



Guidelines for Addressing Standards in Career and Technical Education

“Education and the process of educating is
a total integral, contextual situation,
which includes students, teachers, parents,
administration, and environment.”

Jean Houston

These Guidelines have been written to reflect the policy and educational goals of the state. They are intended to give guidance for organizing the delivery of the Minnesota Graduation Standards within Career and Technical Education (CTE) courses, and not intended as a blueprint for how to assess standards. Rather, this document provides tools for determining how the Minnesota Graduation Standards align with national and industry standards and with goals and curriculum in CTE classes.

This document provides:

- *Connections* between best practice and CTE
- *Tools* for thinking about the alignment of standards and curriculum
- *Suggestions* for assessment activities within career and technical content areas
- *Resources* specific to each CTE content area

How to Think About Standards in a Changing World

The Standards Will Change

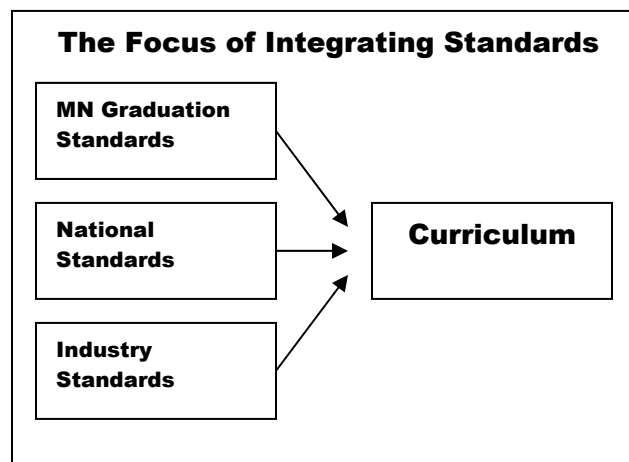
We can count on standards changing. In the world of CTE, industry and national standards must change as a reflection of the evolving nature of the workplace. State educational standards must also change in response to the needs of society, our expectations for learners and what we know about how students learn. The fact that standards change, however, does not lessen our

need to consider them in our curriculum planning.

The Process Will Not Change

Even though standards will change, the systematic way we think about them will not. The process for considering how standards affect CTE curriculum remains constant. Both education and industry standards should be represented in what we teach students.

The following graphic illustrates the relationship between standards and curriculum.



Who Should Use These Guidelines

These guidelines were written for anyone using CTE curriculum in their classroom settings. It offers teachers, specialists, administrators, parents, and policymakers a way to think about and use practical tools for including Minnesota Graduation Standards in CTE.

How Career and Technical Education Supports Standards

What is CTE?

Career and Technical Education, or CTE, is both a philosophy of education and a grouping of content disciplines that align most closely with the philosophy. The evolution of the field parallels changes in society and education so that the original vision of preparing workers for entry-level jobs in business and industry has changed dramatically (Sarkees-Wircenski and Scott, 1995). Now CTE focuses on preparing individuals for a wide range of jobs requiring varying levels of education including high school, post secondary certifications, two and four year degrees, and post baccalaureate programs.

...as a philosophy

Some of the assumptions that drive our current understanding of CTE help define it and distinguish it from other educational fields. CTE:

1. encourages learning that makes connections to the world of work and work-based programs and ideals
2. promotes clear, articulated educational pathways from pre-kindergarten to postsecondary options
3. addresses long-term needs of successful economic and social development of individuals rather than narrow, short-term interests of

special interest groups, business, or industry.

... as a grouping of content disciplines

The content disciplines that make up CTE are based on real-world occupations and adult roles. Minnesota has grouped CTE into the following areas, realizing that the changing nature of work continually impacts how these areas are defined:

- ❖ Agriculture
- ❖ Business
- ❖ Family and Consumer Science/Service Occupations
- ❖ Health Occupations
- ❖ Technology, Trades & Industry

Family and Consumer Sciences and Technology Trades and Industry Education are often introduced as specific subjects at the middle school level, while the remaining areas are introduced in high school. Within each of these disciplines there are two sources of curriculum content: the knowledge and skills unique to the discipline and the knowledge and skills from traditional academic subjects such as math and history needed to function within the discipline. Because the CTE disciplines demand a broad base and wide focus, many of the concepts are introduced as part of the elementary school curriculum.

What is Unique about CTE?

Given that CTE blends traditional academic subjects with the practical application of skills, CTE programs promote genuine learning and real accountability. As a field, CTE is based on:

- Benchmarking against standards

Various occupational or industry-specific standards define ultimate expectations for workers within a CTE area. CTE is expected to address these standards.

- Assessing student achievement through demonstrated performance

From building a bench to creating a spreadsheet to demonstrating CPR, CTE has always expected students to show what they know. This type of performance assessment is an important element of many standards-based educational systems and is a cornerstone of the philosophy driving Minnesota's implementation of the graduation standards.

- Creating partnerships with business, industry, and community groups

Partnerships with groups beyond the school walls enrich students' understanding of their world and their world's understanding of students. By allowing students to participate in job-shadowing, internships and apprenticeships, and other work-experience programs, partners provide the experience of being "out into the real world." By providing speakers, mentors, equipment, and program

expertise, partners can also bring the "real world" of work, community and family into the schools.

- Promoting student organizations to acquire and demonstrate the knowledge and skills of a discipline

CTE has a rich history of strong student organizations. Students participating in Future Farmers of America (FFA), Home Economics and Related Occupations (HERO), or other student groups have opportunities that reflect and extend their classroom or partnership experiences. In many instances, the organizations provide opportunities to meet or demonstrate proficiency in industry, national curriculum, and Minnesota graduation standards.

- Coordinating with higher education to recognize and build on specific skills acquired in high school.

Specific articulation agreements between high school and post-secondary schools (including technical colleges, trade schools, and two-year and four-year comprehensive higher education institutions) allow students to earn credit toward graduation or completion in both programs. These agreements specify the common outcomes of the courses so that there is clarity about what a student completing the course or program of study has accomplished.

How do the unique features of CTE impact teaching?

It can be challenging for teachers to integrate industry and curriculum standards into their lesson plans; assess student achievement through demonstrated performance; and create and maintain partnerships with business, industry, and community groups. Secondary CTE teachers are also expected to coordinate with student organizations and articulate programming with post-secondary institutions, in addition to maintaining their own skill base as a professional within their field of specialty. Successful teachers see these expectations not as individual, exclusive requirements but as mutually reinforcing elements in a truly integrated program.

- Standards require performance assessment
- Teaching to standards and assessing through performance can be done in work and community settings and within the activities of student organizations
- Clear curriculum standards and assessment creates the conditions for designing articulation agreements that can be followed.

How do standards in industry and education affect CTE programming?

A standard can be understood as a goal with a set level of expected performance. To achieve at the standard level means to meet the expectation. Thinking about performance in business

and industry has also become the way of thinking about performance in education. CTE—as both the translation of education to business and industry and the translation of business and industry to education—is at the middle of many sets of standards. Standards from the worlds of work and education guide CTE programs.

Standards from the world of work

What is an employability standard?

Employability standards clarify skills and attitudes necessary for seeking, obtaining, and maintaining employment. In 1991, the U.S. Department of Labor identified three categories of foundational competencies for workers: basic skills, thinking skills, and personal qualities. In addition to the foundational competencies, the report titled *What Work Requires of Schools* also listed competencies for effective workers, categorized as *resources, interpersonal skills, information, technology and systems*. Known by the name of the group that produced the report, the Secretary's Commission on Achieving Necessary Skills (SCANS), the collection of foundational and effective worker competencies were widely circulated and accepted.

What is an industry standard?

Individual industries have defined sets of skills and processes necessary to carry out essential tasks of an occupation. These industry standards are written to set forth entry-level knowledge and skills necessary to perform successfully in a specific workplace. The standards help inform many audiences, including students, employers, and educators.

Standards from the world of education

What is a program standard?

Federal mandates for program quality have accompanied federal funding for CTE. The Carl D. Perkins Vocational and Technical Education Act (1998) requires each consortium receiving funding under the act to submit five year development plans in what are described as seven essential tech prep program elements.

The Perkins Act (Section 113) introduces the language of standards in its “core performance indicators” whereby:

Each eligible agency shall identify its state plan for core indicators of performance for vocational and technical education that include, at a minimum, measures for each of the following:

(i) Student attainment of challenging State established academic, and vocation and technical skill proficiencies.

(ii) Student attainment of a secondary diploma or its recognized equivalent, a proficiency credential in conjunction with a secondary school diploma, or a post secondary degree or credential

(iii) Placement in, retention in, and completion of, post-secondary education or advanced training, placement in military service, or placement or retention in employment.

(iv) Student participation in and completion of vocational and technical education programs that lead to nontraditional training and employment.

The standards set at the federal level to judge the overall quality of a career and technical program are reflected in our state CTE program evaluation process. The Minnesota Department of Children, Families and Learning has developed nine program standards which are personalized to the specific program areas of CTE in Minnesota. There are fifty-one performance indicators designating expected levels for attainment. The standards and performance indicators also provide the basis for state-level CTE program approvals.

Education reform in the United States reflects both the standards movement and the notion of continuous improvement so evident in the quality movement championed by US business and industry. Practitioners in the field of education are being asked to look at data, including examples of student work, to identify strengths and weaknesses and to improve overall delivery systems. A basic premise of continuous improvement is once standards are implemented, performance is evaluated against the standard. And once performance is evaluated, there will be monitoring and adjusting of systems to achieve the standard.

What is a content standard?

Content standards define learning goals for students. Unlike industry standards which define desired entry-level knowledge and skills, content

standards in education define required exit-level knowledge and skills. Standards may focus on what students should *know*, declarative knowledge, or what students should *do*, procedural knowledge, or both.

The standards movement has established a new focus for educational programs and curriculum, but it is important to note that standards are the goals and not the curriculum itself. Teachers don't teach standards, they teach curriculum and in the process, students achieve the standard.

Minnesota Content Standards

Minnesota Graduation Standards comprise a series of state-mandated expectations for all students. There are two primary parts: 1) basic standards which students achieve by passing tests in reading, writing and mathematics and 2) high standards that represent rigorous academic goals. Locally developed assessments often ask students to engage in real world performances to demonstrate mastery of what they know and are able to do.

National Content Standards

Each discipline within CTE has identified national standards. While each standards document is unique, national standards generally propose key standards and benchmarks for the subject. They also define vision and mission statements that often integrate industry expectations into K-14 programming with respect to that curricular area.

Integrating workplace and education standards into CTE programming

Employability, industry, state program, state content, and national content standards can all present a confusing jumble of expectations for educators. Understanding the purpose of these standards is critical to effectively implementing them.

Minnesota CTE Program Standards are the starting place for Minnesota CTE programs. These umbrella standards ensure that federal concerns for overall programming are met. Educators who oversee the implementation of the CTE program will use these nine standards in their program approval and continuous improvement process.

Classroom implementation of standards involves the integration of state, national, and industry standards specific to the discipline. The curriculum goals are determined through an integration of these three elements. Because Minnesota graduation standards were conceived to define the knowledge and skills needed to perform as a productive citizen, the goals of the Minnesota standards support the field in general and do align with the industry and national curriculum standards for the CTE discipline areas. The purpose of this framework is to provide teachers with information on how these three specifically align so that lesson planning can consider all of the elements at once.

Teachers who successfully integrate the state, national, and industry standards consider the SCANS and employability skills as outcomes of instruction. Along with students acquiring industry-specific skills, students will be prepared as

workers ready to meet the challenges of our future.

**For a graphic representation of how graduation standards relates to other standards, see [page 19](#).*

Standards-based education reform has the potential to fuse academic knowledge and practical applications. As Minnesota schools have moved to implement a state-mandated system of standards, we have seen academic-based subjects work to incorporate practical application in their programs. A simultaneous effort is being made to infuse CTE programs with rigorous academics.

Minnesota's performance-based standards system requires a strong connection between academic learning and the practical application of that learning. An ideal system first exposes students to academic based concepts in what has been a traditionally academic classroom setting. Then using the appropriate process skills students demonstrate mastery of this learning through practical applications using real world experiences found in what has been a traditional vocational setting. A high level of interdepartmental coordination and creative delivery systems are needed to create a seamless, high quality learning experience for students. These goals pose a challenge to a delivery system where concepts are often introduced, mastered, and assessed in a single traditional classroom setting.

Best Practices in Career and Technical Education Instruction

In education, the term *best practice* refers to a set of teaching concepts that are shown by research to create the best opportunities for learning. These concepts reinforce the need to

- Make learning relevant, and
- Assess learning through performance

In this respect, CTE has always embodied best practice. Students who are doing classroom work closely aligned with work in the adult world will rarely ask "Why do we need to learn this or "Will this really help me in my life?" Furthermore, their classroom work, or *performance*, often results in a tangible product that shows the student is able to apply an idea in a specific situation.

Best Practice in Minnesota Graduation Standards

Minnesota's graduation standards have been designed to reflect best practice in education. In addition to standards making learning relevant, performance assessment is expected as a way of demonstrating achievement. The fit, therefore, between graduation standards and CTE is a comfortable one.

Principles of Best Practice.... with Health Occupations Examples

The in-depth knowledge and demonstration of skills expected in CTE classrooms matches many aspects of best practice. Following is a listing of 13 principles of best practice in learning (Zemelman, Daniels, & Hyde, 1998). Included are some Health Occupations learning examples.

1. **Student-Centered:** Focusing on student's interests and concerns and exploring the questions that they have should be the basis or starting point for learning. This takes into consideration the experience students bring into the classroom. It also lends itself to a balance between student-led and teacher-led activities.

Example: In a Medical and Health Careers Investigation unit, students may address a career investigation standard in by choosing two or three possible careers to explore based on their own interests. Lesson activities are adjusted to address student-generated questions.

2. **Experimental:** Active learning is powerful and natural. Students should have first-hand opportunities to engage and interact directly with the concepts being taught. Open-ended questions pave the way for experimentation fostering the development of reasoning and problem solving skills.

Example: By examining legal and ethical issues impacting health care, students have the opportunity for open-ended problem solving in international and intercultural

contexts. Health Occupations students can address the reading standards by writing, in teams of four, a case scenario which includes an element of abuse, neglect, confidentiality, sexual harassment, or discrimination. Teams will then use the creative problem-solving process steps outlined by the Health Occupations Student Association (HOSA) to address the issues they've raised.

3. **Holistic:** Students learn best when they encounter whole ideas, events, and materials, as opposed to studying isolated unrelated concepts and subjects.

Example: Students can investigate medical and health careers to understand the multiple facets of the industry, such as worker shortages, required skills, places of employment, legal and ethical topics, and industry vocabulary. As they address the career investigation standard, they can look through local help-wanted ads to see the need for various types of healthcare workers and research and report on contemporary healthcare issues related to the labor market.

4. **Authentic:** Students are empowered by learning real, rich complex ideas. These real-life learning opportunities give the students experience in the subject using a "hands on" approach.

Example: Students in Nursing Assistant, Emergency Medical Technician (EMT) or Dental Assisting classes learn by doing in a number of ways.

- Practice skills in the patient care laboratory
- Demonstrate learned skills in a real community setting, under the supervision of a qualified professional
- Put skills to work in internship or paid employment, with the assistance of a teaching guide

Related to a reading, listening, and viewing standard, nursing assistant students

- demonstrate operating a stethoscope and sphygmomanometer, following the technical skills manual and interpret the technical information gathered.
- give correct assessments of given information from various charts and diagrams.
- describe the principles and standards of infection control including the demonstration of proper hand washing, gloving, and isolation procedure.
- successfully perform the skills evaluations of a Nursing Assistant program.
- prepare for HOSA competitions such as:
 - Nursing Assistant
 - EMT
 - CPR/First Aid
 - Career Display
 - Job Seeking:

5. Expressive: Students need to draw upon a wide range of communicative media including, speech, writing, drawing, poetry, dance, drama, music, movement and visual arts to engage ideas, construct meaning,

and effectively remember information.

Example: Related to a reading standard, students in a variety of Health Occupations courses could engage in medical debate. In this process:

- Teams of learners, using a variety of media, research a topic is viewed as ethically controversial in the medical field.
- Teams research and construct affirmative and negative arguments.
- Through HOSA's Bio-Medical Debate event, learners present the choices and challenges they have found.

6. Reflective: After being immersed in an experience, opportunities should be given for students to reflect and debrief to review what they have thought, felt and learned. This helps students process what they have learned and form deeper understandings and insights related to their learning.

Example: Nursing, EMT, and Dental Assistant students reflect on their experiences as they debrief. Individually and in group in post-lab and post-clinical conferences. They share situations where they feel they performed well and where they need more practice as well as what they have learned from their experiences.

7. Social: Learning is enhanced when students have the opportunity to interact by collaboratively and actively engaging in learning and when they are able to construct opinions and test hypothesis leading to deeper understanding of concepts.

Example: Students learning medical terminology in a number of Health Occupations classes can address a reading standard by working with one another. As an outlet for social learning, the following lesson strategies include the opportunity to receive feedback from fellow students:

- Learners are given case studies containing numerous medical terms that they rewrite, and explain to fellow students.
- Learners prepare lesson plans to teach one or more body systems to middle or elementary students, using technical medical terminology and various visual aids.
- Learners begin preparation for HOSA competitions such as HOSA Bowl or Career Display

8. Collaborative: Learning, which emphasizes cooperation rather than competition, enhances the social power of learning.

Example: Collaboration is a cornerstone of student competitions in Health Occupations Student Association (HOSA). The competitive unit is a team that can work together on a number of products.

- Career Poster Presentation
 - Creative Problem solving
 - Bio-Medical Debate
 - Medical Reading
- Products relating to the public speaking content standard of Learning Area Two include:
- Creative Problem Solving
 - Community Awareness

- Bio-Medical Debate

9. Democratic: students who are required to exercise responsible choices learn citizenship first within the classroom and later within the community.

Example: Some of the same elements of choice present in student-centered and collaborative classrooms also foster responsible choice as a community member. In an examination of health care systems and issues learners can:

- Explore various healthcare settings, the personnel employed at various settings, and the organizational structure of the facilities. They present to the class:
 - A healthcare facility they have created
 - The location of their facility
 - The name of their facility
 - The various departments in their facility
 - A floor plan of their facility
 - The personnel that work in each department of their facility and their educational background
 - An organizational chart for their facility
- Use peer evaluation for their oral presentations and/or HOSA Prepared Speaking guidelines.

10. Cognitive: Higher-order thinking results in the most powerful learning experiences. This involves inquiry and self-monitoring the thinking process.

Example: The academic foundations for Health Occupations

relies on higher-order thinking to understand, interpret, analyze, and categorize learning. Students can address a reading standard as they

- Interpret from case studies information on systems and diseases; causes, symptoms, treatments, and prognosis.
- Create terminology, given word parts for a specific body system (prefixes, suffixes, and root words), and apply a step-by-step process in interpreting medical terminology from information supplied by the medical case studies.

11. Developmental: Children progress in definable but flexible stages of growth and development. Learning activities should be age appropriate while providing for individual developmental differences.

Example: Many health concepts are taught as students progress through school. For ideas on how health occupations foundations can be laid in the elementary and intermediate years.

12. Constructivist: Students do more than receive content. They recreate and reinvent content to attain an understanding that is purely theirs. Students need opportunities in which they are allowed to construct their own meaning from what they are learning.

Example Students given case studies containing numerous medical terms are to explain them to fellow students using their own words.

13. Challenging: Students learn best when presented with challenges and choices and when they are given responsibility for their own learning.

Example: Genuine challenges are presented when students work with real clients or compete in professional skill competitions. Students work with real clients in structured real-life situations requiring both technical and interpersonal skill application, initiative and problem solving. Students could also compete in HOSA professional skill competitions in EMT, Nursing Assisting and Dental Assisting.

Principles of Best Practice Combined . . . with FACS and Agriculture Examples

The learning goal of CTE programs is to provide students with the knowledge and skills they need to fulfill their life and career goals. The relevancy, self-directed learning, and self-monitoring that are the hallmarks of best practice can be found in many classroom activities. The following stories offer ideas for addressing combinations of these practices in the CTE classroom.

- *The FACS Best Practice Vignettes are on page 20.*
- *The Agriculture Best Practice Vignettes are on page 21.*

Instruction that reflects Best Practice Principles and Minnesota Graduation Standards . . . with Health Occupations and Technology, Trades, and Industry Examples

In meeting standards and in addressing best practice, teachers decrease certain elements of instruction and increase others. Following are examples of the shifting emphasis within two types of CTE classrooms, Health Occupations and Technology, Trades, and Industry, as the teacher combines a graduation standard focus with a best practice approach.

**Go to the Health Occupations Content Discipline Chart on [page 22](#).*

In the Technology, Trades, and Industry content discipline, the standards can specifically be addressed through increase in best practices strategies:

(see chart on following pages)

Best Practice Instruction in Technology, Trades and Industry

Reading

High school students should be able to read technical information and perform an action based on that reading. This differs from a traditional technology education approach by decreasing the teacher directed presentation of information and increasing the emphasis on student directed learning. Key points from this instructional approach include:

Decreased Emphasis

- Less lecture
- Fewer demonstrations
- Less teacher directed instruction
- Less dependence on a single textbook
- Less teacher-as-a-source for answers

Increased Emphasis

- More information from reading and viewing
- More reference materials available
- More self-directed learning
- More use of Professional technical doc.
- More interpretation of charts and schematics

Writing

A class focused on technical writing will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Less teacher lecture
- Fewer teacher demonstrations
- Less teacher directed instruction

- Hand written work
- Teacher created illustrations
- All experiences within the classroom

Increased Emphasis

- More reference/technically written materials available
- More student demonstrations
- Student following directions other students have written
- More self-directed learning
- More use of Professional technical doc.
- More interpretation of charts and schematics

Arts

A class focused on arts will differ from typical technical approaches the following ways:

Decreased Emphasis

- Follow a set of plans
- Mass production
- Technical processes (though still present)
- One Evaluator

Increased Emphasis

- More original design
- Originality and creativity
- Elements of design/aesthetics
- Multiple sources of feedback.

Math

A class focused on math will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Expecting students to know the math used
- Mathematics learned through worksheets
- Abstract mathematics

- Memorization of math concepts

Increased Emphasis

- Teaching the math concepts necessary
- Applied mathematics – real world application
- Concrete mathematics – connections to the real world and previous knowledge

- Understanding mathematics

Applied Math

A class focused applying math will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Expecting students to know the math used
- Mathematics learned through worksheets
- Abstract mathematics

- Memorization of math concepts

Increased Emphasis

- Teaching the math concepts necessary
- Applied mathematics – real world application
- Concrete mathematics – connections to the real world and previous knowledge

- Understanding mathematics

New Product Development

A class focused developing new products will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Following a set of plans

- Student ideas initiated in isolation
- Finding solutions to assigned problems
- Whole group instruction
- Working within the school walls

- The product

Increased Emphasis

- Researching and developing plans for a product
- Students researching the need for a product
- Students select the problem to solve
- Individual team learning
- Working outside the school w/community partners
- The process of developing/improving the product

Career Investigation

Decreased Emphasis

- Focusing only on technical education careers
- Skill development
- Teachers selecting the career pathways to explore

Increased Emphasis

- Exploring all career clusters
- Career research (in written form)
- Students selecting the career pathway

Occupational Experience

A class focused on occupational experience will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Experiences in school
- Theory
- Schools delivering knowledge in isolation
- School personnel delivering information

Increased Emphasis

- On the job experience/work based learning
- Actual work experience (application)
- Connecting the school to the workplace
- Mentorships

Technical Systems

A class focused on technical systems will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Focus on individual parts or operations
- Only operating a system
- Discrete knowledge of parts and operations

Increased Emphasis

- Relationships between the parts of a system
- Applying systems theory to the system
- Transfer of knowledge to the whole system

World Language

A class focused on world language will differ from typical technical approaches in the following ways:

Decreased Emphasis

- Local applications of language

(Local building codes, etc.)

- Using computer programs
- Building electronic circuits
- Construction/Production

Increased Emphasis

• Universal language applications (international drafting or schematic symbols).

- Creating or analyzing computer programs
- Electronic circuit schematic design
- Design

Best Practices in Career and Technical Education Assessment

What constitutes good assessment in the classroom?

Minnesota graduation standards emphasize performance-based assessments. In performance-based assessment, students are asked to demonstrate knowledge in authentic, real world ways.

An assessment provides evidence that students have

achieved the expectations of the standard. Standards are often assessed through district-approved assessments, which include task descriptions and checklists. Other assessments may be district determined, created by the individual teacher or identified as a portion of a standardized test.

When developing performance assessments the ABC's of Performance Assessment chart is a useful tool in determining the quality of an assessment. Assessments that meet these criteria should result in student products that reflect real world learning.

ABC's of Performance Assessment

A	Authentic	Represents learning which occurs in the real world. It reflects how people really use knowledge and skills.
B	Bias Fair	Provides all students with an equal opportunity to succeed. Bias-fair assessments would not favor students of one gender or another, whose lifestyle is associated with a particular social class, who possess knowledge typically known in only one culture, or expect the exclusive use of one learning style.
C	Constructivist	Connects student learning with what they already know and allows them to construct their own meaning.
D	Developmentally Appropriate	Appropriate for both the age of the learner and for the readiness of learner to engage in the material.
E	Embedded	The assessment represents a smooth seamless fit into the class. It is not perceived as something extra. Rigorous assessments require a rich body of knowledge and proficiency in appropriate process skills.
F	Focused	Assessments are focused on the learning goals or standards.
G	Generalizable	The assessor has seen enough student work to guarantee that the standard has been achieved.

Best Practices in Career and Technical Education Staff Development

The professional development process improves staff skills and competencies needed to produce outstanding educational results for students.

Creating a Comprehensive Staff Development Plan

1. Include professional development participants and organizers in the professional development design process.
2. Write a plan that includes: <ul style="list-style-type: none">a. How professional development supports the school/district's long-term planb. A professional development needs assessment processc. Professional development goalsd. Professional development content, process, and activitiese. Research that supports the chosen content/process for professional developmentf. Resources available to support the chosen content/process for professional developmentg. Resources available to support professional developmenth. Professional development evaluation steps
3. Share the Plan

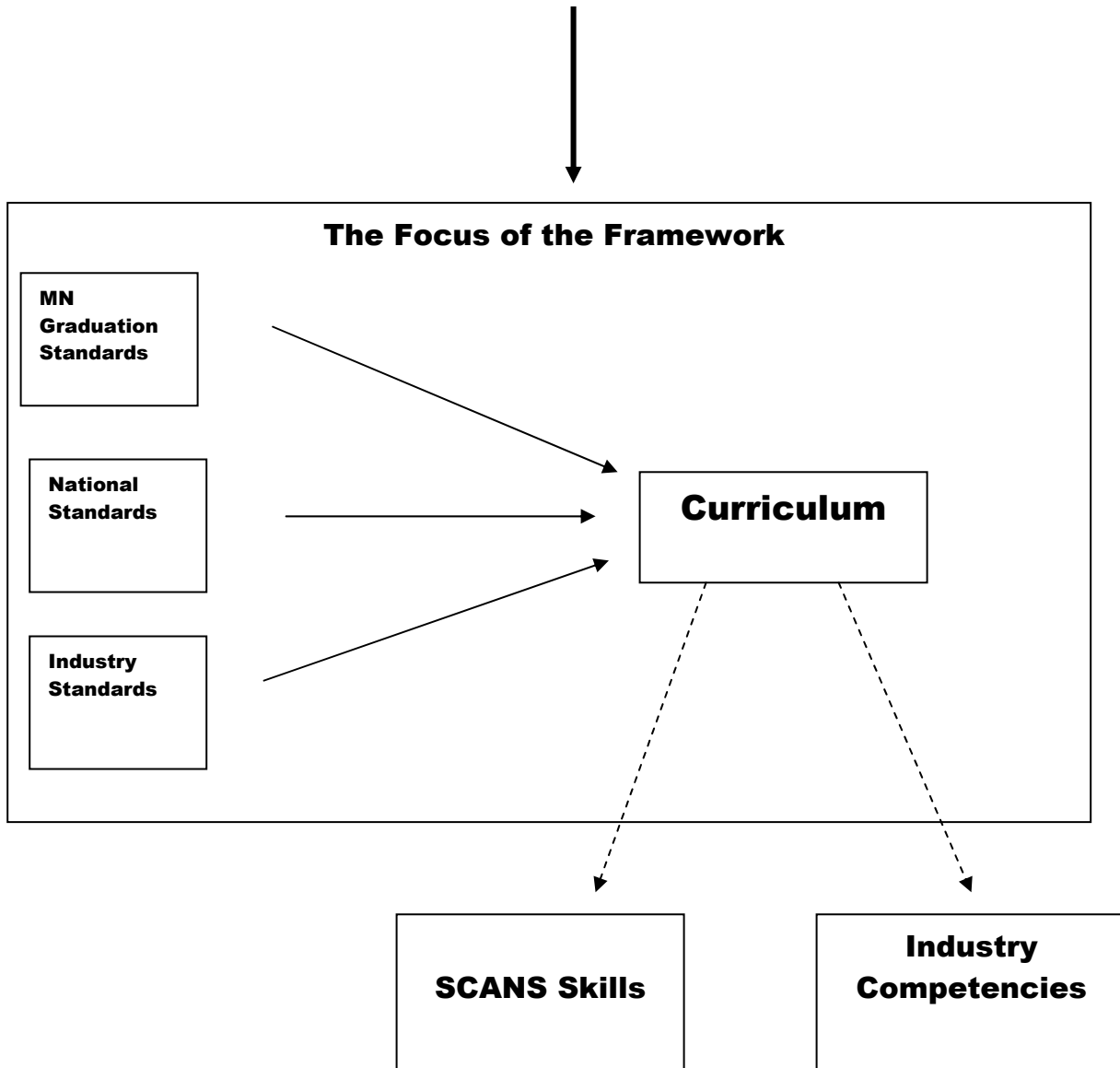
(NCREL, 1999)

Unique to staff development in CTE is an emphasis on teachers securing work-based experiences themselves during non-teaching periods. This staff development plays a vital role in upgrading teacher skills and keeping programs relevant and aligned with the needs of the field. CTE instructors need to “try things on” at a work site in an industry other than education. It is a genuine, mainstream staff development activity termed best practice in the education setting. Participants create a partnership plan that describes how they will apply their new learning skill into

curriculum. The teachers then create lesson plans to share with other teachers and students. These lesson plans provide teachers with ideas to connect students to the world of work and those competencies that are vital for success.

**Integrating Standards in
Career and Technical Education**

Minnesota Program Standards



Best Practice Vignettes: Family and Consumer Sciences

In Family and Consumer Science, the case study content standard from Learning Area Five can be addressed through a learning activity that includes many best practices:

In Mrs. M's child development class, students learn about theories of development. To begin the unit, they reflect on experiences they've had with children). Students then pose challenging questions they would like to research. They create a plan to answer a question of their choice. The plan includes methods of observation, research, and evaluation. Students carry out the plan by collecting data, reporting findings, making connections to previous learning and posing questions for further research. This lesson includes several best practice principles. It is authentic, cognitive, student-centered, constructivist, democratic, experimental and encourages reflection.

Family and Consumer Science classes at Kasson-Mantorville addressed the resource management content standard from Learning Area Five in a way that incorporated best practice principles.

Lunch count is up! Student descriptions of school lunch, such as "The spaghetti is soggy" "The pizza is greasy" and "This tastes like cardboard" are just memories at Kasson-Mantorville High School ever since the students had a say about the school lunch program. After many years of listening to students complain about school lunches, a collaborative effort was launched between the Family and Consumer Science Department and Food Services Program. Students were given an authentic experience to do something to improve the school lunch program by developing and preparing their own recipes. An elective class, Food Innovations, was created to teach the students how to develop and market new products. The class also gave students the opportunity to work with the food service staff to mass-produce a product.

Students first learned the basics of food and nutrition, as well as product marketing and production. After learning these fundamentals students then, in small groups, developed new food recipes using the USDA guidelines established for school food service programs. Each group submitted a proposal which identified the approximate cost, ingredients, packaging and marketing strategies of their initial recipe. Along with the proposal students conducted a survey and did market research.

Once the FACS teacher and food service director approved the students' proposals the students developed a recipe prototype that contained two ounces of meat or meat alternative per serving with less than 30% fat per serving. The cost per serving was required to be approximately 50 cents.

Students then had the opportunity to prepare their product and serve it to their peers in a lab setting. The students had their peers critique the product after taste test evaluations. After each lab the students tallied the results and prepared a prototype analysis summary, with charts, explaining the information gathered from their peers. Using this information, students created a business plan which included documentation of all their work, estimated costs, marketing and advertising strategies, packaging ideas and results of the taste testing labs. Students had the opportunity to use a wide variety of technology: computers, digital cameras, dietary analysis software, graphic software, and food service preparation equipment to develop and market their products.

The number of students that chose to take the Food Innovations class illustrated its success. It is a class well received by students, parents, and the school's food service staff.

This lesson is authentic, challenging, cognitive, student-centered, constructivist, democratic, experimental and encourages reflection and collaboration.

Best Practice Vignettes: Agriculture Education

Agricultural Business classes can create a business plan in a student-centered, authentic, collaborative activity:

Economy & Business Vignette

Mrs. Andy's Agricultural Business class has been studying financial statements and records. To practice these skills Mrs. Andy has the class prepare the financial statements and records for the greenhouse Easter lily and bedding plant crops being grown by the Place Science classes. The students keep track of all orders, bills and payments, along with sales and receipts. The students assist in ordering and receiving supplies, along with assisting with plant sales after school. The students prepare income statements, balance sheets, account receivable and accounts payable statements for the greenhouse crops. The students also reconcile their records with the school account.

Once the students have mastered the creation and management of the financial statements and records, Mrs. Andy has the class complete a financial analysis of the greenhouse sales from the prior year. The students prepare a comparative analysis of the income statement and balance sheet. They calculate the percentage of sales per crop listed on the income statement. The students identify potential problems with cash flow based on a review of the cash flow statement. Calculate the return on sales, inventory turnover, and return on owner's equity. The students use the financial information they have gathered to make a financial recommendation of which crops and how many plants should be grown next year.

The following story illustrates the use of scientific concepts and applications. Students learn science concepts and apply skills in the concepts of biology and animal care and management.

Mr. T's year long Large Animal Science class is studying sheep and how to care for and manage them. Students are working in groups of two. The students will be dissecting the stomach of the sheep to determine the stomach components, contents and functions.

Students remove sections of the stomach lining of each compartment and look at them under a microscope. Each section is then researched using at least two sources to determine the function of the section and how it works in concert with other body systems.

Student teams are required to conduct a science fair project looking into the function or contents of a ruminant stomach. The science fair project is conducted using the University of Minnesota AgriScience Fair rules and procedures. One project might be to look at the effects of wormers used in livestock and how resistance can be developed against wormers.

The students then look at how sheep are evolving through traditional breeding and genetic engineering practices. Each group researches and designs a presentation on how sheep produced in the 1950s are different than sheep produced in 2002. The presentation looks into meat production, wool production, milk production and show animals.

Students take a field trip to the University of Minnesota sheep flock in Morris, Minnesota. There the students witness the different research trials that are being conducted. Researchers share with the students how they conduct their research and how trials are developed. Students are also shown how the research is communicated to the industry and general public.

HEALTH OCCUPATIONS

Recommendations for Teaching Performance Based lessons in Medical Careers/Health Occupations

Increase:

Hands-on activities that include:

- Students identifying their own real questions about physiology and anatomy
- Observation activity, often designed by students, aimed at real discovery, employing a wide range of process skills
- Students use communication and presentation skills to explain data
- Students' apply team work skills to realize concepts and processes learned
- Applications; either to social issues or further health questions

Focus on underlying concepts about human health and diseases.

Questioning, thinking, and problem solving, especially with regards to:

Human behavior, ethical and legal issues conflict resolution infection control and safety measures

Active application of health science learning to contemporary technological issues and social issues

In-depth study of an important health related topics.

Curiosity about positive attitudes toward health sciences for all students, including females and members of minority groups

Integration of reading, writing, and math in health sciences.

Collaborative small-group work, with training to ensure it is efficient and includes learning for all group members

Teacher facilitating students' investigative steps

Evaluation that focuses on health science concepts, processes, and attitudes.

Decrease:

- Instruction based mainly on lecture and information giving
- Dependence on textbooks and lockstep patterns of instruction
- labs in which students follow steps without a purpose or question of their own
- Questions, concepts, and answers provided only by the teacher
- Students treated as if they have no prior knowledge or investigative abilities

Memorizing detailed vocabulary, definitions, and explanations without thorough connection to broader ideas.

Isolation of health science from the rest of students' lives.

Superficial coverage of many topics according to an abstract scope-and-sequence.

Activity limited to texts, lectures, and multiple-choice quizzes

Students working individually, competitively.

Teacher only as expert in subject matter

Testing focused only on memorization of detail, ignoring thinking skills, process skills, attitudes

About this Document

In the Fall of 2001, Intermediate School District 287 was awarded funding from the Goals 2000 grant for the Systems Integration Project for staff development. As a part of the Systems Integration Project and in collaboration with Intermediate Districts 916 and 917, 287 district staff worked to develop guidelines for integrating Minnesota graduation standards with Career and Technical Education.

These guidelines developed by teachers in the field provide curricular ideas and tools for determining how the Minnesota Graduation Standards align with National and Industry standards. The examples, alignment charts, and ideas for activities are intended to encourage districts, sites and teachers to make their own adaptations and develop their own best practices in implementing state, national and industry standards in five areas:

Family And Consumer Sciences and Service Occupations

Business and Marketing

Health Occupations

Trades, Technology and Industry

Agriculture and Food Science

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About the Intermediates

The intermediate school districts were created to deliver instructional programs and services at all educational levels. Minnesota's intermediates serve the following member districts:

Intermediate District 287 - Bloomington, Brooklyn Center, Eden Prairie, Edina, Hopkins, Orono, Osseo, Minnetonka, Richfield, Robbinsdale, St. Louis Park, Wayzata and Westonka

Intermediate District Northeast Metro 916 - Centennial, Columbia Heights, Mahtomedi, Mounds View, North Branch, North St. Paul-Oakdale-Maplewood, Roseville, South Washington County, Spring Lake Park, Stillwater, and White Bear Lake

Intermediate District 917 - Burnsville, Farmington, Hastings, Inver Grove Heights, Lakeville, Randolph, South St. Paul, and West St. Paul-Mendota Heights-Eagan

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