biodiversity.	<b>ESS2.b.8.m:</b> Describe the biodiversity found in soil and the contribution of biodiversity of the physical and chemical characteristics of soil.	<b>ESS2.b.14.h:</b> Relate and evaluate soil microorganism activities to environmental service systems.
	<b>ESS2.b.3.e:</b> Participate in a demonstration of water percolating through different soil types.	<b>ESS2.b.9.m:</b> Explain how the physical qualities of the soil influence the infiltration and percolation of water.	<b>ESS2.b.15.h:</b> Identify physical soil qualities, through testing, that determine its use for environmental service systems.
	<b>ESS2.b.4.e:</b> Compare and contrast land and how it is used.	<b>ESS2.b.10.m:</b> Identify land uses, capability factors and land capability classes.	<b>ESS2.b.16.h:</b> Determine land capability classes for land parcels and design a land-use management plan for a given area.
	<b>ESS2.b.5.e:</b> Identify a simple organism.	<b>ESS2.b.11.m:</b> Identify the basic structures of microorganisms and the major groups of microorganisms.	<b>ESS2.b.17.h:</b> Describe microbial growth in the environment and analyze the influence of environmental factors on microbial growth with an examination of microorganisms using safe practices.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	<b>ESS2.b.6.e:</b> List how pollution affects organisms.	<b>ESS2.b.12.m:</b> Define the purposes of bioassay tests.	<b>ESS2.b.18.h:</b> Outline procedures for a bioassay test followed by a basic bioassay test related to environmental service systems and interpret results.
<b>ESS2.c:</b> Apply hydrology principles to environmental service systems.	<b>ESS2.c.1.e:</b> List ways water is used in daily life tracking its source.	<b>ESS2.c.7.m:</b> Describe the world's water supplies and discuss water uses.	<b>ESS2.c.13.h:</b> Describe and research water characteristics that influence the biosphere for life and be able to identify current environmental water issues.
	<b>ESS2.c.2.e:</b> Define ground and surface water and reinforce the difference by comparing and contrasting.	<b>ESS2.c.8.m:</b> Demonstrate knowledge of hydrogeology by differentiating between ground and surface water.	<b>ESS2.c.14.h:</b> Describe ground and surface water interactions with emphasis on groundwater-flow equations and Darcy's Law to explain how geology and meteorology affect groundwater and its flow.
	<b>ESS2.c.3.e:</b> Explain the source of drinking water.	<b>ESS2.c.9.m:</b> Define groundwater potential.	<b>ESS2.c.15.h:</b> Identify differences in groundwater potential delineate groundwater potential zones.
	<b>ESS2.c.4.e:</b> Match environmental hazards with the natural resource that could be potentially damaged.	<b>ESS2.c.10.m:</b> Identify environmental hazards associated with groundwater supplies.	<b>ESS2.c.16.h:</b> Describe precautions taken to prevent/reduce groundwater contamination while testing and documenting results of related tests.
	<b>ESS2.c.5.e:</b> Explain how water moves through an open channel.	<b>ESS2.c.11.m:</b> Discuss factors that influence the velocity of water through an open channel.	<b>ESS2.c.17.h:</b> Explain, measure and document velocity of water as it influences channel morphology and stream processes.
	<b>ESS2.c.6.e:</b> Describe what happens when a fluid moves through a hose or group of pipes.	<b>ESS2.c.12.m:</b> Identify the operational components of a pumping or fluid movement system.	<b>ESS2.c.18.h:</b> Discuss design principles related to hydraulic systems and high-flow technologies related to fluid movement and created a model.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>ESS2.d:</b> Apply best management techniques associated with the properties, classifications and functions of wetlands.	<b>ESS2.d.1.e:</b> Define wetlands and list reasons and why they are important.	<b>ESS2.d.5.m:</b> Describe the functions of wetlands and differentiate the types of wetlands.	<b>ESS2.d.9.h:</b> Explain the criteria for classifying wetlands while applying the Hydrogeomorphic (HGM) Approach and National Wetland Inventories (NWI) to determine the classification for local wetlands.
	<b>ESS2.d.2.e:</b> Compare and contrast what organisms might live in a wetland verses some other type of habitat.	<b>ESS2.d.6.m:</b> Identify the major types of living organisms that inhabit wetlands.	<b>ESS2.d.10.h:</b> Conduct a survey and identify of the predominant species.
	<b>ESS2.d.3.e:</b> List ways to improve a wetland.	<b>ESS2.d.7.m:</b> Explain the importance of wetland management, creation, enhancement and restoration programs.	<b>ESS2.d.11.h:</b> Identify techniques used to evaluate a wetland, record conditions of a local wetland followed by application of proper techniques used to manage, create and restore a wetland.
	<b>ESS2.d.4.e:</b> Explain how chemistry helps the world.	<b>ESS2.d.8.m:</b> Explain basic chemistry principals.	<b>ESS2.d.12.h:</b> Distinguish characteristics of inorganic and organic compounds and identify standard operating procedures for use of chemicals in environmental service systems.
<b>Standard: ESS3:</b> Students will operate environmental service systems to manage a facility environment.			
<b>ESS3.a:</b> Use pollution control measures to maintain a safe facility environment.	<b>ESS3.a.1.e:</b> Identify different types of pollution.	<b>ESS3.a.3.m:</b> Identify types of pollution and distinguish between point and nonpoint source pollution.	<b>ESS3.a.5.h:</b> Provide examples of industrial and nonindustrial pollution impacts on the environment and discuss a local pollution survey.
	<b>ESS3.a.2.e:</b> List types of pollution that can be found in the country vs. city and ways it can be prevented.	<b>ESS3.a.4.m:</b> Describe ways in which pollution can be managed and prevented.	<b>ESS3.a.6.h:</b> Conduct tests determining the presence and extent of pollution and create a plan to develop a pollution, remediation, management or prevention program.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>ESS3.b:</b> Manage safe disposal of all categories of solid waste.	<b>ESS3.b.1.e:</b> Define solid waste.	<b>ESS3.b.7.m:</b> Describe different types of solid wastes.	<b>ESS3.b.13.h:</b> Evaluate and analyze environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal.
	<b>ESS3.b.2.e:</b> Identify solid waste and its sources.	<b>ESS3.b.8.m:</b> Discuss practical management options for treating solid wastes.	<b>ESS3.b.14.h:</b> Collect, identify and treat solid waste materials and recognize byproducts of solid waste treatments.
	<b>ESS3.b.3.e:</b> Identify a sanitary landfill.	<b>ESS3.b.9.m:</b> Explain sanitary landfill.	<b>ESS3.b.15.h:</b> Explain and evaluate basic sanitary landfill operating procedures and designs.
	<b>ESS3.b.4.e:</b> Describe how items decay in nature.	<b>ESS3.b.10.m:</b> Define composts and composting.	<b>ESS3.b.16.h:</b> Explain and evaluate scientific operating principles of composting and compost facilities.
	<b>ESS3.b.5.e:</b> Compare and contrast solid waste handling.	<b>ESS3.b.11.m:</b> Explain the basic concepts associated with solid waste incineration.	<b>ESS3.b.17.h:</b> Describe and evaluate methods of incineration and its environmental impact including Wisconsin's waste-to-energy plants.
	<b>ESS3.b.6.e:</b> Generate a list of items that are recycled.	<b>ESS3.b.12.m:</b> Explain the importance of recycling.	<b>ESS3.b.18.h:</b> Describe recycling methods and conduct a local survey analyzing for future recycling options.
<b>ESS3.c:</b> Apply the principles of public drinking water treatment operations to ensure safe water at a facility.	<b>ESS3.c.1.e:</b> Explain what safe drinking water is.	<b>ESS3.c.3.m:</b> Identify chemical and physical properties of drinking water.	<b>ESS3.c.5.h:</b> Illustrate and/or demonstrate the steps in the public drinking water treatment process with emphasis on equipment used.
	<b>ESS3.c.2.e:</b> List important reasons for water testing.	<b>ESS3.c.4.m:</b> Define source water quality and assessment steps.	<b>ESS3.c.6.h:</b> Conduct and interpret source water assessment.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
<b>ESS3.d:</b> Apply principles of wastewater treatment to manage wastewater disposal in keeping with rules and regulations.	<b>ESS3.d.1.e:</b> List sources of wastewater.	<b>ESS3.d.3.m:</b> Diagram the steps in wastewater treatment.	<b>ESS3.d.5:</b> Demonstrate use of water-testing instruments and water-treatment equipment to treat wastewater.
	<b>ESS3.d.2.e:</b> Define hazardous.	<b>ESS3.d.4.m:</b> Identify types of hazardous material.	<b>ESS3.d.6.h:</b> Describe procedures for the treatment and disposal of hazardous materials and wastes while identifying safety practices to reduce risks.
<b>Standard: ESS4:</b> Students will examine the relationships between energy sources and environmental service system with a basic understanding of the use of tools, equipment, machinery and technology to accomplish tasks in environmental service systems.			
<b>ESS4.a:</b> Compare and contrast the impact of conventional and alternative energy sources on the environment.	<b>ESS4.a.1.e:</b> Explain energy and ways in which it can be used.	<b>ESS4.a.3.m:</b> Identify conventional energy sources and list conservation measures to reduce energy consumption.	<b>ESS4.a.5.h:</b> Compare and contrast the use and environmental impact of the burning of fossil fuels (conventional energy sources).
	<b>ESS4.a.2.e:</b> List ways energy is created that is friendly to the earth.	<b>ESS4.a.4.m:</b> Identify alternative energy sources.	<b>ESS4.a.6.h:</b> Compare and contrast the use and environmental impact of alternative energy sources.
<b>ESS4.b:</b> Use technological and mathematical tools to map land, facilities and infrastructure with inclusion of basic maintenance knowledge related to tools, equipment and machinery in safe working order for tasks in environmental service systems.	<b>ESS4.b.1.e:</b> Compare and contrast map types.	<b>ESS4.b.3.m:</b> Explain the importance of surveying and mapping for environmental service systems.	<b>ESS4.b.5.h:</b> Explain and demonstrate surveying and mapping principles with identification/description of surveying and mapping equipment with awareness for infrastructure.
	<b>ESS4.b.2.e:</b> Identify hand tools and what they are used for.	<b>ESS4.b.4.m:</b> Demonstrate proper use and maintenance of hand tools.	<b>ESS4.b.6.h:</b> Operate equipment and machinery in accordance with manufacturers' instructions and OSHA standards, specifically addressing personal protective equipment and proper machine guarding.
			<b>ESS4.b.7.h:</b> Demonstrate proper preventative maintenance techniques and set up a mock preventative maintenance schedule.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: NR/Natural Resources

**Standard: NR1:** Students will explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>NR1.a:</b> Apply knowledge of natural resource components to the management of natural resource systems.	<b>NR1.a.1.e:</b> Identify natural resources	<b>NR1.a.3.m:</b> Differentiate between renewable and nonrenewable natural resources.	<b>NR1.a.5.h:</b> Research and debate one or more current issues related to the conservation or preservation of natural resources
	<b>NR1.a.2.e:</b> Compare and contrast different ecosystems.	<b>NR1.a.4.m:</b> Define ecosystem and related terms.	<b>NR1.a.6.h:</b> Compare and contrast the interdependence of organisms within an ecosystem.
<b>NR1.b:</b> Classify natural resources.	<b>NR1.b.1.e:</b> List and describe differences in trees.	<b>NR1.b.6.m:</b> Describe morphological characteristics used to identify trees and other woody plants.	<b>NR1.b.11.h:</b> Compare and contrast trees and other woody plants.
	<b>NR1.b.2.e:</b> Match names to basic herbaceous plants.	<b>NR1.b.7.m:</b> Explain morphological characteristics used to identify herbaceous plants.	<b>NR1.b.12.h:</b> Compare and contrast herbaceous plants.
	<b>NR1.b.3.e:</b> Match names to wildlife species.	<b>NR1.b.8.m:</b> Compare and contrast wildlife species.	<b>NR1.b.13.h:</b> Compare and contrast wildlife species.
	<b>NR1.b.4.e:</b> Match names to aquatic species.	<b>NR1.b.9.m:</b> Compare and contrast aquatic species.	<b>NR1.b.14.h:</b> Conduct an aquatic field inventory experience.
	<b>NR1.b.5.e:</b> Match names to rock, mineral and soil types.	<b>NR1.b.10.m:</b> Demonstrate techniques used to identify rock, mineral and soil differences.	<b>NR1.b.15.h:</b> Identify rock, mineral and soil types.
<b>Standard: NR2:</b> Students will apply scientific principles to natural resource management activities.			
<b>NR2.a:</b> Use cartographic skills to aid in developing, implementing and evaluating natural resource management plans, measure and survey for natural resource status in developing related plans with interpretation of laws related to natural resource management and protection.	<b>NR2.a.1.e:</b> Identify hazards associated with the outdoor environment.	<b>NR2.a.4.m:</b> Identify hazards associated with the outdoor environment.	<b>NR2.a.7.h:</b> Demonstrate safety practices.
	<b>NR2.a.2.e:</b> Explain biohazard materials.	<b>NR2.a.5.m:</b> Recognize biohazards associated with natural resources.	<b>NR2.a.8.h:</b> Demonstrate and use appropriate techniques and equipment when working with biohazard materials along with appropriate responses.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>NR2.a.3.e:</b> Differentiate different types of maps.	<b>NR2.a.6.m:</b> Demonstrate how to use maps to identify directions and features, calculate actual distance and determine the elevations of points.	<b>NR2.a.9.h:</b> Locate natural resources using a land survey and employ a Global Positioning System and/or Geographic Information Systems technologies to inventory features in natural resource management.
<b>NR2.b:</b> Apply ecological concepts and principles to natural resource systems.	<b>NR2.b.1.e:</b> Categorize natural resource inventories and/or population studies.	<b>NR2.b.4.m:</b> Describe the value of resource inventories and population studies.	<b>NR2.b.7.h:</b> Discuss procedures used to conduct resource inventories and population studies.
	<b>NR2.b.2.e:</b> Explain why laws are needed for natural resource systems.	<b>NR2.b.5.m:</b> Identify laws associated with natural resource systems.	<b>NR2.b.8.h:</b> Identify purposes of laws associated with natural resource systems and abide by specific laws pertaining to natural resource systems.
	<b>NR2.b.3.e:</b> Identify natural resource systems that are at risk.	<b>NR2.b.6.m:</b> Define mitigation.	<b>NR2.b.9.h:</b> Identify and evaluate issues involving mitigation of natural resources.
<b>NR2.c:</b> Demonstrate natural resource enhancement techniques.	<b>NR2.c.1.e:</b> Illustrate a stream.	<b>NR2.c.7.m:</b> Categorize the different kinds of streams.	<b>NR2.c.13.h:</b> Identify indicators of the biological health of a stream.
	<b>NR2.c.2.e:</b> Describe different types of forests.	<b>NR2.c.8.m:</b> Generate characteristics of a healthy forest.	<b>NR2.c.14.h:</b> Develop and conduct a timber stand improvement (TSI) plan.
	<b>NR2.c.3.e:</b> Illustrate a healthy wildlife habitat.	<b>NR2.c.9.m:</b> Identify characteristics of a healthy wildlife habitat.	<b>NR2.c.15.h:</b> Design a blueprint and/or survey of a wildlife habitat.
	<b>NR2.c.4.e:</b> Illustrate a healthy rangeland.	<b>NR2.c.10.m:</b> Identify characteristics of a healthy rangeland.	<b>NR2.c.16.h:</b> Summarize methods of rangeland improvement.
	<b>NR2.c.5.e:</b> Compare and contrast natural resources used for recreational purposes.	<b>NR2.c.11.m:</b> Identify natural resource characteristics desirable for recreational purposes.	<b>NR2.c.17.h:</b> Explain natural resource management techniques for improving recreation opportunities.
	<b>NR2.c.6.e:</b> Compare and contrast healthy marine and coastal natural resources.	<b>NR2.c.12.m:</b> Identify characteristics of healthy marine and coastal natural resources.	<b>NR2.c.18.h:</b> Identify methods to improve marine and coastal natural resources.
<b>NR2.d:</b> Apply ecological concepts and principles to natural resource systems.	<b>NR2.d.1.e:</b> Label the parts of a biogeochemical cycle.	<b>NR2.d.8.m:</b> Illustrate biogeochemical cycles.	<b>NR2.d.15.h:</b> Diagram biogeochemical cycles and explain the processes.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>NR2.d.2.e:</b> Identify parts of a watershed.	<b>NR2.d.9.m:</b> Describe properties of watersheds and identify the boundaries of local watersheds.	<b>NR2.d.16.h:</b> Relate the function of watersheds to natural resources.
	<b>NR2.d.3.e:</b> Match groundwater and surface-water flow to sources.	<b>NR2.d.10.m:</b> Compare and contrast groundwater and surface-water flow	<b>NR2.d.17.h:</b> Explain stream hydrology and structure and determine different classes of streams.
	<b>NR2.d.4.e:</b> Illustrate a riparian zone.	<b>NR2.d.11.m:</b> Define riparian zones and riparian buffers and explain their functions	<b>NR2.d.18.h:</b> Identify techniques used in the creation, enhancement and management of riparian zones and riparian buffers.
	<b>NR2.d.5.e:</b> Recognize illustrations of succession.	<b>NR2.d.12.m:</b> Describe the processes associated with ecological succession.	<b>NR2.d.19.h:</b> Give examples of primary-succession and secondary-succession species in a community of organisms.
	<b>NR2.d.6.e:</b> Recognize populations within natural resource systems.	<b>NR2.d.13.m:</b> Explain population ecology, population density and population dispersion.	<b>NR2.d.20.h:</b> Evaluate and create a management plan based on a population study for a community of organisms.
	<b>NR2.d.7.e:</b> Explain why invasive species have negative impacts on natural resource systems with recognition of polluted illustrations and a description of the climate you live in.	<b>NR2.d.14.m:</b> Define invasive species along with pollution descriptions and delineation between point and nonpoint source pollutions with descriptions of climatic factors that influence natural resources.	<b>NR2.d.21.h:</b> Discuss factors that influence the establishment and spread of invasive species.
<b>Standards: NR3:</b> Students will apply knowledge of natural resources to production and processing industries.			
<b>NR3.a:</b> Produce, harvest, process and use natural resource products.	<b>NR3.a.1.e:</b> Define harvesting related to tree products.	<b>NR3.a.8.m:</b> List tree species and describe related uses and harvesting methods.	<b>NR3.a.15.h:</b> List and describe uses of trees species and determine when to harvest forest products.
	<b>NR3.a.2.e:</b> Match names to corresponding aquatic and wildlife species.	<b>NR3.a.9.m:</b> Identify wildlife and aquatic species that can be commercially and or sustainably harvested for commercial and recreational purposes.	<b>NR3.a.16.h:</b> Describe techniques used in the harvesting of wildlife and aquatic species.
	<b>NR3.a.3.e:</b> Compare and contrast wildlife and aquatic products from other products.	<b>NR3.a.10.m:</b> Identify uses and products obtained from wildlife and aquatic species.	<b>NR3.a.17.h:</b> Explain and use techniques to process wildlife and aquatic species.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	<b>NR3.a.4.e:</b> Recognize a mineral and ore.	<b>NR3.a.11.m:</b> Describe the value of minerals and ores to the economy.	<b>NR3.a.18.h:</b> Summarize economically important minerals and ores that are extracted and processed.
	<b>NR3.a.5.e:</b> Match names with corresponding fossil fuels.	<b>NR3.a.12.m:</b> Describe the value of fossil fuels to the economy.	<b>NR3.a.19.h:</b> Describe sources of fossil fuels and products made from fossil fuels.
	<b>NR3.a.6.e:</b> List benefits of a hydroelectric dam as a power source.	<b>NR3.a.13.m:</b> Describe the benefits of hydroelectric generation.	<b>NR3.a.20.h:</b> Describe characteristics of sites that lend themselves to hydroelectric generation and green energy saving system and designs.
	<b>NR3.a.7.e:</b> List ways to enjoy natural resources.	<b>NR3.a.14.m:</b> Identify recreational uses of natural resources.	<b>NR3.a.21.h:</b> Debate an issue related to the creation use of natural resources.
<b>Standard: NR4: Students will demonstrate techniques used to protect natural resources.</b>			
<b>NR4.a:</b> Manage fires in natural resource systems.	<b>NR4.a.1.e:</b> Recognize forest fire types.	<b>NR4.a.2.m:</b> Differentiate between desirable and undesirable fires and prepare a report on the role fire plays in a healthy ecosystem.	<b>NR4.a.3.h:</b> Describe techniques used to suppress wildfires and manage prescribed fires.
<b>NR4.b:</b> Diagnose plant and wildlife diseases and follow protocol to prevent their spread while acquiring management protocol of insect infestations of natural resources.	<b>NR4.b.1.e:</b> Illustrate or recognize a diseased plant.	<b>NR4.b.4.m:</b> Identify causes of diseases in plants.	<b>NR4.b.7.h:</b> Report the observance of diseases affecting plants to the appropriate authorities.
	<b>NR4.b.2.e:</b> Choose a safe practice or procedure around a diseased wildlife animal.	<b>NR4.b.5.m:</b> Identify causes of diseases in wildlife.	
	<b>NR4.b.3.e:</b> Recognize insect damage within natural resources.	<b>NR4.b.6.m:</b> Identify harmful and beneficial insects and signs of insect damage to natural resources.	<b>NR4.b.8.h:</b> Report observance of insect pests to the appropriate authorities and describe techniques used to manage pests of natural resources.
<b>Standard: NR5: Students will use effective methods and venues to communicate natural resource processes to the public.</b>			
<b>NR5.a:</b> Communicate natural resource information to the public.	<b>NR5.a.1.e:</b> Recognize messages that relate natural resources and the message being sent.	<b>NR5.a.2.m:</b> Identify ways in which a message regarding natural resources may be communicated to the public.	<b>NR5.a.3.h:</b> Design and/or construct a display communicating a natural resource message for a media type.



## Agriculture, Food and Natural Resources (AFNR)

### Content Area: PS/Plant Systems

**Standard: PS1:** Students will apply knowledge of plant classification, anatomy and physiology to the production and management of plants.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>PS1.a:</b> Classify agricultural plants according to taxonomy systems.	<b>PS1.a.1.e:</b> Identify how people use plants and match plant products to the appropriate plant class.	<b>PS1.a.4.m:</b> Explain systems used to classify plants and compare and contrast the hierarchical agricultural plants.	<b>PS1.a.7.h:</b> Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons.
	<b>PS1.a.2.e:</b> Observe and describe changes in plants as the seasons change.	<b>PS1.a.5.m:</b> Identify major groups of plants based on physiological characteristics.	<b>PS1.a.8.h:</b> Describe the morphological characteristics used to identify agricultural plants.
	<b>PS1.a.3.e:</b> Prepare a chart categorizing plants or plant products by similar characteristics.	<b>PS1.a.6.m:</b> Identify agriculturally important plants by common names.	<b>PS1.a.9.h:</b> Identify agriculturally important plants by scientific names.
<b>PS1.b:</b> Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.	<b>PS1.b.1.e:</b> Draw the life cycle of a plant.	<b>PS1.b.3.m:</b> Diagram a typical plant cell and identify plant cell organelles and their functions.	<b>PS1.b.9.h:</b> Compare and contrast mitosis and meiosis and apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems.
	<b>PS1.b.2.e:</b> Match fruit to the plant structure that produces it and compare seeds of plants.	<b>PS1.b.4.m:</b> Identify the components, the types and the functions of plant roots.	<b>PS1.b.10.h:</b> Identify root tissues and explain the pathway of water and nutrients into and through the root tissues.
		<b>PS1.b.5.m:</b> Identify the components and the functions of plant stems.	<b>PS1.b.11.h:</b> Relate the active and passive transport of minerals into and through the vascular system to plant nutrition.
		<b>PS1.b.6.m:</b> Discuss leaf morphology and the functions of leaves.	<b>PS1.b.12.h:</b> Describe and apply the processes of translocation to the management of plants.
		<b>PS1.b.7.m:</b> Identify the components of a flower, the functions of a flower and the functions of flower components.	<b>PS1.b.13.h:</b> Explain how leaves capture light energy and allow for the exchange of gases.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
		<b>PS1.b.8.m:</b> Explain the functions and components of seeds and fruit and describe ways they may be carried through the environment.	<b>PS1.b.14.h:</b> Identify the different types of flowers and flower forms and apply the knowledge of flower structures to plant breeding, production and use.
			<b>PS1.b.15.h:</b> Apply the knowledge of seed and fruit structures to plant culture and use.
<b>PS1.c:</b> Apply energy conversion to plant systems.	<b>PS1.c.1.e:</b> Identify plants that require all sun, partial sun or shade.	<b>PS1.c.3.m:</b> Explain the basic process of photosynthesis and its importance to life on Earth.	<b>PS1.c.5.h:</b> Explain the light-dependent and light-independent reactions that occur during photosynthesis and apply the knowledge to plant management.
	<b>PS1.c.2.e:</b> Identify environmental products from plants.	<b>PS1.c.4.m:</b> Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.	<b>PS1.c.6.h:</b> Explain cellular respiration and its importance to plant life.
			<b>PS1.c.7.h:</b> Explain factors that affect cellular respiration and identify the products and byproducts of cellular respiration.
			<b>PS1.c.8.h:</b> Explain the four stages of aerobic respiration and relate cellular respiration to plant growth, crop management and post-harvest handling.
<b>PS1.d:</b> Apply knowledge of plant physiology to plant systems.	<b>PS1.d.1.e:</b> Observe seed and plant growth and changes in seed and plant characteristics.	<b>PS1.d.3.m:</b> Compare and contrast monocot and dicot seed and plant growth characteristics.	<b>PS1.d.5.h:</b> Define primary growth and the role of the apical meristem.
	<b>PS1.d.2.e:</b> Observe the effects of light on plant growth.	<b>PS1.d.4.m:</b> Identify different types of plant growth regulators and forms of tropism.	<b>PS1.d.6.h:</b> Explain the process of secondary plant growth.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
			<b>PS1.d.7.h:</b> Relate the principles of primary and secondary growth to plant systems.
			<b>PS1.d.8.h:</b> Identify the five groups of naturally occurring plant hormones and synthetic plant growth regulators.
			<b>PS1.d.9.h:</b> Identify the plant responses to plant growth regulators and different forms of tropism.
			<b>PS1.d.10.h:</b> Select plant growth regulators to produce desired responses from plants.
<b>Standard: PS2:</b> Students will prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth.			
<b>PS2.a:</b> Determine the influence of environmental factors on plant growth.	<b>PS2.a.1.e:</b> Define the elements that plants need to grow successfully.	<b>PS2.a.3.m:</b> Describe the qualities of light that affect plant growth.	<b>PS2.a.6.h:</b> Describe plant responses to light color, intensity and duration.
	<b>PS2.a.2.e:</b> Identify the different ways that land is used to grow plants.	<b>PS2.a.4.m:</b> Describe the effects air; temperature and water have on plant metabolism and growth.	<b>PS2.a.7.h:</b> Evaluate plant responses to varied light color, intensity and duration.
		<b>PS2.a.5.m:</b> Determine the optimal air, temperature and water conditions for plant growth.	<b>PS2.a.8.h:</b> Design, implement and evaluate a plan to maintain optimal conditions for plant growth.
<b>PS2.b:</b> Prepare growing media for use in plant systems.	<b>PS2.b.1.e:</b> Demonstrate how to properly prepare media for plant growth.	<b>PS2.b.3.m:</b> Identify the major components of growing media and describe how growing media support plant growth.	<b>PS2.b.5.h:</b> Describe the physical characteristics of growing media and explain the influence they have on plant growth.
	<b>PS2.b.2.e:</b> Distinguish between media that is too dry or too wet for seeds or plants to grow efficiently.	<b>PS2.b.4.m:</b> Compare and contrast different plant medias.	<b>PS2.b.6.h:</b> Formulate and prepare growing media for specific plants or crops.
			<b>PS2.b.7.h:</b> Identify the categories of soil water.
			<b>PS2.b.8.h:</b> Discuss how soil drainage and water-holding capacity can be improved.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			<b>PS2.b.9.h:</b> Determine the hydraulic conductivity for soil and how the results influence irrigation practices.
<b>PS2.c:</b> Develop and implement a fertilization plan for specific plants, field crops and/or greenhouse crops.	<b>PS2.c.1.e:</b> Describe what elements plants use for food.	<b>PS2.c.3.m:</b> Identify the essential nutrients for plant growth and development and their major functions and monitor plants for signs of nutrient deficiencies.	<b>PS2.c.7.h:</b> Describe nutrient deficiency symptoms, recognize environmental causes of nutrient deficiencies and prepare a scouting report.
	<b>PS2.c.2.e:</b> Distinguish between healthy and unhealthy plants.	<b>PS2.c.4.m:</b> Adjust the pH of growing media.	<b>PS2.c.8.h:</b> Discuss the influence of pH and cation exchange capacity on the availability of nutrients.
		<b>PS2.c.5.m:</b> Collect soil and plant tissue samples for testing and interpret the test results.	<b>PS2.c.9.h:</b> Contrast pH and cation exchange capacity between mineral soil and soilless growing media.
		<b>PS2.c.6.m:</b> Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations and describe different methods of fertilizer application.	<b>PS2.c.10.h:</b> Determine the nutrient content of soil using appropriate laboratory procedures and prescribe fertilization based on results.
			<b>PS2.c.11.h:</b> Determine the nutrient content of plant tissue samples using appropriate laboratory procedures and prescribe fertilization based on results.
			<b>PS2.c.12.h:</b> Calculate the amount of fertilizer to be applied and calibrate equipment to apply the prescribed amount of fertilizer.
			<b>PS2.c.13.h:</b> Use variable-rate technology to apply fertilizers to meet crop nutrient needs.
<b>Standard: PS3:</b> Students will propagate, culture and harvest plants			
<b>PS3.a:</b> Demonstrate plant propagation techniques.	<b>PS3.a.1.e:</b> Demonstrate sowing techniques and provide favorable conditions for seed germination.	<b>PS3.a.3.m:</b> Explain pollination, cross-pollination and self-pollination of flowering plants.	<b>PS3.a.9.h:</b> Demonstrate proper procedures in budding or grafting selected materials.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>PS3.a.2.e:</b> Conduct tests associated with seed germination rates, viability and vigor.	<b>PS3.a.4.m:</b> Diagram the process of plant fertilization.	<b>PS3.a.10.h:</b> Evaluate asexual propagation practices based on productivity and efficiency.
		<b>PS3.a.5.m:</b> Design and implement a plan to control the pollination of plants.	<b>PS3.a.11.h:</b> Define micropropagation, discuss advantages associated with the practice and outline the four main stages of the process.
		<b>PS3.a.6.m:</b> Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor.	<b>PS3.a.12.h:</b> Propagate plants by micropropagation using aseptic techniques.
		<b>PS3.a.7.m:</b> Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering.	<b>PS3.a.13.h:</b> Explain the principles behind recombinant DNA technology and the basic steps in the process.
		<b>PS3.a.8.m:</b> Give examples of the risks and advantages associated with genetically modified plants.	<b>PS3.a.14.h:</b> Evaluate the performance of genetically modified crops.
<b>PS3.b:</b> Develop and implement a plant management plan for crop production.	<b>PS3.b.1.e:</b> Identify acceptable medias for growing plants.	<b>PS3.b.4.m:</b> Explain the importance of starting with pest- and disease-free propagation material.	<b>PS3.b.10.h:</b> Inspect propagation material for evidence of pests or disease.
	<b>PS3.b.2.e:</b> Prepare growing media for planting.	<b>PS3.b.5.m:</b> Explain the reasons for preparing growing media before planting.	<b>PS3.b.11.h:</b> Produce pest- and disease-free propagation material.
	<b>PS3.b.3.e:</b> Demonstrate proper planting procedures and post-planting care.	<b>PS3.b.6.m:</b> Prepare soil for planting with the addition of amendments.	<b>PS3.b.12.h:</b> Operate mechanized planting equipment.
		<b>PS3.b.7.m:</b> Apply pre-plant treatments required of seeds and plants and evaluate the results.	<b>PS3.b.13.h:</b> Prepare and implement a plant production schedule based on predicted environmental conditions.
		<b>PS3.b.8.m:</b> Observe and record environmental conditions during the germination, growth and development of a crop.	<b>PS3.b.14.h:</b> Explain the reasons for controlling plant growth.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		<b>PS3.b.9.m:</b> Monitor the progress of plantings and determine the need to adjust environmental conditions.	<b>PS3.b.15.h:</b> Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.
			<b>PS3.b.16.h:</b> Create and implement a plan to control and manage plant growth.
<b>PS3.c:</b> Develop and implement a plan for integrated pest management.	<b>PS3.c.1.e:</b> Identify the ways chemicals are used safely in the growing of plants.	<b>PS3.c.3.m:</b> Identify types of plant pests and disorders.	<b>PS3.c.8.h:</b> Predict pest and disease problems based on environmental conditions and life cycles.
	<b>PS3.c.2.e:</b> Identify helpful insects as an alternative to chemicals.	<b>PS3.c.4.m:</b> Identify major local weeds, insect pests and infectious and noninfectious plant diseases.	<b>PS3.c.9.h:</b> Describe pest control strategies associated with integrated pest management.
		<b>PS3.c.5.m:</b> Design and implement a crop scouting program.	<b>PS3.c.10.h:</b> Describe types of pesticide controls and formulations.
		<b>PS3.c.6.m:</b> Describe damage caused by plant pests and diseases.	<b>PS3.c.11.h:</b> Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed.
		<b>PS3.c.7.m:</b> Diagram the life cycles of major plant pests and diseases.	<b>PS3.c.12.h:</b> Explain risks and benefits associated with the materials and methods used in plant pest management.
			<b>PS3.c.13.h:</b> Explain procedures for the safe handling, use and storage of pesticides.
			<b>PS3.c.14.h:</b> Evaluate environmental and consumer concerns regarding pest management strategies.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PS3.d: Apply principles and practices of sustainable agriculture to plant production.		PS3.d.1.m: Explain sustainable agriculture and objectives associated with the strategy.	PS3.d.3.h: Prepare and implement a plan for an agricultural enterprise that involves practices in support of sustainable agriculture.
		PS3.d.2.m: Describe sustainable agriculture practices and compare the ecological effects of traditional agricultural practices with those of sustainable agriculture.	
PS3.e: Harvest, handle and store crops.	PS3.e.1.e: Identify important agricultural crops.	PS3.e.3.m: Identify harvesting methods and harvesting equipment.	PS3.e.8.h: Operate mechanized harvesting equipment.
	PS3.e.2.e: Describe how agricultural crops get from the farm to the table.	PS3.e.4.m: Identify storage methods for plants and plant products.	PS3.e.9.h: Explain reasons for calculating crop yield and loss.
		PS3.e.5.m: Assess the stage of growth to determine crop maturity or salability and demonstrate proper harvesting techniques.	PS3.e.10.h: Evaluate crop yield and loss data.
		PS3.e.6.m: Explain the reasons for preparing plants and plant products for distribution.	PS3.e.11.h: Implement plans to reduce crop loss.
		PS3.e.7.m: Demonstrate techniques for grading, handling and packaging plants and plant products for distribution.	PS3.e.12.h: Explain the proper conditions to maintain the quality of plants and plant products held in storage.
			PS3.e.13.h: Monitor environmental conditions in storage facilities for plants and plant products.
			PS3.e.14.h: Evaluate techniques for grading, handling and packaging plants and plant products.



<b>Standard: PS4: Students will employ elements of design to enhance an environment.</b>			
	<b>Performance Indicators (By Grade Band)</b>		
<b>Learning Priority</b>	<b>PK-5</b>	<b>6-8</b>	<b>9-12</b>
<b>PS4.a:</b> Create designs using plants.	<b>PS4.a.1.e:</b> Draw a picture using the elements of design.	<b>PS4.a.3.m:</b> Define design and identify design elements.	<b>PS4.a.5.h:</b> Explain design elements of line, form, texture and color and express the visual effect each has on the viewer
	<b>PS4.a.2.e:</b> Explain how plants can be used to improve the appearance of an environment.	<b>PS4.a.4.m:</b> Discuss the applications of art in agriculture/horticulture.	<b>PS4.a.6.h:</b> Select plants, hard goods, supplies and other materials for use in a design based on a range of criteria.
			<b>PS4.a.7.h:</b> Discuss principles of design that form the basis of artistic impression.
			<b>PS4.a.8.h:</b> Create and implement designs by following established principles of art.
<b>Standard: PS5: Students will recognize different systems in which plants grow.</b>			
<b>PS5.a:</b> Investigate various means to grow plants.	<b>PS5.a.1.e:</b> Identify the various places plants grow.	<b>PS5.a.2.m:</b> Compare and contrast growing plants in soil versus growing plants in water.	<b>PS5.a.3.h:</b> Compare and contrast various plant growing systems including, but not limited to greenhouse, hydroponics, and aquaponics.



## Discipline: Agriculture, Food and Natural Resources (AFNR)

### Content Area: PST/Power, Structural and Technical Systems

**Standard: PST1:** Students will demonstrate competence in the application of principles and techniques for the development and management of power, structural and technical systems.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>PST1.a:</b> Select energy sources in power generation appropriate to the situation.	<b>PST1.a.1.e:</b> Identify renewable and nonrenewable energy sources	<b>PST1.a.2.m:</b> Examine environmental impacts and efficiencies of energy sources.	<b>PST1.a.3.h:</b> Compare the efficiency of energy production from various sources.
<b>PST1.b:</b> Apply physical science laws and principles to identify, classify and use lubricants.	<b>PST1.b.1.e:</b> Identify the sources of lubricants and its importance.	<b>PST1.b.2.m:</b> Classify lubricants by SAE viscosity and API service classifications.	<b>PST1.b.3.h:</b> Select, use and dispose of lubricants.
<b>PST1.c:</b> Identify and use hand and power tools and equipment for service, construction and fabrication.	<b>PST1.c.1.e:</b> Identify risks of using hand tools and power tools.	<b>PST1.c.2.m:</b> Select, maintain and use hand and power tools in service, construction and fabrication.	<b>PST1.c.3.h:</b> Assess the performance of employees in use of hand and power tools to safely and efficiently service, construct and fabricate quality products.
<b>PST1.d:</b> Perform service routines to maintain power units and equipment.	<b>PST1.d.1.e:</b> Identify Agricultural Equipment such as: tractors, mowers, discs and wagons.	<b>PST1.d.4.m:</b> Identify a maintenance schedule for power equipment.	<b>PST1.d.9.h:</b> Test and service mechanical systems.
	<b>PST1.d.2.e:</b> Maintain the cleanliness and appearance of power units and equipment to assure functionality.	<b>PST1.d.5.m:</b> Service filtration systems and maintain fluid levels on power units and equipment.	<b>PST1.d.10.h:</b> Adjust and troubleshoot equipment, including belts and drives, chains and sprockets and maintain fluid conveyance components, such as hoses, lines and nozzles, using computer and on-board diagnostics.
	<b>PST1.d.3.e:</b> Demonstrate safe practices around power units and equipment.	<b>PST1.d.6.m:</b> Develop a preventive maintenance schedule for power units and equipment.	<b>PST1.d.11.h:</b> Maintain and calibrate metering, monitoring and sensing devices on equipment.
		<b>PST1.d.7.m:</b> Identify power unit and equipment controls and instruments, along with their functions.	<b>PST1.d.12.h:</b> Perform start-up and shut-down procedures on power units and equipment as specified in technical manuals.
		<b>PST1.d.8.m:</b> Locate safety warnings, dangers and caution areas on equipment and in the operation manuals.	<b>PST1.d.13.h:</b> Adjust equipment for safe and efficient operation.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>PST1.e:</b> Identify the principles of operation and the systems of small engines.	<b>PST1.e.1.e:</b> Discuss the use of small engines.	<b>PST1.e.2.m:</b> Observe safety precautions when working around small engines.	<b>PST1.e.5.h:</b> Safely operate small engine equipment.
		<b>PST1.e.3.m:</b> Distinguish between two and four stroke engines.	<b>PST1.e.6.h:</b> Demonstrate the operation of two and four stroke engines.
		<b>PST1.e.4.m:</b> Identify the mechanical systems found in small engines.	<b>PST1.e.7.h:</b> Explain how various mechanical systems interrelate in small engine operation.
<b>PST1.f:</b> Troubleshoot and repair internal combustion engines.	<b>PST1.f.1.e:</b> Identify components and systems of internal combustion engines.	<b>PST1.f.4.m:</b> Use technical manuals and computer-based diagnostics in engine analysis and repair.	<b>PST1.f.6.h:</b> Performance test internal combustion engines to determine service and repair needs.
	<b>PST1.f.2.e:</b> Describe the operation of internal combustion engines by types of fuel used.		<b>PST1.f.7.h:</b> Analyze and troubleshoot internal combustion engines.
			<b>PST1.f.8.h:</b> Overhaul spark-and-compression internal combustion engines.
	<b>PST1.f.3.e:</b> Be safe around internal combustion engines.	<b>PST1.f.5.m:</b> Identify tools used to repair internal combustion engines.	<b>PST1.f.9.h:</b> Use the proper tools to repair and maintain an internal combustion engine.
<b>PST1.g:</b> Use manufacturers' guidelines to service and repair the power transmission systems of equipment.	<b>PST1.g.1.e:</b> Identify and describe applications of simple machines in power systems.	<b>PST1.g.2.m:</b> Apply and use mechanical advantages of simple machines.	<b>PST1.g.4.h:</b> Describe features, benefits and applications of mechanical transmission components, including belts, chains, gears, bearings, seals, universals and drive shafts.
			<b>PST1.g.5.h:</b> Identify and compare operation principles and features, benefits and applications of various power transmission systems.
			<b>PST1.g.6.h:</b> Use speed, torque and power measurements to improve efficiency in power transmission systems.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		<b>PST1.g.3.m:</b> Identify power transfer principles, including those using friction, gears and fluids.	<b>PST1.g.7.h:</b> Inspect, analyze and repair drive trains.
			<b>PST1.g.8.h:</b> Inspect, analyze and repair clutches and brakes.
<b>PST1.h:</b> Service and repair hydraulic and pneumatic systems.	<b>PST1.h.1.e:</b> Describe the features, benefits and applications of common types of hydraulic and pneumatic systems.	<b>PST1.h.2.m:</b> Describe principles of hydraulic and pneumatic system operation.	<b>PST1.h.5.h:</b> Use symbols and schematic drawings in the maintenance of hydraulic and pneumatic systems.
		<b>PST1.h.3.m:</b> Identify major components of hydraulic and pneumatic systems and describe their use.	<b>PST1.h.6.h:</b> Inspect, analyze and repair hydraulic and pneumatic system components, including fluid and compressed-air conveyance components.
		<b>PST1.h.4.m:</b> Identify hydraulic and pneumatic system fittings and ports.	<b>PST1.h.7.h:</b> Use a pressure-and-flow tester in diagnosing malfunctions and repairing hydraulic and pneumatic systems.
<b>PST1.i:</b> Troubleshoot and service electrical systems.	<b>PST1.i.1.e:</b> Identify the kinds and applications of electricity and its impact on your life.	<b>PST1.i.2.m:</b> Apply the meaning and measurement of electricity, including amperage, voltage and wattage.	<b>PST1.i.3.h:</b> Assess and install electrical circuits, including conductors, insulators and controls.
			<b>PST1.i.4.h:</b> Interpret electrical system symbols and diagrams.
<b>PST1.j:</b> Create sketches and plans of agricultural structures.	<b>PST1.j.1.e:</b> Identify and sketch various agriculture structures.	<b>PST1.j.2.m:</b> Develop plans and sketches using drafting equipment and computer programs.	<b>PST1.j.4.h:</b> Apply principles of design, fabrication and installation of agricultural structures.
		<b>PST1.j.3.m:</b> Use scale measurement and dimension to develop plans and sketches.	<b>PST1.j.5.h:</b> Design functional and efficient facilities for agricultural use.
<b>PST1.k:</b> Apply structural plans, specifications and building codes.	<b>PST1.k.1.e:</b> Identify major parts of a construction drawing.	<b>PST1.k.2.m:</b> Identify and interpret different views of a construction drawing.	<b>PST1.k.3.h:</b> Locate, explain and apply elements of a construction drawing.
			<b>PST1.k.4.h:</b> Follow local construction and safety codes in agricultural construction.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>PST1.l:</b> Examine structural requirements for materials and procedures and estimate construction cost.	<b>PST1.l.1.e:</b> Identify materials used in agricultural construction/fabrication.	<b>PST1.l.2.m:</b> Select types of materials, determine quantities and estimate their costs and other costs associated with a specified project plan.	<b>PST1.l.3.h:</b> Prepare a project cost estimate, including materials, labor and management.
<b>PST1.m:</b> Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities.	<b>PST1.m.1.e:</b> Construct models of Agricultural Buildings with wood and metal.	<b>PST1.m.4.m:</b> Install and/or repair pipes and plumbing equipment and fixtures.	<b>PST1.m.9.h:</b> Evaluate work products or samples for quality and efficiency of workmanship following architectural and mechanical plans.
	<b>PST1.m.2.e:</b> Identify various fencing materials.	<b>PST1.m.5.m:</b> Distinguish electrical circuits and components of each.	<b>PST1.m.10.h:</b> Install and/or repair electrical wiring components and fixtures following appropriate codes and standards.
	<b>PST1.m.3.e:</b> Be aware of energy conservation in your world.	<b>PST1.m.6.m:</b> Measure and calculate fencing materials.	<b>PST1.m.11.h:</b> Identify electricity measurements and make measurement calculations.
		<b>PST1.m.7.m:</b> Identify insulation materials and methods to achieve desired R-value.	<b>PST1.m.12.h:</b> Construct and/or repair fencing, including wood, static wire, electrical wire and other fencing materials.
		<b>PST1.m.8.m:</b> Calculate volume for concrete projects.	<b>PST1.m.13.h:</b> Insulate a structure. Calculate BTU Loss.
			<b>PST1.m.14.h:</b> Construct and/or repair with concrete, brick, stone or masonry units.
<b>PST1.n:</b> Use arc, MIG/TIG welders, equipment and materials needed to weld.	<b>PST1.n.1.e:</b> Describe the shielded metal arc welding process.	<b>PST1.n.5.m:</b> Distinguish types of electric welding machines.	<b>PST1.n.9.h:</b> Select suitable supplies and equipment for shielded metal arc welding.
	<b>PST1.n.2.e:</b> Identify welding equipment.	<b>PST1.n.6.m:</b> Recognize, color and numerical code marking on electrodes.	<b>PST1.n.10.h:</b> Select Electrodes for use in various arc welding applications.
	<b>PST1.n.3.e:</b> Identify safety equipment and protective clothing for welding.	<b>PST1.n.7.m:</b> Identify safety equipment and protective clothing for welding.	<b>PST1.n.11.h:</b> Use safety equipment and protective clothing for welding.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	<b>PST1.n.4.e:</b> Point out various welds.	<b>PST1.n.8.m:</b> Describe types of welding operations.	<b>PST1.n.12.h:</b> Demonstrate through use of welding equipment welding operations (beads, butt, t, lap, fillet vertical, horizontal and pipe welding).
<b>PST1.o:</b> Use gas welding equipment and materials to weld.	<b>PST1.o.1.e:</b> Be safe around welding equipment.	<b>PST1.o.2.m:</b> Identify the parts of gas welding equipment and its safe use.	<b>PST1.o.6.h:</b> Use heating, cutting and gas welding equipment safely
		<b>PST1.o.3.m:</b> Point out parts of a gas welding system.	<b>PST1.o.7.h:</b> Change, adjust, shut down and check for leaks in oxygen and acetylene equipment.
		<b>PST1.o.4.m:</b> Explain the uses of brazing and gas welding.	<b>PST1.o.8.h:</b> Braze and weld safely with oxyacetylene equipment.
		<b>PST1.o.5.m:</b> Identify the parts of an oxyfuel cutting system.	<b>PST1.o.9.h:</b> Use oxyfuels and other gases to cut steel with a flame touch.
<b>PST1.p:</b> Apply the use of welding to agricultural related industries.	<b>PST1.p.1.e:</b> Identify kinds and characteristics of metal materials.	<b>PST1.p.2.m:</b> Distinguish welding processes, positions and materials preparation.	<b>PST1.p.3.h:</b> Construct and/or repair metal structures and equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch methods.
<b>PST1.q:</b> Apply electrical wiring principles in agricultural applications.	<b>PST1.q.1.e:</b> Discuss various types and sources of electricity.		<b>PST1.q.6.h:</b> Locate and use electrical codes and regulations.
			<b>PST1.q.7.h:</b> Use volt and amp meters and continuity testers to demonstrate electricity principles.
	<b>PST1.q.2.e:</b> Identify uses of electrical sensors and controls. (Thermostat, light sensors etc.)	<b>PST1.q.4.m:</b> Interpret maintenance schedules for electrical control systems. (Thermostat, light sensors etc.)	<b>PST1.q.8.h:</b> Troubleshoot electrical control system performance problems. (Thermostat, light sensors etc.)
	<b>PST1.q.3.e:</b> Identify hazards and safety when using electricity.	<b>PST1.q.5.m:</b> Identify hazards and safety related to the materials and tools used in electrical control circuit installation.	<b>PST1.q.9.h:</b> Identify hazards and safety when using electricity while installing electrical control circuits.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
<b>PST1.r:</b> Apply technology principles in the use of agricultural technical systems.	<b>PST1.r.1.e:</b> Identify the importance and uses of computer-based systems in agriculture, food and natural resources.	<b>PST1.r.2.m:</b> Use common computer-based programs to analyze agricultural data.	<b>PST1.r.3.h:</b> Assess database summaries to draw conclusions and propose plans of action.
<b>PST1.s:</b> Use geospatial technologies in agricultural applications.	<b>PST1.s.1.e:</b> Identify geospatial technologies, including global positioning, geographical information and remote sensing.	<b>PST1.s.2.m:</b> Explain and evaluate concepts and principles of geospatial technologies.	<b>PST1.s.6.h:</b> Assess and install instrumentation and data acquisition systems, including Global Positioning System (GPS) receivers.
		<b>PST1.s.3.m:</b> Describe equipment and processes used in geospatial technologies.	<b>PST1.s.7.h:</b> Output and apply maps using GIS/GPS systems.
		<b>PST1.s.4.m:</b> Identify uses, components and setup of precision technology in agriculture, food and natural resources.	<b>PST1.s.8.h:</b> Describe principles of precision agriculture for map-and sensor-based systems.
		<b>PST1.s.5.m:</b> Describe the meaning and use of sensors, controllers and actuators.	<b>PST1.s.9.h:</b> Identify sensor, control and actuator system components on power units and equipment.



This page intentionally left blank.



## **Section V**

---

### Connecting Career and Technical Education to the Common Core State Standards



This page intentionally left blank.



## Connecting Career and Technical Education to the Common Core State Standards

### Introduction

In Wisconsin, the education vision is for every child to graduate ready for postsecondary education and the workforce—to be college and career ready. To achieve this vision, students must develop the skills to think, read, communicate and perform in many academic contexts. Since students must develop these specific skills, every educator must consider how students learn in their discipline.

In 2010, State Superintendent Tony Evers officially adopted the Common Core State Standards (CCSS) in English Language Arts, Mathematics and Literacy in All Subject Areas. The CCSS in Mathematics and English Language Arts are designed to be focused and coherent. Each is anchored in college and career readiness; as well as evidence and research-based. The CCSS signify the need to change practice in at least three areas: content, instruction and assessments. Building on the strength of the Common Core State Standards and the **Wisconsin Standards for Career and Technical Education (CTE)**, educators in CTE must be knowledgeable in how both CTE and CCSS standards are addressed in their classrooms. Connections between the CCSS and CTE come in two forms.

### Making the Connection: CCSS and CTE Content

#### 1. Integration with Disciplinary Literacy (Literacy in All Subjects) and Standards for Mathematical Practice

**Standards and Instruction-** The knowledge and skills students learn in conjunction with content standards to assist students in reading, writing, speaking, listening and computing while using the specific knowledge and skills of the content area.

**Assessment** - Standards should be measured through multiple assessments including performance-based assessments, like those used in CTE to measure technical skill attainment.

#### 2. Direct “return on investment” within course content where standards from other content areas are embedded:

**Standards and Instruction** -- The use of multiple sets of standards to create relevance of content for students; both CTE **AND** content/standards from other subjects.

**Assessment** -- Standards should be measured through multiple assessments including performance-based assessments, like those used in CTE to measure technical skill attainment.

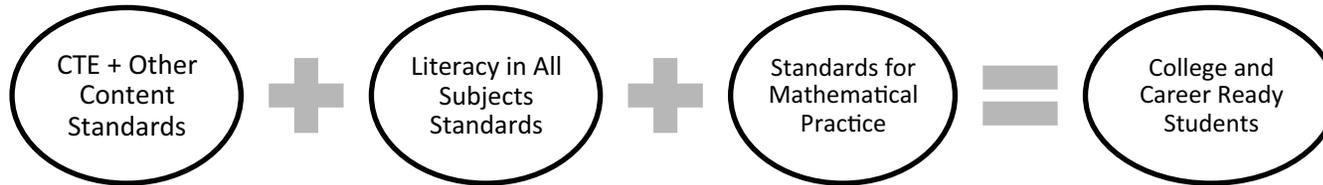
**Equivalency** – Equivalency shows a one-to-one correlation between CCSS or other content areas such as science and social studies **and** CTE standards through a state approved equivalency process in conformity with the Wisconsin State Statute for equivalency credit (§ 118.33, Wis. Stats.). This is an option for CTE courses that prove to have sufficient academic content and are taught in a technical and applied setting.

When district administrators and teachers alike ask for “an alignment of CTE to the CCSS” there is uncertainty about what that means or looks like. It will take time for CTE and core teachers to review their standards before beginning to work collaboratively to see connections between sets of standards. The reality is that there is no easy “one-to-one” match between CTE and CCSS and other content standards—it is about changing the role of the teacher to not only be experts in their content area, but to engage in deep conversations with colleagues across all content areas to make strong connections for students.



### The Connection

This visual shows the relationship of the CCSS and CTE Content that, when combined together and adding the standards from other content areas, ensures that students are college and career ready for further education in their chosen pathway.



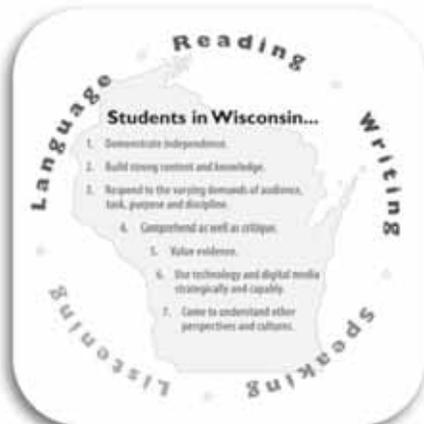
### Literacy in All Subjects: The Shift

The shift in English language arts means a shared responsibility across all grade levels for all students. Extensive research establishes the need for college and career ready students to be proficient in reading both complex literary text and informational texts independently across a variety of content areas. Literacy, the ability to read, write, listen, speak, think critically and perform in different ways and for different purposes, begins to develop early and becomes increasingly important as students pursue specialized fields of study in high school and beyond. The Common Core State Standards (CCSS) for Literacy in All Subjects<sup>†</sup> are connected to college and career readiness standards that guide educators as they strive to help students meet the literacy challenges within each particular field of study. This national effort is referred to as “disciplinary literacy” that prepares students for college and career readiness.

**In Wisconsin, disciplinary literacy is defined as the confluence of content knowledge, experiences and skills merged with the ability to read, write, listen, speak, think critically and perform in a way that is meaningful within the context of a given field.**

~ Taken from “Literacy in All Subjects.”

Disciplinary Literacy will look different in every classroom based upon the nature of the academic standards addressed within the course and the types of reading and writing required to convey knowledge. Students are reading texts to gain knowledge about the discipline; teachers are engaging students with questions and performance tasks; students are writing/composing/creating.



For the first time ever, the Common Core State Standards identify the specific literacy skills that should be a part of the Career and Technical Education (CTE) and other disciplines. The task, as experts, is to expose students to the authentic literacy activities of the discipline and teach students how to interact with content effectively. It is often taken for granted that by high school, students should be able to read what is given to them, but research now shows otherwise. The standards make it clear: Literacy must be taught—not assigned—within every classroom, every day.

*“Literacy is a prerequisite to learning in all other subjects, especially as students are exposed to increasingly diverse and intricate texts from which they need to glean knowledge. Unfortunately, too many adolescents lack the literacy skills necessary to navigate the reading and writing requirements of high school and the future world in which they will work and live...While educators around the country are*



*seeking ways to address this [literacy] challenge, career and technical education (CTE) programs are stepping up to offer students a rigorous and relevant education rich in literacy content and strategies. CTE courses, often overlooked in academic discussions, can have a tremendous impact on students' literacy engagement and achievement and must be considered as part of the adolescent literacy solution."*

**~CTE's Role in Adolescent Literacy. Issue Brief, November 2009, Association for Career and Technical Education**

### Mathematical Practices: The Shift

*"When today's students become adults, they will face new demands for mathematical proficiency that school mathematics should attempt to anticipate. Moreover, mathematics is a realm no longer restricted to a select few. All young Americans must learn to think mathematically and they must think mathematically to learn."*

**~Adding It Up, National Research Council, 2001**

The shift in mathematics processes means students are able to transfer math skills and understanding across concepts and grades. Focus allows each student to think, practice and integrate new ideas into a growing knowledge structure. Mathematical proficiency is necessary for every student. Therefore, understanding concepts and being fluent are both important.

This means teaching more than **"how to get the answer"** and instead **support students' ability to access concepts** from a number of perspectives while demonstrating conceptual understanding of core math concepts by applying them to new situations. Teachers in content areas outside of math, particularly science and CTE, ensure students are using math at all grade levels to make meaning of and access content. Educators must intentionally engage students at all levels, so they are readily able to apply mathematics in their ever-changing world.

By combining the mathematical practices and CTE standards, it allows the teacher to build on students' prior learning from multiple content areas. Students are able to see the relevance of their learning in their chosen career pathway and deepen their learning by transferring skills and concepts.

### Connecting to Other Content Area Standards

Career and Technical Education courses and programs are the quintessential convergence of standards from numerous content areas. Not only do students learn the knowledge and skills necessary for successful transition to college and careers, they also practice and apply their learning in real-life instructional situations that prepare them for specific entry-level careers and postsecondary studies. Along with CTE specific standards, students are also applying and reinforcing the standards learned in many other areas of study; such as, science, arts and creativity, social studies and mathematics. Educators should be considering how standards from other content areas are incorporated into instruction and assessments within CTE courses and units.





Other standards, such as the Wisconsin Model Academic Standards for Personal Financial Literacy, National Content Standards for Entrepreneurship and the Career Cluster's Green/Sustainability Standards, can easily be embedded into CTE coursework curriculum and activities to reinforce the knowledge and skills that are important for every future employee and citizen.

Showcasing the connections made through CTE courses and programs serves to illustrate student mastery of all of these areas that make them truly ready for the next stage of their lives.

### **Performance Tasks**

Wisconsin is a Smarter Balanced Assessment Consortium (SBAC) state, so the Theory of Action outlined by SBAC for creating performance tasks have been adapted for Wisconsin's classrooms. Performance tasks challenge students to apply their knowledge and skills to respond to real-world problems. They can best be described as collections of questions and activities that are coherently connected to a single theme or scenario. These activities are meant to measure capacities such as depth of understanding, research skills and complex analysis, which cannot be adequately assessed with selected- or constructed-response items.

When determining performance tasks, teachers need to determine **the purpose** of the performance task: Is the performance task going to plan, support, monitor or verify learning? Teachers need to determine **the type** of assessment the performance task is going to be: Is the performance task going to be a formative, benchmark or summative assessment?

Once that is decided, then teachers can design the performance task. A performance task presents students with a complex, real-world challenge in which the scenario, role, process and product are authentic; students must then demonstrate that they have the skills and knowledge to complete the task.

#### **Elements of a performance task:**

- Integrate knowledge and skills across multiple content standards or strands within a content area.
- Measure capacities such as depth of understanding, research skills, complex analysis and identification/providing of relevant evidence.
- Require student-initiated planning, management of information and ideas, interaction with other materials.
- Require production of extended responses, such as oral presentations, exhibitions and other scorable products, including more extended written responses, which might be revised and edited.
- Reflect a real-world task and/or scenario-based problem.
- Allow for multiple approaches.
- Represent content that is relevant and meaningful to students.



- Allow for demonstration of important knowledge and skills, including those that address 21st-century skills such as critically analyzing and synthesizing information presented in a variety of formats, media, etc.
- Require scoring that focuses on the essence of the task.
- Be feasible for the school/classroom environment.

In the next section there are examples of implementing CCSS into specific content areas through the use of performance tasks using sentence frames like the one shown below.

After reading/listening/viewing/researching \_\_\_\_\_ (texts),  
write/create/present \_\_\_\_\_ (product) for \_\_\_\_\_ (audience)  
that provides an/a explanation/argument/narrative \_\_\_\_\_ (content)  
so that \_\_\_\_\_ (purpose/so what).

† Transformed in Wisconsin from the Common Core State Standards for Literacy in Science, Social Studies, History and Technical Subjects.



## Connecting Agriculture, Food and Natural Resources to the Common Core State Standards

### Connecting To Academic Standards through Performance Tasks

Once the purpose and type of performance task is decided, teachers can then design the performance task. A performance task presents students with a complex, real-world challenge in which the scenario, role, process and product are authentic; students must then demonstrate that they have the skills and knowledge to complete the task.

Displayed below is an example of a tool known as a sentence frame that may be used to develop a performance task in an Agriculture, Food and Natural Resource course. Implementing CCSS may look different for every teacher, every program, every course and potentially every unit. Once a performance task has been identified, then an instructor may connect the task to academic standards associated with the respective content area within AFNR, as well as within other academic areas.

#### **(Example 1: grade 9-10 performance task in a Food Science course)**

After reading/listening/viewing/researching an article on yogurt manufacturing, write/create/present a marketing and/or advertising plan for your yogurt that uses information about the “competitors” yogurts to formulate your plan that provides an/a explanation/argument/narrative for selecting desirable brands. The plan should include a budget and potential sales projections.

The following academic standard(s) are addressed through the performance task displayed above:

#### **Agriculture, Food and Natural Resources**

**FPP4.c:** Process, preserve, package and present food and food products for sale and distribution.

#### **Literacy Standards**

**Anchor Standard for Reading 1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

**Anchor Standard for Reading 2:** Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon or concept; provide an accurate summary of the text.

**Anchor Standard for Reading 4:** Determine the meaning of symbols, key terms and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

**Anchor Standard for Writing 4:** Produce clear and coherent writing in which the development organization and style are appropriate to task, purpose and audience.

**Anchor Standard for Writing 7:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

#### **Mathematical Practices**

Make sense of problems and persevere in solving them.

Reason abstractly and quantitatively.

Construct viable arguments and critique the reasoning of others.

#### **Standards for Scientific and Engineering Practice**

Asking questions and defining problems.

Developing and using models.

Planning and carrying out investigations.



Using mathematics and computational thinking.  
Engaging in argument from evidence.  
Obtaining, evaluating and communication evidence

**Other Content Standards Alignment**

Social Studies/Economics  
Mathematics  
Personal Financial Literacy

**(Example 2: grade 11-12 performance task in a Greenhouse Management course.)**

Your manager at the greenhouse where you work has asked you to help her produce a crop of seasonal flowers. After reading/listening/viewing/researching different crop options, write/create/present a budget that includes the income and expenses for selected crop to the greenhouse manager. Show your work that provides an/explanation/argument/narrative so that you can make an informed decision regarding appropriate crops and inventory. Express estimates and answers using an appropriate level of precision.

The following academic standard(s) are addressed through the performance task displayed above:

**Agriculture, Food and Natural Resources**

**PS5.a:** Investigate various means to grow plants.

**PST1.I:** Examine structural requirements for materials and procedures and estimate construction cost.

**Literacy Standards**

**Anchor Standard for Reading 2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes or information presented in a text by paraphrasing them in simpler but still accurate terms.

**Anchor Standard for Writing 2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments or technical processes.

**Anchor Standard for Writing 4:** Produce clear and coherent writing in which the development organization and style are appropriate to task, purpose and audience.

**Mathematical Practices**

Reason abstractly and quantitatively.

Construct viable arguments and critique the reasoning of others.

Use appropriate tools strategically.

Attend to precision.

**Standards for Scientific and Engineering Practice**

Planning and carrying out investigations.

Using mathematics and computational thinking.

Engaging in argument from evidence.

**Other Content Standards Alignment**

Mathematics

English Language Arts



### **The Value of Agriculture, Food and Natural Resources**

Through an example of a common performance task, the documentation above identifies that the connection to academic standards extends far beyond the Agriculture, Food and Natural Resource classroom. Critical knowledge and skills are developed through performance tasks which challenge a student to apply prior knowledge emphasized in other academic areas when combined with discipline specific content in Agriculture, Food and Natural Resources. Additionally, the discipline specific performance task can play a critical role in providing an opportunity for student growth in other core academic areas when this connection to an elective program of study is clearly made through classroom instruction. This reflective practice of combining Agriculture, Food and Natural Resource Content Standards plus Literacy in All Subject Standards and Standards for Mathematical Practices plus standards for other content areas equals a greater assurance that students are college and career ready.



## Reaching Every Student; Reaching Every Discipline

### Reaching Every Student

The CCSS set high, clear and consistent expectations for all students. In order to ensure that all students can meet and exceed those expectations, Wisconsin educators provide flexible and fluid support based on student need. Each student brings a complex system of strengths and experiences to learning. One student may have gifts and talents in mathematics and need additional support to reach grade-level standards in reading. A student may be learning English as a second language while remaining identified for gifted services in science. The following statements provide guidance for how to ensure that the CCSS provide the foundation for learning for every student in Wisconsin, regardless of their unique learning needs.

### Application of Common Core State Standards for English Language Learners

The National Governors Association Center for Best Practices and the Council of Chief State School Officers strongly believe that all students should be held to the same high expectations outlined in the Common Core State Standards. This includes students who are English language learners (ELLs). However, these students may require additional time, appropriate instructional support and aligned assessments as they acquire both English language proficiency and content area knowledge.

ELLs are a heterogeneous group with differences in ethnic background, first language, socioeconomic status, quality of prior schooling and levels of English language proficiency. Effectively educating these students requires pre-assessing each student instructionally, adjusting instruction accordingly and closely monitoring student progress. For example, ELLs who are literate in a first language that shares cognates with English can apply first-language vocabulary knowledge when reading in English; likewise ELLs with high levels of schooling can often bring to bear conceptual knowledge developed in their first language when reading in English. However, ELLs with limited or interrupted schooling will need to acquire background knowledge prerequisite to educational tasks at hand. Additionally, the development of native-like proficiency in English takes many years and may not be achieved by all ELLs especially if they start schooling in the US in the later grades. Teachers should recognize that it is possible to achieve the standards for reading and literature, writing and

research, language development and speaking and listening without manifesting native-like control of conventions and vocabulary.

### English Language Arts

The Common Core State Standards for English Language Arts (ELA) articulate rigorous grade-level expectations in the areas of reading, writing, speaking, listening to prepare all students to be college and career ready, including English language learners. Second-language learners also will benefit from instruction about how to negotiate situations outside of those settings so they are able to participate on equal footing with native speakers in all aspects of social, economic and civic endeavors.

ELLs bring with them many resources that enhance their education and can serve as resources for schools and society. Many ELLs have first language and literacy knowledge and skills that boost their acquisition of language and literacy in a second language; additionally, they bring an array of talents and cultural practices and perspectives that enrich our schools and society. Teachers must build on this enormous reservoir of talent and provide those students who need it with additional time and appropriate instructional support. This includes language proficiency standards that teachers can use in conjunction with the ELA standards to assist ELLs in becoming proficient and literate in English. To help ELLs meet high academic standards in language arts it is essential that they have access to:

- Teachers and personnel at the school and district levels who are well prepared and qualified to support ELLs while taking advantage of the many strengths and skills they bring to the classroom;
- Literacy-rich school environments where students are immersed in a variety of language experiences;
- Instruction that develops foundational skills in English and enables ELLs to participate fully in grade-level coursework;
- Coursework that prepares ELLs for postsecondary education or the workplace, yet is made comprehensible for students learning content in a second language (through specific pedagogical techniques and additional resources);



- Opportunities for classroom discourse and interaction that are well-designed to enable ELLs to develop communicative strengths in language arts;
- Ongoing assessment and feedback to guide learning; and
- Speakers of English who know the language well enough to provide ELLs with models and support.

### **Application to Students with Disabilities**

The Common Core State Standards articulate rigorous grade-level expectations in the areas of mathematics and English language arts. These standards identify the knowledge and skills students need in order to be successful in college and careers.

Students with disabilities, students eligible under the Individuals with Disabilities Education Act (IDEA), must be challenged to excel within the general curriculum and be prepared for success in their post-school lives, including college and/or careers. These common standards provide an historic opportunity to improve access to rigorous academic content standards for students with disabilities. The continued development of understanding about research-based instructional practices and a focus on their effective implementation will help improve access to mathematics and English language arts (ELA) standards for all students, including those with disabilities. Students with disabilities are a heterogeneous group with one common characteristic: the presence of disabling conditions that significantly hinder their abilities to benefit from general education (IDEA 34 CFR §300.39, 2004). Therefore, how these high standards are taught and assessed is of the utmost importance in reaching this diverse group of students.

In order for students with disabilities to meet high academic standards and to fully demonstrate their conceptual and procedural knowledge and skills in mathematics, reading, writing, speaking and listening (English language arts), their instruction must incorporate supports and accommodations, including:

- Supports and related services designed to meet the unique needs of these students and to enable their access to the general education curriculum (IDEA 34 CFR §300.34, 2004).
- An Individualized Education Program (IEP)<sup>1</sup> which includes annual goals aligned with and chosen to facilitate their attainment of grade-level academic standards.

- Teachers and specialized instructional support personnel who are prepared and qualified to deliver high-quality, evidence-based, individualized instruction and support services.

Promoting a culture of high expectations for all students is a fundamental goal of the Common Core State Standards. In order to participate with success in the general curriculum, students with disabilities, as appropriate, may be provided additional supports and services, such as:

- Instructional supports for learning, based on the principles of Universal Design for Learning (UDL),<sup>2</sup> which foster student engagement by presenting information in multiple ways and allowing for diverse avenues of action and expression.
- Instructional accommodations (Thompson, Morse, Sharpe & Hall, 2005), changes in materials or procedures, which do not change the standards but allow students to learn within the framework of the Common Core.
- Assistive technology devices and services to ensure access to the general education curriculum and the Common Core State Standards.

Some students with the most significant cognitive disabilities will require substantial supports and accommodations to have meaningful access to certain standards in both instruction and assessment, based on their communication and academic needs. These supports and accommodations should ensure that students receive access to multiple means of learning and opportunities to demonstrate knowledge, but retain the rigor and high expectations of the Common Core State Standards.

### **Implications for the Common Core State Standards for Students with Gifts and Talents**

The CCSS provide a roadmap for what students need to learn by benchmarking expectations across grade levels. They include rigorous content and application of knowledge through higher-order skills. As such, they can serve as a foundation for a robust core curriculum, however, students with gifts and talents may need additional challenges or curricular options. In order to recognize what adaptations need to be made or what interventions need to be employed, we must understand who these students are.



According to the National Association for Gifted Children (2011), “Giftedness, intelligence and talent are fluid concepts and may look different in different contexts and cultures” (para. 1). This means that there are students that demonstrate high performance or have the potential to do so in academics, creativity, leadership and/or the visual and performing arts. Despite this diversity there are common characteristics that are important to note.

Students with gifts and talents:

- Learn at a fast pace.
- Are stimulated by depth and complexity of content.
- Make connections.

These traits have implications for how the Common Core State Standards are used. They reveal that as curriculum is designed and instruction is planned there must be:

- Differentiation based on student readiness, interest and learning style:
  - Pre-assessing in order to know where a student stands in relation to the content that will be taught (readiness), then teach those standards that the student has not mastered and enrich, compact and/or accelerate when standards have been mastered. This might mean using standards that are beyond the grade level of the student.
  - Knowledge of our students so we are familiar with their strengths, background knowledge, experiences, interests and learning styles.
  - Flexible grouping to provide opportunities for students to interact with peers that have similar abilities, similar interests and similar learning styles (homogenous grouping), as well as different abilities, different interests and different learning styles (heterogeneous grouping).
- Differentiation of content, process and product.
  - Use of a variety of materials (differentiating content) to provide challenge. Students may be studying the same concept using different text and resources.
  - Variety of tasks (differentiating process). For example in a science lesson about the relationship between temperature and rate of melting, some students may use computer-enhanced

thermometers to record and graph temperature so they can concentrate on detecting patterns while other students may graph temperature at one-minute intervals, then examine the graph for patterns.

Variety of ways to demonstrate their learning (differentiating product). These choices can provide opportunities for students with varying abilities, interests and learning styles to show what they have discovered.

- Adjustment to the level, depth and pace of curriculum.
  - Compact the curriculum to intensify the pace.
  - Vary questioning and use creative and critical thinking strategies to provide depth.
  - Use standards beyond the grade level of the students. Since the CCSS provide a PK-12 learning progression, this is easily done.
  - Accelerate subject areas or whole grades when appropriate.
- Match the intensity of the intervention with the student’s needs. This means that we must be prepared to adapt the core curriculum and plan for a continuum of services to meet the needs of all students, including those with gifts and talents.



## References

Individuals with Disabilities Education Act (IDEA), 34 CFR §300.34 (a). (2004).

Individuals with Disabilities Education Act (IDEA), 34 CFR §300.39 (b)(3). (2004).

National Association for Gifted Children (2010). Redefining Giftedness for a New Century Shifting the Paradigm. Retrieved from <http://www.nagc.org/index.aspx?id=6404>.

National Association for Gifted Children (2011). What is giftedness? Retrieved from <http://nagc.org/index.aspx?id=574>.

Sousa, D.A. (200). How the gifted brain learns. Thousand Oaks, CA: Corwin Press.

Thompson, Sandra J., Amanda B. Morse, Michael Sharpe and Sharon Hall. "Accommodations Manual: How to Select, Administer and Evaluate Use of Accommodations and Assessment for Students with Disabilities," 2nd Edition. Council for Chief State School Officers, 2005 <http://www.ccsso.org/content/pdfs/AccommodationsManual.pdf>. (Accessed January, 29, 2010).





## What is Disciplinary Literacy?

Literacy, the ability to read, write, listen, speak, think critically and perform in different ways and for different purposes, begins to develop early and becomes increasingly important as students pursue specialized fields of study in high school and beyond. The Common Core State Standards (CCSS) for Literacy in Science, Social Studies, History and the Technical Subjects are connected to College and Career Readiness Standards that guide educators as they strive to help students meet the literacy challenges within each particular field of study. This national effort is referred to as disciplinary literacy.

**In Wisconsin, disciplinary literacy is defined as the confluence of content knowledge, experiences and skills merged with the ability to read, write, listen, speak, think critically and perform in a way that is meaningful within the context of a given field.**

These abilities are important in ALL courses and subjects. While the Common Core State Standards (CCSS) for Literacy in Science, Social Studies, History and the Technical Subjects provide standards for cross-discipline reading and writing in grades 6-12, Wisconsin recognizes the need to broaden this effort and include **all disciplines and every educator in every grade level K-12**. This literacy focus must begin as soon as children have access to formal education and continue intentionally as college and career readiness goals advance for all children in Wisconsin.

To address this expanded definition and approach to disciplinary literacy, excerpts from the K-5 Common Core State Standards for English Language Arts are included in this document. Elementary classroom teachers build the foundational literacy skills necessary for students to access all learning. Additionally, they develop content specific to deep literary study oratory tradition and linguistic analysis; skills specific to English language arts. Literacy reaches beyond this knowledge in one content area to include reading, writing, listening, speaking and thinking critically in each discipline beginning at an early age. The applicable K-5 standards help educators in Wisconsin build a ladder of skills and dispositions that lead to accelerated achievement across disciplines and will be included in every content-specific standards document into the future.

## Why is disciplinary literacy important?

The modern global society, of which our students are a part, requires postsecondary learning. An analysis of workforce trends by Georgetown University economist Anthony Carnevale and his colleagues found that nearly 60 percent of all job openings in 2007 required some postsecondary education; postsecondary success depends on students' ability to comprehend and produce the kinds of complex texts found in all disciplines. Therefore, the economic future of our state, as well as our students and their success as productive citizens and critical thinkers link to disciplinary literacy.

Textbooks, articles, manuals and historical primary source documents create specialized challenges for learners. These texts often include abstracts, figures, tables, diagrams and specialized vocabulary. The ideas are complex and build across a number of paragraphs requiring focus and strategic processing. To comprehend and produce this type of text, students must be immersed in the language and thinking processes of that discipline and they must be supported by an expert guide, their teacher (Carnegie Report, 2010).

A focus at the elementary level on foundational reading, when expanded to include engaging experiences connected to informational texts, vocabulary and writing for content-specific purposes builds background knowledge and skills in each discipline. This increases opportunities for success as students approach more rigorous content in those disciplines (Alliance for Excellent Education, 2011).

Reading, writing, speaking, listening and critical thinking must be integrated into each discipline across all grades so that all students gradually build knowledge and skills toward college and career readiness. Collaboration among institutes of higher education, CESA Statewide Network, districts, schools, teachers and family and community will guide the implementation of the Common Core State Standards in Wisconsin.





**The message is that literacy is integral to attainment of content knowledge and content is essential background knowledge for literacy development. This interdependent relationship exists in all disciplines.**

The Common Core State Standards require educators to support literacy in each classroom across the state. Since the impact of this effort is significant, it is essential that resources and supports be accessible to all educators. To build consistent understanding, DPI convened a statewide Disciplinary Literacy Leadership Team in 2011 comprised of educators from many content areas and educational backgrounds. This team was charged with examining the CCSS for Disciplinary Literacy, identifying the needs in the field for support and gathering materials and resources to address those needs.





## Wisconsin Foundations for Disciplinary Literacy

To guide understanding and professional learning, a set of foundations, developed in concert with Wisconsin's *Guiding Principles for Teaching and Learning*, directs Wisconsin's approach to disciplinary literacy.

### Academic learning begins in early childhood and develops across all disciplines.

Each discipline has its own specific vocabulary, text types and ways of communicating. Children begin learning these context- and content-specific differences early in life and continue through high school and beyond. While gardening, small children observe and the form and function of a root, stem, leaf and soil; or measure, mix and blend while baking a cake. School offers all students opportunities to develop the ability to, for example, think like a scientist, write like a historian, critique like an artist, problem-solve like an auto mechanic or analyze technological advances like a health care technician. As literacy skills develop, educators gradually shift the responsibility for reading, writing, listening, speaking and critical thinking to students through guided supports in both individual and collaborative learning experiences.

### Content knowledge is strengthened when educators integrate discipline-specific literacy into teaching and learning.

Educators help students recognize and understand the nuances of a discipline by using strategies that "make their thinking visible." They promote classroom reading, writing, listening, speaking and critical thinking using authentic materials that support the development of content-specific knowledge. They guide students through these complex texts by using strategies that develop conceptual understanding of language and set expectations for relevant application of skills. These

literacy practices deepen students' content knowledge, strategies and skills so that their learning transfers to real world situations.

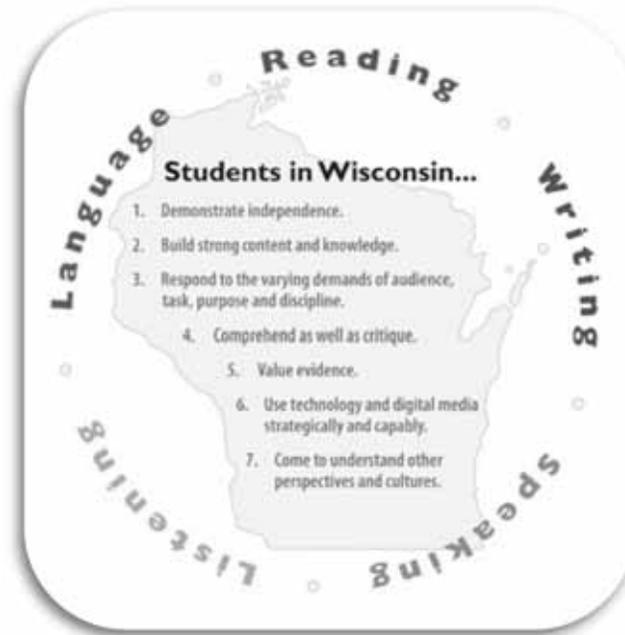
### The literacy skills of reading, writing, listening, speaking and critical thinking improve when content-rich learning experiences motivate and engage students.

Educators who foster disciplinary literacy develop experiences that integrate rigorous content with relevant collaborative and creative literacy processes to motivate and engage students. Setting high expectations, they structure routines and supports that empower students to take charge of their own learning. When students work in teams to research science and mathematics concepts in the development of an invention or a graphic arts design; when they collaboratively build a blog that contains their recent marketing venture, they use specific literacy skills and strategies to solidify learning. Students need these opportunities over time to develop the precise and complex reading, writing, listening, speaking and critical thinking skills demanded in today's careers.

### Students demonstrate their content knowledge through reading, writing, listening and speaking as part of a content-literate community.

Students who are literate in a particular discipline are able to successfully read, write and speak about that discipline and can listen to and think critically as others communicate in that community.

Performance tasks that allow students to present the complexity of a content area in a way that is meaningful to the field become authentic approaches to assessing mastery within a discipline. Such tasks empower students to discover the real world connections across disciplines and to actively participate in communities of discipline-literate peers. As Wisconsin moves to the SMARTER Balanced Assessment System these performance tasks will be integral to assessment of student learning.





## What research and resources are available to support educators' use of the Common Core State Standards for Literacy in All Subjects?

The Common Core State Standards for Literacy in All Subjects reflect the importance of literacy in both the oral and written language and in both productive (speaking and writing) and receptive (listening and reading) discourse. Clearly, critical and precise thinking are required to develop all of these specific strategies and skills. The standards also address the learning and functioning of language in a technological, media-driven world because the language that we use is selective depending upon the context of the conversation.

The following section will offer relevant research and resources to support professional learning in reading, writing, speaking, listening and language across disciplines. Collegial conversation and learning, both cross-discipline and within-discipline will help make the Common Core State Standards more applicable to schools and districts and will address the needs of unique programs within those contexts. A collection of online resources will continue to develop as support materials emerge.

### Reading Connections

While early reading focuses on learning that letters make sounds and that words carry meaning, reading quickly develops to a point where the message taken from text depends on what the reader brings to it. The Carnegie Report, *Reading in the Disciplines* (2010) describes this phenomenon:

**“The ability to comprehend written texts is not a static or fixed ability, but rather one that involves a dynamic relationship between the demands of texts and prior knowledge and goals of the reader.”**

Therefore, a musician reading a journal article that describes concepts in music theory will take more information away from the text than a music novice because of their knowledge and experience in music. As well, an individual who spends a significant amount of time reading automotive manuals will more easily navigate a cell phone manual because of familiarity with that type of text.

A chart excerpted from the Carnegie Report (2010) details a few of the generic and more discipline-specific strategies that support students as they attempt to comprehend complex text. While the generic strategies pertain across content areas, discipline-specific ones must be tailored to match the demands of the content area.

Both generic and discipline focused strategies and knowledge must be applied to the comprehension and evaluation of:

- Textbooks
- Journal and magazine articles
- Historically situated primary documents
- Full Length Books
- Newspaper Articles
- Book Chapters
- Multimedia and Digital Texts



Generic Reading Strategies	Discipline-Specific Reading Strategies
Monitor comprehension	Build prior knowledge
Pre-read	Build specialized vocabulary
Set goals	Learn to deconstruct complex sentences
Think about what one already knows	Use knowledge of text structures and genres to predict main and subordinate ideas
Ask questions	Map graphic (and mathematical) representations against explanations in the text
Make predictions	Pose discipline relevant questions
Test predictions against the text	Compare claims and propositions across texts
Re-read	Use norms for reasoning within the discipline (i.e. what counts as evidence) to evaluate claims
Summarize	

Source: *Carnegie Report, (2010)*

Additional resources that support reading in specific subjects include *Content Counts! Developing Disciplinary Literacy Skills, K–6* by Jennifer L. Altieri (2011). This guide for discipline-specific literacy at the elementary level offers strategies to balance the demands of literacy while continuing to make content count and help students meet the reading, writing, speaking and listening demands of the content areas as they advance in school.

A resource by Doug Buehl (2011) entitled *Developing Readers in the Academic Disciplines* describes what it means to read, write and think through a disciplinary lens in the adolescent years. This teacher-friendly guide helps connect literacy with disciplinary understandings to bridge academic knowledge gaps, frontload instruction and build critical thinking through questioning.

### Note on range and content of student reading

To become college and career ready, students must grapple with works of exceptional craft and thought whose range extends across genres, cultures and centuries. Such works offer profound insights into the human condition and serve as models for students' own thinking and writing. Along with high-quality contemporary works, these texts should be chosen from seminal U.S. documents, the classics of American literature and the timeless dramas of Shakespeare. Through wide and deep reading of literature and literary nonfiction of steadily increasing sophistication, students gain a reservoir of literary and cultural knowledge, references and images; the ability to evaluate intricate arguments; and the capacity to surmount the challenges posed by complex texts. (CCSS p. 35 [http://www.corestandards.org/assets/CCSSI\\_ELA%20Standards.pdf](http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf))

The Common Core State Standards require that all students “be able to comprehend texts of steadily increasing complexity as they progress through school” (Appendix A: Research Supporting Key Elements of the Standards, p. 2). More detailed definitions of complex text and examples of complex texts across disciplines are available in Appendix B of the English Language Arts CCSS.

### Writing Connections

The Common Core State Standards call for emphasis on three types of writing: narrative, informational and logical argument. Writing that presents a logical argument is especially appropriate to discipline-specific work since credible evidence differs across content areas. The ability to consider multiple perspectives, assess the validity of claims and present a point of view is required in argumentative writing. These thinking and communication skills are “critical to college and career readiness”.

**A 2007 report entitled *Writing Next: Effective Strategies to Improve Writing of Adolescents in Middle and High Schools* detailed research on writing to learn, rather than only for assessment, as having a significant impact on content learning.**



The study found writing to learn was equally effective for all content areas in the study (social studies, math and science) and at every grade (4-12).

### **Note on range and content of student writing**

For students, writing is a key means of asserting and defending claims, showing what they know about a subject and conveying what they have experienced, imagined, thought and felt. To be college- and career-ready writers, students must take task, purpose and audience into careful consideration, choosing words, information, structures and formats deliberately. They need to know how to combine elements of different kinds of writing—for example, to use narrative strategies within an argument and explanation within narrative—to produce complex and nuanced writing. They need to be able to use technology strategically when creating, refining and collaborating on writing. They have to become adept at gathering information, evaluating sources and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have flexibility, concentration and fluency to produce high quality first draft text under a tight deadline as well as the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. (CCSS p.41  
[http://www.corestandards.org/assets/CCSSI\\_ELA%20Standards.pdf](http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf))

When a social studies teacher guides students in taking on the perspective of a person from a specific historical era, she might ask students to write a first person narrative from that perspective. Research into that era leads students to discover personal beliefs of that historical person. They may dig into the personal experiences, ideas and events involved in the era to visualize life in that period. They then develop a rich understanding of the era and embed language from that era into the texts that they create. (Samples of discipline-specific writing across grades and content areas are available in Appendix C of the English Language Arts CCSS.

### **Speaking, Listening and Language Connections**

The ability to share ideas and orally communicate with credibility in a specific academic discourse empowers students and allows access to specialized groups. In *Situated Language and Learning: A Critique of Traditional Schooling*, James Paul Gee (2004) describes the need to prioritize these skills so that students are at ease as they enter situations connected to a specific content area and are more likely to continue their learning in that discipline.

As expertise develops, students feel more and more comfortable applying knowledge and skills while speaking and listening in a specific discipline.

- A media course may teach students appropriate expression, tone and rate of speech when addressing a large audience.
- Listening carefully to questions posed is a specialized skill that debate facilitators develop.
- Scientists learn to listen for bias in the perspectives presented by peers to determine the reliability of scientific outcomes.
- Artists have very specialized and specific ways of speaking about the many aspects of a piece.

A policy brief from the Alliance for Excellent Education called, *Engineering Solutions to the National Crisis in Literacy: How to Make Good on the Promise of the Common Core State Standards* describes “a staircase of literacy demands” and emphasizes the importance of a progressive development of language and literacy over time.

The conceptual understanding of “functions” in mathematics may begin to develop in elementary school in its simplest form. As the concept develops over the years, students will use the word “function” in a meaningful way when speaking and writing to describe the mathematical concept they apply. When educators explicitly connect a mathematical term to its application and repeatedly expose students to the concept connected to the term, a specialized language becomes second nature to the mathematics classroom.

**Students must have extensive vocabularies, built through reading and explicit instruction embedded in the context of content learning. This enables them to comprehend complex texts, engage in purposeful writing and communicate effectively within a discipline.**



Skills in determining or clarifying the meaning of words and phrases encountered, choosing flexibly from an array of strategies and seeing an individual word as part of a network of other words that, for example, have similar denotations but different connotations allow students to access information and support their own learning.

### Literacy in Multiple Languages

Increasing economic, security, cross-cultural and global demands underscore the value of literacy in more than one language. Students who think, read, write and communicate in multiple languages are an asset to our own country and can more easily interact and compete in the world at large.

English language learners (ELL) in our classrooms face significant challenges as they add a new language and work to grasp content at the same rate as their English-speaking peers. In a report to the Carnegie Corporation entitled *Double the Work: Challenges and Solutions to Acquiring Academic Literacy for Adolescent English Language Learners (2007)* researchers found that a focus on academic literacy is crucial for ELL's success in school. In their description of academic literacy they include reading, writing and oral discourse that:

- Varies from subject to subject.
- Requires knowledge of multiple genres of text, purposes for text use and text media.
- Is influenced by students' literacies in context outside of school.
- Is influenced by students' personal, social and cultural experiences.

The needs of our English language learners are addressed when we embed disciplinary literacy strategies into our subject area teaching. These high impact strategies and skills allow English language learners and all students to more readily access content knowledge and connect it to the prior knowledge they bring to the classroom. When educators take the initiative to understand and embed these strategies and skills, they offer additional opportunities for success to all of our students.

## Who Should Use the Common Core State Standards for Literacy in All Subjects?

The term “disciplinary literacy” may be new to many Wisconsin teachers. The Common Core State Standards for Literacy in All Subjects, as excerpted from the Common Core Standards for English Language Arts, are intended for all PK-12 educators. Each standard is written broadly in content-neutral language, breaking down the complex skills that comprise reading, writing, speaking, listening and language. These standards serve as a complement to the specific content-related standards of each individual discipline. Administrators and communities may also find the disciplinary literacy standards helpful in charting a clear and consistent school or district-wide approach to literacy that moves Wisconsin forward toward the goal of every student career and college ready.





## References:

Altieri, Jennifer (2011). *Content Counts! Developing Disciplinary Literacy Skills, K–6*. International Reading Association. ISBN 13: 978-0-87207-838-3

Buehl, Doug. (2011). *Developing Readers in the Academic Disciplines*. International Reading Association. ISBN 13: 978-0-87207-845-1

Carnevale, A. (2010) *Center on Education and the Workforce Forecasts of Education Demand to 2018*

*College and Career Readiness Standards*; [http://www.nc4ea.org/files/appropriate\\_college-readiness\\_standards\\_for\\_all\\_students-05-03-06.pdf](http://www.nc4ea.org/files/appropriate_college-readiness_standards_for_all_students-05-03-06.pdf)

*Common Core Standards for English Language Arts*; [www.corestandards.org](http://www.corestandards.org)

Washington, DC: Georgetown Center on Education and the Workforce, 2010, available at:  
[http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/CEW\\_press\\_conference\\_ppt.pdf](http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/CEW_press_conference_ppt.pdf) (accessed June 7, 2011)

*Double the work: Challenges and Solutions to Acquiring Academic Literacy for Adolescent English Language Learners*. Carnegie Corporation. New York: 2007.  
*Engineering Solutions to the National Crisis in Literacy: How to Make Good on the Promise of the Common Core State Standards*. Alliance for Excellent Education. Washington D.C. 2011

Gee, James Paul (2004) *Situated Language and Learning: A Critique of Traditional Schooling*

*Reading in the Disciplines: The Challenges of Adolescent Literacy*. Carnegie Corporation. New York: 2010

*State Superintendent's Adolescent Literacy Plan* (2008) Wisconsin Department of Public Instruction, Madison, WI

Vygotsky, (1978) *Mind in Society: The Development of Higher Psychological Processes* Harvard University Press; 14th edition

*Writing Next: Effective Strategies to Improve Writing of Adolescents in Middle and High Schools* (2007)



---

**Common Core State Standards  
for Literacy in All Subjects**



This page intentionally left blank.



# Table of Contents

Introduction	136
Literacy in All Subjects 6-12	141



## Key Design Considerations

### CCR and grade-specific standards

The CCR standards anchor the document and define general, cross-disciplinary literacy expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed. The K–12 grade-specific standards define end-of-year expectations and a cumulative progression designed to enable students to meet college and career readiness expectations no later than the end of high school. The CCR and high school (grades 9–12) standards work in tandem to define the college and career readiness line—the former providing broad standards, the latter providing additional specificity. Hence, both should be considered when developing college and career readiness assessments.

Students advancing through the grades are expected to meet each year’s grade-specific standards, retain or further develop skills and understandings mastered in preceding grades, and work steadily toward meeting the more general expectations described by the CCR standards.

### Grade levels for K–8; grade bands for 9–10 and 11–12

The Standards use individual grade levels in kindergarten through grade 8 to provide useful specificity; the Standards use two-year bands in grades 9–12 to allow schools, districts, and states flexibility in high school course design.

### A focus on results rather than means

By emphasizing required achievements, the Standards leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. Thus, the Standards do not mandate such things as a particular writing process or the full range of metacognitive strategies that students may need to monitor and direct their thinking and learning. Teachers are thus free to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for meeting the goals set out in the Standards.

### An integrated model of literacy

Although the Standards are divided into Reading, Writing, Speaking and Listening, and Language strands for conceptual clarity, the processes of communication are closely connected, as reflected throughout this document. For example, Writing standard 9 requires that students be able to write about what they read. Likewise, Speaking and Listening standard 4 sets the expectation that students will share findings from their research.

### Research and media skills blended into the Standards as a whole

To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to conduct research and to produce and consume media is embedded into every aspect of today’s curriculum. In like fashion, research and media skills and understandings are embedded throughout the Standards rather than treated in a separate section.

### Shared responsibility for students’ literacy development

The Standards insist that instruction in reading, writing, speaking, listening, and language be a shared responsibility within the school. The K–5 standards include expectations for reading, writing, speaking, listening, and language applicable to a range of subjects, including but not limited to ELA. The grades 6–12 standards are divided into two sections, one for ELA and the other for history/social studies, science, and technical subjects. This division reflects the unique, time-honored place of ELA teachers in developing students’ literacy skills while at the same time recognizing that teachers in other areas must have a role in this development as well.

Part of the motivation behind the interdisciplinary approach to literacy promulgated by the Standards is extensive research establishing the need for college and career ready students to be proficient in reading complex informational text independently in a variety of content areas. Most of the required reading in college and workforce training programs is informational in structure and challenging in content; postsecondary education programs typically provide students with both a higher volume of such reading than is generally required in K–12 schools and comparatively little scaffolding.

The Standards are not alone in calling for a special emphasis on informational text. The 2009 reading framework of the National Assessment of Educational Progress (NAEP) requires a high and increasing proportion of informational text on its assessment as students advance through the grades.



### Distribution of Literary and Informational Passages by Grade in the 2009 NAEP Reading Framework

Grade	Literary	Informational
4	50%	50%
8	45%	55%
12	30%	70%

Source: National Assessment Governing Board. (2008). *Reading framework for the 2009 National Assessment of Educational Progress*. Washington, DC: U.S. Government Printing Office.

The Standards aim to align instruction with this framework so that many more students than at present can meet the requirements of college and career readiness. In K-5, the Standards follow NAEP's lead in balancing the reading of literature with the reading of informational texts, including texts in history/social studies, science, and technical subjects. In accord with NAEP's growing emphasis on informational texts in the higher grades, the Standards demand that a significant amount of reading of informational texts take place in and outside the ELA classroom. Fulfilling the Standards for 6-12 ELA requires much greater attention to a specific category of informational text—literary nonfiction—than has been traditional. Because the ELA classroom must focus on literature (stories, drama, and poetry) as well as literary nonfiction, a great deal of informational reading in grades 6-12 must take place in other classes if the NAEP assessment framework is to be matched instructionally.<sup>1</sup> To measure students' growth toward college and career readiness, assessments aligned with the Standards should adhere to the distribution of texts across grades cited in the NAEP framework.

NAEP likewise outlines a distribution across the grades of the core purposes and types of student writing. The 2011 NAEP framework, like the Standards, cultivates the development of three mutually reinforcing writing capacities: writing to persuade, to explain, and to convey real or imagined experience. Evidence concerning the demands of college and career readiness gathered during development of the Standards concurs with NAEP's shifting emphases: standards for grades 9-12 describe writing in all three forms, but, consistent with NAEP, the overwhelming focus of writing throughout high school should be on arguments and informative/explanatory texts.<sup>2</sup>

### Distribution of Communicative Purposes by Grade in the 2011 NAEP Writing Framework

Grade	To Persuade	To Explain	To Convey Experience
4	30%	35%	35%
8	35%	35%	30%
12	40%	40%	20%

Source: National Assessment Governing Board. (2007). *Writing framework for the 2011 National Assessment of Educational Progress, pre-publication edition*. Iowa City, IA: ACT, Inc.

It follows that writing assessments aligned with the Standards should adhere to the distribution of writing purposes across grades outlined by NAEP.

#### Focus and coherence in instruction and assessment

While the Standards delineate specific expectations in reading, writing, speaking, listening, and language, each standard need not be a separate focus for instruction and assessment. Often, several standards can be addressed by a single rich task. For example, when editing writing, students address Writing standard 5 (“Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach”) as well as Language standards 1-3 (which deal with conventions of standard English and knowledge of language). When drawing evidence from literary and informational texts per Writing standard 9, students are also demonstrating their comprehension skill in relation to specific standards in Reading. When discussing something they have read or written, students are also demonstrating their speaking and listening skills. The CCR anchor standards themselves provide another source of focus and coherence.

The same ten CCR anchor standards for Reading apply to both literary and informational texts, including texts in history/social studies, science, and technical subjects. The ten CCR anchor standards for Writing cover numerous text types and subject areas. This means that students can develop mutually reinforcing skills and exhibit mastery of standards for reading and writing across a range of texts and classrooms.

<sup>1</sup>The percentages on the table reflect the sum of student reading, not just reading in ELA settings. Teachers of senior English classes, for example, are not required to devote 70 percent of reading to informational texts. Rather, 70 percent of student reading across the grade should be informational.

<sup>2</sup>As with reading, the percentages in the table reflect the sum of student writing, not just writing in ELA settings.



## What is Not Covered by the Standards

The Standards should be recognized for what they are not as well as what they are. The most important intentional design limitations are as follows:

1. The Standards define what all students are expected to know and be able to do, not how teachers should teach. For instance, the use of play with young children is not specified by the Standards, but it is welcome as a valuable activity in its own right and as a way to help students meet the expectations in this document. Furthermore, while the Standards make references to some particular forms of content, including mythology, foundational U.S. documents, and Shakespeare, they do not—indeed, cannot—enumerate all or even most of the content that students should learn. The Standards must therefore be complemented by a well-developed, content-rich curriculum consistent with the expectations laid out in this document.
2. While the Standards focus on what is most essential, they do not describe all that can or should be taught. A great deal is left to the discretion of teachers and curriculum developers. The aim of the Standards is to articulate the fundamentals, not to set out an exhaustive list or a set of restrictions that limits what can be taught beyond what is specified herein.
3. The Standards do not define the nature of advanced work for students who meet the Standards prior to the end of high school. For those students, advanced work in such areas as literature, composition, language, and journalism should be available. This work should provide the next logical step up from the college and career readiness baseline established here.
4. The Standards set grade-specific standards but do not define the intervention methods or materials necessary to support students who are well below or well above grade-level expectations. No set of grade-specific standards can fully reflect the great variety in abilities, needs, learning rates, and achievement levels of students in any given classroom. However, the Standards do provide clear signposts along the way to the goal of college and career readiness for all students.
5. It is also beyond the scope of the Standards to define the full range of supports appropriate for English language learners and for students with special needs. At the same time, all students must have the opportunity to learn and meet the same high standards if they are to access the knowledge and skills necessary in their post-high school lives.  
  
Each grade will include students who are still acquiring English. For those students, it is possible to meet the standards in reading, writing, speaking, and listening without displaying native-like control of conventions and vocabulary.  
  
The Standards should also be read as allowing for the widest possible range of students to participate fully from the outset and as permitting appropriate accommodations to ensure maximum participation of students with special education needs. For example, for students with disabilities *reading* should allow for the use of Braille, screen-reader technology, or other assistive devices, while *writing* should include the use of a scribe, computer, or speech-to-text technology. In a similar vein, *speaking* and *listening* should be interpreted broadly to include sign language.
6. While the ELA and content area literacy components described herein are critical to college and career readiness, they do not define the whole of such readiness. Students require a wide-ranging, rigorous academic preparation and, particularly in the early grades, attention to such matters as social, emotional, and physical development and approaches to learning. Similarly, the Standards define literacy expectations in history/social studies, science, and technical subjects, but literacy standards in other areas, such as mathematics and health education, modeled on those in this document are strongly encouraged to facilitate a comprehensive, schoolwide literacy program.



## Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, and Language

The descriptions that follow are not standards themselves but instead offer a portrait of students who meet the standards set out in this document. As students advance through the grades and master the standards in reading, writing, speaking, listening, and language, they are able to exhibit with increasing fullness and regularity these capacities of the literate individual.

### **They demonstrate independence.**

Students can, without significant scaffolding, comprehend and evaluate complex texts across a range of types and disciplines, and they can construct effective arguments and convey intricate or multifaceted information. Likewise, students are able independently to discern a speaker's key points, request clarification, and ask relevant questions. They build on others' ideas, articulate their own ideas, and confirm they have been understood. Without prompting, they demonstrate command of standard English and acquire and use a wide-ranging vocabulary. More broadly, they become self-directed learners, effectively seeking out and using resources to assist them, including teachers, peers, and print and digital reference materials.

### **They build strong content knowledge.**

Students establish a base of knowledge across a wide range of subject matter by engaging with works of quality and substance. They become proficient in new areas through research and study. They read purposefully and listen attentively to gain both general knowledge and discipline-specific expertise. They refine and share their knowledge through writing and speaking.

### **They respond to the varying demands of audience, task, purpose, and discipline.**

Students adapt their communication in relation to audience, task, purpose, and discipline. They set and adjust purpose for reading, writing, speaking, listening, and language use as warranted by the task. They appreciate nuances, such as how the composition of an audience should affect tone when speaking and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in science).

### **They comprehend as well as critique.**

Students are engaged and open-minded—but discerning—readers and listeners. They work diligently to understand precisely what an author or speaker is saying, but they also question an author's or speaker's assumptions and premises and assess the veracity of claims and the soundness of reasoning.

### **They value evidence.**

Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others' use of evidence.

### **They use technology and digital media strategically and capably.**

Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.

### **They come to understand other perspectives and cultures.**

Students appreciate that the twenty-first-century classroom and workplace are settings in which people from often widely divergent cultures and who represent diverse experiences and perspectives must learn and work together. Students actively seek to understand other perspectives and cultures through reading and listening, and they are able to communicate effectively with people of varied backgrounds. They evaluate other points of view critically and constructively. Through reading great classic and contemporary works of literature representative of a variety of periods, cultures, and worldviews, students can vicariously inhabit worlds and have experiences much different than their own.



## How to Read This Document

### Overall Document Organization

The Standards comprise three main sections: a comprehensive K-5 section and two content area-specific sections for grades 6-12, one for ELA and one for history/social studies, science, and technical subjects. Three appendices accompany the main document.

Each section is divided into strands. K-5 and 6-12 ELA have Reading, Writing, Speaking and Listening, and Language strands; the 6-12 history/ social studies, science, and technical subjects section focuses on Reading and Writing. Each strand is headed by a strand-specific set of College and Career Readiness Anchor Standards that is identical across all grades and content areas.

Standards for each grade within K-8 and for grades 9-10 and 11-12 follow the CCR anchor standards in each strand. Each grade-specific standard (as these standards are collectively referred to) corresponds to the same-numbered CCR anchor standard. Put another way, each CCR anchor standard has an accompanying grade-specific standard translating the broader CCR statement into grade-appropriate end-of-year expectations.

Individual CCR anchor standards can be identified by their strand, CCR status, and number (R.CCR.6, for example). Individual grade-specific standards can be identified by their strand, grade, and number (or number and letter, where applicable), so that RI.4.3, for example, stands for Reading, Informational Text, grade 4, standard 3 and W.5.1a stands for Writing, grade 5, standard 1a. Strand designations can be found in brackets alongside the full strand title.

### Who is responsible for which portion of the Standards

A single K-5 section lists standards for reading, writing, speaking, listening, and language across the curriculum, reflecting the fact that most or all of the instruction students in these grades receive comes from one teacher. Grades 6-12 are covered in two content area-specific sections, the first for the English language arts teacher and the second for teachers of history/social studies, science, and technical subjects. Each section uses the same CCR anchor standards but also includes grade-specific standards tuned to the literacy requirements of the particular discipline(s).

### Key Features of the Standards

#### Reading: Text complexity and the growth of comprehension

The Reading standards place equal emphasis on the sophistication of what students read and the skill with which they read. Standard 10 defines a grade-by-grade “staircase” of increasing text complexity that rises from beginning reading

to the college and career readiness level. Whatever they are reading, students must also show a steadily growing ability to discern more from and make fuller use of text, including making an increasing number of connections among ideas and between texts, considering a wider range of textual evidence, and becoming more sensitive to inconsistencies, ambiguities, and poor reasoning in texts.

#### Writing: Text types, responding to reading, and research

The Standards acknowledge the fact that whereas some writing skills, such as the ability to plan, revise, edit, and publish, are applicable to many types of writing, other skills are more properly defined in terms of specific writing types: arguments, informative/explanatory texts, and narratives. Standard 9 stresses the importance of the writing-reading connection by requiring students to draw upon and write about evidence from literary and informational texts. Because of the centrality of writing to most forms of inquiry, research standards are prominently included in this strand, though skills important to research are infused throughout the document.

#### Speaking and Listening: Flexible communication and collaboration

Including but not limited to skills necessary for formal presentations, the Speaking and Listening standards require students to develop a range of broadly useful oral communication and interpersonal skills. Students must learn to work together, express and listen carefully to ideas, integrate information from oral, visual, quantitative, and media sources, evaluate what they hear, use media and visual displays strategically to help achieve communicative purposes, and adapt speech to context and task.

#### Language: Conventions, effective use, and vocabulary

The Language standards include the essential “rules” of standard written and spoken English, but they also approach language as a matter of craft and informed choice among alternatives. The vocabulary standards focus on understanding words and phrases, their relationships, and their nuances and on acquiring new vocabulary, particularly general academic and domain-specific words and phrases.



---

 STANDARDS FOR  
**Literacy in All Subjects**  
**6-12**



## College and Career Readiness Anchor Standards for Reading

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

### Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

### Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

### Integration of Knowledge and Ideas

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.\*
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

### Range of Reading and Level of Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

\*Please see “Research to Build and Present Knowledge” in Writing for additional standards relevant to gathering, assessing, and applying information from print and digital sources.

### Note on range and content of student reading

*Reading is critical to building knowledge in history/social studies as well as in science and technical subjects. College and career ready reading in these fields requires an appreciation of the norms and conventions of each discipline, such as the kinds of evidence used in history and science; an understanding of domain-specific words and phrases; an attention to precise details; and the capacity to evaluate intricate arguments, synthesize complex information, and follow detailed descriptions of events and concepts. In history/social studies, for example, students need to be able to analyze, evaluate, and differentiate primary and secondary sources. When reading scientific and technical texts, students need to be able to gain knowledge from challenging texts that often make extensive use of elaborate diagrams and data to convey information and illustrate concepts. Students must be able to read complex informational texts in these fields with independence and confidence because the vast majority of reading in college and workforce training programs will be sophisticated nonfiction. It is important to note that these Reading standards are meant to complement the specific content demands of the disciplines, not replace them.*



## Reading Standards for Literacy in All Subjects

The standards below begin at grade 6; standards for K–5 reading in history/social studies, science, and technical subjects are integrated into the K–5 Reading standards. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<b>Key Ideas and Details</b>		
1. Cite specific textual evidence to support analysis of primary and secondary sources.	1. Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.	1. Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.
2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.	2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.	2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.
3. Identify key steps in a text’s description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).	3. Analyze in detail a series of events described in a text; determine whether earlier events caused later ones or simply preceded them.	3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.
<b>Craft and Structure</b>		
4. Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.	4. Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social studies.	4. Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines <i>faction</i> in <i>Federalist</i> No. 10).
5. Describe how a text presents information (e.g., sequentially, comparatively, causally).	5. Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.	5. Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.
6. Identify aspects of a text that reveal an author’s point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).	6. Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.	6. Evaluate authors’ differing points of view on the same historical event or issue by assessing the authors’ claims, reasoning, and evidence.
<b>Integration of Knowledge and Ideas</b>		
7. Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.	7. Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.	7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.
8. Distinguish among fact, opinion, and reasoned judgment in a text.	8. Assess the extent to which the reasoning and evidence in a text support the author’s claims.	8. Evaluate an author’s premises, claims, and evidence by corroborating or challenging them with other information.
9. Analyze the relationship between a primary and secondary source on the same topic.	9. Compare and contrast treatments of the same topic in several primary and secondary sources.	9. Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.
<b>Range of Reading and Level of Text Complexity</b>		
10. By the end of grade 8, read and comprehend history/social studies texts in the grades 6–8 text complexity band independently and proficiently.	10. By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.	10. By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.



# Reading Standards for Literacy in All Subjects

RST

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<b>Key Ideas and Details</b>		
1. Cite specific textual evidence to support analysis of science and technical texts.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.	2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
<b>Craft and Structure</b>		
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6–8 texts and topics</i> .	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i> .	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 11–12 texts and topics</i> .
5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i> ).	5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
<b>Integration of Knowledge and Ideas</b>		
7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
<b>Range of Reading and Level of Text Complexity</b>		
10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.	10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.



## College and Career Readiness Anchor Standards for Writing

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade span. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

### Text Types and Purposes\*

1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

### Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

### Research to Build and Present Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

### Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

### Note on range and content of student writing

*For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college and career ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first-draft text under a tight deadline and the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.*

\*These broad types of writing include many subgenres.



## Writing Standards for Literacy in All Subjects

The standards below begin at grade 6; standards for K–5 writing in history/social studies, science, and technical subjects are integrated into the K–5 Writing standards. The CCR anchor standards and high school standards in literacy work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<b>Text Types and Purposes</b>		
<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <p>a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.</p> <p>b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p> <p>c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</p> <p>d. Establish and maintain a formal style.</p> <p>e. Provide a concluding statement or section that follows from and supports the argument presented.</p>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <p>a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.</p> <p>b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.</p> <p>c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</p> <p>d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>e. Provide a concluding statement or section that follows from or supports the argument presented.</p>	<p>1. Write arguments focused on <i>discipline-specific content</i>.</p> <p>a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.</p> <p>b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.</p> <p>c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</p> <p>d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>e. Provide a concluding statement or section that follows from or supports the argument presented.</p>



## Writing Standards for Literacy in All Subjects

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes (continued)		
<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> <li>Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.</li> <li>Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.</li> <li>Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.</li> <li>Use precise language and domain-specific vocabulary to inform about or explain the topic.</li> <li>Establish and maintain a formal style and objective tone.</li> <li>Provide a concluding statement or section that follows from and supports the information or explanation presented.</li> </ol>	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> <li>Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</li> <li>Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.</li> <li>Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.</li> <li>Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</li> <li>Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</li> <li>Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</li> </ol>	<p>2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ol style="list-style-type: none"> <li>Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</li> <li>Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.</li> <li>Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.</li> <li>Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</li> <li>Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).</li> </ol>
<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>	<p>3. (See note; not applicable as a separate requirement)</p>

**Note:** Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.



## Writing Standards for Literacy in All Subjects

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
<b>Production and Distribution of Writing</b>		
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
<b>Research to Build and Present Knowledge</b>		
7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.
<b>Range of Writing</b>		
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.



## College and Career Readiness Anchor Standards for Speaking and Listening

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

### Comprehension and Collaboration

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
2. Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

### Presentation of Knowledge and Ideas

4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

### Note on range and content of student speaking and listening

*To become college and career ready, students must have ample opportunities to take part in a variety of rich, structured conversations—as part of a whole class, in small groups, and with a partner—built around important content in various domains. They must be able to contribute appropriately to these conversations, to make comparisons and contrasts, and to analyze and synthesize a multitude of ideas in accordance with the standards of evidence appropriate to a particular discipline. Whatever their intended major or profession, high school graduates will depend heavily on their ability to listen attentively to others so that they are able to build on others' meritorious ideas while expressing their own clearly and persuasively.*

*New technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication. The Internet has accelerated the speed at which connections between speaking, listening, reading, and writing can be made, requiring that students be ready to use these modalities nearly simultaneously. Technology itself is changing quickly, creating a new urgency for students to be adaptable in response to change.*



# Speaking and Listening Standards for Literacy in All Subjects

SL

The following standards for grades 6–12 offer a focus for instruction in each year to help ensure that students gain adequate mastery of a range of skills and applications. *Students advancing through the grades are expected to meet each year’s grade-specific standards and retain or further develop skills and understandings mastered in preceding grades.*

Grade 6 students:	Grade 7 students:	Grade 8 students:
<b>Comprehension and Collaboration</b>		
1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 6 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly. <ol style="list-style-type: none"> <li>Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.</li> <li>Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.</li> <li>Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.</li> </ol>	1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 7 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly. <ol style="list-style-type: none"> <li>Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>Pose questions that elicit elaboration and respond to others’ questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</li> <li>Acknowledge new information expressed by others and, when warranted, modify their own views.</li> </ol>	1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 8 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly. <ol style="list-style-type: none"> <li>Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.</li> <li>Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.</li> <li>Pose questions that connect the ideas of several speakers and respond to others’ questions and comments with relevant evidence, observations, and ideas.</li> <li>Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.</li> </ol>
2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	2. Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.	2. Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.
3. Delineate a speaker’s argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.	3. Delineate a speaker’s argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.	3. Delineate a speaker’s argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.
<b>Presentation of Knowledge and Ideas</b>		
4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.	4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.	4. Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.	5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.	5. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.	6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.	6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.



## Speaking and Listening Standards for Literacy in All Subjects

The CCR anchor standards and high school grade-specific standards work in tandem to define college and career readiness expectations—the former providing broad standards, the latter providing additional specificity.

### Grades 9–10 students:

### Grades 11–12 students:

#### Comprehension and Collaboration

- |  |  |
|--|--|
| <p>1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others' ideas and expressing their own clearly and persuasively.</p> <p>a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</p> <p>b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.</p> <p>c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</p> <p>d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.</p> | <p>1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 11–12 topics, texts, and issues</i>, building on others' ideas and expressing their own clearly and persuasively.</p> <p>a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</p> <p>b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.</p> <p>c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.</p> <p>d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.</p> |
| <p>2. Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.</p>   | <p>2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p>  |
| <p>3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.</p>  | <p>3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.</p>  |

#### Presentation of Knowledge and Ideas

- |   |   |
|---|---|
| <p>4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.</p> | <p>4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> |
| <p>5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p>   | <p>5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p>   |
| <p>6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.</p>   | <p>6. Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.</p>   |



## College and Career Readiness Anchor Standards for Language

The grades 6–12 standards on the following pages define what students should understand and be able to do by the end of each grade. They correspond to the College and Career Readiness (CCR) anchor standards below by number. The CCR and grade-specific standards are necessary complements—the former providing broad standards, the latter providing additional specificity—that together define the skills and understandings that all students must demonstrate.

### Conventions of Standard English

1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

### Knowledge of Language

3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

### Vocabulary Acquisition and Use

4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
6. Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

### Note on range and content of student language use

*To be college and career ready in language, students must have firm control over the conventions of standard English. At the same time, they must come to appreciate that language is as at least as much a matter of craft as of rules and be able to choose words, syntax, and punctuation to express themselves and achieve particular functions and rhetorical effects. They must also have extensive vocabularies, built through reading and study, enabling them to comprehend complex texts and engage in purposeful writing about and conversations around content. They need to become skilled in determining or clarifying the meaning of words and phrases they encounter, choosing flexibly from an array of strategies to aid them. They must learn to see an individual word as part of a network of other words—words, for example, that have similar denotations but different connotations. The inclusion of Language standards in their own strand should not be taken as an indication that skills related to conventions, effective language use, and vocabulary are unimportant to reading, writing, speaking, and listening; indeed, they are inseparable from such contexts.*



## Language Standards for Literacy in All Subjects

The following standards for grades 6–12 offer a focus for instruction each year to help ensure that students gain adequate mastery of a range of skills and applications. *Students advancing through the grades are expected to meet each year’s grade-specific standards and retain or further develop skills and understandings mastered in preceding grades.* Beginning in grade 3, skills and understandings that are particularly likely to require continued attention in higher grades as they are applied to increasingly sophisticated writing and speaking are marked with an asterisk (\*).

Grade 6 students:	Grade 7 students:	Grade 8 students:
<b>Conventions of Standard English</b>		
1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. <ol style="list-style-type: none"> <li>Ensure that pronouns are in the proper case (subjective, objective, possessive).</li> <li>Use intensive pronouns (e.g., <i>myself, ourselves</i>).</li> <li>Recognize and correct inappropriate shifts in pronoun number and person.*</li> <li>Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents)*.</li> <li>Recognize variations from standard English in their own and others’ writing and speaking, and identify and use strategies to improve expression in conventional language.*</li> </ol>	1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. <ol style="list-style-type: none"> <li>Explain the function of phrases and clauses in general and their function in specific sentences.</li> <li>Choose among simple, compound, complex, and compound-complex sentences to signal differing relationships among ideas.</li> <li>Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.*</li> </ol>	1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. <ol style="list-style-type: none"> <li>Explain the function of verbals (gerunds, participles, infinitives) in general and their function in particular sentences.</li> <li>Form and use verbs in the active and passive voice.</li> <li>Form and use verbs in the indicative, imperative, interrogative, conditional, and subjunctive mood.</li> <li>Recognize and correct inappropriate shifts in verb voice and mood.*</li> </ol>
2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. <ol style="list-style-type: none"> <li>Use punctuation (commas, parentheses, dashes) to set off nonrestrictive/parenthetical elements.*</li> <li>Spell correctly.</li> </ol>	2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. <ol style="list-style-type: none"> <li>Use a comma to separate coordinate adjectives (e.g., <i>It was a fascinating, enjoyable movie</i> but not <i>He wore an old[,] green shirt</i>).</li> <li>Spell correctly.</li> </ol>	2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. <ol style="list-style-type: none"> <li>Use punctuation (comma, ellipsis, dash) to indicate a pause or break.</li> <li>Use an ellipsis to indicate an omission.</li> <li>Spell correctly.</li> </ol>
<b>Knowledge of Language</b>		
3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. <ol style="list-style-type: none"> <li>Vary sentence patterns for meaning, reader/listener interest, and style.*</li> <li>Maintain consistency in style and tone.*</li> </ol>	3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. <ol style="list-style-type: none"> <li>Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.*</li> </ol>	3. Use knowledge of language and its conventions when writing, speaking, reading, or listening. <ol style="list-style-type: none"> <li>Use verbs in the active and passive voice and in the conditional and subjunctive mood to achieve particular effects (e.g., emphasizing the actor or the action; expressing uncertainty or describing a state contrary to fact).</li> </ol>



## Language Standards for Literacy in All Subjects

Grade 6 students:	Grade 7 students:	Grade 8 students:
<b>Vocabulary Acquisition and Use</b>		
<p>4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <i>grade 6 reading and content</i>, choosing flexibly from a range of strategies.</p> <ul style="list-style-type: none"> <li>a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</li> <li>b. Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., <i>audience, auditory, audible</i>).</li> <li>c. Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</li> <li>d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</li> </ul>	<p>4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <i>grade 7 reading and content</i>, choosing flexibly from a range of strategies.</p> <ul style="list-style-type: none"> <li>a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</li> <li>b. Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., <i>belligerent, bellicose, rebel</i>).</li> <li>c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</li> <li>d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</li> </ul>	<p>4. Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on <i>grade 8 reading and content</i>, choosing flexibly from a range of strategies.</p> <ul style="list-style-type: none"> <li>a. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</li> <li>b. Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., <i>precede, recede, secede</i>).</li> <li>c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</li> <li>d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</li> </ul>
<p>5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.</p> <ul style="list-style-type: none"> <li>a. Interpret figures of speech (e.g., personification) in context.</li> <li>b. Use the relationship between particular words (e.g., cause/effect, part/whole, item/category) to better understand each of the words.</li> <li>c. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., <i>stingy, scrimping, economical, unwasteful, thrifty</i>).</li> </ul>	<p>5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.</p> <ul style="list-style-type: none"> <li>a. Interpret figures of speech (e.g., literary, biblical, and mythological allusions) in context.</li> <li>b. Use the relationship between particular words (e.g., synonym/antonym, analogy) to better understand each of the words.</li> <li>c. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., <i>refined, respectful, polite, diplomatic, condescending</i>).</li> </ul>	<p>5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.</p> <ul style="list-style-type: none"> <li>a. Interpret figures of speech (e.g. verbal irony, puns) in context.</li> <li>b. Use the relationship between particular words to better understand each of the words.</li> <li>c. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., <i>bullheaded, willful, firm, persistent, resolute</i>).</li> </ul>
<p>6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>	<p>6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>	<p>6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>



## Language Standards for Literacy in All Subjects

## Grades 9–10 students:

## Grades 11–12 students:

## Vocabulary Acquisition and Use

- |  |   |
|--|---|
| <p>4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <i>grades 9–10 reading and content</i>, choosing flexibly from a range of strategies.</p> <p>a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.</p> <p>b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., <i>analyze, analysis, analytical; advocate, advocacy</i>).</p> <p>c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.</p> <p>d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</p> | <p>4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <i>grades 11–12 reading and content</i>, choosing flexibly from a range of strategies.</p> <p>a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.</p> <p>b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., <i>conceive, conception, conceivable</i>).</p> <p>c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.</p> <p>d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</p> |
| <p>5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.</p> <p>a. Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.</p> <p>b. Analyze nuances in the meaning of words with similar denotations.</p>   | <p>5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.</p> <p>a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.</p> <p>b. Analyze nuances in the meaning of words with similar denotations.</p>   |
| <p>6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>  | <p>6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>   |



## Language Progressive Skills, by Grade

The following skills, marked with an asterisk (\*) in Language standards 1–3, are particularly likely to require continued attention in higher grades as they are applied to increasingly sophisticated writing and speaking.

Standard	Grade(s)							
	3	4	5	6	7	8	9–10	11–12
L.3.1f. Ensure subject-verb and pronoun-antecedent agreement.								
L.3.3a. Choose words and phrases for effect.								
L.4.1f. Produce complete sentences, recognizing and correcting inappropriate fragments and run-ons.								
L.4.1g. Correctly use frequently confused words (e.g., <i>to/too/two</i> ; <i>there/their</i> ).								
L.4.3a. Choose words and phrases to convey ideas precisely.*								
L.4.3b. Choose punctuation for effect.								
L.5.1d. Recognize and correct inappropriate shifts in verb tense.								
L.5.2a. Use punctuation to separate items in a series.†								
L.6.1c. Recognize and correct inappropriate shifts in pronoun number and person.								
L.6.1d. Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents).								
L.6.1e. Recognize variations from standard English in their own and others' writing and speaking, and identify and use strategies to improve expression in conventional language.								
L.6.2a. Use punctuation (commas, parentheses, dashes) to set off nonrestrictive/parenthetical elements.								
L.6.3a. Vary sentence patterns for meaning, reader/listener interest, and style.‡								
L.6.3b. Maintain consistency in style and tone.								
L.7.1c. Place phrases and clauses within a sentence, recognizing and correcting misplaced and dangling modifiers.								
L.7.3a. Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.								
L.8.1d. Recognize and correct inappropriate shifts in verb voice and mood.								
L.9–10.1a. Use parallel structure.								

\* Subsumed by L.7.3a  
 † Subsumed by L.9–10.1a  
 ‡ Subsumed by L.11–12.3a



## Standards for Mathematical Practice

Mathematical proficiency is necessary for every student; therefore, understanding concepts and being fluent with procedural skills are both important. This means that educators must intentionally engage students at all levels so they are readily able to understand important concepts, use skills effectively and apply mathematics to make sense of their changing world.

*Adding it Up* (National Research Council, 2001), a major research report that informed the development of the Common Core State Standards for Mathematics, emphasizes the five strands of mathematical proficiency: conceptual understanding, procedural fluency, adaptive reasoning, strategic competence and productive disposition. These strands are not sequential, but intertwined and form the basis for the *Standards for Mathematical Content* and the *Standards for Mathematical Practice*. Together, these two sets of mathematics standards define what students should understand and be able to do in their study of PK-12 mathematics.

Standards for Mathematical Practice	Characteristics of Mathematically Proficient Students
<p><b>Make sense of problems and persevere in solving them.</b></p>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Explain the meaning of a problem and restate it in their words.</li> <li>Analyze given information to develop possible strategies for solving the problem.</li> <li>Identify and execute appropriate strategies to solve the problem.</li> <li>Evaluate progress toward the solution and make revisions if necessary.</li> <li>Explain the connections among various representations of a problem or concept.</li> <li>Check for accuracy and reasonableness of work, strategy and solution.</li> <li>Understand and connect strategies used by others to solve problems.</li> </ul>
<p><b>Reason abstractly and quantitatively.</b></p>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Translate given information to create a mathematical representation for a concept.</li> <li>Manipulate the mathematical representation by showing the process considering the meaning of the quantities involved.</li> <li>Recognize the relationships between numbers/quantities within the process to evaluate a problem.</li> <li>Review the process for reasonableness within the original context.</li> </ul>
<p><b>Construct viable arguments and critique the reasoning of others.</b></p>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Use observations and prior knowledge (stated assumptions, definitions and previous established results) to make conjectures and construct arguments.</li> <li>Compare and contrast logical arguments and identify which one makes the most sense.</li> <li>Justify (orally and in written form) the approach used, including how it fits in the context from which the data arose.</li> <li>Listen, understand, analyze and respond to the arguments of others.</li> <li>Identify and explain both correct and flawed logic.</li> <li>Recognize and use counterexamples to refine assumptions or definitions and dispute or disprove an argument.</li> </ul>



Standards for Mathematical Practice	Characteristics of Mathematically Proficient Students
<b>Model with mathematics.</b>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Use a variety of methods to model, represent and solve real-world problems.</li> <li>Simplify a complicated problem by making assumptions and approximations.</li> <li>Interpret results in the context of the problem and revise the model if necessary.</li> <li>Choose a model that is both appropriate and efficient to arrive at one or more desired solutions.</li> </ul>
<b>Use appropriate tools strategically.</b>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Identify mathematical tools and recognize their strengths and weaknesses.</li> <li>Select and use appropriate tools to best model/solve problems.</li> <li>Use estimation to predict reasonable solutions and/or detect errors.</li> <li>Identify and successfully use external mathematical resources to pose or solve problems.</li> <li>Use a variety of technologies, including digital content, to explore, confirm and deepen conceptual understanding.</li> </ul>
<b>Attend to precision.</b>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Understand symbols and use them consistently within the context of a problem.</li> <li>Calculate answers efficiently and accurately and label them appropriately.</li> <li>Formulate precise explanations (orally and in written form) using both mathematical representations and words.</li> <li>Communicate using clear mathematical definitions, vocabulary and symbols.</li> </ul>
<b>Look for and make use of structure.</b>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Look for, identify and accept patterns or structure within relationships.</li> <li>Use patterns or structure to make sense of mathematics and connect prior knowledge to similar situations and extend to novel situations.</li> <li>Analyze a complex problem by breaking it down into smaller parts.</li> <li>Reflect on the problem as a whole and shift perspective as needed.</li> </ul>
<b>Look for and express regularity in repeated reasoning.</b>	<p><b>Mathematically proficient students can:</b></p> <ul style="list-style-type: none"> <li>Recognize similarities and patterns in repeated trials with a process.</li> <li>Generalize the process to create a shortcut which may lead to developing rules or creating a formula.</li> <li>Evaluate the reasonableness of results throughout the mathematical process while attending to the details.</li> </ul>

\* Collaborative project with Cedarburg, Franklin, Fox Point-Bayside, Grafton, Greendale, Kettle Moraine, Menomonee Falls, Oconomowoc, Pewaukee, Waukesha and Whitefish Bay School Districts and CESA 1.



## **Section VI**

---

### Wisconsin's Guiding Principles for Teaching and Learning



This page intentionally left blank.



## Guiding Principles for Teaching and Learning

These guiding principles are the underpinnings of effective teaching and learning for every Wisconsin teacher and every Wisconsin student. They are larger than any one initiative, process or set of standards. Rather, they are the lens we look through as we identify teaching and learning standards, design assessments and determine what good instruction looks like. These principles recognize that every student has the right to learn and are built upon three essential elements: high quality instruction, balanced assessment and collaboration. They are meant to align with academic excellence, rigorous instruction and college and career readiness for every Wisconsin student. For additional research, resources and probing questions to support professional learning on the six principles, please see the Wisconsin Research and Resources section of this document.

### **Every student has the right to learn.**

It is our collective responsibility as an education community to make certain each child receives a high-quality, challenging education designed to maximize potential, an education that reflects and stretches his or her abilities and interests. This belief in the right of every child to learn forms the basis of equitable teaching and learning. The five principles that follow cannot exist without this commitment guiding our work.

### **Instruction must be rigorous and relevant.**

To understand the world in which we live, there are certain things we all must learn. Each school subject is made up of a core of essential knowledge that is deep, rich and vital. Every student, regardless of age or ability, must be taught this essential knowledge. What students learn is fundamentally connected to how they learn and successful instruction blends the content of a discipline with processes of an engaging learning environment that changes to meet the dynamic needs of all students.



Wisconsin Standards for Agriculture, Food and Natural Resources

### **Purposeful assessment drives instruction and affects learning.**

Assessment is an integral part of teaching and learning. Purposeful assessment practices help teachers and students understand where they have been, where they are and where they might go next. No one assessment can provide sufficient information to plan teaching and learning. Using different types of assessments as part of instruction results in useful information about student understanding and progress. Educators should use this information to guide their own practice and in partnership with students and their families to reflect on learning and set future goals.

### **Learning is a collaborative responsibility.**

Teaching and learning are both collaborative processes. Collaboration benefits teaching and learning when it occurs on several levels: when students, teachers, family members and the community collectively prioritize education and engage in activities that support local schools, educators and students; when educators collaborate with their colleagues to support innovative classroom practices and set high expectations for themselves and their students; and when students are given opportunities to work together toward academic goals in ways that enhance learning.

### **Students bring strengths and experiences to learning.**

Every student learns. Although no two students come to school with the same culture, learning strengths, background knowledge or experiences and no two students learn in exactly the same way, every student's unique personal history enriches classrooms, schools and the community. This diversity is our greatest education asset.

### **Responsive environments engage learners.**

Meaningful learning happens in environments where creativity, awareness, inquiry and critical thinking are part of instruction. Responsive learning environments adapt to the individual needs of each student and encourage learning by promoting collaboration rather than isolation of learners. Learning environments, whether classrooms, schools or other systems, should be structured to promote engaged teaching and learning.



## Guiding Principle 1: Every student has the right to learn.

*It is our collective responsibility as an education community to make certain each child receives a high-quality, challenging education designed to maximize potential, an education that reflects and stretches his or her abilities and interests. This belief in the right of every child to learn forms the basis of equitable teaching and learning. The five principles that follow cannot exist without this commitment guiding our work.*

Every student's right to learn provides the overarching vision for Wisconsin's Guiding Principles for education. To be successful, education must be committed to serving the learning needs of students from various social, economic, cultural, linguistic and developmental backgrounds. For all students to have a guaranteed right to learn, schooling must be equitable.

### Research Summary

#### *Focusing on Equity*

The belief that each student has the right to learn despite differences in educational needs and backgrounds has important implications for ensuring an equitable education for all students. In the education research literature, the term *educational equality* refers to the notion that all students should have access to an education of similar quality—the proxy for which is frequently educational *inputs* such as funding, facilities, resources and quality teaching and learning. In contrast, the term *educational equity* connotes the requirement that all students receive an education that allows them to achieve at a standard level or attain standard educational *outcomes* (Brighthouse & Swift, 2008). Importantly, equality in terms of educational resources or inputs may not guarantee equity in educational outcomes because not all students reach the same level of achievement with the same access to resources (Brighthouse & Swift, 2008). To serve students of varying economic, social, developmental or linguistic backgrounds, achieving equity in education may require more resources to meet the greater educational needs of certain students (Berne & Stiefel, 1994).

The research literature offers several components that provide a framework for understanding what an equitable education for all students looks like at the classroom level. These components include a call for all students to be provided with the following:

- Access to resources and facilities
- Instruction in all areas tailored to their needs

- Curriculum that is rigorous and relevant
- Educators who are culturally sensitive and respectful
- Interactions with staff and other students that are positive and encouraging in an atmosphere of learning
- Assessment that is varied to give each student the opportunity to demonstrate learning (Education Northwest, 2011)

#### *Access*

Access to resources and facilities largely refers to various legal mandates that all children have the right to attend school and participate in all school activities. Since the landmark ruling *Brown v. Board of Education of Topeka* (1954), court decisions and federal regulations have mandated equality of access to all educational opportunities for students regardless of race, ethnicity or gender (Civil Rights Act, 1964), disability (Education for All Handicapped Children Act, 1975) or language (*Lau v. Nichols*, 1974). Equity in the provision of educational resources and funding was improved with the passage of Title I of the Elementary and Secondary Education Act (ESEA; 1965), which provided additional resources for economically disadvantaged students to meet their learning needs. Since Title I, research on equity in education has grown and with the reauthorization of ESEA in the No Child Left Behind Act in 2001, equity in educational outcomes for all students was emphasized in the law. Access to an equitable education is a legal right for all children and the quality of that access in classroom instruction is a moral and ethical right.

#### *Instruction*

Instruction that is tailored to meet all students' needs goes beyond simply providing equal access to education. High-quality instruction has increasingly been defined in the literature as a key factor in student achievement. High-quality instruction includes differentiated instructional strategies, teaching to students' learning styles and provision of instructional support for students who are educationally, socially or linguistically challenged. Differentiated instruction involves utilizing unique instructional strategies for meeting individual student needs as well as modifying curriculum for both high- and low-performing students. Assessing and teaching to student learning styles is one form of differentiation. Research has shown the value of adapting instructional strategies to different student learning styles (Gardner, 1999) and supports the practice of classroom differentiation (Mulroy & Eddinger, 2003; Tomlinson, 2005).



### Curriculum

Designing curriculum that is rigorous and relevant provides an important foundation for a high-quality learning environment by helping make standards-based content accessible to all students. A relevant, rigorous curriculum has been found to be important for all students. Although advanced and rigorous curriculum is generally viewed to be an important factor of academic success for high-achieving students, research also indicates that using challenging, interesting and varied curriculum for students of all achievement levels improves student achievement (Daggett, 2005). Rigorous curriculum can be adapted for low-performing students in a way that challenges them and helps them meet learning standards. For example, the universal design for learning (UDL) offers strategies for making the general curriculum accessible to special education students (Rose, Hasselbring, Stahl, & Zabala, 2009). Similarly, research on lesson scaffolding emphasizes strategies for providing a rigorous content curriculum to student who are culturally or linguistically diverse or who need additional context to understand certain concepts (Gibbons, 2002).

### Climate

Interactions with staff and students that are positive and focused on learning are part of an emotionally safe school climate, but the literature also supports the need for a climate of high academic expectations (Haycock, 2001). Schools with large numbers of high-poverty and racially diverse students have shown significant academic growth when teachers and staff members create an environment of high expectations for achievement (Reeves, 2010). In addition, research on school climate has asserted the need for students to feel emotionally safe and respected as well as physically safe in school (Gronna & Chin-Chance, 1999).

A positive, respectful learning environment with high expectations and curricular and instructional supports for all students offers an avenue to genuine educational equity.

### Probing Questions

- What are some of the needs and challenges your school faces in moving toward a fully equitable education for all students?
- How could you provide leadership in your school to work to ensure an equitable education for all students?

### Resources

A variety of resources are available for teachers and leaders on educational equity for all students. A few websites and links are highlighted below:

The School Improvement Center developed activities to help districts develop an equity framework. These resources can be found at *Actualizing Equity: The Equity Framework*: [http://www.gapsc.com/EducatorPreparation/NoChildLeftBehind/Admin/Files/conference\\_032010/Actualizing\\_Equity.pdf](http://www.gapsc.com/EducatorPreparation/NoChildLeftBehind/Admin/Files/conference_032010/Actualizing_Equity.pdf).

The Education Equality Project developed a website with useful resources for educators. It can be found at <http://www.edequality.org>.

The Equity Center has a website with a variety of resources. The resources can be found at <http://educationnorthwest.org/project/Equity%20Program/resource/>.

The Midwest Equity Assistance Center has a website with many resources. It can be found at <http://www.meac.org/Publications.html>.

The Office for Civil Rights has a useful website for educators. It can be found at <http://www2.ed.gov/about/offices/list/ocr/index.html>.

Southern Poverty Law Center, Teaching Tolerance Program. Resources can be found at <http://www.splcenter.org/what-we-do/teaching-tolerance>.

### References

Berne, R., & Stiefel, L. (1994). Measuring educational equity at the school level: The finance perspective. *Educational Evaluation and Policy Analysis*, 16(4), 405–421.

Brighthouse, H., & Swift, A. (2008). Putting educational equality in its place. *Education, Finance and Policy*, 3(4), 444–446.

Brown v. Board of Education of Topeka, 347 U.S. 483 (1954).

Civil Rights Act, Title IX, Pub. L. No. 88-352, 78 Stat. 241 (1964).

Daggett, W. R. (2005). *Achieving academic excellence through rigor and relevance* [White paper]. Rexford, NY: International Center for Leadership in Education. Retrieved June 3, 2011, from [http://www.leaderead.com/pdf/Academic\\_Excellence.pdf](http://www.leaderead.com/pdf/Academic_Excellence.pdf).

Education Northwest. (2011). *Key components of educational equity* [Website]. Retrieved June 3, 2011, from <http://educationnorthwest.org/equity-program/educational>.



Education for All Handicapped Children Act, Pub. L. No. 94-142 (1975).

Elementary and Secondary Education Act of 1965, Pub. L. No. 89-10 (1965).

Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. New York: Basic Books.

Gibbons, P. (2002). *Scaffolding language, scaffolding learning: Teaching second language learners in the mainstream classroom*. Westport, CT: Heinemann.

Gronna, S. S., & Chin-Chance, S.A. (1999, April). *Effects of school safety and school characteristics on grade 8 achievement*. Paper presented at the American Educational Research Association, Montreal, Quebec, Canada. (ERIC Document Reproduction Service No. 430292). Retrieved June 3, 2011, from <http://www.eric.ed.gov/PDFS/ED430292.pdf>.

Haycock, K. (2001). Closing the achievement gap. *Educational Leadership*, 58(6), 6–11.

Lau v. Nichols, 414 U.S. 565 (1974).

Mulroy, H., & Eddinger, K. (2003, March). *Differentiation and literacy*. Paper presented at the Institute on Inclusive Education, Rochester, NY.

No Child Left Behind Act of 2001, Pub. L. No. 107-110, 115 Stat. 1425 (2002). Retrieved June 3, 2011, from <http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf>.

Reeves, D. B. (2010). The 90/90/90 schools: A case study. In D. B. Reeves, *Accountability in action* (2nd ed., 185–196). Denver, CO: Advanced Learning Press.

Rose, D., Hasselbring, T., Stahl, S., & Zabala, J. (2009). Assistive technology, NIMAS and UDL: From some students to all students. In D. Gordon, J. Gravel, & L. Schifter (Eds.), *A policy reader in universal design for learning* (pp. 133–154). Cambridge, MA: Harvard Education Press.

Tomlinson, C.A. (2005). Grading and differentiation: Paradox or good practice? *Theory Into Practice*, 44(3) 262–269.



## Guiding Principle 2: Instruction must be rigorous and relevant.

To understand the world in which we live, there are certain things we all must learn. Each school subject is made up of a core of essential knowledge that is deep, rich and vital. Every student, regardless of age or ability, must be taught this essential knowledge. What students learn is fundamentally connected to how they learn and successful instruction blends the content of a discipline with processes of an engaging learning environment that changes to meet the dynamic needs of all students.

### Research Summary

Instruction should connect directly to students' lives and must deeply engage them with the content in order for students to be better prepared for college and careers. To succeed in postsecondary education and in a 21st century economy, students must be afforded opportunities to practice higher-order thinking skills, such as how to analyze an argument, weigh evidence, recognize bias (their own and others' bias), distinguish fact from opinion, balance competing principles, work collaboratively with others and be able to communicate clearly what they understand (Wagner, 2006). In order to accomplish these goals, instruction must be rigorous and meaningful.

The definition of rigor varies greatly in both research and practice. Bower and Powers (2009) conducted a study to determine the essential components of rigor. They defined rigor through their research as “how the standard curriculum is delivered within the classroom to ensure students are not only successful on standardized assessments but also able to apply this knowledge to new situations both within the classroom and in the real world.” They also identified higher-order thinking and real-world application as two critical aspects of rigor, suggesting that it is not enough for students to know how to memorize information and perform on multiple-choice and short-answer tests. Students must have deep and rich content knowledge, but rigor also includes the ability to apply that knowledge in authentic ways.

Teaching and learning approaches that involve students collaborating on projects that culminate with a product or presentation are a way to bring rigor into the classroom. Students can take on real problems, use what

they know and research to come up with real solutions to real problems. They must engage with their subject and with their peers.

In August 2010, the Institutes of Education Sciences reported the results of a randomized control trial showing that a problem-based curriculum boosted high school students' knowledge of economics. This research suggests that students using this learning system and its variants score similarly on standardized tests as students who follow more traditional classroom practices. The research also suggests that students learning through problem-solving and projects are more adept at applying what they know and are more deeply engaged.

The notion of a meaningful curriculum is not a new one. John Dewey (1990), writing in 1902, called for a curriculum that involves a critical but balanced understanding of the culture and the prior knowledge of each child in order to extend learning. According to Spillane (2000), presenting content in more authentic ways—disciplinary and other real-world contexts—has become a central theme of current reform movements. Schools should be places where “the work students are asked to do [is] work worth doing” (Darling-Hammond, 2006, p. 21). Research collected by the International Center for Leadership in Education shows that “students understand and retain knowledge best when they have applied it in a practical, relevant setting” (Daggett, 2005, p. 2). A skilled 21st century educator helps students master learning targets and standards using purposefully crafted lessons and teaches with appropriate instructional strategies incorporated. The students understand why they are learning particular skills and content and are engaged in learning opportunities that allow them to use their inquiry skills, creativity and critical thinking to solve problems.

According to Brown, Collins and Duguid (1989), instruction connected to individual contexts has been found to have a significant impact on learning. Research conducted by Sanbonmatsu, Shavitt and Sherman (1991) and Petty and Cacioppo (1984) also contends that student learning is directly influenced by how well it is connected to a context. Much of this research began with the analysis of how people learn when they find



the ideas significant to their own world. It begins to show the importance of connecting content and instruction to the world of the students. Weaver and Cottrell (1988) point out that how content is presented can affect how students retain it. They state instruction that connects the content to the students' lives and experiences helps students to internalize meaning. Sass (1989) and Keller (1987) suggest that if teachers can make the content familiar to the students and link it to what they are familiar with, students' learning will increase. Shulman and Luechauer (1993) contend that these connections must be done by engaging students with rigorous content in interactive learning environments.

#### *Higher-Order Thinking*

Higher-order thinking, according to Newmann (1990), "challenges the student to interpret, analyze or manipulate information" (p. 45). This definition suggests that instruction must be designed to engage students through multiple levels in order for them to gain a better understanding of the content. An analysis of the research by Lewis and Smith (1993) led to their definition of higher-order thinking: "when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations" (p. 44). This definition emphasizes the level of complexity necessary to help students reach a deeper and higher level of understanding of the content. Shulman (1987) points out teachers will need an in-depth knowledge of their content to be able to fit these types of strategies to their instruction.

#### *Real-World Application*

VanOers and Wardekker (1999) indicate that connecting instruction to real-world applications gives meaning to learning, makes it practical and can help to develop connections with the greater community. Incorporating real-world examples becomes more authentic to students because they will be able to connect the learning to the bigger picture rather than just the classroom. Newmann and Wehlage (1993) describe the three criteria developed by Archbald and Newmann (1988) for this type of authentic learning: "Students construct meaning and produce knowledge, students use disciplined inquiry to construct meaning and students aim their work toward production of discourse, products and performances that have value or meaning beyond success in school" (p. 8) These criteria, when reflected upon by teachers, can be a useful tool to ensure that instruction is authentic and engaging for all students.

#### *Authentic Learning*

Authentic learning builds on the concept of "learning by doing" to increase a student's engagement. To succeed, this method needs to have meaning or value to the student, embody in-depth learning in the subject and allow the student to use what he or she learned to produce something new and innovative (Lemke & Coughlin, 2009). For example, in project-based learning, students collaborate to create their own projects that demonstrate their knowledge (Bell, 2010). Students start by developing a question that will guide their work. The teacher acts as the supervisor. The goal is greater understanding of the topic, deeper learning, higher-level reading and increased motivation (Bell, 2010). Research has shown that students who engage in project-based learning outscore their traditionally educated peers in standardized testing (Bell, 2010).

Constructivist learning is also a way to bring authenticity to the classroom. Richard Mayer (2004) defines constructivist learning as an "active process in which learners are active sense makers who seek to build coherent and organized knowledge." Students co-construct their learning, with the teacher serving as a guide or facilitator (oftentimes using technology as a facilitating tool). The teacher doesn't function in a purely didactic manner. Neo and Neo (2009) state that constructivism helps students develop problem-solving skills, critical thinking and creative skills and apply them in meaningful ways. Inquiry-based instruction, a type of constructivist learning, has students identify real world problems and then pose and find answers to their own questions. A study by Minner, Levy and Century (2010) has shown this method can improve student performance. They found inquiry-based instruction has a larger impact (approximately 25-30% higher) on a student's initial understanding and retention of content than any other variable.

Another form of authentic learning involves video simulated learning or gaming. Research has shown that video games can provide a rich learning context by fostering creative thinking. The games can show players how to manage complex problems and how their decisions can affect the outcome (Sharritt, 2008). This form of learning also can engage students in collaboration and interaction with peers.

#### *Multimodal Instruction*

Multimodal teaching leverages various presentation formats—such as printed material, videos, PowerPoints and computers—to appeal to



different learning styles (Birch, 2009; Moreno & Mayer, 2007). It accommodates a more diverse curriculum and can provide a more engaging and interactive learning environment (Birch, 2009). According to research, an effective way of learning is by utilizing different modalities within the classroom, which can help students understand difficult concepts—therefore improving how they learn (Moreno & Mayer, 2007).

An example of multimodal learning that incorporates technology is digital storytelling. Digital storytelling is the practice of telling stories by using technology tools (e.g., digital cameras, authoring tools, computers) to create multimedia stories (Sadik, 2008). Researchers have found that using this form of learning facilitates student engagement, deep learning, project-based learning and effective integration of technology into instruction (Sadik, 2008).

#### **Probing Questions**

Research emphasizes the need for higher-order thinking embedded in instructional practice. How might you learn to incorporate higher-order thinking strategies into your practice?

The research also suggests the need to connect learning experiences to the real world of the students. How can you use real-world examples in your practice to better engage students in their learning?

#### **Resources**

The Rigor/Relevance Framework created by Daggett (2005) is a useful tool to create units, lessons and assessments that ask students to engage with content at a higher, deeper level. The model and examples are available on the following website: <http://www.leadered.com/rrr.html>.

Newmann's Authentic Intellectual Work Framework (Newmann, Secada & Wehlage, 1995) gives teachers the tools to analyze instructional practices and student work in regard to indicators of rigor. The research and tools are available at the Center for Authentic Intellectual Work website: <http://centerforaiw.com/>.

#### **References**

Archbald, D., & Newmann, F. M. (1988). *Beyond standardized testing: Assessing authentic academic achievement in the secondary school*. Reston, VA: National Association of Secondary School Principals.

Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83, 39–43.

Birch, D. (2009). PowerPoint with audio: A breeze to enhance the student learning experience. *E-Journal of Business Education & Scholarship of Teaching*, 3(1), 36–42.

Bower, H.A., & Powers, J. D. (2009, Fall). What is rigor? A qualitative analysis of one school's definition. *Academic Leadership Live: The Online Journal*, 7(4). Retrieved June 3, 2011, from [http://www.academicleadership.org/article/What\\_is\\_Rigor\\_A\\_Qualitative\\_Analysis\\_of\\_One\\_School\\_s\\_Definition](http://www.academicleadership.org/article/What_is_Rigor_A_Qualitative_Analysis_of_One_School_s_Definition).

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32–42.

Daggett, W. R. (2005). *Achieving academic excellence through rigor and relevance*. Rexford, NY: International Center for Leadership in Education.

Darling-Hammond, L. (2006). Securing the right to learn: Policy and practice for powerful teaching and learning. *Educational Researcher*, 35(7), 13–24.

Dewey, J. (1990). *School and society [and] The child and the curriculum*. Chicago: University of Chicago Press.

Finkelstein, Neal, Thomas Hanson, Chun-Wei Huang, Becca Hirschman and Min Huang. (2010). *Effects of problem based economics on high school economics instruction.* Institute For Education Sciences. West Ed.

Keller, J. M. (1987). Strategies for stimulating the motivation to learn. *Performance & Instruction*, 26(8), 1–7.

Lemke, C., & Coughlin, E. (2009, September). The change agents: Technology is empowering 21st century students in four key ways. *Educational Leadership*, 67(1), 54–59.

Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory Into Practice*, 32(3), 131–137.



Mayer, R.E. (2004). Should There Be a Three-Strikes Rule Against Pure Discovery Learning? The Case for Guided Methods of Instruction. *American Psychologist*, 59(1), 14-19.

Minner, Daphne D., Abigail Jurist Levy and Jeanne Century. "Inquiry-Based Science Instruction—What Is It and Does It Matter? Results from a Research Synthesis years 1984 to 2002." *JOURNAL OF RESEARCH IN SCIENCE TEACHING* 47.4 (April 2010): 474-96.

Moreno, R., & Mayer, R. (2007). Interactive multimodal learning environments [Special issue on interactive learning environment-contemporary issues and trends]. *Educational Psychology Review*, 19, 309–326.

Neo, M. & Neo, T.K. (2009). Engaging students in multimedia-mediated Constructivist learning-Students' perceptions. *Educational Technology & Society*, 12(2), 254-266.

Newmann, F. M. (1990). Higher order thinking in teaching social studies: A rationale for the assessment of classroom thoughtfulness. *Journal of Curriculum Studies*, 22(2), 41–56.

Newmann, F. M., Secada, W. G., & Wehlage, G. G. (1995). *A guide to authentic instruction and assessment: Vision, standards and scoring*. Madison, WI: Wisconsin Center for Education Research.

Newmann, F. M., & Wehlage, G. G. (1993, April). Five standards of authentic instruction. *Educational Leadership*, 50(7), 8–12.

Petty, R. E., & Cacioppo, J.T. (1984). The effects of involvement on responses to argument quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46(1), 69–81.

Sadik, A. (2008). Digital storytelling: A meaningful technology-integrated approach for engaged student learning. *Educational Technology Research & Development*, 56, 487–506.

Sanbonmatsu, D. M., Shavitt, S., & Sherman, S. J. (1991). The role of personal relevance in the formation of distinctiveness-based illusory correlations. *Personality and Social Psychology Bulletin*, 17(2), 124–132.

Sass, E. J. (1989). Motivation in the college classroom: What students tell us. *Teaching of Psychology*, 16(2), 86–88.

Sharritt, M. J. (2008). Forms of learning in collaborative video game play. *Research and Practice in Technology Enhanced Learning*, 3(2), 97–138.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22.

Shulman, G., & Luechauer, D. (1993). The empowering educator: A CQI approach to classroom leadership. In D. L. Hubbard (Ed.), *Continuous quality improvement: Making the transition to education* (pp. 424–453). Maryville, MO: Prescott.

Spillane, J. P. (2000). A fifth-grade teacher's reconstruction of mathematics and literacy teaching: Exploring interactions among identity, learning and subject matter. *Elementary School Journal*, 100(4), 307–330.

VanOers, B., & Wardekker, K. (1999). On becoming an authentic learner: Semiotic activity in the early grades. *Journal of Curriculum Studies*, 31(2), 229–249.

Wagner, T. (2006, January 11). Rigor on trial [Commentary]. *Education Week*, 25(18), 28–29. Retrieved June 3, 2011, from <http://www.edweek.org/ew/articles/2006/01/11/18wagner.h25.html?tkn=NXVFIUJgch3u9KNoybF2gM%2BinCPa3hvbbWkj&print=1>

Weaver, R. L., & Cottrell, H.W. (1988). Motivating students: Stimulating and sustaining student effort. *College Student Journal*, 22, 22–32.

Wentling, R. M., & Waight, C. L. (2001). Initiative that assist and barriers that hinder the successful transition of minority youth into the workplace in the USA. *Journal of Education and Work*, 14(1), 71–89.



## Guiding Principle 3:

### Purposeful assessment drives instruction and affects learning.

Assessment is an integral part of teaching and learning. Purposeful assessment practices help teachers and students understand where they have been, where they are and where they might go next. No one assessment can provide sufficient information to plan teaching and learning. Using different types of assessments as part of instruction results in useful information about student understanding and progress. Educators should use this information to guide their own practice and in partnership with students and their families to reflect on learning and set future goals.

#### Research Summary

Assessment informs teachers, administrators, parents and other stakeholders about student achievement. It provides valuable information for designing instruction; acts as an evaluation for students, classrooms and schools; and informs policy decisions. Instruments of assessment can provide formative or summative data and they can use traditional or authentic designs. Research on assessment emphasizes that the difference between formative and summative assessment has to do with how the data from the assessment is used.

Dunn and Mulvenon (2009) define summative assessment as assessment “data for the purposes of assessing academic progress at the end of a specified time period (i.e., a unit of material or an entire school year) and for the purposes of establishing a student’s academic standing relative to some established criterion” (p. 3).

The Council of Chief State School Officers (CCSSO) (2008) define formative assessment as a process “used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students’ achievement of intended instructional outcomes” (p. 3).

Wisconsin’s approach to balanced assessment [www.dpi.wi.gov/oea/balanced](http://www.dpi.wi.gov/oea/balanced) emphasizes the importance of identifying the purposes for administering an assessment. Identifying the purpose or data needed establishes whether a particular assessment is being used formatively or summatively. There can be multiple purposes for giving a particular

assessment, but identifying how the data will be used helps to ensure that the assessment is collecting the data that is needed for educators, students and their families.

Assessments, whether formative or summative, can be designed as traditional or authentic tools. Traditional assessment uses tools such as paper and pencil tests, while authentic assessment focuses on evaluating student learning in a more “real life” situation. The bulk of the research on assessment design focuses on authentic assessment.

#### *Formative Assessment*

Using formative assessment as a regular part of instruction has been shown to improve student learning from early childhood to university education. It has been shown to increase learning for both low-performing and high-performing students. Black and Wiliam’s (1998) seminal study found that the use of formative assessment produces significant learning gains for low-achieving students. Other researchers have shown similar results for students with special learning needs. (McCurdy & Shapiro, 1992; Fuchs & Fuchs, 1986). Research also supports the use of formative assessment in kindergarten classes (Bergan, Sladeczek, Schwarz, & Smith, 1991) and university students (Martinez & Martinez, 1992).

Formative assessment provides students with information on the gaps that exist between their current knowledge and the stated learning goals (Ramaprasad, 1983). By providing feedback on specific errors it helps students understand that their low performance can be improved and is not a result of lack of ability (Vispoel & Austin, 1995). Studies emphasize that formative assessment is most effective when teachers use it to provide specific and timely feedback on errors and suggestions for improvement (Wininger, 2005), when students understand the learning objectives and assessment criteria and when students have the opportunity to reflect on their work (Ross, 2006; Ruiz-Primo & Furtak, 2006). Recent research supports the use of web-based formative assessment for improving student achievement (Wang, 2007). A number of studies emphasize the importance of teacher professional development on formative assessment in order to gain maximum student



achievement benefits (Atkins, Black & Coffey, 2001; Black & Wiliam, 1998). A 2009 article in *Educational Measurement* asserts that teachers are better at analyzing formative assessment data than at using it to design instruction. Research calls for more professional development on assessment for teachers (Heritage, Kim, Vendlinski, & Herman, 2009).

#### *Authentic Assessment*

Generating rich assessment data can be accomplished through the use of an authentic assessment design as well as through traditional tests. Authentic assessments require students to “use prior knowledge, recent learning and relevant skills to solve realistic, complex problems” (DiMartino & Castaneda, 2007, p. 39). Research on authentic assessment often explores one particular form, such as portfolios (Berryman & Russell, 2001; Tierney et al., 1998); however, several studies examined more than one form of authentic assessment: portfolios, project-based assessment, use of rubrics, teacher observation and student demonstration (Darling-Hammond, Rustique-Forrester, & Pecheone, 2005; Herman, 1997; Wiggins, 1990). Authentic assessment tools can be used to collect both formative and summative data. These data can provide a more complete picture of student learning.

#### *Balanced Assessment*

Wisconsin’s Next Generation Assessment Task Force (2009) defines the purpose and characteristics of a balanced assessment system:

Purpose: to provide students, educators, parents and the public with a range of information about academic achievement and to determine the best practices and policies that will result in improvements to student learning.

Characteristics: includes a continuum of strategies and tools that are designed specifically to meet discrete needs—daily classroom instruction, periodic checkpoints during the year and annual snapshots of achievement. (p. 6)

A balanced assessment system is an important component of quality teaching and learning. Stiggins (2007) points out that a variety of quality assessments must be available to teachers in order to form a clearer picture of student achievement of the standards. Popham (2008) believes that when an assessment is of high quality, it can accurately detect changes in student achievement and can contribute to continuous improvement of the educational system.

#### **Probing Questions**

- How might you use questioning and discussion in your classroom in a way that gives you formative assessment information on all students?
- How can you use assignments and tests as effective formative assessment?
- How could you design and implement a balanced assessment system that includes pre- and post-assessments for learning?

#### **Resources**

Rick Stiggins, founder and director of the Assessment Training Institute, provides resources on the practice of assessment at <http://www.assessmentinst.com/author/rick-stiggins/>.

Margaret Heritage’s books *Formative Assessment for Literacy and Academic Language* (2008, coauthored with Alison Bailey) and *Formative Assessment: Making It Happen in the Classroom* (2010) provides resources and practices. These books are available through bookstores.

ASCD has publications on assessment at <http://www.ascd.org/SearchResults.aspx?s=assessment&c=1&n=10&p=0>.

The National Middle Schools Association provides assessment information through a search for “assessment” at <http://www.nmsa.org/>.

Boston (2002) recommends the following resources for assessment:

*A Practical Guide to Alternative Assessment*, by J. R. Herman, P. L. Aschbacher and L. Winters. Available at a variety of booksellers.

*Improving Classroom Assessment: A Toolkit for Professional Developers*  
<http://educationnorthwest.org/resource/700>  
*Classroom Assessment and the National Science Education Standards*  
<http://www.nap.edu/catalog/9847.html>

#### **References**

Atkins, J. M., Black, P., & Coffey, J. (2001). *Classroom assessment and the National Science Education Standards*. Washington, DC: National Academy Press.



Bergen, J. R., Sladeczek, I. E., Schwarz, R. D., & Smith, A. N. (1991). Effects of a measurement and planning system on kindergartners' cognitive development and educational programming. *American Educational Research Journal*, 28(3), 683–714.

Berryman, L., & Russell, D. R. (2001). Portfolios across the curriculum: Whole school assessment in Kentucky. *English Journal*, 90(6), 76–83.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, 5(1), 7–74.

Boston, C. (2002). The concept of formative assessment. *Practical Assessment, Research and Evaluation*, 8(9). Retrieved June 3, 2011, from <http://pareonline.net/getvn.asp?v=8&n=9>.

Council of Chief State School Officers. (2008). *Attributes of effective formative assessment*. Washington, DC: Author. Retrieved June 3, 2011, from [http://www.ccsso.org/Documents/2008/Attributes\\_of\\_Effective\\_2008.pdf](http://www.ccsso.org/Documents/2008/Attributes_of_Effective_2008.pdf).

Darling-Hammond, L., Rustique-Forrester, E., & Pecheone, R. (2005). *Multiple measure approaches to high school graduation*. Stanford, CA: School Redesign Network at Stanford University.

DiMartino, J., & Castaneda, A. (2007). Assessing applied skills. *Educational Leadership*, 64(7), 38–42.

Dunn, K. E., & Mulvenon, S.W. (2009). A critical review of research on formative assessment: The limited scientific evidence of the impact of formative assessment in education. *Practical Assessment, Research and Evaluation*, 14(7). Retrieved June 3, 2011, from <http://pareonline.net/pdf/v14n7.pdf>

Fuchs, L. S., & Fuchs, D. (1986). Effects of systematic formative evaluation: A meta-analysis. *Exceptional Children*, 52(2), 199–208.

Heritage, M., Kim, J., Vendlinski, T., & Herman, J. (2009). From evidence to action: A seamless process in formative assessment? *Educational Measurement: Issues and Practice*, 28(3), 24–31.

Herman, J. (1997). Assessing new assessments: Do they measure up? *Theory Into Practice*, 36(4), 196–204.

Martinez, J. G. R., & Martinez, N. C. (1992). Re-examining repeated testing and teacher effects in a remedial mathematics course. *British Journal of Educational Psychology*, 62(3), 356–363.

McCurdy, B. L., & Shapiro, E. S. (1992). A comparison of teacher monitoring, peer monitoring and self-monitoring with curriculum-based measurement in reading among student with learning disabilities. *Journal of Special Education*, 26(2), 162–180.

Next Generation Assessment Task Force. (2009). *Crafting a balanced system of assessment in Wisconsin*, Madison: Wisconsin Department of Public Instruction. Retrieved June 3, 2011, from <http://www.dpi.state.wi.us/oea/pdf/NGTFbr.pdf>.

Popham, W. J. (2008). *Transformative assessment*. Alexandria, VA: Association for Supervision and Curriculum Development.

Ramaprasad, A. (1983). On the definition of feedback. *Behavioral Science*, 28(1), 4–13.

Ross, J.A. (2006). The reliability, validity and utility of self-assessment. *Practical Assessment, Research and Evaluation*, 11(10). Retrieved June 3, 2011, from <http://pareonline.net/pdf/v11n10.pdf>

Ruiz-Primo, M.A., & Furtak, E. M. (2006). Informal formative assessment and scientific inquiry: Exploring teachers' practices and student learning. *Educational Assessment*, 11(2), 205–235.

Stiggins, R. J. (2007, November–December). Assessment for learning: A key to student motivation and learning. *Edge*, 2(2), 1–20.

Tierney, R., Clark, C., Fenner, L., Herter, R. J., Simpson, C. S., & Wisner, B. (1998). Portfolios: Assumptions, tensions and possibilities. *Reading Research Quarterly*, 33(4), 474–486.



Vispoel, W. P., & Austin, J. R. (1995). Success and failure in junior high school: A critical incident approach to understanding students' attributional beliefs. *American Educational Research Journal*, 32(2), 377–412.

Wang, T. H. (2007). What strategies are effective for formative assessment in an e-learning environment? *Journal of Computer Assisted Learning*, 23(1), 171–186.

Wiggins, G. (1990). The case for authentic assessment. *Practical Assessment, Research and Evaluation*, 2(2). Retrieved June 3, 2011, from <http://pareonline.net/getvn.asp?v=2&n=2>.



## Guiding Principle 4: Learning is a collaborative responsibility.

Teaching and learning are both collaborative processes. Collaboration benefits teaching and learning when it occurs on several levels: when students, teachers, family members and the community collectively prioritize education and engage in activities that support local schools, educators and students; when educators collaborate with their colleagues to support innovative classroom practices and set high expectations for themselves and their students; and when students are given opportunities to work together toward academic goals in ways that enhance learning.

### Research Summary

Collaborative learning is an approach to teaching and learning that requires learners to work together to deliberate, discuss and create meaning. Smith and MacGregor (1992) define the term as follows:

“Collaborative learning” is an umbrella term for a variety of educational approaches involving joint intellectual effort by students or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions or meanings or creating a product. Collaborative learning activities vary widely, but most center on students’ exploration or application of the course material, not simply the teacher’s presentation or explication of it. (p. 1)

Collaborative learning has been practiced and studied since the early 1900s. The principles are based on the theories of John Dewey (2009), Lev Vygotsky (1980) and Benjamin Bloom (1956). Their collective work focusing on how students learn has led educators to develop more student-focused learning environments that put students at the center of instruction. Vygotsky specifically stated that learning is a social act and must not be done in isolation. This principle is the foundation of collaborative learning.

The research of Vygotsky (1980) and Jerome Bruner (1985) indicates that collaborative learning environments are one of the necessities for learning. Slavin’s (1989) research also suggests that students and teachers learn more, are more engaged and feel like they get more out of their classes when working in a collaborative environment. Totten, Sils, Digby

and Russ (1991) found that those involved in collaborative learning understand content at deeper levels and have higher rates of achievement and retention than learners who work alone. They suggest that collaborative learning gives students opportunities to internalize their learning.

A meta-analysis from the Cooperative Learning Center at the University of Minnesota concluded that having students work collaboratively has significantly more impact on learning than having students work alone (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981). An analysis of 122 studies on cooperative learning revealed:

- More students learn more material when they work together—talking through the material with each other and making sure that all group members understand—than when students compete with one another or work alone individualistically.
- More students are motivated to learn the material when they work together than when students compete or work alone individualistically (and the motivation tends to be more intrinsic).
- Students have more positive attitudes when they work together than when they compete or work alone individualistically.
- Students are more positive about the subject being studied, the teacher and themselves as learners in that class and are more accepting of each other (male or female, handicapped or not, bright or struggling or from different ethnic backgrounds) when they work together.

Collaboration can be between teachers, between students and between teacher and student.

### *Teacher-Teacher Collaboration*

It is critical for teachers to have the time to collaborate. Professional learning communities, which provide teachers with established time to collaborate with other teachers, have become a more common practice in recent years. Louis and Kruse (1995) conducted a case study analysis that highlighted some of the positive outcomes associated with professional learning communities, including a reduction in teacher isolation, increases in teacher commitment and sense of shared responsibility and a better understanding of effective instructional practices. Professional learning



communities encourage collaborative problem solving and allow teachers to gain new strategies and skills to improve and energize their teaching and classrooms.

Another example of teacher-to-teacher collaboration is lesson study. This professional development process began in Japan. Lesson study is a collaborative approach to designing and studying classroom lessons and practice. The most critical components of lesson study are observation of the lesson, collection of data about teaching and learning and a collaborative analysis of the data to further impact instruction (Lewis, 2002; Lewis & Tsuchida, 1998; Wang-Iverson & Yoshida, 2005). Some of these characteristics are similar to other forms of professional development—analyzing student work, cognitive coaching and action research, to name a few—but the fact that it focuses on teachers observing a live lesson that was collaboratively developed is different than any other form of professional development. Lesson study is a way for teachers to work together, collect data and analyze data to reflect on teaching and learning (Lewis, 2002).

#### *Student-Student Collaboration*

Collaborative learning not only allows students to engage deeply with content but also helps students build the interpersonal skills needed to be successful in college and careers. Johnson, Johnson and Holubec (1993) state that collaborative learning provides students with the opportunity to develop social skills. They found that many of the outcomes expected as part of a collaborative learning activity corresponded with goals for student content understanding and skill attainment. The strategies associated with collaborative learning—such as role assignments, collaborative problem solving and task and group processing—all build the social skills that students need to be successful when working with others. Additionally, these skills are important in preparing students for the world of work, where collaborative writing and problem-solving are key elements of many careers.

There is a plethora of instructional and learning strategies that encourage student collaboration, including peer teaching, peer learning, reciprocal learning, team learning, study circles, study groups and work groups, to name just a few (Johnson & Johnson, 1986). Collaborative inquiry, which combines many of the elements of student collaboration just mentioned, is a research-based strategy in which learners work together through various phases “of planning, reflection and action as they explore an issue or question of importance to the group” (Goodnough, 2005 88). Collaborative inquiry brings together many perspectives to solve a problem, engaging students in relevant learning around an authentic question. It allows students to work together

toward a common purpose to explore, make meaning and understand the world around them (Lee & Smagorinsky, 2000).

#### *Teacher-Student Collaboration*

The purpose for collaboration in an educational setting is to learn and unpack content together to develop a shared understanding. Harding-Smith (1993) points out that collaborative learning approach is based on the idea that learning must be a social act. It is through interaction that learning occurs. Johnson and Johnson (1986) similarly emphasize that when students and teachers talk and listen to each other; they gain a deeper understanding of the content and can develop the skills necessary to negotiate meaning throughout their lives.

Collaboration requires a shift from teacher-led instruction to instruction and learning that is designed by both teachers and students. Collaboration between student and teacher plays a critical role in helping students reflect and engage in their own learning experiences. The constructivist learning movement is one current example of efforts to increase the amount of collaboration between student and teacher occurring in the classroom. Mayer (2004) defines constructivist learning as an “active process in which learners are active sense makers who seek to build coherent and organized knowledge” (p. 14). Students co-construct their learning, with the teacher serving as a guide or facilitator. The teacher does not function in a purely didactic (i.e., lecturing) role. Neo and Neo (2009) found that constructivism helps students develop problem-solving skills, critical thinking and creative skills and apply them in meaningful ways.

#### **Probing Questions**

- How can you use collaborative learning processes to engage students in their learning?
- How might you create space for teacher-teacher collaboration within your context?



## Resources

All Things PLC website provides a number of resources on professional learning communities. Links to these resources can be found at <http://www.allthingsplc.info/>.

The Wisconsin Center for Education Research hosts a website with many resources for collaborative and small group learning. It can be found at <http://www.wcer.wisc.edu/archive/cl1/cl/>.

The Texas Collaborative for Teaching Excellence has created a professional development module about collaborative learning, which provides readings, research and resources. It can be found at [http://www.texascollaborative.org/Collaborative\\_Learning\\_Module.htm](http://www.texascollaborative.org/Collaborative_Learning_Module.htm).

A review of research on professional learning communities, presented at the National School Reform Faculty research forum in 2006, contains findings that outline what is known about professional learning communities and how they should be structured. This paper is available at [http://www.nsrffharmony.org/research.vescio\\_ross\\_adams.pdf](http://www.nsrffharmony.org/research.vescio_ross_adams.pdf).

## References

- Bloom, B. S. (Ed.) (1956). *Taxonomy of educational objectives. Handbook 1: Cognitive domain*. White Plains, NY: Longman.
- Bruner, J. (1985). Vygotsky: An historical and conceptual perspective. In J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives* (pp. 21–34). London: Cambridge University Press.
- Dewey, J. (2009). *Democracy and education: An introduction to the philosophy of education*. New York: Cosimo Classics.
- Goodnough, Karen. (2005). Fostering teacher learning through collaborative inquiry. *The Clearing House* 79(2), 88-92.
- Harding-Smith, T. (1993). *Learning together: An introduction to collaborative learning*. New York: HarperCollins.
- Johnson, R.T., & Johnson, D.W. (1986). Action research: Cooperative learning in the science classroom. *Science and Children*, 24(2), 31–32.
- Johnson, D.W., Johnson, R.T., & Holubec, E. J. (1993). *Circles of learning: Cooperation in the classroom*. Edina, MN: Interaction.
- Johnson, D.W., Maruyama, G., Johnson, R.T., Nelson, D., & Skon, L. (1981). Effects of cooperative, competitive and individualistic goal structures on achievement: A meta-analysis. *Psychological Bulletin*, 89(1), 47–62.
- Lee, C. D., & Smagorinsky, P. (Eds.). (2000). *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry*. Cambridge, England: Cambridge University Press.
- Lewis, C. (2002). *Lesson study: A handbook of teacher-led instructional change*. Philadelphia: Research for Better Schools.
- Lewis, C., & Tsuchida, I. (1998, Winter). A lesson is like a swiftly flowing river: Research lessons and the improvement of Japanese education. *American Educator*, 14–17, 50–52.
- Wang-Iverson, P., & Yoshida, M. (2005). Building our understanding of lesson study. Philadelphia: Research for Better Schools.
- Louis, K. S., & Kruse, S. D. (1995). *Professionalism and community: Perspectives on reforming urban schools*. Thousand Oaks, CA: Corwin Press.
- Mayer, R. E. (2004). Should there be a three strikes rule against pure discovery? The case for guided methods of instruction. *American Psychologist*, 59(1), 14–19.
- Neo, M., & Neo, T.-K. (2009). Engaging students in multimedia-mediated constructivist learning: Students' perceptions. *Educational Technology and Society*, 12(2), 254–266.
- Slavin, R. E. (1989). Research on cooperative learning: An international perspective. *Scandinavian Journal of Educational Research*, 33(4), 231–243.
- Smith, B. L., & MacGregor, J.T. (1992). *What is collaborative learning?* Olympia, WA: Washington Center for Improving the Quality of Undergraduate Education. Retrieved June 3, 2011, from <http://learningcommons.evergreen.edu/pdf/collab.pdf>
- Totten, S., Sills, T., Digby, A., & Russ, P. (1991). *Cooperative learning: A guide to research*. New York: Garland.
- Vygotsky, L. (1980). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.



## Guiding Principle 5: Students bring strengths and experiences to learning.

Every student learns. Although no two students come to school with the same culture, learning strengths, background knowledge or experiences and no two students learn in exactly the same way, every student's unique personal history enriches classrooms, schools and the community. This diversity is our greatest education asset.

### Research Summary

The authors of the groundbreaking work *How People Learn: Brain, Mind, Experience and School* (Bransford, Brown, & Cocking, 2000) found that students' preconceptions may clash with new concepts and information they learn in school. If those preconceptions are not addressed, students may fail to grasp what is being taught or may learn only to pass a test. In other words, a student might enter kindergarten believing the world is flat because he or she has seen a flat map. Despite the presentation of geographic names and principles, the student still maintains the fundamental preconception about the shape of the world. Developing competence—or in this case, a knowledge of the shape of the world—requires that students have a deep foundation of factual knowledge, a context or conceptual framework to place it in and the opportunity to explore how it connects to the real world. Ultimately, a metacognitive approach—one that pushes students to think about their own thought processes—can help them take control of their own learning.

As educational research on how people learn advances, so does our approach to teaching and learning. Strategies to advance teaching and learning are constantly evolving into new and innovative ways to reach learners. When a teacher uses students' interests, curiosity and areas of confidence as starting points in planning instruction, learning is more productive. Teachers who are cognizant of these issues—and reflect on how to use them as strengths upon which they can build—ensure that all students have access to the content. Areas to consider are student strengths, gender, background knowledge and connections to the home environment.

### *Building on Student Strengths*

Teaching to students' strengths can improve student engagement (Sternberg, 2000, Sternberg & Grigorenko, 2000). Many students have

strengths that are unrecognized and neglected in traditional schooling. Students in underrepresented minority groups have culturally relevant knowledge that teachers can use to promote learning. Sternberg et al. (2000) found that conventional instruction in school systematically discriminates against students with creative and practical strengths and tends to favor students with strong memory and analytical abilities. This research, combined with Sternberg's earlier (1988) research showing that teaching for diverse styles of learning produces superior results, suggests that capitalizing on the various strengths that all students bring to the classroom can positively affect students' learning. When students are taught in a way that fits how they think, they do better in school (Sternberg, 2000; Sternberg & Grigorenko, 2000). Sternberg and O'Hara (2000) found that when students were taught in a way that incorporated analytical thinking, creative thinking (creating, imagining and inventing) and practical thinking (applying, implementing and putting into practice)—students achieved at higher levels than when taught using conventional instructional methods.

### *Gender Considerations*

Changing instruction might help alleviate the gender gap in literacy achievement. Research conducted by Sax (2005) reveals that boys fall behind girls in reading and writing early on and never catch up. Sax (2007) found that this dynamic plays a role in higher high school dropout rates for males, particularly black males. The college graduation rate for females approaches twice that of males in Hispanic and black populations. Many classrooms are a better fit for the verbal-emotive, sit-still, take-notes, listen-carefully, multitasking girl (Sax, 2005). The characteristics that boys bring to learning—impulsivity, single-task focus, spatial-kinesthetic learning and physical aggression—often are viewed as problems.

Researchers such as Blum (1997) have identified more than 100 structural differences between the male and female brains. Altering strategies to accommodate more typically male assets—for example, the use of multimodal teaching (discussed on pages 10-11 of this report); the use of various display formats, such as printed material, videos, presentations and computers; and an interactive learning environment to appeal to different learning styles—can help bridge the gap between what students



are thinking and what they are able to put down on paper. Sadik's (2008) research suggests that using multimodal instructional strategies like digital storytelling—allowing students to incorporate digital cameras, creative and editing tools, computers and other technology to design multimedia presentations—deepens students' learning.

Background Knowledge Bransford et al. (2000) note in *How People Learn*, learning depends on how prior knowledge is incorporated into building new knowledge and thus teachers must take into account students' prior knowledge. Jensen's (2008) research on the brain and learning demonstrates that expertise cannot be developed merely through exposure to information. Students must connect the information to their prior knowledge to internalize and deepen their understanding. Teachers can connect academic learning with real-life experiences. Service learning, project-based learning, school-based enterprises and student leadership courses are some examples of how schools are trying to make the curriculum relevant. The key to making the curriculum relevant is asking the students to help connect the academics to their lives; this approach gets students actively engaged in their learning, which builds a stronger connection and commitment to school. Bell (2010) suggests that strategies such as project-based approaches to learning can help ensure that content and skills are taught together and connected to prior knowledge, which helps students understand how to develop and apply new skills in various contexts.

#### *Connections to the Home Environment*

Cochran-Smith (2004) emphasizes family histories, traditions and stories as an important part of education. Often, children enter school and find themselves in a place that does not recognize or value the knowledge or experience they bring from their homes or communities. This situation can create a feeling of disconnect for students—a dissonance obliging them to live in and navigate between two different worlds, each preventing them from full participation or success in the other. Districts and schools can alleviate this dissonance by valuing and taking advantage of the unique experiences that each student brings to the classroom. Emphasizing connections to parents and community, recognizing and utilizing student strengths and experiences and incorporating varied opportunities within the curriculum can help alleviate this dissonance.

Ferguson (2001) points out that it is particularly important to establish connections that not only bring the parents into the school environment

but also encourage school understanding and participation within the community. Social distinctions often grow out of differences in attitudes, values, behaviors and family and community practices (Ferguson, 2001). Students need to feel their unique knowledge and experience is valued by the school and parents and community members need to feel they are respected and welcome within the school.

Although much attention has been paid to No Child Left Behind (NCLB) requirements for annual achievement tests and high-quality teachers, the law also includes important requirements for schools, districts and states to organize programs of parental involvement and to communicate with parents and the public about student achievement and the quality of schools. Epstein (2005) offers perspectives on the NCLB requirements for family involvement; provides a few examples from the field; suggests modifications that are needed in the law; and encourages sociologists of education to take new directions in research on school, family and community partnerships.

#### **Probing Questions**

- What are some ways that you currently use students' background knowledge to inform instruction?
- Does your experience teaching boys to read and write concur with the research? What ideas do you have to address the achievement gaps related to gender?
- What are ways you can uncover, acknowledge and use students' backgrounds and strengths to enhance learning?
- What are some strategies for valuing and taking advantage of the unique experiences that each student brings to the classroom?

#### **Resources**

A good resource still valid today is *Making Assessment Work for Everyone: How to Build on Student Strengths*. See the SEDL website to download this resource: <http://www.sedl.org/pubs/tl05/>.

A short, easy-to-digest article from Carnegie Mellon University is titled *Theory and Research-Based Principles of Learning*. The article and full bibliography are at <http://www.cmu.edu/teaching/principles/learning.html>.



## References

- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83(2), 39–43. Retrieved June 3, 2011, from <http://teacherscollegesj.org/resources/publications/PBL%20for%20the%2021%20Century.pdf>
- Blum, D. (1997). *Sex on the brain: The biological differences between men and women*. New York: Viking.
- Bransford, J. D., Brown, A. L. & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience and school (Expanded ed.)*. Washington, DC: National Academy Press.
- Cochran-Smith, M. (2004). *Walking the road: Race, diversity and social justice in teacher education*. New York: Teachers College Press.
- Epstein, J. (2005). Attainable goals? The spirit and letter of the No Child Left Behind Act on parental involvement. *Sociology of Education*, 78(2), 179–182.
- Ferguson, A. A. (2001). *Bad boys: Public schools in the making of black masculinity*. Ann Arbor: University of Michigan Press.
- Jensen, E. P. (2008). A fresh look at brain-based education. *Phi Delta Kappan*, 89(6), 408–417.
- Sadik, A. (2008). Digital storytelling: A meaningful technology-integrated approach for engaged student learning. *Educational Technology Research and Development*, 56(4), 487–506.

- Sax, L. (2005). *Why gender matters: What parents and teachers need to know about the emerging science of sex differences*. New York: Doubleday.
- Sax, L. (2007). *Boys adrift: The five factors driving the growing epidemic of unmotivated boys and underachieving young men*. New York: Basic Books.
- Sternberg, R. J. (1988). *The triarchic mind: A new theory of human intelligence*. New York: Viking.
- Sternberg, R. J. (2000). Wisdom as a form of giftedness. *Gifted Child Quarterly*, 44(4), 252–259.
- Sternberg, R. J., & Grigorenko, E. L. (2000). *Teaching for successful intelligence*. Arlington Heights, IL: Skylight Training.
- Sternberg, R. J., Grigorenko, E. L., Jarvin, L., Clinkenbeard, P., Ferrari, M., & Torff, B. (2000, Spring). The effectiveness of triarchic teaching and assessment. *NRC/GT Newsletter*, 3–8. Retrieved June, 3, 2011, from <http://www.gifted.uconn.edu/nrcgt/newsletter/spring00/spring00.pdf>
- Sternberg, R. J., & O'Hara, L.A. (2000). Intelligence and creativity. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 611–628). New York: Cambridge University Press.
- Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.



## Guiding Principle 6: Responsive environments engage learners.

Meaningful learning happens in environments where creativity, awareness, inquiry and critical thinking are part of instruction. Responsive learning environments adapt to the individual needs of each student and encourage learning by promoting collaboration rather than isolation of learners. Learning environments, whether classrooms, schools or other systems, should be structured to promote engaged teaching and learning.

### Research Summary

To be effective for all students, classroom learning environments must be responsive to a broad range of needs among a diverse student population. These diverse needs include cultural and linguistic differences as well as developmental levels, academic readiness and learning styles. A responsive learning environment engages all students by providing a respectful climate where instruction and curriculum are designed to respond to the backgrounds and needs of every student.

### *Culturally Responsive Teaching*

Research on culturally responsive teaching emphasizes the importance of teachers' understanding the cultural characteristics and contributions of various ethnic groups (Smith, 1998) and showing respect toward these students and their culture (Ladson-Billings, 1995; Pewewardy & Cahape, 2003). Culturally responsive teaching is defined by Gay (2002) as "using the cultural characteristics, experiences and perspectives of ethnically diverse students as conduits for teaching them more effectively" (p. 106).

Research on culturally responsive teaching has found that students both are more engaged in learning and learn more effectively when the knowledge and skills taught are presented within a context of their experience and cultural frames of references (Au & Kawakami, 1994; Gay, 2000; Ladson-Billings, 1995). Areas considered part of creating a culturally responsive learning environments are (1) understanding the cultural lifestyles of their students, such as which ethnic groups give priority to communal living and problem solving; (2) knowing differences in the modes of interaction between children and adults in different ethnic groups; and (3) becoming aware of cultural implications of gender role socialization among different groups (Banks & Banks, 2001). To provide a culturally responsive learning environment teachers need to:

- Communicate high expectations for all students (Gay, 2000; Hollins & Oliver, 1999; Ladson-Billings, 1994, Nieto, 1999).
- Use active teaching methods and act as learning facilitators (Banks & Banks, 2001; Gay, 2000).
- Maintain positive perspectives on families of diverse students (Delgado-Gaitin & Trueba, 1991).
- Gain knowledge of cultures of the students in their classrooms (Banks & Banks, 2001; Nieto, 1999).
- Reshape the curriculum to include culturally diverse topics (Banks & Banks, 2001; Gay, 2000; Hilliard, 1991).
- Use culturally sensitive instruction that includes student-controlled discussion and small-group work (Banks & Banks, 2001; Nieto, 1999).

Further research asserts that culturally responsive teachers help students understand that knowledge is not absolute and neutral but has moral and political elements. This knowledge can help students from diverse groups view learning as empowering (Ladson-Billings, 1995; Sharp & Gallimore, 1988).

Strategies for designing curriculum and instruction for culturally diverse students are similar to the strategies for differentiating curriculum and instruction. In fact, Mulroy and Eddinger (2003) point out that the research on differentiation emerged, in part, because of the demand on schools to serve an increasingly diverse student population. Heacox (2002) asserts that classrooms are diverse in cognitive abilities, learning styles, socioeconomic factors, readiness, learning pace and gender and cultural influences.

### *Differentiation*

Research on differentiation includes meeting the learning needs of all students through modifying instruction and curriculum to consider developmental level, academic readiness and socioeconomic backgrounds, as well as cultural and linguistic differences. Tomlinson (2005) defines differentiated instruction as a philosophy of teaching based on the premise that students learn best when their teachers



accommodate the difference in their readiness levels, interests and learning profiles. In a differentiated learning environment, each student is valued for his or her unique strengths while being offered opportunities to learn and demonstrate learning through a variety of strategies (Mulroy & Eddinger, 2003). Hall (2002) states, “To differentiate instruction is to recognize students’ varying backgrounds, readiness, language, learning preferences and interests and to react responsively” (p. 1).

According to Tomlinson (2005), who has written extensively on differentiation, three elements guide differentiated instruction: content, process and product. Content means that all students are given access to the same content but are allowed to master it in different ways. Process refers to the ways in which the content is taught. Product refers to how students demonstrate understanding. Corley (2005) provides three questions that drive differentiation: (1) What do you want the student to know? (2) How can each student best learn this? and (3) How can each student most effectively demonstrate learning? Maker (1986) offers a framework through which differentiation can occur in the classroom:

- Create an encouraging and engaging learning environment through student-centered activities, encouraging independent learning, accepting student contributions, using a rich variety of resources and providing mobility and flexibility in grouping.
- Modify the content according to abstractness and complexity. Provide a variety of content and particularly content focused on people.
- Modify the learning process through use of inquiry, higher-order thinking activities, group interactions, variable pacing, creativity and student risk-taking and freedom of choice in learning activities.
- Modify the product through facilitating different ways for students to demonstrate learning, such as the use of authentic assessments.

In addition, researchers have found that the use of flexible grouping and tiered instruction for differentiation increases student achievement (Corley, 2005; Tomlinson & Eidson, 2003). Heacox (2002) describes differentiation as follows:

The focus is not on the adjustment of the students, but rather the adjustment of teaching and instructional strategies making it about learning, not teaching. The teacher is the facilitator who...puts students at the center of teaching and learning and

lets his or her students’ learning needs direct instructional planning (p. 1).

Several studies conducted in elementary and middle school classroom have found that student achievement is increased in differentiated classrooms (Connor, Morrison, & Katch 2004; McAdamis, 2001). Tomlinson and Eidson (2003) emphasize the need to include the components of student readiness, student interest and student learning profile in differentiating instruction. Students’ interests and learning profiles are often tied to their learning styles.

#### *Learning Styles*

The body of research on learning styles has coalesced around the work of Howard Gardner, who introduced the theory of multiple intelligences in 1983. Gardner’s work suggests that the concept of a pure intelligence that can be measured by a single I.Q. score is flawed and he has identified nine intelligences that people possess to various degrees. His theory asserts that a person’s type of intelligence determines how he or she learns best (Gardner, 1999).

Learning style refers to how a student learns and the concept takes into account cultural background and social and economic factors as well as multiple intelligences. Beishuizen and Stoutjesdijk (1999) define learning style as a consistent mode of acquiring knowledge through study or experience. Research has shown that the quality of learning at all levels of education (primary, secondary and higher education) is enhanced when instruction and curriculum take into account individual learning styles (Dunn, Griggs, Olsen, Beasley & Gorman, 1995). Another study found that student learning improved when the learning environment was modified to allow students to construct personally relevant knowledge and to engage in the materials at different levels and from different points of view (Dearing, 1997).

A responsive classroom environment considers the individual learning needs of all students. These learning needs include a variety of factors that influence how students learn: culture, language, developmental level, readiness, social and economic background and learning style.