

NBPTS

Career and Technical Education STANDARDS



for teachers of students ages 11-18+

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The world-class schools the United States requires cannot exist without a world-class teaching force; the two go hand in hand. Many accomplished teachers already work in the nation's schools, but their knowledge and skills are often unacknowledged and underutilized. Delineating outstanding practice and recognizing those who achieve it are important first steps in shaping the kind of teaching profession the nation needs. This is the core challenge embraced by the National Board for Professional Teaching Standards™ (NBPTS). Founded in 1987 with a broad base of support from governors, teacher union and school board leaders, school administrators, college and university officials, business executives, foundations, and concerned citizens, NBPTS is a nonprofit, nonpartisan organization governed by a 63-member board of directors, the majority of whom are teachers. Committed to basic reform in education, NBPTS recognizes that teaching is at the heart of education and, further, that the single most important action the nation can take to improve schools is to strengthen teaching.

The National Board's mission is to advance the quality of teaching and learning by:

- maintaining high and rigorous standards for what accomplished teachers should know and be able to do,
- providing a national voluntary system certifying teachers who meet these standards, and
- advocating related education reforms to integrate National Board Certification® in American education and to capitalize on the expertise of National Board Certified Teachers®.

Dedication to this mission is elevating the teaching profession, educating the public about the demands and complexity of accomplished teaching practice, and making teaching a more attractive profession for talented college graduates with many other promising career options.

National Board Certification is more than a system for recognizing and rewarding accomplished teachers. It offers an opportunity to guide the continuing growth and development of the teaching profession. Together with other reforms, National Board Certification is a catalyst for significant change in the teaching profession and in education.

The Philosophical Context

The standards presented here lay the foundation for the Career and Technical Education certificate. They represent a professional consensus on the aspects of practice that distinguish accomplished teachers. Cast in terms of actions that teachers take to advance student achievement, these standards also incorporate the essential knowledge, skills, dispositions, and commitments that allow teachers to practice at a high level. Like all NBPTS Standards, this standards document is grounded philosophically in the NBPTS policy statement *What Teachers Should Know and Be Able to Do*. That statement identifies five core propositions.

1) Teachers are committed to students and their learning.

Accomplished teachers are dedicated to making knowledge accessible to all students. They act on the belief that all students can learn. They treat students equitably, recognizing the individual differences that distinguish their students from one another and taking account of these differences in their practice. They adjust their practice, as appropriate, on the basis of observation and knowledge of their students' interests, abilities, skills, knowledge, family circumstances, and peer relationships.

Accomplished teachers understand how students develop and learn. They incorporate the prevailing theories of cognition and intelligence in their practice. They are aware of the influence of context and culture on behavior. They develop students' cognitive capacity and respect for learning. Equally important, they foster students' self-esteem; motivation; character; sense of civic responsibility; and respect for individual, cultural, religious, and racial differences.

2) Teachers know the subjects they teach and how to teach those subjects to students.

Accomplished teachers have a rich understanding of the subject(s) they teach and appreciate how knowledge in their subjects is created, organized, linked to other disciplines, and applied to real-world settings. While faithfully representing the collective wisdom of our culture and upholding the value of disciplinary knowledge, they also develop the critical and analytical capacities of their students.

Accomplished teachers command specialized knowledge of how to convey subject matter to students. They are aware of the preconceptions and background knowledge that students typically bring to each subject and of strategies and instructional resources that can be of assistance. Their instructional repertoire allows them to create multiple paths to learning the subjects they teach, and they are adept at teaching students how to pose and solve challenging problems.

3) Teachers are responsible for managing and monitoring student learning.

Accomplished teachers create, enrich, maintain, and alter instructional settings to capture and sustain the interest of their students. They make the most effective use of time in their instruction. They are adept at engaging students and adults to assist their teaching and at making use of their colleagues' knowledge and expertise to complement their own.

Accomplished teachers command a range of instructional techniques and know when to employ them. They are devoted to high-quality practice and know how to offer each student the opportunity to succeed.

Accomplished teachers know how to engage groups of students to ensure a disciplined learning environment and how to organize instruction so as to meet the schools' goals for students. They are adept at setting norms of social interaction among students and between students and teachers. They understand how to motivate students to learn and how to maintain their interest even in the face of temporary setbacks.

Accomplished teachers can assess the progress of individual students as well as the progress of the class as a whole. They employ multiple methods for assessing student growth and understanding and can clearly explain student performance to students, parents, and administrators.

4) Teachers think systematically about their practice and learn from experience.

Accomplished teachers are models of educated persons, exemplifying the virtues they seek to inspire in students—curiosity, tolerance, honesty, fairness, respect for diversity, and appreciation of cultural differences. They demonstrate capacities that are prerequisites for intellectual growth—the ability to reason, take multiple perspectives, be creative and take risks, and experiment and solve problems.

Accomplished teachers draw on their knowledge of human development, subject matter, and instruction, and their understanding of their students, to make principled judgments about sound practice. Their decisions are grounded not only in the literature of their fields but also in their experience. They engage in lifelong learning, which they seek to encourage in their students.

Striving to strengthen their teaching, accomplished teachers examine their practice critically; expand their repertoire; deepen their knowledge; sharpen their judgment; and adapt their teaching to new findings, ideas, and theories.

5) Teachers are members of learning communities.

Accomplished teachers contribute to the effectiveness of the school by working collaboratively with other professionals on instructional policy, curriculum development, and staff development. They can evaluate school progress and the allocation of school resources in light of their understanding of state and local educational objectives. They are knowledgeable about specialized school and community resources that can be engaged for their students' benefit and are skilled at employing such resources as needed.

Accomplished teachers find ways to work collaboratively and creatively with parents, engaging them productively in the work of the school.

The Certification Framework

Using the Five Core Propositions as a springboard, NBPTS sets standards and offers National Board Certification in nearly 30 fields. These fields are defined by the developmental level of the students and the subject or subjects being taught. The first descriptor represents the four overlapping student developmental levels:

- Early Childhood, ages 3–8;
- Middle Childhood, ages 7–12;
- Early Adolescence, ages 11–15;
- Adolescence and Young Adulthood, ages 14–18+.

The second descriptor indicates the substantive focus of a teacher's practice. Teachers may select either a subject-specific or a generalist certificate at a particular developmental level. Subject-specific certificates are designed for teachers who emphasize a single subject area in their teaching (e.g., Early Adolescence/English Language Arts, Adolescence and Young Adulthood/Mathematics); generalist certificates are designed for teachers who

develop student skills and knowledge across the curriculum (e.g., Early Childhood/Generalist, Middle Childhood/Generalist). For some subject-specific certificates, developmental levels are joined together to recognize the commonalities in teaching students at those developmental levels (e.g., Early and Middle Childhood/Art).

Standards and Assessment Development

Following a nationwide search for outstanding educators, a standards committee is appointed for each field. The committees are generally made up of 15 members who are broadly representative of accomplished professionals in their fields. A majority of committee members are teachers regularly engaged in teaching students in the field in question; other members are typically professors, experts in child development, teacher educators, and other professionals in the relevant discipline. The standards committees develop the specific standards for each field, which are then disseminated widely for public critique and comment and subsequently revised as necessary before adoption by the NBPTS Board of Directors. Periodically, standards are updated so that they remain dynamic documents, responsive to changes in the field.

Determining whether or not candidates meet the standards requires performance-based assessment methods that are fair, valid, and reliable and that ask teachers to demonstrate principled, professional judgments in a variety of situations. A testing contractor specializing in assessment development works with standards committee members, teacher assessment development teams, and members of the NBPTS staff to develop assessment exercises and pilot test them with teachers active in each certificate field. The assessment process involves two primary activities: (1) the compilation of a portfolio of teaching practice over a period of time and (2) the demonstration of content knowledge through assessment center exercises. Teachers prepare their portfolios by videotaping their teaching, gathering student learning products and other teaching artifacts, and providing detailed analyses of their practice. At the assessment center, teachers write answers to questions that relate primarily to content knowledge specific to their fields.

The portfolio is designed to capture teaching in real-time, real-life settings, thus allowing trained assessors from the field in question to examine how teachers translate knowledge and theory into practice. It also yields the most valued evidence NBPTS collects—videos of practice and samples of student work. The videos and student work are accompanied by commentaries on the goals and purposes of instruction, the effectiveness of the practice, teachers' reflections on what occurred, and their rationales for the professional judgments they made. In addition, the portfolio allows candidates to document their accomplishments in contributing to the advancement of the profession and the improvement of schooling—whether at the local, state, or national level—and to document their ability to work constructively with their students' families.

Teachers report that the portfolio is a professional development vehicle of considerable power, in part because it challenges the historic isolation of teachers from their peers. It accomplishes this by actively encouraging candidates to seek the advice and counsel of their professional colleagues—whether across the hall or across the country—as they build their portfolios. It also requires teachers to examine the underlying assumptions of their practice and the results of their efforts in critical but healthy ways. This

emphasis on reflection is highly valued by teachers who go through the process of National Board Certification.

The assessment center exercises are designed to complement the portfolio. They validate that the knowledge and skills exhibited in the portfolio are, in fact, accurate reflections of what candidates know and can do, and they give candidates an opportunity to demonstrate knowledge and skills not sampled in the portfolio because of the candidate's specific teaching assignment. For example, high school science teachers assigned to teach only physics in a given year might have difficulty demonstrating in their portfolio a broad knowledge of biology. Given that the NBPTS Standards for science teachers place a high value on such capabilities, another strategy for data collection is necessary. The assessment center exercises fill this gap and otherwise augment the portfolio. Each candidate's work is examined by trained assessors who teach in the certificate field.

The National Board for Professional Teaching Standards believes that a valid assessment of accomplished practice must allow for the variety of forms sound practice takes. It must also sample the range of content knowledge that teachers possess and must provide appropriate contexts for assessments of teaching knowledge and skill. Teaching is not just about knowing things; it is about the use of knowledge—knowledge of learners and of learning, of schools and of subjects—in the service of helping students grow and develop. Consequently, NBPTS believes that the most valid teacher assessment processes engage candidates in the activities of teaching—activities that require the display and use of teaching knowledge and skill and that allow teachers the opportunity to explain and justify their actions.

In its assessment development work, NBPTS uses technology for assessment when appropriate; ensures broad representation of the diversity that exists within the profession; engages pertinent disciplinary and specialty associations at key points in the process; collaborates closely with appropriate state agencies, academic institutions, and independent research and education organizations; establishes procedures to detect and eliminate instances of external and internal bias with respect to age, gender, and racial and ethnic background of teacher-candidates; and selects the method exhibiting the least adverse impact when given a choice among equally valid assessments.

Once an assessment has been thoroughly tested and found to meet NBPTS requirements for validity, reliability, and fairness, eligible teachers may apply for National Board Certification. To be eligible, a teacher must hold a baccalaureate degree from an accredited institution; have a minimum of three years' teaching experience at the early childhood, elementary school, middle school, or high school level; and have held a valid state teaching license for those three years or, where a license is not required, have taught in schools recognized and approved to operate by the state.

Strengthening Teaching and Improving Learning

The National Board's system of standards and certification is commanding the respect of the profession and the public, thereby making a difference in how communities and policymakers view teachers, how teachers view themselves, and how teachers improve their practice throughout their careers. National Board Certification has yielded such results in part because

it has forged a national consensus on the characteristics of accomplished teaching practice in each field. The traditional conversation about teacher competence has focused on beginning teachers. The National Board for Professional Teaching Standards has helped broaden this conversation to span the entire career of teachers.

Developing standards of accomplished practice helps to elevate the teaching profession as the standards make public the knowledge, skills, and dispositions of accomplished teachers. However, making such standards the basis for National Board Certification promises much more. Since National Board Certification identifies accomplished teachers in a fair and trustworthy manner, it can offer career paths for teachers that will make use of their knowledge, wisdom, and expertise; give accomplished practitioners the opportunity to achieve greater status, authority, and compensation; and accelerate efforts to build more successful school organizations and structures.

By holding accomplished teachers to high and rigorous standards, National Board Certification encourages change along several key fronts:

- changing what it means to have a career in teaching by recognizing and rewarding accomplished teachers and by making it possible for teachers to advance in responsibility, status, and compensation without having to leave the classroom;
- changing the culture of teaching by accelerating growth in the knowledge base of teaching, by placing real value on professional judgment and accomplished practice in all its various manifestations, and by encouraging teachers to search for new knowledge and better practice through a steady regimen of collaboration and reflection with peers and others;
- changing the way schools are organized and managed by creating a vehicle that facilitates the establishment of unique teacher positions, providing accomplished teachers with greater authority and autonomy in making instructional decisions and greater responsibility for sharing their expertise to strengthen the practice of others;
- changing the nature of teacher preparation and ongoing professional development by laying a standards-based foundation for a fully articulated career development path that begins with prospective teachers and leads to accomplished teachers;
- changing the way school districts think about hiring and compensating teachers by encouraging administrators and school boards to reward excellence in teaching by seeking to hire accomplished teachers.

Although National Board Certification has been designed with the entire country in mind, each state and locality decides for itself how best to encourage teachers to achieve National Board Certification and how best to take advantage of the expertise of the National Board Certified Teachers in their midst. Across the country, legislation has been enacted that supports National Board Certification, including allocations of funds to pay for the certification fee for teachers, release time for candidates to work on their

portfolios and prepare for the assessment center exercises, and salary supplements for teachers who achieve National Board Certification. Incentives for National Board Certification exist at the state or local level in all 50 states and in the District of Columbia.

As this support at the state and local levels suggests, National Board Certification is recognized throughout the nation as a rich professional development experience. Because National Board Certification provides states and localities with a way to structure teachers' roles and responsibilities more effectively and to allow schools to benefit from the wisdom of their strongest teachers, National Board Certification is a strong component of education reform in the United States.

Career and technical educators play a vital role in preparing young people to function successfully in the adult world. They build students' knowledge of leading-edge technologies, expand their capacity to solve problems they have yet to encounter, and broaden their understanding of the world of work. Because these are times of significant change—in education; in the world economic marketplace; and in many of our cities, towns, and families—the goals and purposes of career and technical education teachers have more saliency than ever.

A New Vision for Career and Technical Education

As the contemporary workplace evolves, so does the field of career and technical education. It has changed from a field in which students worked in isolation on specific skills that were sometimes obsolete before even being tested in the marketplace to one in which students, under the guidance of accomplished teachers, work in teams on multidisciplinary projects that have broad applicability in the marketplace. Embracing this purpose, career and technical educators are attempting to avoid the narrow occupational specificity of earlier times and provide students with opportunities to envision a range of career paths in a variety of different industries.

The changes in career and technical education have been fomented through a variety of public and private initiatives at the local, state, and national levels. At the core of many reform efforts is the belief that the “shopping mall” high school, providing opportunities for a wide range of choices, also leaves many students adrift and without a clear and constructive focus for their educational experience; schools would better engage students in their own learning if there were greater coherence among the myriad course offerings students encounter. The most recent wave of reforms is thus designed to improve career and technical education offerings, to assure high-quality instruction to all students, and to narrow the distance between career and technical courses and courses in “academic disciplines” by promoting disciplinary learning within career and technical studies and infusing “academic” studies with career and technical education’s emphasis on the application of theory to everyday problems.

The most successful schools in the country have begun to enhance student learning by replacing conventional teacher-centered didactic instruction with more activity-based, project-oriented methods. This trend reflects a philosophical shift in beliefs about learning from a behaviorist viewpoint that focused on practice and repetition to a model that views learning as the construction of knowledge and places a high value on instruction that encourages student initiative and inquiry. Other important features of the reforms in secondary education have the potential to transform career and technical education as well. They include the integration of career and technical with academic programs; the creation of opportunities for students to learn in real-world contexts and thus be better prepared for the changing needs of the workplace; and the exposure of students to the wide range of career paths that will be available to them at the end of their secondary school experience.

Accomplished career and technical teachers are at the vanguard of many of these changes and reforms. Prepared with an extensive repertoire of methods, strategies, and resources in their own classrooms, they put into practice alternative ways of teaching and learning that serve as models for their colleagues and communities. For example, an in-school medical technology lab serves as a perfect vehicle for students to pursue the academic goals of a

strong high school biology curriculum. Across both the traditional curriculum and a range of career and technical fields, models such as this have been created and put into practice by outstanding career and technical educators.

At the federal and state level, new and updated legislation reflects the consensus among leaders in the field. These legislative initiatives—in addition to emphasizing the value and importance of career and technical education in the lives of young people—also seek to help schools articulate more clearly the links between student’s school experience and the life beyond formal schooling, when young people move into the world of work. These changes in education in general and in career and technical education in particular place new demands on the nation’s teachers. Embedded in the legislative reforms, for example, are recommendations for collaborative planning and teaching, integrated instruction, and close links between the school and workplace. In addition to encouraging teachers to broaden their vision of their own professional roles, these legislative initiatives by their nature may require rethinking the way schools utilize time and space. A critical component of these legislative initiatives and the concomitant reform efforts is a vision that all students—regardless of their social or economic backgrounds, ethnicity, gender, race, exceptional needs, or disabilities—should have access to high-quality career and technical education. Accomplished career and technical educators, long accustomed to serving a diverse population of students, often provide exemplars for their colleagues and are leaders in discussions of how to create programs that increase the likelihood of success for students with a wide range of interests and abilities.

The Changing Demands of the Workplace

Changes in the organization of the workplace are a pressing demand on the talent and vision of career and technical educators. Often, pushed by the demands of international competition, businesses must be prepared to shift to new processes and products quickly, sometimes retooling overnight and bringing in entirely different technologies to keep up with industry trends. Workplaces have become less hierarchical, more cooperative and team oriented; employers value workers who are flexible enough in skills and temperament to deal with uncertainty and change and understand the need for continuous improvement and problem solving by those who are on the front line of creating products and serving customers. Recognizing that students will likely change careers several times in their working lives, career and technical educators are shifting the emphasis in their classrooms, programs, and professional development from a focus on a narrow body of skills to a vision that values flexibility, cross-training, and a broad foundation of knowledge and skills.

Adolescents in Context

Complementing their focus on change in the workplace is accomplished teachers’ knowledge of adolescent development. Accomplished teachers demonstrate genuine interest in and appreciation for adolescents and have a rich understanding of the ways they grow and

develop. Teachers enjoy and are challenged by the diversity, energy, and earnestness of their students as they mature into young adulthood. Teachers are intrigued by the changes in perceptions, peer and adult relationships, and the varying levels of accomplishment that characterize young people. Because accomplished teachers seek to nurture student development within school and on the job and may work with students for several years, they come to know their students well and are prepared to serve as advocates, adult role models, and advisors.

The face of the United States classroom is changing. A significant linguistic and cultural shift is underway in the composition of students who fill our classrooms, providing both opportunities and challenges for teachers. A growing percentage of students entering school come with a home language other than English. Although migration and immigration have always been central to life in the United States, the sheer numbers and variety of cultures now found in urban, suburban, and even some rural settings challenges teachers to adapt their practices to ensure that all students, including those with exceptional needs or for whom English is a new language (ENL students), gain full access to the curriculum.

Coupled with these demographic shifts are changes in family circumstances and the difficult path to adulthood faced by many of today's youth. The number of students raised in poverty has increased dramatically in the last two decades. Many students are exposed to drugs, crime, and violence and are faced with difficult choices about their behavior and their goals. Although these realities carry new responsibilities, accomplished career and technical educators can see what is unique and what is similar about each of their students. They work diligently to weave all students into the fabric of the classroom. Such teachers face these challenges head-on, often using the community as a laboratory of investigation.

Despite the stated goals of a given school, most students and families view schooling as serving what is essentially a vocational purpose, and this is true whether formal schooling ends with a high school diploma or whether students seek postsecondary options. As the gap in earnings among high school dropouts, graduates, and those with some kind of postsecondary credential continues to increase, so do the consequences of schooling decisions. *Should I take advanced algebra? Will the general science class be enough? How important are grades? Where will I acquire technology skills?* These questions and the choices students make in answering them have the potential of opening or closing career paths, often irreversibly. Accomplished career and technical educators are prepared to guide students as they begin to wend their way through the messy and often confusing paths toward building an adult life.

The Structure of the Career and Technical Education Certificate for National Board Certification

Although all accomplished career and technical educators share a common body of knowledge, skills, and dispositions, they are a varied group who also command specialized areas of expertise that set them apart one from the other. For example, agriculture

teachers and health services teachers both depend on backgrounds in science and understand the challenges students face in making the transition to the world of work, but they also have particular knowledge of their respective fields and related pedagogical approaches that are distinctly their own. In seeking to define these subspecialties within career and technical education, NBPTS has attempted to navigate a course between two hazards—(1) the creation of multiple specialties that would suggest a narrowly gauged instructional course for students and an administratively infeasible certification system for NBPTS; and (2) the establishment of a single certificate that denies the existence of critical areas of in-depth expertise that are essential to accomplished practice.

The National Board for Professional Teaching Standards is not the first organization to struggle with the matter of recognizing specialties as opposed to general knowledge and skills, as regular debates in the states, in the research literature, and within the profession suggest. The National Board sought to take advantage of these discussions by looking to their findings for criteria that might appropriately be applied to the design of a system of advanced certification for teachers. The clustering concept used in this document reflects the nation's ongoing efforts to organize the economy into coherent sectors that will facilitate the development and implementation of a national skills standards system. These clusters provide the basis for issuing industry-recognized, portable credentials and career majors in a national school-to-work system designed to develop a world-class work force. Therefore, the rationale behind the structure advanced in this document stems from the notion that career and technical education should prepare students, not just for a first job but for a promising career within a particular sector of the economy. Thus, teachers need to be broadly grounded in their outlook and their practice to afford their students this more ambitious sense of possibility and the wherewithal to take productive first steps in the marketplace.

In developing NBPTS Standards and National Board Certification in the area of Career and Technical Education, the following criteria were applied to the process: There should be a common, coherent, and substantial body of knowledge associated with each industry cluster; there should be a substantial number of teachers whose practice can be encompassed within each field; the fields should not be so broad that expertise about any one of them is beyond the grasp of accomplished teachers; each field should be readily distinguishable from all others; current career and technical education teachers should be able to see themselves functioning well within one or more industry clusters. Furthermore, it was decided that encouraging teachers to develop expertise in each cluster is a sound decision from an education and policy perspective.

With these ideas in mind, the Career and Technical Education Standards Committee has advanced the following eight industry clusters as areas within which teachers should be able to seek National Board Certification as accomplished career and technical educators: agriculture and environmental sciences; arts and communications; business, marketing, information management, and entrepreneurship; family and consumer sciences; health services; human services; manufacturing and engineering technology; and technology education.

The Career and Technical Education Standards Committee has drawn on the critical ideas embedded in key legislation, as well as on the experience of accomplished teachers, researchers, and other career and technical education professionals to develop its standards

for accomplished practice in this field. This standards document represents a consensus that has emerged from an extensive process of debate and discussion. Though this consensus is still relatively new, it is hoped that these standards will serve as a catalyst for change in the quest for stronger career and technical education for the nation's students.

Developing High and Rigorous Standards for Accomplished Teaching

In 1994, a committee of career and technical education teachers and other educators with expertise in this field began the process of developing advanced professional standards for teachers of students ages 11–18+. The Career and Technical Education Standards Committee (then known as the Vocational Education Standards Committee) was charged with translating the Five Core Propositions of the National Board for Professional Teaching Standards into a standards document that defines outstanding teaching in this field.

This NBPTS Standards document describes in observable form what accomplished teachers should know and be able to do. The standards are meant to reflect the professional consensus at this point about the essential aspects of accomplished practice. The deliberations of the Career and Technical Education Standards Committee were informed by various national and state initiatives on student and teacher standards that have been operating concurrently with the development of NBPTS Standards. As the understanding of teaching and learning continues to evolve over the next several years, *Career and Technical Education Standards* will be updated again.

An essential tension of describing accomplished practice concerns the difference between the analysis and the practice of teaching. The former tends to fragment the profession into any number of discrete duties, such as designing learning activities, providing quality explanation, modeling, managing the classroom, and monitoring student progress. Teaching as it actually occurs, in contrast, is a seamless activity.

Everything an accomplished teacher knows through study, research, and experience is brought to bear daily in the classroom through innumerable decisions that shape learning. It frequently requires balancing the demands of several important educational goals. It depends on accurate observations of particular students and settings. And it is subject to revision on the basis of continuing developments in the classroom. The professional judgments that accomplished teachers make also reflect a certain improvisational artistry.

The paradox, then, is that any attempt to write standards that dissect what accomplished teachers know and are able to do will, to a certain extent, misrepresent the holistic nature of how teaching actually takes place. Nevertheless, the fact remains: Certain identifiable commonalities characterize the accomplished practice of teachers. The 13 standards that follow are designed to capture the craft, artistry, proficiency, and understandings—both deep and broad—that contribute to the complex work that is accomplished teaching.

The Standards Format

Accomplished teaching appears in many different forms, and it should be acknowledged at the outset that these specific standards are not the only way it could have been described. No linearity, atomization, or hierarchy is implied in this vision of accomplished teaching, nor is each standard of equal weight. Rather, the standards are presented as aspects of teaching that are analytically separable for the purposes of this standards document but that are not discrete when they appear in practice.

The report follows a two-part format for each of the 13 standards:

- I. *Standard Statement***—This is a succinct statement of one vital aspect of the practice of the accomplished Career and Technical Education teacher. Each standard is expressed in terms of observable teacher actions that have an impact on students.
- II. *Elaboration***—This passage provides a context for the standard, along with an explanation of what teachers need to know, value, and do if they are to fulfill the standard. The elaboration includes descriptions of teacher dispositions toward students, their distinctive roles and responsibilities, and their stances on a range of ethical and intellectual issues that regularly confront them.

Finally, a word about the order of presentation. The 13 standards have been organized around the effect of teacher actions on student learning. They are divided into four categories: (1) teacher actions that create the conditions for productive student learning; (2) teacher actions that directly advance student learning in the classroom; (3) teacher actions that help students transition to work and adult roles; and (4) teacher actions that indirectly support student learning through professional development and outreach initiatives.

Career and Technical Education STANDARDS

(for teachers of students 11–18+)

OVERVIEW

The National Board for Professional Teaching Standards has developed the following 13 standards of accomplished practice for career and technical education teachers. The standards have been ordered as they have to facilitate understanding, not to assign

priorities. They each describe an important facet of accomplished teaching; they often occur concurrently because of the seamless quality of teaching. The standards serve as the basis for the National Board Certification in this field.

Creating a Productive Learning Environment

- I. **Knowledge of Students (p. 9)**
Accomplished career and technical educators are dedicated to advancing the learning and well-being of all students. They personalize their instruction and apply knowledge of human development to best understand and meet their students' needs.
- II. **Knowledge of Subject Matter (p. 13)**
Accomplished career and technical educators command a core body of knowledge about the world of work in general and the skills and processes that cut across industries, industry-specific knowledge, and a base of general academic knowledge. They draw on this knowledge to establish curricular goals, design instruction, facilitate student learning, and assess student progress.
- III. **Learning Environment (p. 31)**
Accomplished career and technical educators efficiently manage their classrooms and create an environment that fosters democratic values, risk taking, and a love of learning. In this environment, students develop knowledge, skills, and confidence through contextualized learning activities, independent and collaborative laboratory work, and simulated workplace experiences.

IV. **Diversity (p. 35)**

Accomplished career and technical educators create an environment where equal treatment, fairness, and respect for diversity are modeled, taught, and practiced by all. They take steps to ensure quality career and technical learning opportunities for all students.

Advancing Student Learning

V. **Advancing Knowledge of Career and Technical Subject Matter (p. 39)**

Accomplished career and technical educators foster experiential, conceptual, and performance-based student learning of career and technical subject matter and create important, engaging activities for students that draw upon an extensive repertoire of methods, strategies, and resources. Their practice is also marked by their ability to integrate career and technical and academic disciplines productively.

VI. **Assessment (p. 45)**

Accomplished career and technical educators utilize a variety of assessment methods to obtain useful information about student learning and development, to assist students in reflecting on their own progress, and to refine their teaching.

Helping Students Transition to Work and Adult Roles

VII. Workplace Readiness (p. 49)

Accomplished career and technical educators develop student career decision-making and employability skills by creating opportunities for students to gain understanding of workplace cultures and expectations.

VIII. Managing and Balancing Multiple Life Roles (p. 53)

Accomplished career and technical educators develop in students an understanding of the competing demands and responsibilities that are part of the world of work and guide students as they begin to balance those roles in their own lives.

IX. Social Development (p. 57)

Accomplished career and technical educators develop in students self-awareness, confidence, character, leadership, and sound personal, social, and civic values and ethics.

Improving Education through Professional Development and Outreach

X. Reflective Practice (p. 61)

Accomplished career and technical educators regularly analyze, evaluate, and strengthen the effectiveness and quality of their practice through lifelong learning.

XI. Collaborative Partnerships (p. 65)

Accomplished career and technical educators work with colleagues, the community, business and industry, and postsecondary institutions to extend and enrich the learning opportunities available to students and to ease school-to-work transitions.

XII. Contributions to the Education Profession (p. 69)

Accomplished career and technical educators work with colleagues and the larger educational community both to improve schools and to advance knowledge and practice in their field.

XIII. Family and Community Partnerships (p. 73)

Accomplished career and technical educators work with families and communities to achieve common goals for the education of all students.

The pages that follow provide elaborations of each standard that discuss the knowledge, skills, dispositions, and habits of mind that describe accomplished teaching in the field.

Creating a Productive Learning Environment

The following three standards form the knowledge base of accomplished career and technical educators. The requisite knowledge of students, subject matter, and learning environment form a foundation for the remaining standards. Only by knowing students well can teachers make instructional decisions

appropriate to their unique individual needs. For teachers to practice at an accomplished level, knowledge of students must be combined with a command of subject matter and the ability to create a productive learning environment.

Standard I: Knowledge of Students

Accomplished career and technical educators are dedicated to advancing the learning and well-being of all students. They personalize their instruction and apply knowledge of human development to best understand and meet their students' needs.

The career and technical education classroom, like the world of work, is often a complex, multifaceted place, with a range of tasks and activities competing for attention and with a range of students with varying needs ready to take on these challenges. Whether instruction is individualized, organized around teams, or focused on the class as a whole, teachers must stand ready to engage each student personally in the work at hand. To accomplish this, teachers¹ must know their students well. But knowing them well cannot be limited to knowledge of their backgrounds or their prior learning or experiences; it must also include a knowledge of student career interests and opportunities as well as the repertoire of approaches that each student takes to his or her own learning. Even this extensive base of knowledge is insufficient without a deep concern for and commitment to all students.

Dedication to All Students

Like accomplished teachers in all fields, career and technical educators are dedicated to the education of all students. Their actions are fueled by a commitment to see students make a successful transition from the world of schooling to work. Career and technical educators also have a rich history of welcoming a diverse clientele into their classrooms. They tailor instruction and assessment to meet the needs of all students equitably, including those with special needs associated with disabilities or other unique characteristics or qualities related to culture, gender, or language. They challenge students with high expectations, encouraging them to make strides no matter what their level of competence is at the outset of the school year.

In order to meet students' needs and subsequently bring them to new depths of understanding and skill, teachers are mindful that each student learns in his/her own way. Teachers are well grounded in learning theory and have a rich repertoire of methods to engage students productively in learning.

1. All references to teachers in this document, whether explicitly stated or not, refer to accomplished Early Adolescence through Young Adulthood/ Career and Technical Education teachers.

They take great pride in their ability to motivate young people, playfully cajoling or quietly observing individual students as needed. This understanding of what students know and can do, combined with their understanding of student attitudes, beliefs, and values, allows them to design meaningful instructional tasks for all students. It also provides them with the ability to determine proper student placement, especially where programs are carefully sequenced.

Using a Systematic Assessment Process for Understanding Student Needs

Teachers employ a range of systematic methods to find out about their students' needs. They are skilled at assessing students in the context of work, often bringing individual students into a given skill, process, or technique gradually, and creating the opportunity to personally judge student achievement and readiness for the next steps. Comfortable in the role of coach to student worker or apprentice to master, teachers learn to understand the influences of students' strengths and interests, as well as the way culture and prior learning experiences or background shape classroom behavior. When needed, teachers are also able to call on more formal assessment to help make judgments about students. (See Standard VI—*Assessment*.) These observations and understandings ultimately guide teacher decision making about content and processes toward decisions that are the best fit for a particular group of students.

Being Alert to the Particular Needs of Individual Students and the Changing Nature of the Labor Market and Workplace

In addition to bringing a wide variety of skills, talents, and abilities to the classroom, most students are also greatly concerned about their future. Therefore, the career and technical education classroom is centered not only around student needs, interests, and academic preparation but also around future aspirations, vocations, workplace values, and life skills. In order to create a learning environment to address both the commonalities and the differences that characterize their students, teachers are well versed in areas of particular importance to adolescents and young adults, including the requirements of local businesses and industries and the potential availability of work; the workplace environment of the businesses in question; and the need for, desirability of, and availability of further educational opportunities. To use this knowledge effectively, teachers are skilled at forming relationships with students, knowing them as well as a coach may know an athlete.

Teachers know that school is a time of exploration and discovery for their students. It is also a time during which the development of a positive self-image rests, in large part, on acquiring and demonstrating skill and competence in school. Teachers help students gain a sure footing by exploring problems and issues they have never previously confronted—problems that are likely to be encountered in the workplace, that develop their knowledge and skill base, and that yield a sense of satisfaction when solved well. Teachers acknowledge the importance of working simultaneously on these goals. For example, whereas they create opportunities in their curriculum that allow students to gain mastery of a set of specific skills, they

Standard II: Knowledge of Subject Matter

Accomplished career and technical educators command a core body of knowledge about the world of work in general and the skills and processes that cut across industries, industry-specific knowledge, and a base of general academic knowledge. They draw on this knowledge to establish curricular goals, design instruction, facilitate student learning, and assess student progress.

A sound foundation in content is the key to all accomplished teaching. In the field of career and technical education, the whole notion of what it means to know subject matter has changed over time. Previously, the focus of a career and technical educator's practice was on the development of skilled artistry within a specific occupation. Consistent with the philosophy embodied in many of the most forward-thinking career and technical policy pronouncements,² career and technical education has been reconceptualized to emphasize two distinct bodies of knowledge woven together by teachers into a unified vision of accomplished practice and used to prepare students for meaningful and rewarding work in high-performance settings. The first of these bodies of knowledge is a common core of career and technical knowledge, which includes general academic content, workplace skills, and a knowledge of skills and processes that cut across industries. The other body of knowledge concerns a specific industry cluster: groups of industries that are related by virtue of common production procedures, distribution methods, and/or underlying disciplines.

Common Core of Career and Technical Knowledge

All accomplished career and technical educators have command of a common core of career and technical knowledge and skills. One subset of this knowledge is often referred to as “workplace basics” or “employability skills,” and includes important qualities needed to function in the workplace, such as interpersonal skills, critical-thinking abilities, basic communication and mathematical skills, and familiarity with the latest technology, including computers and automation. In addition to these skills, teachers have general industry knowledge, knowledge of a core set of disciplines that allows them to integrate academic and career and technical education, and professional knowledge about programs and trends in career and technical education. These areas are discussed in the sections that follow.

2. This includes legislation such as the federal government's Carl D. Perkins Vocational and Applied Technology Education Act of 1990 and the School-to-Work Opportunities Act.

Understanding Workplace Basic Skills

Accomplished career and technical educators are knowledgeable of the many general skills and attitudes that need to be inculcated in students to make them successful in employment and in life. This knowledge can be clustered into six key areas: interpersonal skills (such as negotiation, working on teams, leadership, and understanding the rewards and difficulties of working with others who in

some way differ from you); resource allocation (which includes creative thinking and problem solving); technology usage; information acquisition and usage; systems operation; and health and safety issues.

In order to help ensure that their students will meet with success in the workplace, teachers place particular importance on helping students develop the skills associated with working with other people, whether they are colleagues on a team, suppliers, customers, supervisors, or subordinates. Teachers have firsthand knowledge of the demands of workplaces, including collaborating with others, responding to client needs, leading a team, and working well with people from different walks of life. They help students understand the importance of customer relations, that production takes the cooperation of many people—whose views and values may differ from the students' own. Organizing their classrooms with attention to such interpersonal relationships—by having students work in teams, share production tasks, and model the kind of client-centered courtesy that employers seek—is one way teachers create well-rounded, competent, and self-directed students.

Key to successful completion of work in any industry is the ability to use one's mind well. Teachers have a repertoire of strategies and approaches for projects and activities that are useful in helping students develop the judgment and decision-making and problem-solving skills central to workplace and life success. Teachers themselves possess critical-thinking abilities and model for their students the kind of analytic thinking they value. They view the projects and tasks they create for students as existing beyond a set of discrete skills; they see them instead as an opportunity for the development of student reasoning abilities, including the ability to evaluate risks, examine alternatives, recognize trends, and deal with uncertainty. They know that the world of employment offers ample opportunities for those who can think through workplace issues thoroughly, take direction, work

collaboratively, and demonstrate occupational and career competencies.

Teachers also know about the basic academic skills that underlie all workplace environments and know how to work with students to ensure that they will enter the workplace with these skills soundly in place. These include the communication skills necessary to convey product or process information, or to discuss important issues in an office, clinic, factory, business, family, or farm. They know the mathematics and science concepts fundamental to most industries, particularly those germane to the industry in which they have specialized knowledge. They are also knowledgeable about technology usage, particularly about the types of technology that are common to most workplaces (e.g., computers and telecommunications, automation and robotics) and know about the most common applications of these technologies in industry.

Teachers know that many job processes are dependent on the ability to acquire and use information well, and they are well-versed in many of the techniques that are commonly used for gathering, storage, and retrieval of data needed in many work settings. They understand how different industrial systems operate across the economy and know the kinds of roles workers play in making those systems run well. Finally, they know about the health and safety issues that workers commonly confront on the job—such as the kinds of protective clothing that might be required when handling toxic substances—and stay abreast of the evolving knowledge and controversies in these areas.

They also understand that in addition to teaching these workplace skills, the most important outcome of a first-rate program is the development of students with a sense of responsibility, self-confidence, well-honed social skills, and integrity. Teachers know how to design opportunities for the development of such aspects of personal character in ways that recognize that such traits are

best developed in the context of real experience, including the chance to try and fail and ultimately to demonstrate successful growth as a potential employee.

Commanding General Industry Knowledge

In addition to possessing workplace basic skills, accomplished teachers know the general skills and processes found in all industry clusters. They understand the process of acquiring a craft, the bases of different industries, and the process of exploring a career and planning for the future. They understand that students may need a variety of exploratory experiences to help their future decision making and are adept at designing such experiences. They are well versed about the basic purposes, skills, and issues central to different careers. For example, they know that students who are especially interested in working with the natural world might find a variety of attractive career options within those clustered around agriculture and environmental sciences. Or, if students express an interest in the constructed environment, teachers can direct them toward programs that develop the skills needed to pursue a range of employment opportunities in manufacturing and engineering technology.

As part of their general industry knowledge, teachers have a basic understanding of the range of fields, occupations, or industry clusters that make up career and technical education, and they are able to introduce students to them. Teachers have a broad understanding of the basic purposes, issues, skills, nature of work, and major concepts that undergird the industry cluster in which they specialize. Teachers are also knowledgeable about workplace economics; they understand labor market conditions, macro-economic factors of the United States and global economies, the basics of supply and demand, current employment patterns, and

projections and trends for future employment. They stay abreast of general structural changes in the economy, which at the present time would include industry-wide trends such as preferences for multiskilled workers, part-time employees, and quality assurance.

Teachers understand how to use this knowledge to help students make career decisions. For many students, the task of choosing an area of focus is not easy. Within a given industry, teachers understand which career paths and occupational structures are promising and which may be more limiting. They see their role, in part, as serving as a career counselor to their students. They draw on their industry knowledge and their knowledge about the way young people think about their futures to guide students as they begin to make career choices. Understanding that students often make decisions on the basis of knowledge or aspirations circumscribed by their life experiences, teachers strive to expand students' horizons and open their eyes to a variety of rich and rewarding possibilities. They help students recognize potential dead ends and, because of their general industry knowledge, are able to guide students in more promising directions.

In order to be fully effective in these roles, teachers must also know about specific program structures and key legislation germane to career and technical education classrooms. For example, teachers are knowledgeable about articulation agreements and relationships with other institutions, elementary school through the postsecondary level. They know about transition programs that connect students' secondary schooling experiences with the workplace or further educational opportunities; they know about the quality of each. They are also familiar with principles that lead to the design and delivery of successful cooperative education methods, including youth apprenticeship programs, internships, job shadowing, and school-based enterprises. They establish and maintain active advisory committees to guide their work in curriculum and in developing



simulated and off-site experiences for students.

Beyond career decision making, teachers understand firsthand the process of “growing into” an industry, which includes such notions as apprenticing alongside a master and gradually assuming more responsibility. They know how to help students get a sense of the operation, rhythm, roles, and tasks that may be required of them in a given segment of an industry. They are aware that for novices, it is difficult to see beyond one’s specific task. Because teachers understand the “big picture” themselves, they know how to design activities that allow students to understand individual work in the context of broader industry goals. Teachers use this knowledge to organize instruction in school and work-site learning experiences that enable students to more effectively learn how to acquire skills, gain a perspective on a career, and embark successfully on their first jobs.

Integrating Career and Technical Content with Other Disciplines

By its nature, a sound approach to career and technical education demands the infusion of the core disciplines in the school curriculum—English language arts, history and social studies, mathematics, and science—into the career and technical education curriculum. Teachers not only have to understand these disciplines, they must also know how to select from among the concepts and skills integral to these disciplines those that will allow them to create powerful learning experiences for students. This foundation allows teachers to develop contextualized learning activities, such as project-based learning, and to design courses and activities soundly, knowing when a student may need additional academic support. In most cases, despite teachers’ extensive personal knowledge, a comprehensive approach to teaching

demands collaboration with colleagues. For example, in a Geo-Space Academy, teachers with expertise in math and science might collaborate to design a unit and help students present information and results of their experiments on space-related projects (e.g., the use of hydraulics in space, robotics, or earthquakes on various planets) to members of the business community. Their English-teacher colleagues might work alongside them to help their students learn to formulate interview questions, use effective follow-up questioning strategies, and read historical accounts of space exploration. In collaboration with social science colleagues, they might consider the controversies that have surrounded manned space flights. In science, topics might include basic astronomy, spectroscopy, gravitation, satellite motion, and prospects for a space-based telecommunications industry. Such collaborations can be as limited as calling on colleagues for curricular assistance and information or as expansive as designing interdisciplinary units for an entire team of teachers. Whatever the focus of collaboration, career and technical educators stand ready to work with colleagues to further the goals of integrating career and technical education and academic content.

To integrate curriculum as an independent teacher or as part of a collaborative team, accomplished teachers have a broad knowledge of the core curriculum of the school—English language arts, history and social studies, mathematics, and science. As part of their specialized expertise as career and technical educators, they may also command a greater depth of knowledge in one or more disciplines closely related to the industry cluster in which they specialize. For example, although all teachers are familiar with the fundamentals of science, it is understood that because of the nature of their specialty, teachers in the health services area have more background in the biological sciences. The following sections outline the knowledge base of teachers in the core curricular areas.

English Language Arts

Because communication is central to all employment, accomplished career and technical educators have a sound background in the English language arts. They understand that facility in reading, writing, speaking, and listening crosses curricular boundaries, and they work to incorporate language learning into their students' classroom experiences. They emphasize the usefulness of these skills in student internships, work-based learning sites, and future employment positions. They model the use of standard English in their speaking and writing and help students understand its critical importance in the workplace.

These teachers understand the full range of value inherent in writing—from the development of thinking skills to its usefulness for the expression of both personal and work-related ideas. They recognize the importance of students' becoming adept at writing for different purposes. They help their students construct sound arguments to support their beliefs and help them to understand the importance of using evidence to support such arguments, as opposed to simply making assertions that may or may not have a foundation in fact. Teachers understand the range of situational contexts that will apply to many of their students' future workplaces—the way, for example, grammatical conventions are often dropped in advertising, or the way the language of a technical report differs from the language of a letter to a client. They help students understand the language conventions that are appropriate for specific audiences or purposes, and they also work with students to understand the importance of the individual's role in making decisions about appropriate language use. Although they lead students to develop their own useful and comfortable approaches to writing, they also make sure students become adept at producing writing that is particularly suited for the workplace, such as technical

reports. Teachers are knowledgeable of the specific writing applications appropriate to the industry cluster in which they specialize. They encourage experimentation and provide students with many different writing experiences—writing journals, work plans, letters to businesses and customers, advertisements, and numerous others that involve using writing to discuss products or services. In order to provide students with responses from a variety of sources and allow them to share and explore their thinking and writing with different audiences, teachers arrange opportunities for students to write in different settings—on their own, in groups, and with direct teacher input. Teachers understand how effective writing develops and how to use and explain grammatical conventions, and they use this knowledge to assist their students in becoming more effective writers.

In addition to their knowledge of writing, teachers have a solid grounding in the important ideas, concepts, and strategies central to developing expertise in reading and oral discourse for different audiences. They know how to support the oral language development of their students—including those learning English as a new language—and, in their teaching, foster and support language acquisition and development, especially as it relates to effective communication.

Teachers know that skill in reading develops over a lifetime only when people continually extend their reading experiences. They know how to work with students to help develop their skill at textual interpretation, including how that process differs according to the nature of the material and the purpose of the reading task. Within their classes, teachers direct their attention to helping students learn to interpret materials common to their industry cluster. They seek to foster the development of students' comprehension, analysis, and application of a variety of materials, including manuals, records, and technical papers.

History and Social Studies

Accomplished career and technical educators have a knowledge base in history and the social studies, which includes geography, political science, and economics in general and particular strands of these disciplines that are germane to the world of work. Teachers also have a solid understanding of the history of their field and the events, ideas, and individuals that have intersected to produce change over time; they are also familiar with the forces that have helped maintain continuity. Teachers stay informed of current social, political, and economic questions. They understand how these questions fit into the context of the sector of the economy in which they specialize; they also understand the labor issues and related economic issues as they affect industrial development and productivity. They know the history of work and labor, including the events and issues that led to the development of organized labor unions in the United States. They know how these questions interconnect, and they help students appreciate these relationships so they can learn how to make informed and reasoned decisions, both as participants in democratic institutions and as members of labor or management. They understand the workings of the United States economy and its effects on industry and the prospects for employment, particularly in their local communities. This understanding involves an awareness of international trade and competition and how the economies of other countries can directly affect the economy of their own communities.

Teachers' knowledge of geography includes how geography has helped shape the history and economic development of regions and the relationships between and among regions of the world. They also understand relationships among people, places, and environments. They understand how a range of global issues affects the workplace. These issues include the effect of the value of the dollar on the world market

and how it might benefit or harm the productivity of an individual factory and the ways in which international copyright law influences decisions in the production of media. They know about international labor issues and are cognizant of human rights issues germane to the world of work.

Career and technical educators demonstrate an understanding of the economic system of the United States and how it operates; they can compare and contrast it with the economic systems of other nations. They also know the economic issues that will affect students in their personal lives, such as the challenges that face the individual consumer. Career and technical educators have a deep knowledge of the history and economics of work and the workplace, including the major developments that have changed the nature of work and the workplace over time. They have a knowledge of the history of child labor and the nature and extent of child labor in today's global economy. They have a knowledge of how these changes have impacted the relationship between and among workers and between workers and employers. They know the history of organized labor as well as the structure, goals, activities, and contemporary issues relating to the labor and federal laws and the dynamics of collective bargaining.

Teachers are knowledgeable about the major historical issues that have faced the United States and its people; they are also aware of the nation's place in the world and of the contributions of many cultures to the fabric of the nation. Teachers may focus student work on major historical and economic themes, issues, people, and events relevant to the project or field of study at hand. They also focus on the psychology and sociology of the workplace, specifically helping students make sense of data, studies, and reports about the organization of the workplace and the rewards and stresses that may affect them as workers. Ultimately, teachers use the study of history and the social

sciences to establish a learning environment that models democratic values, contributes to students' appreciation and respect for diverse viewpoints, and encourages the growth of leadership skills and abilities. Furthermore, teachers use history to help students understand the labor, economic, and social issues that have influenced the evolution of industries and that provide perspective on the economics, sociology, and politics of today's workplace.

Career and technical educators' knowledge of political science includes basic tenets of political philosophy, with an emphasis on the principles of democracy and how it differs from other forms of government. They have a working knowledge of the Constitution as a social contract that defines the nation's democratic government and guarantees individual rights. Teachers know how government at its various levels works and how they and their students can play an active role in it. They encourage their students to develop civic and democratic values as integral elements of good citizenship. Their classrooms reflect democratic values of participation, fair play, respect for others, due process, rights, responsibilities, and justice. Teachers help students learn that people in a democratic society have the right to disagree, that different perspectives have to be taken into account, and that judgment should be based on evidence and not assertion, bias, or emotion.

Mathematics

Accomplished career and technical educators have specific knowledge about the foundations of mathematics as well as a core knowledge of all areas of mathematics, including number systems and theory, algebra, geometry, statistics, and probability—and, where applicable to their area of expertise, calculus and discrete mathematics. Applied mathematics is a central feature of most, if not

all, the career paths students will follow, whether these are managing the statistical processes for inventory and daily cash flow at a retail outlet, designing a building, or interpreting a graphical analysis of cost trends. Career and technical programs give teachers a unique opportunity to develop mathematical skill in context, and teachers help their students achieve a solid foundation in the range of mathematical ideas and operations as well as in the problem-solving skills they need to address commonplace issues. Teachers help students to understand the use of numbers in a variety of settings and to begin to think mathematically: to form and solve problems; to conjecture and discuss in mathematical terms; to recognize patterns; and to understand mathematics well enough to use it as a tool for communication.

Teachers make students comfortable and confident using mathematics as a tool to accomplish the work of their industry and to manage the personal economics of their homes and families. As part of the overall problem-solving strategies students use in product design and creation, they investigate the reasoning behind mathematical claims and learn to solve a wide range of practical problems. They know how to apply their mathematical knowledge in a variety of situations beyond computation and can explain their thinking to others orally, in writing, and through the use of graphical representations.

Science

Accomplished career and technical educators are knowledgeable about a variety of scientific principles and properties applicable to all areas of career and technical education. In the physical sciences, these include the basic properties of matter and principles governing its interactions; the forms energy takes, its transformations from one form to another, and its relationship to matter; motion and the principles that explain it; the nature of atoms and molecules; and the

forces that exist between and within objects and atoms.

In the life sciences, teachers know about the diversity and unity that characterize life, the genetic basis for the transfer of biological characteristics from one generation to the next, the structure and function of cells, the life cycle (particularly in reference to the human organism), the dependence of all organisms on one another and on their environment, the cycling of matter and flow of energy through the living environment, and the basic concepts of the evolution of species.

Teachers are also knowledgeable about earth and space sciences, including the origin, composition, and structure of the universe and the motion of objects in it; the uniformity of materials and forces found everywhere in it; the motions of the earth and the materials and systems that compose it; the processes that shape the earth's surfaces; and the relation of these cycling processes to the living environment. They understand the relationships of these sciences to one another and to other disciplines. They use their knowledge of science to examine and understand the changes in today's world and to help students do the same.

Teachers approach science as an integrated field. They engage their students in considering the relationships among science, technology, and society and how these relationships are changing their lives and shaping their values. For example, teachers encourage multidisciplinary approaches to the study of topics such as the impact of robotics on a changing world and how developments in automation may effect the way people do their jobs in the future.

Teachers create opportunities for students to act, think, and communicate as scientists. They frame instruction to encourage students to study, question, and explore ideas, topics, and concepts. They ask questions that require students to probe important issues and think through a range of responses. As with mathematics, the process of science mirrors the

problem-solving strategies used in career and technical classrooms and workplaces. Teachers create projects that place science in the context of work; for example, they might develop recycling projects so students might come to understand waste management issues that affect the workplace. Teachers engage students in the techniques of gathering, organizing, and evaluating scientific information related to projects. Students build their knowledge of the world when they are confronted with problems that challenge their creativity and imagination and when they have the opportunity to compare their ideas with the hypotheses of others. The students of accomplished teachers plan projects, ask questions, make observations, interpret data, and draw conclusions, and they do so in a physically and intellectually safe manner. Through these experiences, students learn to extend methods and skills of scientific inquiry to their careers of interest while developing a scientist's appreciation, curiosity, and respect for empirical evidence.

Industry-Specific Knowledge

Coupled with the common core of knowledge described above, accomplished teachers have command of industry-specific knowledge. This knowledge can be separated into two categories: in-depth knowledge of particular aspects of the industry and a broad knowledge that cuts across all aspects of an industry.

Teachers are knowledgeable about the subject matter in their field, including new developments, findings, and technology. They explore their subject areas thoroughly in order to establish and maintain a firm grasp of the content in their field. In addition, they recognize that staying informed contributes to the school-to-work expectation of their work. Given how quickly fields change, nothing could be more crucial than meeting these multiple demands; therefore,

they find ways to stay abreast of current technological advances, changes in the workplace, and shifts in consumer markets. They do so by staying actively involved in the schools and in the workplace. They read journals, talk frequently with industry experts, and may arrange for their own externships. They may also keep up with their field through part-time consulting, by spending a significant amount of time seeking work-based learning experiences for their students, or by owning their own businesses. They know their classrooms can only be living laboratories if they themselves are continually engaged in their industry. They are also cognizant of their field's definitions of competence, including industry skill standards. They know what students need to know and be able to do in order to demonstrate competence in the field, secure an initial job, and advance in the field.

Accomplished teachers have a broad understanding of the sector of the economy in which they specialize, including the necessary planning, management, finance, technical, and production skills; underlying principles of technology; and related labor, community, health, safety, and environmental issues. Such knowledge is important not only to inform decisions about curriculum design, but also because teachers understand that some students may be too immature to make permanent career decisions and therefore need to be exposed to the wide spectrum of opportunities within a given career cluster. Teachers also know it is difficult for students to imagine a future that involves options other than those they see in their immediate surroundings. By providing them with knowledge and experience in many aspects of a career cluster, teachers help students to gain capacity, understanding, and habits of mind that can often be transferred to another industry. For example, in addition to learning the specifics of food production in a culinary course, students might also learn the different jobs involved in planning, designing, and

running a restaurant through experiences in school-based enterprises. Likewise, in a building-trades academy, students may learn about architecture, engineering, interior design, planning, and housing policy, as well as carpentry, masonry, plumbing, and electricity. In addition to knowing about prospective occupations such as soil technologist, paper products manufacturer, or greenhouse owner, agriscience teachers are knowledgeable about agriculture as a system, and about the economic and social role it plays in the local community and in the state, nation, and world.

Accomplished career and technical educators are well versed in the subject matter of one of eight broad economic sectors. These areas are technology education, which focuses on the development of skills that have application in many industries and their related careers but is not itself typically a specific career focus; agriculture and environmental sciences; arts and communications; business, marketing, information management, and entrepreneurship; family and consumer sciences; health services; human services; and manufacturing and engineering technology.

What follows is a description of teacher knowledge about each of the career cluster areas. Within each cluster, they know the range of careers that are available to students and are able to guide students toward choices that are promising, interesting, and appropriate.

Agriculture and Environmental Sciences

The careers in this area share a focus on natural resources and include such areas as agriscience, animal science, agricultural business management, agricultural mechanics, earth sciences, environmental sciences, fisheries management, forestry, horticulture, and wildlife management. In addition to a strong knowledge base in the life sciences, teachers in this industry cluster also know about the issues related to the production of food and

other products, and about a range of other related issues, including finance, processing, marketing, distribution, supply for production, management of land and water, and the social and political dimension of natural resource systems. Their knowledge is centered around the key themes of environmental science which are food and fiber systems; the historical, cultural, and geographic significance of products for a specific region; the interdependence of the environment; animal husbandry; and food, nutrition, and health.

Teachers also have specialized knowledge of one of the specific areas within this cluster so that they guide students toward successful employment in that area. For example, in wildlife management, teachers understand the way habitat works for a given animal; understand macro- and microecological systems, including the natural systems that work to keep them in balance; know the different theories and practices in species management, including controversies over the best ways to maintain, increase, or decrease numbers or reintroduce depleted species to a range; are aware of the tension between preservation and development and the competition for habitat; and are knowledgeable about other political and social issues related to the management of wildlife.

Arts and Communications

What unifies this field is a focus on the creative use of symbolic or literal language to communicate ideas. Teachers expose students to the array of career possibilities that exist in arts and communications. Careers in this industry cluster can be put into three major categories: media arts (which includes film studies, music and video production, and radio and television broadcasting), writing and related arts (which includes journalism, translation, library sciences and services, advertising, and public relations), and graphic arts (which includes advertising design, graphic design, and printing production).

Teachers in these fields are knowledgeable about communications in all its various forms, including broadcast, electronic, and printed media. They understand the processes and equipment that go into the production of various media. Because so much of the work in these industries involves communication, teachers in these fields are skilled users of language and understand the conventions and styles that are employed across the spectrum of potential jobs. For similar reasons, they have a strong awareness of the fine and performing arts—music, visual art, dance, creative writing, and theatre. They have a clear aesthetic sense, know how to mentor students as they develop their skills, and know the kinds of tools and techniques that students will need in order to gain employment. For example, teachers know that in addition to possessing a range of traditional skills, today's students must come to the workplace ready and able to use computer-based design programs. They are familiar with software that is currently used in this industry cluster and know how to help students become proficient in its use. Also, because so much of the work in this cluster involves public presentation, teachers also know the kinds of communication skills that make presentations effective and persuasive.

Teachers also believe that successful employment requires an awareness of the current trends and sensibilities across the industry cluster. They therefore strive to know about and understand the direction each field within the industry cluster is taking, and, where needed, help students balance between developing their own sense of style and gaining an awareness of the tastes of the day. Teachers are also able to articulate the ethical dilemmas that exist in public relations and advertising, for example, and are able to help students think through issues such as the placement near schools of billboards for products with low nutritional value.

Business, Marketing, Information Management, and Entrepreneurship

Teachers in this broad cluster focus on education for and about business. Within this cluster are a multitude of career paths about which teachers are knowledgeable. The occupational and academic content may be distributed throughout such career areas as the following: accounting and finance; information systems; administrative office technology; marketing; and entrepreneurship. The knowledge may be applied in the context and scope of a particular business enterprise within one or more industries. Although teachers command a breadth of knowledge that cuts across all aspects of this career cluster, they also possess in-depth knowledge needed to prepare students for careers in at least one area. For example, accomplished teachers who prepare students for careers in marketing may also command the knowledge necessary for teaching accounting and finance. However, other accomplished teachers may possess the in-depth knowledge base in one career area.

Teachers involved with this cluster understand that for companies to be successful in today's rapidly changing marketplace, employees and entrepreneurs need to understand business and economic concepts, including the content areas of accounting, communications, economics, business law, entrepreneurship, information management, international business concepts, marketing, and management (including leadership). Teachers are knowledgeable of leading-edge technologies, such as telecommunications systems and total quality management, so that their students can be successful in high-performance organizations.

Teachers in the career area of accounting and finance have a thorough understanding of general accounting functions, payroll and personnel records, inventory systems, and business technology. Specialized teachers have in-depth knowledge in areas

specific to the industry, such as banking services. Teachers in advanced levels will have an understanding of areas such as managerial accounting.

The career area of information systems entails industry-specific knowledge in data functions, computer operations, and data systems and programs. This knowledge is applied in the context of the business and within an industry. Teachers of a management-level curriculum also have a thorough understanding of supervisory and management functions as applied in business environments focusing on information systems.

Teachers in the career area of administrative office technology possess specific knowledge in business communications, computer systems functions (such as word processing, spreadsheets, databases, and business graphics), and records management. They also have in-depth knowledge of the support tasks (such as communicating by telephone, receptioning, scheduling, coordinating meetings and travel, and mailing and shipping). At the management level, teachers have a thorough understanding of supervisory functions, the management of workflow and projects, strategic planning, and employee training and development.

The career area of marketing involves principles and techniques that can be applied within a variety of employment fields. A teacher may have general knowledge in marketing that can be applied across fields or in-depth knowledge in one or more areas specific to a career such as advertising, fashion merchandising, travel and tourism, financial services, food marketing, hospitality, distribution, and warehousing. Accomplished teachers also have a thorough understanding of various levels of employment opportunities in marketing, such as entry or career-sustaining levels, management, and the ownership of related businesses. The marketing functions serve as the basis for a teacher's in-depth knowledge, namely selling, promotion, pricing, purchasing, marketing information



management, product/service planning, distribution, financing, and risk management.

The career area of entrepreneurship involves principles and techniques from a host of subject areas related to business. Teachers understand the special skills of entrepreneurship associated with starting, owning, and managing one's own business. They especially have an understanding of marketing, finance, and management, as well as such concepts as risk, profit, independence, sacrifice, and leadership. As job security, long tenure, retraining, and advancement with one company become rarer, and as consultants or part-time workers with specific skills are engaged to increase the flexibility and lower the overhead expenses of business firms through outsourcing, growing numbers of individuals are becoming self-employed.

Accomplished teachers in the career areas within business, marketing, information systems, and entrepreneurship can apply their knowledge appropriately, according to several variables, including the business or organization's size (realizing the widespread growth of entrepreneurial small businesses and emerging growth businesses), setting (inside or outside the home), and sector (private or public). As in other industries, teachers in this sector stress the importance of flexibility of training and flexibility of mind, so that students are ready and able to shift careers and begin new challenges as the need arises.

Family and Consumer Sciences

Family and consumer sciences teachers demonstrate an understanding of the major concepts, theoretical views, scientific principles, resources, and skills that prepare students for family life, work life, and careers. They provide opportunities for students to develop the knowledge, skills, attitudes, and behaviors needed for strengthening the well-being of individuals and

families throughout the life span; becoming responsible citizens and leaders in family, community, and work settings; promoting nutrition and wellness throughout the life span; managing resources to meet the material needs of individuals and families; balancing personal, home, family, and work lives; using critical and creative skills to address issues in family, community, and work environments; functioning effectively as providers and consumers of goods and services; and obtaining entry-level positions in family and consumer sciences careers and other related careers. Teachers understand that social, cultural, cognitive, economic, emotional, and physical factors contribute to the well-being of individuals and families who can be empowered through education to maximize their potential and to function independently and collaboratively.

Teachers of family and consumer sciences prepare students to be productive members of society and lay the groundwork for students to pursue careers in such fields as child and elder care, clothing, and hospitality. Teachers have the skills to critique, develop, and implement policies that support individuals, families, and communities. They help students develop the capacities needed to balance work and family. They help students maximize their potential through problem solving, critical thinking, ethical reasoning, leadership, citizenship, and communication skills.

Teachers of young adolescents focus on assisting students in understanding the development and use of personal, social, and material resources to meet human needs, because these teachers believe family and consumer sciences can improve the quality of individual and family life. They help students confront many of the decisions they will make over the course of their lives concerning careers, leisure, community involvement, and personal and family relationships. Teachers of older adolescents may focus more directly on career paths in family and consumer sciences, as well as on

preparing students for the imminent responsibilities of managing work and family roles as dependable members of families and communities. The goals of teachers of family and consumer sciences span the areas of personal and family development, life-span human growth and development, parenting and child development, interpersonal skills, human sexuality, resource management, life and career planning, nutrition and food, wellness, living environments, and apparel and textiles. Across all these areas, teachers bring a strong background in psychology, health, and consumer economics.

Teachers of nutrition and wellness help students apply the concepts of nutrition to daily living and recognize the relationship between nutrition and wellness. These teachers know how to take advantage of technology and develop students' ability to meet the nutritional needs of different individuals, taking into account the economics of the food service industry. They also are knowledgeable about proper safety and sanitary procedures, the use and care of equipment and technology, and the techniques and aesthetic considerations used in preparation and service of foods in various settings (domestic and commercial).

The focus in the family relationships and human development area is primarily on the growth and development of individuals and the family across the life span. These teachers are knowledgeable about the contemporary issues facing individuals and families. Of primary interest are the physical, social, intellectual, and emotional characteristics of human development at every stage, and the material resources required to meet human needs. Teachers help students understand the personal needs and priorities of individuals at various ages and stages of the life cycle. They help their students understand the effects of communication skills, values, and cultural differences on family and workplace interactions and how to apply stress management

and coping skills to conflict situations. They develop and sharpen their students' problem-solving and decision-making skills, readying them for a range of personal issues. They also teach students how to relate to and learn from adults and younger children.

Within the clothing and textiles area, teachers are knowledgeable about clothing as it is influenced by many factors. They help students use technology in understanding textiles and fabric and clothing production, and they know the important cultural, aesthetic, and historical aspects of clothing and textiles. These teachers are knowledgeable about conservation issues as well as the variety of opportunities in the apparel and textile industries.

Finally, in the living environment area, teachers have a background in such topics as housing decision making and technology, home living and maintenance, and interior and exterior management. This allows them to assist students in learning about suitable housing options and in making decisions about housing needs, taking into consideration family needs and economic factors. In terms of design, teachers are knowledgeable about the multiple influences on architecture, as well as structural and decorative design. They are aware of the resource considerations involved in housing decisions, including energy conservation procedures and new technology; they know techniques and procedures for ensuring home safety; and they are familiar with maintenance techniques.

Family and consumer sciences teachers are committed to a program that has the unique focus of teaching about families, work, and their interrelationships. They consider the understanding of family and consumer sciences a progression of knowledge that ultimately empowers individuals and families across the life span to manage the challenges of living and working in society in fulfilling and productive ways.

Health Services

Health care reform is driving many changes in the industry, including new cost containment practices and a greater focus on preventive care and personal health responsibility that will lead ultimately to new job categories and the demand for different combinations of skills. Cross training, the creation of broader job definitions, and continued technological advances are anticipated to be important factors in the twenty-first century.

There are currently over 300 different health-related careers requiring various levels of education. Accomplished teachers know the different options, including the many careers related directly to patient care (e.g., nursing, psychiatry, and rehabilitative therapy), as well as those tied to the infrastructure of health care systems (e.g., biotechnology, hospital administration, and medical records).

Teachers know the issues central to the health industry as well as the variety of career paths within it. In addition, they know the main ideas and themes that students need to understand about this field, including the history of health care, health care delivery systems, human body systems, human development stages, the basics of diagnosis and first-aid, ethical and legal responsibilities, health care environment and safety issues, health care business practices, personal traits and health care planning, and patient contact skills. Because of the necessary focus on the body, health, and disease and other biological systems, teachers in these fields are knowledgeable about science—particularly biology and physiology—as well as health sciences.

In addition, teachers are aware of the rules and regulations set forth by health licensure and certification boards and agencies. These rules and regulations are intended to ensure safe practice and, in turn, ensure the safety of the practitioner and patient. They describe the scope of practice for individual practitioners, course content, and student-teacher ratios during lab practice and interning.

Human Services

What unites this career cluster is the focus on direct service to individuals in the community. As in the case of business, human services is a large sector of the economy that has many facets in both the public and private sectors, including education (preschool or day care, in particular), law and legal studies (court clerks, paralegals), law enforcement (police officers, forensic technicians), public administration (community planning, public works), child and family services (foster care, family support systems), religion (youth counselors, family support systems), and social services.

Because the field of human services is so heavily dependent on strong communication skills, teachers are especially knowledgeable about communication theory and English language arts. They know in particular the kinds of interpersonal skills that are valuable for students to have to be successful in this industry cluster, such as the need to be able to listen carefully and to respond authentically to the needs of others. They especially focus on helping students develop the skills needed to work with and understand individuals from a wide range of backgrounds and cultures and on helping students understand that the kinds of communication that work best in one setting may need to be modified substantially as circumstances change.

At a more specific level, teachers command a body of knowledge within a more narrow focus of the human services. For example, those working in education know about the development of young children; how to supervise and teach children in a variety of settings; the nutritional and other health needs of children; and the roles and responsibilities that are placed on those who work in day care centers, schools, and other settings that provide services to children and their families.

Teachers also help students understand the various legal and public policy issues that affect workers and clients in the public sector, ranging from the health and sanitation

legislation affecting day care centers to the current policy discussions relating to the rights of persons placed under arrest. They know how to nurture the leadership and self-direction that are critical in human services work—particularly important because of the generally entrepreneurial nature of client-centered work. They are also well versed in other essential core knowledge, including budgeting, ensuring healthy and safe environments, psychology and sociology, basic economic concepts, consumer rights and responsibilities, conserving and managing resources, and basic office practices.

Manufacturing and Engineering Technology

Though economic trends point to a shift toward a service- and information-based economy, the careers within this cluster continue to account for a significant percentage of the job market because they involve the design, manufacture, and maintenance of so many important items. Students prepared by career and technical educators in this area will build our homes, repair the plumbing, maintain and service our automobiles, and design and manufacture new products that may serve to make our lives easier. Within this cluster, teachers are knowledgeable about the following career paths: engineering-related technologies; mechanics and repair technology; manufacturing technology; and transportation, including the maintenance of transportation systems, energy technology, and built-environment technology.

Teachers in this cluster are knowledgeable about scientific principles and skilled in mathematics; they understand and know the applications and implications of the latest technology. In order to ensure that their teaching stays current with advancing technology, they develop programs centered around skill and performance standards developed by industry specialty groups.

As job processes become more intervention oriented, workers will need the skills to enter tasks or processes put in motion by others but maintained by new tools over which the worker has some degree of control. Workers are functioning increasingly as part of teams, with roles and responsibilities changing as the work changes. Therefore, teachers have strong interpersonal and communications skills and know how to foster those skills in their students.

Each of the unique specialty areas within this cluster has a substantial knowledge base with its own tools and technologies, industry standards, and ways of inducting new employees into the workforce. All teachers within this cluster have a general knowledge of those standards and processes. They know the general concepts that span this sector of the economy, for example, new and emerging technologies and materials, processing and feedback control, outputs and robotics, the role and function of tools and machines, entrepreneurship and economics, and computer skills (e.g., operations, interfacing, networking and controlling).

Within their own area of specialization, teachers know specific industry standards, tools, and methodologies and know how to work with students who hope to enter fields within this industry cluster. For example, within manufacturing technology, teachers know about the new methods of flexible production and about specific standards that encompass particular processes—metal joining, materials testing, safety and quality control, prototyping, service and maintenance, and numerical controls.

Teachers of built-environment technology command specific knowledge of the building trades, including plumbing, electrical wiring, and carpentry and have a basic grounding in related matters such as architecture, engineering, interior design, planning, housing policy, and construction technology. Examples of the skill standards these teachers know include those for construction technology, involving planning and layout processes, material

processing, assembly processes, cabinet making, work-site safety, masonry, and insulation tolls.

Technology Education

Technology education teachers direct student learning to broad thinking about systems rather than to the development of work skills specific to a single industry. They have an interest in interdisciplinary instruction to contextualize theory and extend industry knowledge beyond mere production. They are also knowledgeable about the techniques and tools that career and technical educators bring to solving problems in a variety of industries.

Technology can be defined as the use of knowledge, tools, and skills to solve practical problems; technology education involves introducing students to the concepts behind how technological systems work—specifically, that systems involve inputs, processes, and outputs. Although there are myriad applications and variations, teachers are knowledgeable about four types of systems: communication systems, transportation systems, manufacturing systems, and construction systems. Innovation happens quickly in technology; therefore, teachers build their ever-expanding and revised knowledge on processes that, while improved by technology, essentially remain the same. In communication, the processes they know involve encoding, transmitting, receiving, decoding, storing, and retrieving information. In transportation, these processes involve the routing, loading, moving, unloading, and storing of various goods. Manufacturing is seen as a system of locating material resources, extracting them, producing industrial materials, and producing products. Construction technology is a system of preparing the site for building, setting foundations for the structure, erecting the structure, installing utilities where required, and completing the site. Teachers know these systems and processes and guide students through lab-based learning

experiences that allow them to both understand each system and work at a particular process. For example, rather than read about a fiber optics system, students will hook up to one, troubleshoot it, and, if necessary, make modifications to improve efficiency. These teachers know how to develop problems that promote student learning around each of the communication processes.

Across the four systems on which these teachers focus, there are a large number of technological tools and processes. Although technology education teachers would not be expected to be experts in the use of all of these tools—for example, knowing computer-assisted design (CAD) to the extent required of a manufacturing and engineering teacher—they should be familiar enough with the general operations of such tools to introduce students to the general principles behind their use and how they operate in the systems being studied.

Teachers know the roles and responsibilities of workers at different stages in these systems, the problems that frequently arise, and innovations that have been designed over time to make systems operate more efficiently. For example, they know about the “Just-in-Time” philosophy of parts distribution (a solution to massive storage requirements) and about management principles designed to address problems of job stratification and worker alienation.

Within each of the four major technological systems, teachers know the history, development, and major achievements of various industries; the types of equipment in use; the career paths that are available to students; and the training needed at various levels. For example, in communication technology, they understand the functioning of satellite uplinks and downlinks, broadcast technology, laser/fiber optic communication systems, print and computer graphics, and the social consequences of these new technologies, both domestically and internationally. In order to direct students toward future training, teachers

Standard III: Learning Environment

Accomplished career and technical educators efficiently manage their classrooms and create an environment that fosters democratic values, risk taking, and a love of learning. In this environment, students develop knowledge, skills, and confidence through contextualized learning activities, independent and collaborative laboratory work, and simulated workplace experiences.

Supportive, collaborative learning environments where students are intellectually challenged and develop new knowledge, skills, and confidence are the result of the skill and hard work of accomplished teachers. To create environments where students feel they are valued and respected members of the learning community, teachers cultivate student interests, value the unique perspectives each student brings to class, and encourage students to devise and solve problems both individually and collectively. Teachers value risk taking and learning that emerges from errors of judgment, confusion, or the challenge of addressing complex problems, and they encourage students to recognize that successes and setbacks are both part of the processes of invention, discovery, and creation.

Contextualizing Learning Environments

Because career and technical education is naturally centered around activities and application, teachers create highly collaborative and cooperative classroom cultures, centered on problem solving and investigation. As authentically as possible, teachers carefully organize their classrooms around the principles of high-performance workplaces. For example, in a class presentation structured around the development of an electric vehicle or student-run farm, students work together problem solving, inventing, and creating the

product at hand and focusing on how to address authentic workplace dilemmas in the most effective and efficient ways. Even when the activity takes place in the context of a master-apprentice relationship, with students working directly alongside a master crafts-person, students work collaboratively and cooperatively, taking on more responsibility as they gain new knowledge and skills.

Teachers in a master-apprentice relationship manifest high standards of conduct. In order to honor the work and uphold the spirit of cooperation and invention, teachers create an environment that values fairness, recognizes and rewards quality work, and offers constructive criticism that directs students toward growth and improvement of skills. Such teachers push students to apply their knowledge from project to project, and not merely soak up and store away new knowledge with each new task.

The learning-lab environment is a trademark of career and technical education, and is driven by the desire to both engage students and encourage mastery of learning. Teachers believe it is their responsibility to develop all aspects of students, including their academic, vocational, social, and ethical selves. (See Standard VII—*Workplace Readiness* and Standard VIII—*Managing and Balancing Multiple Life Roles*.) The classroom environment is designed specifically to tap all these aspects. Teachers cultivate these aspects by deliberately aligning instruction with their knowledge of the ways students learn best—in context, their hands and minds actively

involved and engaged in relevant and meaningful tasks. Teachers tailor their instruction to students' perceptions of what is real and relevant at the moment and what is pertinent to their future—a message that places high value on student initiative and creativity.

In addition to their power to engage students, contextualized learning experiences are central to student mastery of specific content. Successful contextual learning can be achieved in a number of possible settings, including classroom simulations, labs, or work-based learning experiences beyond the traditional classrooms (e.g., on-the-job training, apprenticeship, clinical internships, or service-learning opportunities). Teachers are adept at using these different activities to create an environment where students can demonstrate mastery of new skills and knowledge. Embedded within such learning activities are opportunities to empower students through decision making, interdisciplinary collaboration and teamwork, leadership, problem solving, and negotiation. Work patterns of this nature create a classroom environment that mirrors those found in high-performance workplaces.

Managing Classrooms Efficiently

The learning environment described above can only flourish in a well-managed classroom. Central to the establishment of such classrooms is an environment of intellectual and physical safety where students feel respected by all as individuals. By modeling and communicating clear expectations of classroom policy, teachers promote the open sharing of ideas and the taking of initiative. In such classrooms, the sense of community is forged through the validation of positive, constructive behavior. When dealing with disruption, teachers do so expeditiously and fairly and in ways that do not create a continual focus on disruptive behavior.

Teachers foster teamwork in the classroom by encouraging productive work. Teachers manage to filter out unimportant actions, reduce disruptions, and distinguish between exuberance and misbehavior among their students. When they have to reprimand a student for misconduct, they do so constructively, getting to the root of the problem or issue in a timely manner.

The establishment and maintenance of a productive learning environment results from the careful blending of attention to individual student needs and the goals of the entire class. Balancing competing and complementary interests, teachers skillfully juggle the needs of all students to create lessons that result in a high level of student engagement. Teachers are skilled at anticipating difficulties that students may encounter that may disrupt the classroom flow or the collective sense of purpose, enthusiasm, and engagement. This is no small accomplishment, considering the fact that students may be engaged at many different levels—individually, cooperatively, in groups, or in a whole-class project. Teachers model team-building and collaborative behavior in a variety of ways, including through their interaction with students and through the alliances they establish with other educators within and outside the school and with educators and citizens in the larger learning community.

Maintaining Safety

When it comes to safety, teachers run a tight ship. Career and technical education classrooms and work sites are filled with potentially dangerous equipment and machinery, so securing student safety is a primary concern in the creation of an environment conducive to learning. Teachers make students well aware of safety regulations and laws both in school and at work sites. They understand that mishandling equipment can lead not only

to personal harm but also, if the equipment is rendered inoperable, to the loss of potentially valuable learning experiences or financial resources. Students come to understand that the lab and work environments are places for concentration and attention to detail.

Creating a Democratic Environment

Rather than being the sole source of authority or expertise, teachers are receptive to student ideas and interests. They are as attentive to the process of education as they are to student mastery of discrete skills. Teachers are particularly interested in promoting the values of fairness, tolerance, and community. One way teachers accomplish this, in addition to valuing student comments and concerns, is by involving students in the negotiation of classroom rules, routines, and behaviors, as is done in high-performance workplaces. Such involvement on the part of students is an important component in the development of student leadership and teamwork skills and is another way teachers actively engage students in the classroom. Teachers are also aware that students may bring to the classroom attitudes that run counter to the kinds of democratic values they seek to instill in their students. They confront such attitudes and model alternative behaviors and frames of mind that will serve students in their future employment. Through participation in rule setting and classroom functioning, students learn firsthand about individual differences and preferences and therefore increase their awareness of the needs of others. Using the techniques described above, as well as others, teachers also demonstrate skill in bringing students with exceptional needs into the mainstream of classroom life. Their attention to democratic values and classroom processes and procedures enables teachers to use the diversity of the class as a strength.

Encouraging Love of Learning, Invention, and Risk Taking

Teachers also work to establish a culture of inquisitiveness and exploration. They model and carefully nurture the interests of all students. They are passionate and enthusiastic about their field and driven by a love of learning for learning's sake. But their infectious enthusiasm is not limited to their field. In general, they are intellectually adventurous and more than willing to share their discoveries in many areas with their students.

Teachers continually push themselves and their students to do their best and to be persistent about “getting the job done.” This work ethic extends from their desire to continually improve and perfect their craft to their “can do” attitude with all students to their outlook on both classroom and student problems. At heart, they are problem solvers and are not easily dissuaded from doing what is best for students.

Modeling a love of learning is not necessarily sufficient to develop the same behaviors in their students however. In addition to the enthusiasm they display about their own learning, teachers cultivate students' enthusiasm for and pride in their own discoveries. Teachers select projects that evolve and unfold—that begin with student interest and eventually take on more student direction. Rather than direct student work with step-by-step instruction, teachers create flexible assignments that encourage student creativity and problem solving. As students grow and succeed in their work, teachers allow them to take on projects themselves, decreasing direct teaching and increasingly coaching from the sidelines. Teachers foster student empowerment by validating independent thinking, encouraging inquisitiveness, and celebrating competence.



Standard IV: Diversity

Accomplished career and technical educators create an environment where equal treatment, fairness, and respect for diversity are modeled, taught, and practiced by all. They take steps to ensure quality career and technical learning opportunities for all students.

Like most workplaces, career and technical education classrooms can be diverse in many respects. Students and teachers of different genders, socioeconomic status, ethnicities, cultures, and backgrounds work together to achieve common goals. In such settings, accomplished teachers strive to make sure that, regardless of an individual's background, all are treated with fairness and respect. Knowing the advantages of being able to work successfully with people different from oneself, teachers ensure that their students leave their programs understanding the attitudes and behaviors that are likely to bring them success in the world of work. Additionally, being aware of many of the historical inequities that have kept some students from having access to quality career and technical programs, they seek to ensure that such programs are available to all.

Creating Environments Where Equity, Fairness, and Diversity Are Modeled, Taught, and Practiced

By showing respect for and valuing all members of their communities, and by having high expectations that their students will treat each other fairly and with dignity, career and technical education teachers model and promote the behavior necessary for a multicultural society. They know that the attitudes they manifest as they work with students, families, colleagues, community members, and others who support the learning process provide powerful exemplars for young

people; therefore, they conscientiously demonstrate in their own behaviors the kind of treatment they expect from their students and others.

Career and technical educators are aware that the collaborative working environment so important in developing their students' skills also provides special opportunities and challenges. They know that a diversity of backgrounds often means a diversity of skills, and they provide opportunities for students to work to their own strengths as well as learn from those whose strengths are different. Teachers know that for some of their students, being aware of and responding appropriately to the differences in the group may be a new experience, and they are therefore careful to help such students understand both how to conduct themselves in an appropriate manner and why it is important to do so. Teachers understand that some students may harbor beliefs that are at odds with the attitudes they, as teachers and mentors, are working to develop. They respond directly to such challenges, emphasizing the importance of equality, fairness, and respect both in the community and the workplace. (See Standard III—*Learning Environment*.)

Preparing Students for the Diversity of the Workplace

Career and technical educators know that students who work collaboratively stand a greater chance of succeeding in the workplace. Knowing that collaborative teams will almost certainly be diverse in many respects, teachers not only prepare their students with skills



needed to work on teams but also prepare them to do so with attention to issues of diversity.

Teachers recognize the importance of exposing their students to individuals and cultures that might be new to them and provide opportunities in their ongoing program for such exposure. They might, for example, be sure that as they invite members of the business community to their classroom, they include people of different backgrounds. Or, if placing students in workplace experiences, they might match the student with a mentor of a different ethnicity or gender. They know that the key to successful collaboration is communication, and they supply their students with occasions to practice and improve their communication skills, paying particular attention to how interactions may change (or not change) when someone from a different cultural background is involved. They give their students opportunity to practice their interactive skills, allowing, for example, a group to role play a conflict in the workplace. They help their students understand the attitudes and behaviors likely to bring them success, as well as those that may cause disruption or dissent in the workplace.

Accomplished teachers also help students understand legislation and policies that are related to fairness and equity, such as laws relating to sexual harassment and affirmative action. They are aware that some students may misunderstand or have strong feelings about such regulations and that others may already have had direct experience in these areas. They build on their students' knowledge base by sharing additional information and by providing opportunities for students to discuss the way these work rules may affect their lives.

Ensuring Access to Quality Career and Technical Learning

Accomplished career and technical educators are aware that historically, not all students have had access to quality career and technical education. They know, for example, that children of color often have been tracked toward low-paying, low-skilled career paths, and that young women have been discouraged from participating in what have traditionally been seen as “male” fields. In their own programs and schools, they strive to ensure that all students have access to high-quality programs. They may do this by collaborating with their colleagues in guidance departments so parents and counselors understand the options available in the school and the career paths these programs support. Or they may work with individual students to help them match their interests and abilities with appropriate courses of study, seeking ways to expose the students to a wide variety of careers and choices. Teachers continually review and refine their programs, and they monitor their students to ensure that all are given equal access to curriculum and are exposed to additional options, as well. Aware of the often wide gulf between academic and career and technical programs and the implications this has for the careers of all students, teachers also advocate within their schools for the dissolution of this unnatural barrier and, wherever possible, build bridges to their colleagues throughout the school.

Finally, teachers know that an individual student's physical challenges may present an additional barrier in terms of access to equipment. Where possible, they adapt equipment to students' special needs, seek equivalent learning opportunities at alternative sites, or, if needed, help match the student with more appropriate learning experiences.



Advancing Student Learning

An extensive knowledge base about human growth and development, subject matter, and the creation of productive learning environments only benefits students if teachers are able to put such knowledge into practice. The next two standards describe the joining of teachers' knowledge

about students, subject matter, and pedagogy with professional judgment. Included in this section are the ways teachers use an extensive instructional repertoire to encourage student mastery of knowledge and the ways teachers encourage student success through assessment practices.

Standard V: Advancing Knowledge of Career and Technical Subject Matter

Accomplished career and technical educators foster experiential, conceptual, and performance-based student learning of career and technical subject matter and create important, engaging activities for students that draw upon an extensive repertoire of methods, strategies, and resources. Their practice is also marked by their ability to integrate career and technical and academic disciplines productively.

Whether teachers are focused on general or specific industry knowledge, they do so within a classroom of invention and production that demands an extensive repertoire in experiential learning. Often referred to as *contextualized learning*, many strategies, both real and simulated and within and outside the classroom, are used by accomplished teachers. These strategies include work-based learning, clinical internships, apprenticeships, cooperative education, entrepreneurship, school-based enterprises, the use of performance-based evaluation, and project- or product-based learning.

Teachers design instruction to engage students in wrestling with and gaining command of important ideas, concepts, theories, facts, and skills, as opposed to just

memorizing discrete facts and procedures. Teachers teach theory in addition to production skills, creating a marriage of both hand and mind learning. Classrooms that fit this conception authentically mirror activities, projects, problems, and jobs in the world beyond the classroom.

Embedded in classroom activities are the knowledge, skills, and abilities essential to success in the adult world. Teachers use these activities in a variety of ways, matching the developmental levels of their students with appropriate opportunities to extend the classroom beyond the school. One purpose of such projects and activities is to ensure that students gain exposure to and competence within a career area.

Creating Engaging Learning Activities That Enhance Student Mastery of Knowledge

Teachers draw on their knowledge of the disciplines and career and technical content and skills to create learning activities aligned with their goals for students. They design programs and activities that integrate academic and career and technical content and that help students come to grips with the key issues, concepts, competencies, and skills necessary for work in a specific industry and for employment in general. Teachers take care to ensure that their work meshes with industry standards, current issues in the field, and themes central to the industry structure within which they practice. They help students understand how to see their field through many lenses.

Because the workplace often presents challenges that cut across arbitrary boundaries, teachers devise activities that draw on multiple disciplines in addition to career and technical content. They design projects that help students understand the potential breadth of tasks within a field, practice and develop the kinds of academic skills that might be brought to a given job, and develop some of the specific skills and techniques that are used to solve problems within a given industry. Accomplished teachers see and understand the needs and demands of a whole project. Often, projects are broken down into their constituent parts so that students are better able to understand the theoretical constructs that undergird them.

Teachers integrate career and technical and academic content, both across academic disciplines and throughout the high school curriculum and beyond. They understand that the purpose of integration is not just to broaden career and technical projects for the sake of breadth alone, but to mirror the

blending of disciplines found in the world. To accomplish this integration, teachers may create projects or activities, such as school-based enterprises, that naturally require students to draw on knowledge and skills in many disciplines. Or teachers may collaborate with colleagues in other departments to design multidisciplinary instruction. In both instances, they purposefully target specific career and technical and academic understandings that students need to develop.

Teachers design and implement projects that provide students with opportunities for problem solving and that assist them in developing the critical habits of mind that allow them to make sense of what they are learning and how it relates to the bigger picture of the industry or system they are studying. Teachers expose students to a variety of techniques for negotiating an activity or project, for example, orchestrating the class around a series of key questions such as the following: *What literature is available that can help me? What expertise can I draw upon? What is potentially dangerous? What resources do I have and how shall I use them? What are the potential gains, losses, and risks of a given course of action?* Classroom environments characterized by discovery and invention introduce the notion of uncertainty and provide opportunities for students to test unfamiliar waters and think independently in the absence of strict directives. Such settings allow teachers to encourage students to take measured risks when the path to solving a problem is unclear and to experience failure and learn how to recover. In these classrooms, directly confronting uncertainty and chaos is as important to learning as success is.

Teachers work collaboratively to establish work site learning activities or internships and ensure supervision of students in these situations. They know how to ensure that quality learning is going on when students are off-site. In collaboration with a work-site

mentor, they structure such experiences around explicit objectives, training plans, and assessment processes.

Guiding Students in the Acquisition of Knowledge

Designing the appropriate project, activity, or exercise is the necessary first step toward helping students achieve competency. Skillful instruction must follow. The coaching, or step-by-step process of bringing students into the work, is a complex enterprise, given that each student places different demands on the structure and character of the coaching. Teachers must carefully diagnose current student skill levels in the work process, help and support students when necessary, and gradually remove support structures as students learn to manage on their own. Whereas some students may need help simply in conceptualizing a possible topic, scope, or sequence, others may demand greater assistance before taking the next step. Still others may begin quite vigorously and confidently, rejecting assistance until the very end. Teachers are astute at understanding the type of support each student needs and acting effectively on these judgments to design tasks appropriate to the work of the students in each class. In all cases, the emphasis is on advancing student performance.

Contextualized learning activities are useful because they create a master-apprentice relationship. Beyond ensuring student mastery of career and technical content, teachers take advantage of this relationship through attention to three key debriefing activities.

First, they carefully debrief all activities by helping students identify what precisely has been learned, helping students understand and appreciate both the final outcome as well as the knowledge and skills they have developed and demonstrated.

Second, teachers help students reflect on their own thinking to illuminate and then analyze their problem-solving strategies. Teachers skillfully lead students in this analysis, which includes questions such as the following: *What did you do and why? What risks did you take and to what purpose? What could you do differently next time?*

Third, teachers help students understand their personal learning processes. Through this exercise, students become cognizant of their strengths and weaknesses and how to apply this knowledge in new learning situations.

Ultimately, students learn to use their minds well as they acquire concrete production skills. Through attention to these learning processes, students develop an awareness of their performance and how it fits into the larger system.

Utilizing a Variety of Materials and Resources

To create an engaging environment and meet the needs of a diverse clientele, teachers take into account several factors in their decision making. Among these are the selection and adaptation of materials that reflect what they know about the way students learn best. They are careful to select, adapt, and create only those materials that meet specified criteria and standards for quality. Often, this entails extending the classroom into the community, where teachers judiciously select from an abundant array of resources to enhance student learning. When community resources are sparse, teachers create a rich classroom environment that simulates the world of work.

Teachers are skilled at garnering and developing resources in the community at large and within the school itself. Because the ultimate goal of a career and technical classroom is to bring the outside world in, teachers make use of a wide range of resources from many different sources to create an engaging

Standard VI: Assessment

Accomplished career and technical educators utilize a variety of assessment methods to obtain useful information about student learning and development, to assist students in reflecting on their own progress, and to refine their teaching.

Assessment serves several critical purposes and is integral to creating a student-centered and performance-based classroom. Accomplished teachers use assessment to determine individual student progress and to guide decision making about the effectiveness of teaching strategies for the class as a whole. This often requires teachers to develop their own tools for assessment to ensure a good fit between the assessment tool and the goals they have set for their students. Teachers also teach students to assess and monitor their own progress.

Assessment for a Variety of Purposes

The ultimate purpose of assessment is to gain perspective on student learning as it relates to the goals of career and technical education. Teachers use informal assessment, monitoring student work on a regular basis to encourage student initiative, responsibility, and ownership of a project as the master-apprentice relationship evolves. As instruction moves forward, teachers adjust student assignments and work on the basis of information gleaned from assessments. On a more formal basis, assessment is used as an analytic tool for students. Teachers help students consider results critically, analyzing them to understand the theoretical constructs, discrete skills, problem-solving processes, and learning styles they reveal.

Assessment is also used to gauge long-term progress within a class, as well as a student's entire high school career in relation to external benchmarks such as industry-

driven standards and skills. Through the use of portfolios, for example, teachers help students select meaningful work that illustrates their growing accomplishments, knowledge, skills, and interests.

Utilizing a Variety of Assessment Methods

Teachers are knowledgeable about a broad array of assessment methods and issues from which they select approaches that are well matched to their instructional goals and purposes. Furthermore, they know that the range of important objectives they have and the student skills and understandings they seek to gauge usually cannot be captured with a single assessment, and that tracking student progress requires frequent sampling of student work and thinking. Recognizing the limits of standardized tests, teachers are adept at utilizing other methodologies, such as portfolios, videotapes, demonstrations, exhibitions, and work-based assessments. These methodologies give teachers and their students a variety of means to consider their accomplishments, uncover misunderstandings, and identify concepts and skills needing further attention. Teachers are knowledgeable about industry and workplace standards appropriate to their area of expertise, including national skills standards and industry certification and licensure standards. They build their assessment tools and methodologies around these standards. Teachers are able to articulate the unique strengths and weaknesses of different assessment vehicles and communicate their findings effectively to students and their families.



Helping Students Understand Their Progress

Beyond its utility in helping teachers understand their own performance, one of the many purposes of assessment is to help students understand their progress. Collecting work samples in portfolios, producing resumes, and writing weekly journal entries are examples of some of the methodologies that are useful in helping students reflect on their own work. Guiding students to an awareness of their own learning begins at the point student work begins, as teachers make sure students understand from the beginning what is expected of them and what the goals and standards of the work are. Increasing student awareness of goals and expectations with regard to a variety of benchmarks—including personal, workplace, and school goals—is an initial but critical step in developing the habits of mind necessary for continuous reflection and assessment of progress.

Teachers use a variety of methods to help students become adept at assessing themselves in various situations. Ultimately, the purpose of students becoming self-assessors is to help them understand the application of knowledge, as well as increase their self-awareness and confidence, document their level of skill, and aid decision making about further education and career choices.

Assessment as an Opportunity for Feedback

In addition to informing teacher decision making and the development of student skill in self-assessment, teachers view assessment

as an opportunity to validate risk taking, invention, and learning from experiments that may not go according to plan. They understand the role teacher and employer feedback can play in initiating students' self-reflection, setting a course of action for improvement, and documenting progress for parents and other interested stakeholders. In addition, teachers understand that constructive feedback is an important opportunity to communicate to students attitudes that foster an effective learning environment: regard for their students, a genuine desire to help them do well, and a collaborative spirit of teamwork.

Assessment and feedback responsibilities extend to student workplace activities, as well. Although teachers do not always have opportunities for involvement in workplace activities, when they do, they take care to work collaboratively with employers to ensure quality experiences for students. Because assessment is central to these experiences, teachers educate employers on how to assess students. Wherever possible, they assist employers in the assessment of students. For example, after a placement or internship has been negotiated, teachers will often write a job description in collaboration with employers. The description might be divided into observable components. Students' competence is assessed at the start of the placement to establish an initial level and then used as a benchmark throughout the internship or co-op placement. Through such arrangements, students are more likely to receive feedback from employers in a manner that illuminates progress and competence.



Helping Students Transition to Work and Adult Roles

In addition to developing in their students proficient levels of workplace skills, accomplished career and technical educators also recognize the importance of preparing their students for work and adult roles that

will begin when their students leave the world of formal education. This preparation includes the development of workplace readiness skills, the ability to manage multiple life roles, and social competence.

Standard VII: Workplace Readiness

Accomplished career and technical educators develop student career decision-making and employability skills by creating opportunities for students to gain understanding of workplace cultures and expectations.

Teachers know that although advancing student understanding of the particulars of specific industries is important, this alone is not sufficient without an understanding of workplace culture and expectations and the development of employability skills. Teachers foster this understanding and ensure that students can apply this knowledge to their own career decision making.

Helping Students with Career Decision Making

Experiences in simulated or real workplace environments are significant for providing perspective for students' career decision making. Teachers understand that student decision making relies on a host of factors, including experience and exposure, family aspirations, peer views, and student perceptions of their own talents. Teachers therefore create class laboratory activities and processes to illustrate certain aspects of work associated with particular career choices, and they take time to guide students in decision making toward promising paths in the students' fields of interest. For example, as part of helping students create a schoolwide health fair, a

teacher might bring in staff from a hospital personnel department to expose students to the range of jobs available in the facility. Teachers encourage students to think expansively about the range of possibilities that lie before them and identify career paths that are best suited to their interests.

In addition to creating opportunities for career exposure and development, teachers take responsibility to guide students in their decision-making processes. Although experience alone can teach students about their likes, dislikes, skills, and abilities, teachers can help students sort out these experiences. As instructional guides and mentors, teachers help students to think deeply and purposefully, enabling them to make sound decisions about the steps teachers might take following high school. Along with exposing students to the options before them, they might also provide opportunities for students to read further about their fields of interest, meet with experienced workers in particular industries to talk about the advantages and disadvantages of pursuing a particular career path, or to converse with their peers about the decisions they all face. These decisions are often influenced by the cultural norms and mores of the family, the community, and peers,

which can limit the choices students perceive as worthwhile and available to them. Consequently, teachers recognize their obligation to help students navigate this uncertain terrain. In doing so, they make students aware of the steps they can take to maintain some degree of flexibility in their careers and avoid settling for a narrow set of choices.

Developing Employability Skills

Teachers know that in addition to an extensive, industry-specific knowledge base, employers often place great stock in generic workplace skills and dispositions; teachers seek to help students develop these assets. (See Standard IX—*Social Development*.) Teachers design classroom activities that help students develop a strong work and personal ethic that include learning how to plan for success and how to take responsibility for one's own tasks and assignments. They teach students how to work effectively with co-workers and clients from diverse backgrounds and of ability levels different from their own. Teachers also create opportunities for students to develop the ability to teach others new skills, to satisfy customer or client expectations, and to work with their peers to settle disputes born of honest differences of the sort that might emerge in the workplace.

Related to skill in problem solving is the ability to organize, plan, and allocate resources. In the workplace, it is necessary to know how to manage four categories of resources: time, money, material and facilities, and human resources. Students are challenged to manage and allocate resources efficiently in all classroom projects and activities. Teachers also develop students' systems knowledge, ensuring that students understand how social, organizational, and technological systems work, operate effectively, and interrelate. Working with students to understand resource management and

systems processes provides teachers another opportunity to hone students' thinking skills.

Understanding Workplace Culture and Expectations

The creation of simulations of workplace settings is central to the development of workplace skill and knowledge; placement in these environments allows students to experience firsthand workplace culture and expectations. Equally important, however, is the creation of exercises and activities that have embedded within them the processes, quality methods, tools, expectations, standards, and practices demanded in high-performance workplaces. For example, students need to know the norms of dress in most office environments and the expectations for customer service and quality control. Teachers construct classroom lessons and design work-based learning opportunities that provide opportunities for students to learn about high performance workplace standards and current industry practice, such as total quality management production techniques. Students work in teams designing and executing original creations, enterprises, or services, rather than mimicking processes conceived and directed by others. Through firsthand experience in the workplace culture, students come to appreciate the demands of the workplace, including the need for direct communication among on-line workers and the need to be responsible for one's own assigned duty. On-line tasks, dilemmas, challenges, and opportunities are addressed directly in their real-life context. Students become reflective and gain a critical perspective on important industry issues that allow them to anticipate issues and continually seek better ways to create and deliver products and services. Teachers design projects to stretch student knowledge, engender perseverance and risk taking, and encourage students to take increasing responsibility for honing skills.

Standard VIII: Managing and Balancing Multiple Life Roles

Accomplished career and technical educators develop in students an understanding of the competing demands and responsibilities that are part of the world of work and guide students as they begin to balance those roles in their own lives.

Teachers balance specific industry knowledge, workplace know-how, and specific employability skills with a broader understanding of the life roles that students will assume beyond the world of work. They understand that students must make choices about a variety of roles in their lives, from the relationships within their families and with peers to more structured relationships in the community and with employers. They work with students as they manage these roles and responsibilities.

Balancing Life Roles

Teachers understand that as adults, students must balance competing responsibilities and obligations, which include understanding and making decisions about which responsibilities they will undertake and when they will undertake them. Decisions facing students in the near or immediate future include whether to marry and have a family, how much responsibility to assume for older family members, and how actively to be involved in their communities. Teachers know that it is useful for students to have available a range of strategies for making decisions and therefore include in their curriculum discussion of such issues and examples of a variety of strategies students may find useful. Teachers also know that regardless of choices made, challenges will arise. They help students begin to prepare for these challenges by starting to think through their own coping mechanisms. Teachers also teach students to recognize that balance and

trade-offs are often necessary when their chosen roles conflict with their work responsibilities. For example, the demands of family life, while rewarding, can sometimes overwhelm and threaten performance at work, or vice versa. Teachers discuss such dilemmas with students and consider with them a range of strategies that might be useful in dealing with the unpredictability of life, including family life. Teachers are realistic, helping students to understand that often there are no easy answers, that priorities and values may conflict, and that the available choices may seem limiting and unfair.

Teachers help students recognize the importance of understanding the cultural and social norms of the workplace and adapting their language and behavior to that which is most appropriate for the given situation. Where necessary, teachers help model the appearance, language, and behavior that will best serve students in their chosen line of work. They recognize that outside mentors can also serve as models for appropriate behavior and can communicate the importance of shifting from what is acceptable community language and behavior to the language and behavior of the workplace.

Understanding Personal Economics and Managing Daily Life

In addition to teaching how to balance many life roles and how to behave in different situations, teachers also prepare students to

Standard IX: Social Development

Accomplished career and technical educators develop in students self-awareness, confidence, character, leadership, and sound personal, social, and civic values and ethics.

Because accomplished career and technical educators are dedicated to preparing students for adulthood, their interest in student development extends beyond the cognitive domain to issues of social development. Teachers recognize that students seek independence from their families at the same time they develop ties to adults in the workplaces they are in the process of joining. Teachers work with students to ease this transition, demonstrating what it means to think and act as a caring and ethical human being.

Fostering Development of Students' Self-Awareness, Confidence, and Character

Although the key mission of many schools is to impart academic knowledge, teachers know that developing the social and emotional side of students is also critical. Teachers observe, cultivate, and assess the social development of their students, noting their classroom comfort, relationships with friends, sense of belonging, character, integrity, and concern for others. Through frequent interactions, teachers learn of their students' concerns and aspirations and determine if and when students need advice and guidance. On the basis of these observations, teachers offer students encouragement and direction in how to communicate ideas and feelings more effectively and in ways that

create self-respect and convey respect for others. They help students move from concern about themselves to an awareness of the needs, views, and rights of others.

Teachers are concerned with development of tolerance and integrity in their students and conduct their classes in a manner that encourages respect for individual differences related to skills, culture, gender, ethnicity, language diversity, physical exceptionalities, and other factors. They employ specific strategies that extend learning to all students. For example, they develop project-based activities that require cooperation and provide opportunities for students from different backgrounds and abilities to work together toward common goals.

Equally important to the development of these qualities is the opportunity to develop personal knowledge—an awareness of talents, skills, abilities, preferences, and other perspectives—coupled with a sense of confidence about these attributes. Teachers use diverse strategies to enable students to see themselves and the consequences of their actions more clearly. They understand that self-confidence comes from the development of skill and competence. They hold high expectations for all students and demand hard work to ensure achievement of such expectations. They are careful to model perseverance, self-direction, and dedication to work, and they make sure students understand how much their teachers appreciate their accomplishments.



Development of Student Initiative and Teamwork Skills

Teachers create a variety of opportunities for students to take action, assume responsibility, exercise leadership, and develop initiative. For example, teachers may encourage student involvement in service organizations, community groups, political action committees, honor societies, or school organizations. Career and technical student organizations provide an important example of structures that develop initiative and teamwork in students. Like other teacher-generated activities, career and technical student organizations create a forum for the development of leadership and teamwork skills and provide a place to showcase student work in particular career and technical fields. In many curricular areas, students learn to plan, manage, and direct activities through their participation in such organizations. Such participation contributes to the development of oral discourse, knowledge of democratic processes, and facility in committee work. Through such activities, students become attuned to the expectations and preferences of different workplace cultures.

Encouraging the Development of Sound Social, Personal, and Civic Ethics

Teachers foster civic and social responsibility in their students by providing them with opportunities for joint decision making through participation in the leadership and

governance of the classroom. Students see and experience connections between schoolwork and the larger community that help them understand and apply principles of justice, freedom, and liberty. Accomplished teachers design instruction that allows students to apply such knowledge to diverse events, themes, topics, and situations that lead students to confront academic and civic dilemmas simultaneously.

Well-rounded workers and citizens have well-developed ethical perspectives, habits of personal responsibility, and concern for others; teachers seek ways of instilling in their students character traits such as punctuality, honesty, fairness, and tolerance that will serve them well not only in their work but throughout their lives. Through their daily lessons and in conversations with students, teachers work to build positive and caring relationships with and among students. They thereby model the kind of communities they hope their students will become a part of and perpetuate. Teachers also encourage such students to broaden their perspectives by taking part in other arenas of life, such as community service or other forms of civic involvement.

Teachers know that in many settings, workers are confronted with ethical dilemmas, such as coworkers who steal or employers who use substandard materials or construction practices. Teachers help students understand the kinds of ethical decisions they may be called upon to make and provide them with opportunities to practice making sound judgments.



Improving Education through Professional Development and Outreach

Being an accomplished teacher requires continual attention to one's practice. Teachers who do not steadily work to refine their practice may find themselves stagnating in their careers, or losing ground in their profession. Accomplished teachers regularly work collaboratively with families, colleagues,

and others to ensure the continued quality and effectiveness of their teaching and their programs. The four standards that follow describe the ways in which accomplished teachers engage in regular activities within and beyond the classroom walls to strengthen their practice.

Standard X: Reflective Practice

Accomplished career and technical educators regularly analyze, evaluate, and strengthen the effectiveness and quality of their practice through lifelong learning.

Accomplished teachers consider reflection on their practice central to their responsibilities as professionals. They continually extend their knowledge, perfect their technique, and refine their philosophy of education. They regularly examine their own strengths and weaknesses and employ that knowledge in their planning. They analyze the relative merits of both older and newer pedagogical approaches and judge the appropriateness of these approaches for their own particular circumstances.

Teachers regularly engage in the process of professional growth and development. They are motivated by the rapid change they see around them (in the workplace, in technology, and in research literature). They are spurred by the desire to equip students for an evolving future. In their quest for self-renewal, teachers follow several paths that often include interacting with other professionals, exploring new resources, attending professional conferences and workshops, studying the professional literature, returning to business and industry, and participating in advanced education programs. Teachers distinguish themselves through their capacity for ongoing, dispassionate self-examination;

their openness to innovation; their willingness to experiment with new pedagogical approaches; and their readiness to change in order to strengthen their teaching.

Evaluating Results and Seeking Input Systematically from a Variety of Sources

In their efforts to gain insight about their practice, teachers often hold conversations with students and employers about the quality, climate, and interactions in their class. They also carefully analyze input received from formal and informal conferences with families, guardians, students, and others. These observations and discussions are carefully weighed by teachers as they reflect on their planning, monitoring, assessment, and instructional techniques.

For accomplished teachers, every class and every activity provide an opportunity for reflection and improvement. In the same way they encourage students to reflect and debrief after project work, teachers also consider the

results of their actions. When things go well, they think about why the class succeeded and how to adapt the lessons learned to other classes. When things go poorly, they reflect on how to avoid such results in the future. The review of work in progress and final student products are opportunities for teachers to assess themselves, as well.

Teachers regularly seek advice from colleagues through discussions, in-class observation of their own teaching, and personal observation of others' practice. These observations and discussions, and other discoveries from workshops and research, shape their decisions about if, when, and how practice should change. This examination also creates a predisposition to abandon less effective practices and replace them with more promising approaches. Teachers eagerly share their ideas with colleagues, serving as "critical friends," and they test and refine their evolving approaches to instruction.

Reflecting on One's Own Point of View

Teachers consider the effects of their own cultural background, biases, values, and personal experiences on their practice. They are alert to their own philosophical biases and take these into account when dealing with students whose backgrounds, beliefs, or values may differ significantly from the teachers' own. Teachers seek to treat each student fairly by working carefully through such conflicts. They understand they will be most effective with students by modeling responsible, respectful behavior. Hence, they become attuned to the ways their own beliefs and behaviors influence their practice for better or worse.

Continually Refining Practice through Study and Self-Examination

Teachers stay abreast of current research, trends, and information by reading professional and technical journals, actively participating in related professional organizations and in-service workshops, completing graduate coursework, observing other accomplished teachers, and collaborating with colleagues and other professionals. When appropriate, they apply these lessons to their classrooms.

They stay abreast of significant developments, new findings, and debates in their field, aware that such efforts are essential in the rapidly changing worlds of business and industry. Through their industry, work-based, and other community contacts, they keep up with prevailing trends and new technologies and processes. They adapt their practice as needed to account for such developments. They understand that some workplace changes are controversial, and they have well-considered positions on such issues. Teachers have cogent reasons for what they do and can explain those reasons clearly to students, parents, guardians, colleagues, administrators, school board members, and guidance counselors, among others.

Teachers take responsibility for their own professional growth and development. They explore topics in which they may have limited expertise and experiment with alternative materials, approaches, and instructional strategies. This personal study provides support for the instructional decisions they make and for their ability to articulate a rationale for their actions. It also contributes to their consistent ability to seek solutions to difficult problems they encounter.

Accomplished teachers participate in a wide range of reflective practices. They might keep a journal of how their own personal biases affect their teaching, or they

Standard XI:

Collaborative Partnerships

Accomplished career and technical educators work with colleagues, the community, business and industry, and postsecondary institutions to extend and enrich the learning opportunities available to students and to ease school-to-work transitions.

Ambitious goals for instruction often demand extraordinary means. Accomplished career and technical educators pride themselves on making the best connections possible between school and the workplace. Alert to student needs for relevancy and engagement, they understand they are more likely to meet this demand through the development and maintenance of several types of collaborative partnerships, including those with professional colleagues, local businesses, and community and postsecondary institutions. Partnerships of several varieties are integral to program design and implementation because career and technical education is about connection—connecting career and technical knowledge to other disciplines, connecting theory to practice, and connecting students’ immediate lives to their futures.

Collaborations are also a means to garner support for the field. Career and technical educators often must advocate for their programs before administrators and the community. They can articulate to other educators and lay audiences the virtues of their programs and identify potential threats to program integrity. The partnerships career and technical educators forge with individuals in their schools and communities often serve to further the status of and support for career and technical education.

Building Partnerships with Business, Industry, Labor, and the Community

Teachers cultivate extensive partnerships with businesses, industries, agencies, labor, and the community to ensure that program content is well aligned with the demands of work. Although their partners may vary from community to community, teachers cultivate relationships with such individuals and organizations to ensure program viability and quality. Together these partners may serve a variety of functions, including curriculum development, standard setting, equipment and technology procurement, and the design of workplace learning opportunities such as apprenticeships and internship experiences.

Teachers ensure the appropriateness of student placement through the establishment of internships and other opportunities well matched with student needs. Some students need narrow experiences to help refine a future career focus, whereas others need to expand their horizons. Teachers work collaboratively with business and community partners to negotiate beneficial opportunities for students according to student needs, classroom and industry standards, and the needs of local industry. Teachers also rely on partners to lend or donate equipment and materials, facilitate job placement, provide job-shadowing experiences, and present in-service programs and workshops.



Teachers are adept at assessing the field for firms that will offer experiences, equipment, or training consistent with their program goals. In addition, they look to business to help them update their industry knowledge, standards, and skills, and to arrange for teacher externships.

Collaborating with Career and Technical Educators and Colleagues from Other Disciplines

Designing an integrated curriculum is central to broadening the base of contextual learning activities and creating rich learning experiences for students. Accomplished career and technical educators are adept at working in and leading teams of teachers and industry personnel and at creating integrated projects. They have knowledge and experience in project-based and integrated curriculum, including the different approaches to both. In addition to the actual content and mechanics of integration, they are skilled at encouraging teachers who are used to practicing independently to work together to achieve common goals.

Collaborating with Postsecondary Colleagues

Teachers' concerns extend beyond providing students with experiences in the workplace, they encourage students to experience and explore postsecondary education. Teachers take the responsibility to provide students with exposure to and experience in postsecondary schools and are skilled in working with colleagues in postsecondary institutions to achieve this end. Their skill in encouraging postsecondary options coincides with current efforts to more tightly align secondary and postsecondary career and technical education through articulation agreements, sequenced curriculum, and partnerships. Vital to this effort is the creation of sequenced courses to create a seamless curriculum between high school and community or technical colleges. Accomplished teachers are adept at developing partnerships that begin the process of institutional alignment by encouraging the involvement of postsecondary faculty and staff to help define program goals and content.



Reflections on Standard XI:

Standard XII: Contributions to the Education Profession

Accomplished career and technical educators work with colleagues and the larger educational community both to improve schools and to advance knowledge and practice in their field.

As professionals, accomplished teachers see their responsibilities extending beyond the classroom to the welfare of their school, their colleagues, and their area of expertise. They see themselves as prominent members in the larger learning community, contributing to the professional culture and intellectual environment of the school. They can be found serving a variety of roles in such areas as school-based management and staff and curriculum development.

Contributing to the School

Accomplished teachers are team players who believe they have much to contribute as well as much to gain by collaborating with others. They challenge ideas and assumptions as they build a strong curriculum and professional culture with their colleagues. Proud and sure of the value of their programs, they seek to repair the historical split between academic and vocational education, and non-college-bound and college-bound students. As change agents and leaders in the school, they are central players in redesigning the secondary school experience for all students. They draw upon a range of disciplines through practical career and technical applications.

Collaborating with Colleagues

Teachers act as a resource to other colleagues, perhaps as mentor teachers, peer coaches, or student teacher supervisors. They may help develop lessons and curriculum or design and provide staff development. They may observe colleagues at work and serve as a “critical friend,” sharing their observations and coaching colleagues toward stronger practice. Because of the positive effect it has on student learning, the goal of such work is to help create a healthy professional environment and culture built on a foundation of continuous reflection, insight, new ideas, and teamwork.

Advancing Knowledge in Their Field

Teachers are committed to advancing their field. Therefore, they may contribute to a variety of professional development activities that extend beyond their school. This might include collaborating with other teachers and administrators in district, state, regional, national, and international efforts. They may appear on the programs of or take on leadership responsibilities in state, regional, or national organizations that support the improvement of career and technical education and the professional growth of experienced and novice teachers. They might also

Standard XIII: Family and Community Partnerships

Accomplished career and technical educators work with families and communities to achieve common goals for the education of all students.

Families and community members can be among a teacher's strongest allies in the education of adolescents and young adults. Teachers understand and value the central and distinctive role these individual families play and find opportunities to build strong partnerships with them. Teachers welcome the participation of family and community members in class activities and take the initiative in encouraging them to become a part of school life.

Teachers know the role of families and the community is not only to provide input. They clearly signal through word and deed the importance of both as partners with the school in preparing young people for the adult world. As teachers work to create a sense of community among the school, students' homes, workplace mentors, and community agencies, they demonstrate the mutual interest they share with families in seeing students succeed.

Gaining Insight into Students through Partnerships with Families

Teachers recognize that families have experiences and insights that, once tapped, can enrich the quality of education for students. Involvement with families helps teachers learn about students' backgrounds, creating a window through which they gain insight into parental expectations and aspirations for their children. Teachers also understand that the nature of the family has evolved significantly from earlier times.³ Such an understanding of students' lives outside of

school is often helpful in tailoring curriculum and instruction within the school. Regular interaction helps teachers establish rapport with families. It also holds the promise of stimulating family support for and involvement with their children's education. However, these relationships may not be uniformly congenial or productive. When confronted with difficulties in relationships with families, teachers seek common ground and attempt to build understanding that will serve students' best interests.

Cultivating Families' Interest in Supporting Their Children's Education

Teachers effectively communicate with families about students' accomplishments, successes, and needs for improvement, including means for attaining higher goals. With students of this age, a primary concern of families is postsecondary education and training and the employability of their children. Families often have concerns or questions about different options or opportunities. Teachers attempt to respond thoughtfully and thoroughly to such healthy interest in students' futures. They also inform families about the consequences of course selection, the availability of work-based opportunities, and the importance of planning further education.

Because school today is often different from the education of many family members, teachers search for ways to share the school's objectives and expectations for its students,

3. The term family, as used in this document, recognizes the full range of configurations of the family unit can take.



as well as the reasons for group or individual assignments. They also provide families with an accurate portrait of student progress. They offer parents suggestions on how to help students develop better learning habits and skills, complete homework, set goals, and improve performance. As necessary, teachers may address other family needs by assisting families in finding additional resources and services outside the school, such as health care and counseling.

Cultivating family interest extends beyond the traditional classroom setting. To enhance student progress, teachers actively seek to involve families in every aspect of the educational process. Collaboration with families is an essential tool in providing students with the support, motivation, and understanding they desire and need. Teachers help establish avenues for family input and involvement in the development of curriculum and school improvement plans. One promising approach is to have families participate in classroom activities such as computer or technology simulations. Through such participation, families learn about often unfamiliar techniques and processes that ultimately will help them understand classroom expectations,

content, and activities. Accomplished teachers keep families informed of these avenues and encourage family participation. They also encourage their participation in schoolwide programs. Because parents are often unfamiliar with school processes and policies, teachers help them understand, thereby increasing the likelihood that families will remain involved in students' education.

Teachers also encourage support from families in ways that help improve schools. Although giving input and support on individual student or overall classroom issues are the primary roles families play in schools, teachers also know the importance of family and community involvement in the overall functioning of the school. Accomplished teachers seek parental support for their programs. They seek to enlist parents in evaluating the current effectiveness of programs and guiding future directions. Teachers recognize that, particularly with programs that are neglected and beleaguered, an active and involved parent community can be the difference between a marginal program and a vital one.



Reflections on Standard XIII:

The 13 standards in this document represent a professional consensus on the characteristics of accomplished practice and provide a profile of the accomplished career and technical educator. Although the standards are challenging, they are upheld every day by teachers like the ones described in these pages, who inspire and instruct the nation's youth and lead their profession. By publishing this document and offering National Board Certification to career and technical educators, NBPTS aims to affirm the practice of the many teachers who meet these standards and challenge others to strive to meet them. Moreover, NBPTS hopes to bring increased attention to the professionalism and expertise of accomplished career and technical educators and in so doing, pave the way for greater professional respect and opportunity for these essential members of the teaching community.

In addition to being a stimulus to self-reflection on the part of teachers at all levels of performance, *Career and Technical Education Standards* is intended to be a catalyst for discussion among administrators, staff developers, and others in the education community about accomplished practice in this field. If these standards advance the conversation about accomplished teaching, they will provide an important step toward the NBPTS goal of improving student learning in our nation's schools.

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In developing this document, The National Board for Professional Teaching Standards, with the able assistance of the Career and Technical Education Standards Committee (originally known as the Vocational Education Standards Committee), sought to forge a professional consensus about the critical aspects of accomplished practice in this field and to develop advanced teaching standards that speak clearly and powerfully to prospective candidates for National Board Certification, the career and technical education community, the larger education community, and the public.

The NBPTS *Career and Technical Education Standards* portrays only some of the many forms accomplished teaching takes in this complex field. The standards, developed by the National Board for Professional Teaching Standards, were constructed through the the experience, cooperation, and wisdom of many people. Teachers, professors, researchers, administrators, state and local officials, education association leaders, and others from across the country reviewed draft standards documents, providing advice about how to strengthen and position the standards so they might complement other initiatives to advance practice in this field.

While a variety of people unstintingly provided the National Board with caring, intelligent, and imaginative counsel, several deserve special thanks. Thanks go first and foremost to the members of the Career and Technical Education Standards Committee, a group of exceptionally dedicated, creative, and industrious professionals, who explored their experience to yield this new vision of accomplished practice. They were ably led by Chair Michael Jensen, who kept the teacher's perspective in the forefront, and Vice Chair Phyllis Hudecki, whose national reputation and extensive experience provided a broad range of input and support.

The Career and Technical Education Standards Committee was aided by the NBPTS Board of Directors and its Certification Standards Working Group, which provided careful guidance, thoughtful criticism, and necessary encouragement. Together, they helped forge a consensus around large principles and complex issues. Ruth Perry Smith, the NBPTS Board of Directors' first liaison to the committee, made important contributions in advancing the debate across a range of critical issues. This role was subsequently assumed by former committee member Tom Blanford when he was elected to the NBPTS Board of Directors. David Stern of the National Center for Research in Vocational Education contributed expert guidance, especially in helping to form a workable framework upon which the standards report could be constructed. This initiative also benefited from the special efforts of Charlotte Coomer and Patricia Schwaille of the American Vocational Association; their input and support were instrumental in capturing an accurate representation of the career and technical education field.

David Haynes was the lead staff member for the committee, uncovering difficult issues, developing solutions, and extending thinking. Erika Nielson Andrew served as the committee's principal scribe, capturing the committee's thoughts. Jacqui Olkin managed the editorial production of the revised edition of the standards.

On behalf of the National Board for Professional Teaching Standards, I offer sincere thanks to those who have willingly given their time and energy to this landmark effort to improve career and technical education in this country. Your efforts have contributed to the positive reception this document has received in the education community.

Charles E. Cascio
Vice President, Certification Standards and Teacher Development
2000



The core propositions of the National Board for Professional Teaching Standards

- 1) *Teachers are committed to students and their learning.*
- 2) *Teachers know the subjects they teach and how to teach those subjects to students.*
- 3) *Teachers are responsible for managing and monitoring student learning.*
- 4) *Teachers think systematically about their practice and learn from experience.*
- 5) *Teachers are members of learning communities.*