Supporting High School Students Through Assessment of Academic and Industry-Valued Skills

What Have We Learned?

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Abstract

High school reforms that incorporate industry-valued skills — integrating academics with "real-world" teaching and learning — have led to important lessons for improving student assessment systems. Drawing on that knowledge, this paper addresses four assessment-related questions that need to be considered as states and localities refine and build upon existing assessment systems:

- What is the likely impact of increased high-stakes testing on industry-valued high school programs and the students they serve?
- What success has there been in using additional assessments — beyond state-mandated, academic-focused tests — for career-technical education (CTE) and other high school reform efforts?
- How can career-related and other SCANS-like skills be incorporated into states' academic standards and assessments?
- How can assessment help support and improve contextual teaching and learning?

After addressing each of these questions based on a review of data and current state practices, this paper concludes with specific assessment-related recommendations to support industry-valued high school reform.

Current assessment pressures pose significant challenges to advocates of industry-valued reforms for high schools, reforms that integrate academics with "real-world" teaching and learning. Efforts to assess industry-valued standards through large-scale, comprehensive systems that offer portable skill certificates for high school students have yet to reach fruition. Meanwhile, high-stakes, academic assessment and school accountability increasingly dominate the policy landscape. Kane, Staigar, and Geppert (2001) note that in spring 2000, 40 states used statewide student test scores to evaluate school performance, with 20 of them basing rewards and sanctions on a school's test performance. The recently enacted *No Child Left Behind Act of 2001*, which requires states to meet new and far-reaching federal mandates for student assessment and school accountability, formalizes as a national mandate what the majority of states have already begun on their own. Yet, such high-stakes, academic assessments for high school students do not systematically and formally incorporate work preparation (WestEd, 2001a) and skills such as those identified by the Secretary's Commission on Achieving Necessary Skills, or SCANS (1991).

There is much support among policymakers and educators across the nation for the philosophy embodied in the *No Child Left Behind Act of 2001*. Nonetheless, there is also widespread concern among states and districts about how to meet the law's myriad assessment and accountability requirements. The new law calls for states by 2005–06 to implement annual testing in mathematics and reading for grades 3 through 8 as well as testing at least once in these subjects during high school. By 2007–08, states also need to implement testing in science at the elementary, middle, and high school levels. Based primarily on student performance on these assessments, starting in 2002–03, a state must also set up a single accountability system whereby all students score at the "proficient" level by the end of 12 years and demonstrate annual, incremental progress toward this goal. A common fear within high school reform circles is that the increased attention to academic, high-stakes testing and school accountability mandated by this new law may negatively impact some of the students served by high school reform programs — particularly minority students, low socioeconomic-status students, English language learners, and special education students — and constrain the programs themselves.

Despite these new and formidable assessment challenges, high school education reform efforts that incorporate work-related requirements and industry-valued skills have led to important lessons that could serve to improve student assessment systems. It is important for policymakers, educators, and trainers involved with high school and youth programs to be aware of these lessons as well as other assessment-related issues that impact the youth they serve. The high school level, in particular, faces assessment needs that have yet to be met. Specifically, some programs are intensifying their work-related curriculum, thus requiring assessments that are reflective of this shift. Furthermore, increasing numbers of school districts and states are beginning to explore and undertake substantial high school reforms that will require additional enhancements to their assessment strategies.

To that end, this paper addresses some of the fundamental assessment-related questions that need to be considered as states and localities refine and build upon existing assessment systems:

- What is the likely impact of increased high-stakes testing on industry-valued high school programs and the students they serve?
- What success has there been in using additional assessments — beyond state-mandated, academic-focused tests — for career-technical education (CTE) and other high school reform efforts?
- How can career-related and other SCANS-like skills be incorporated into states' academic standards and assessments?
- How can assessment help support and improve contextual teaching and learning?

This paper poses answers to each of these questions based on a review of data and current state practices. The paper concludes with specific assessment-related recommendations to support industry-valued high school reform.

What is the likely impact of increased high-stakes testing on industry-valued high school programs and the students they serve?

There are good reasons for concern that the increase in high-stakes testing may have a negative impact on high school reform efforts and the students they serve. First, high school reform efforts serve a range of students with different learning and response styles. These students' skills might not be best demonstrated through paper-and-pencil standardized testing. High-stakes tests are typically limited to multiple-choice items only or multiple-choice items plus a limited number of constructed-response items that require written responses (typically, short-answer items or essays). Other test formats (e.g., hands-on, performance-based assessments; portfolios) are too resource intensive to administer and score on a statewide basis (Ananda & Rabinowitz, 2000; Rabinowitz & Ananda, 2001). Multiple-choice testing, in particular, is inconsistent with the constructivist teaching and learning focus of many high school reform efforts. Thus, students who are benefiting from constructivist, contextualized learning situations may not be expected to perform as well on multiple-choice testing because of its emphasis on isolated, fragmented concepts. Moreover, many statewide academic assessment systems rely extensively on norm-referenced tests (NRTs) that are designed to measure how well students have achieved relative to each other and relative to national norms. NRTs are often not well-aligned to a particular curriculum and hence may not measure what a student has learned in the classroom.

Yet another concern about the possible effects of high-stakes academic testing on students is that such testing may deter them from fully participating in applied learning courses and industry-valued programs. Prior to the most recent wave of increased high-stakes academic testing, declines had already occurred in the number of high school students taking a concentrated number of career-technical education (CTE) courses. A recent study reported that the portion of students who took three or more courses in a single occupational program area decreased from about 33 to 25 percent among high school graduates from 1982 to 1994 (Levesque et al., 2000). This trend was found to be accompanied by increases in academic course-taking and is also thought to be linked to increases in high-stakes academic testing (National Dissemination Center for Career and Technical Education, 2001).

High school exit exams are suspected to be the measures that would have the most negative impact on student participation in industry-valued programs. Specifically, it is thought that students who do not initially pass the high school exit exam will be targeted for remediation in academic subjects areas and, consequently, will be discouraged from participating in CTE and other industry-valued programs. More significantly, a common fear is that the implementation of challenging high school exit exams will result in an increased dropout rate, especially among specific sub-groups of students (i.e., minority students, low socioeconomic-status students, English language learners, special education students). Although some research studies suggest a link between increased dropout rates and high school exit exams, such studies often do not adequately control for potentially confounding variables (for example, student background factors and programmatic changes, such as more rigorous content standards and curricula). Thus, the evidence that links increased dropout rates of subgroups of high school students to high school exit exams is not conclusive (Rabinowitz, Zimmerman, & Sherman, 2001).

On the other hand, there is also a lack of definitive data to support the often-cited claim that participation in industry-valued high school reform initiatives leads to increases in student academic achievement. Indeed, while the available data from high school innovations that provide a thematic focus (e.g., career academies, career magnates) demonstrate higher student attendance, fewer discipline problems, and higher likelihood to attend college as compared with traditional high schools, there is little evidence of the significant increases in student achievement anticipated by proponents of industry-valued high school reform efforts (Katz, Jackson, Reeves, & Benson,1995; Lynch, 2000). In fact, some data seem to suggest lower performance of students in industry-valued programs on academic achievement tests. However, in their study of Arizona high school students' Stanford-9 scores, Elliot and Knight (2002) found that when they statistically controlled for extraneous variables (e.g., disproportionately large numbers of students from special population groups in CTE programs), apparent test score deficits for CTE students were negligible. Nevertheless, the authors warned that school leaders need to take care to control for such variables when conducting analyses of CTE programs and general education tracks; otherwise, CTE programs may face discrimination as the nation rushes ahead with implementation of high-stakes academic testing.

High Schools That Work (HSTW) embodies a possible exception to the lack of evidence of increased student academic achievement associated with industry-valued high school reform efforts. HSTW is designed to increase the academic achievement of career-focused high school students by combining the content of a college preparatory curriculum with CTE. Administered by the Southern Regional Education Board, HSTW was 1 of 24 nationwide school reform initiatives reviewed in a recent study by the American Institutes for Research (AIR). In its review, AIR found few studies of student outcomes for the 24 school reform initiatives that were based on rigorous research designs (Herman et al., 1999). However, cumulative evidence over more than a decade suggests that HSTW schools have increased student achievement. More specifically, a study conducted by MPR Associates under the auspices of the National Center for Research in Vocational Education demonstrated increases in HSTW assessment scores from 1996 to 1998 in reading, math, and science (Kaufman, Bardby, & Teitelbaum, 2000).

In summary, the data to date on the potential impact of high-stakes testing on industry-valued programs and the students they serve are inconclusive. However, the data suggest that the consequences of high-stakes testing on these programs and the students being served warrant concerted attention for both positive and negative outcomes.

What success has there been in using additional assessments — beyond state-mandated, academic-focused tests — for career-technical education and other high school reform efforts?

During the past decade, states and localities have investigated and developed a range of assessment tools, in part spurred by national efforts and supported by the federal government. *The School-to-Work Opportunities Act of 1994* (STWOA) calls for standards-based assessment that leads to portable skill certificates for high school students who master important industry-valued and related academic skills. Similarly, the *National Skills Standards Act of 1994* envisions a comprehensive national system of standards-based assessments and certification, encompassing both entry-level workers as well as the full range of adult workers in major industry sectors. More recently, the National Association of the State Directors of Career Technical Education Consortium has been exploring systemwide options for high school end-of-course assessments to underscore career-technical education (CTE) as an integral part of the total education system (Wills, 2002).

To date, the above-mentioned goals of large-scale systems of career-related assessments and certification for high school students still remain mostly elusive at the state and national levels. There are many formidable obstacles precluding states from endorsing and using instruments that lead to portable skill certificates. Among them is the difficulty of identifying any single assessment instrument that is appropriate within and across career majors, schools, and districts. The wide range of local programs with different instructional foci suggests a need for different assessment approaches and instruments to meet local needs. On the other hand,

allowing for different assessments would make it hard to achieve portability, whereas implementing a single, common statewide assessment would virtually assure the portability of skills certificates or credentials.

Because of the difficulty in finding a single, hence fully portable, assessment instrument that would fit well with different programs, many states have either explicitly or implicitly encouraged local programs to devise their own assessment and certification models to support locally endorsed industry-valued models. Given this local flexibility, a number of promising assessment models have emerged. While some of these involve selected-response (i.e., multiple-choice) assessment, many feature performance-based assessment. Performance-based assessments require examinees to construct or produce a response to an assessment item or task, as opposed to multiple-choice testing in which examinees must select the correct response. At its best, performance-based assessment includes cognitively demanding, hands-on activities that aim to stimulate learners to think, react to new situations, review, revise, and evaluate their work, and communicate in verbal and visual ways. Examples of performance-based assessment methods include problem-solving scenarios, performance events, and computer simulation tasks.

Described below are selected examples of assessment and certification models being developed or implemented in CTE and other industry-focused contexts. They have demonstrated promise in the field as alternatives for the assessment and certification models espoused by the STWOA and other related legislation. They range from specific instruments (WorkKeys), to performance-based assessment methods (problem-solving scenarios, projects, portfolios), to innovative assessment frameworks and delivery modes (national industry-endorsed credentials, computer-based assessment).

WorkKeys

Developed by ACT, Inc., WorkKeys is a system for instruction and testing of general workplace competencies and employability skills. It is an assessment tool that shows students their levels (assessment profiles) in eight foundational skills: applied mathematics, applied technology, listening, locating information, observation, reading for information, teamwork, and writing. It also provides a job analysis system that identifies skill levels that employees need to perform competently in specific jobs. While it is primarily a paper-and-pencil assessment, WorkKeys is now including computer-based delivery for some of its components. Nearly 14,000 companies nationwide have used WorkKeys for initial hiring, training, and employment (Lynch, 2000). In the past few years, thousands of high school students have been tested with WorkKeys. For example, Oregon's Certificate of Advanced Mastery assessment includes specific local options to measure student performance relative to the Career-Related Learning Standards (CRLSs). WorkKeys was included as part of a pilot study to determine valid measurement of CRLSs. Similarly, Michigan's Department of Career Development has proposed using WorkKeys throughout the state as a measure of general workplace skills for secondary-level

students and welfare-to-work program participants. Illinois also has incorporated part of the WorkKeys battery in its state-mandated Prairie State Exam for grade 11 (Wills & Kaufmann, in progress).

There are many benefits to using the WorkKeys system for assessment of high school students' proficiency on workplace readiness and employability skills. Most significantly, WorkKeys is a standardized assessment package that is based on extensive research. Thus, it is appropriate for use in a range of educational settings and has empirical, psychometric data to justify its use. However, some WorkKeys users have also suggested a few limitations. Specifically, WorkKeys assesses a range of workplace skills, from rote to more complex. As such, some teachers find WorkKeys not fully aligned with their curriculum which integrates workplace readiness and challenging academics. Others suggest that the video and audio stimuli for some of the WorkKeys assessment items seem removed from high school students' experiences and interests. Despite these apparent limitations, few, if any, other assessment packages for workplace readiness skills are as comprehensive and well-researched as WorkKeys.

Problem-solving scenarios

Scenarios represent a popular approach to assessment of career-related skills. They depict complex and realistic problems in a work-related or other "real-world" situation. An examinee's response to the scenario demonstrates his or her ability to apply previous knowledge to generate solutions to realistic problems. Table 1 shows an example of a scenario that requires a written response from high school students studying animal science.

Table 1: Example of a written scenario prompt in animal science

Species Selection

SCENARIO

A neighbor has inherited 500 acres of sparsely forested range land and has decided to start a large animal livestock operation. Your neighbor doesn't have much experience with livestock, so he has asked you to help him choose what animals to run on his property.

The property includes rolling hills. The primary vegetation is annual grasses and small shrubs. There is a wooded portion of the property, which contains mostly coastal live oak. There is a seasonal, natural water supply. The winters are mild and wet, but the summers can be very hot. There is perimeter fencing around the property.

[adapted from the Career-Technical Assessment Program (Ananda, 1999)]

INSTRUCTIONS

Think about animal production. Select which species or combination of species could be used, given the conditions of your neighbor's property. Give reasons for what you suggest.

To receive a Proficient rating on this task, you must show all of the following:

1. Knowledge of:
   - Earning potential in animal production
   - Range management
   - Animal facilities
2. Ability to propose a solution to this scenario
3. Ability to communicate effectively in writing

A number of skill standards projects have used scenarios to either frame the skill standards themselves or as a preferred method to assess mastery relative to skill standards. For example, the Bioscience National Skill Standards, developed by Education Development Center (EDC), include scenarios as routine procedures and unanticipated problems that the student must master (Malyn-Smith & Leff, 1997). These scenarios are used for learning as well as evaluative purposes. Similarly, the Family and Consumer Sciences National Standards, developed by the Vocational-Technical Education Consortium of the States (V-TECS), include scenarios for at least two occupational areas. The Manufacturing Linkage Project, another project led by V-TECS (and co-directed by the state of Indiana), has also developed assessment scenarios with significant industry participation (Border, 1998).

Furthermore, Indiana is using locally developed assessment scenarios on a statewide basis to award individuals with Certificates of Technical Achievement. Certificates are awarded to students, incumbent workers, and adults whose performance on scenarios meet specific criteria. The Indiana Department of Workforce Development monitors individual assessment sites to protect the value and credibility of each certificate awarded (Wills & Kaufmann, in progress).

There are many benefits to scenario assessment. Compared to other assessment methods that require students to construct rather than select a response, scenarios are fairly easy to administer and score. Scenarios are discrete and versatile tasks.

They can be incorporated into large-scale paper-and-pencil (as well as computer-based) assessments with both multiple-choice and open-ended response options. Using a scenario to elicit both multiple-choice and open-ended responses can result in more comprehensive content coverage and more efficient and reliable measurement. In addition to their use in large-scale testing, scenarios can also be used for classroom instructional and assessment purposes.

There are some limitations to scenarios, however. First, it is difficult to develop useful, relevant scenarios in generic workplace readiness contexts that are meaningful to all students. It is much easier to develop scenarios that reflect a more specialized occupational context, such as marketing or home health care. Moreover, although scenarios are more amenable to inclusion in large-scale assessment than many other performance-based assessment options, scenarios are still much more expensive to develop and score than typical multiple-choice items.

Project assessments

A project is an in-depth, hands-on exploration of a topic, theme, idea, or activity, resulting in a product, performance, or event for assessment (Katz & Chard, 1989). The objective of a project is for the student to delve more deeply into and learn about a topic of interest. A project takes place over a substantial period of time (e.g., weeks, months) and represents the best of what a student can do, given constructive feedback and opportunities to revise his or her work. As such, projects focus on depth of knowledge and result in substantial work products.

Although projects are considered an innovative assessment method, many teachers have used a form of project assessment at one time or another — particularly at the high school level. Projects are a powerful tool for assessing a blend of hands-on skills and challenging academic content because they require students to demonstrate in-depth content knowledge, evaluate their own work, solve problems, plan and carry out complex activities, and (often) communicate findings to an audience. The senior project is a form of assessment that is commonly used in high schools across the country. Typically adopted as a requirement for high school graduation, almost all senior projects include background research, a research paper, development of a product related to the paper, and an oral presentation of the research and product to an audience. Table 2 provides brief descriptions of senior projects.

Table 2: Examples of senior project ideas

Neighborhood Project: Student identifies a topic of concern to his or her neighborhood, conducts a neighborhood survey on attitudes toward that topic (e.g., a new freeway construction measure on an upcoming city election), analyzes the results, and summarizes their implications.
The Plant Science Experiment: Student conducts research on the factors contributing to the growth of a rare plant, develops some hypotheses that can be tested, designs a plant experiment to test these hypotheses, then summarizes findings on a poster board and in a written report.
Computer Software Manual: Student investigates computer software questions that are most frequently asked by beginning users and develops a software reference manual to help users find answers to their questions.
The Infomercial: As a group project, students research the infomercial trend, select a product to advertise, and create a videotape infomercial.

The use of project assessments as an integral part of teaching and learning activities can have many effects on student learning and teacher practices (Long & Crepeau, 2000). On the positive side, students can increase and deepen their knowledge and skills on a particular topic of interest to them. Many students show increased autonomy and resourcefulness as they engage in active, rather than passive, learning. High schools with senior projects also report higher rates of homework completion, increased self-reflection, and increased student competence in writing and research skills. At the same time, project assessment can be difficult and frustrating for some students who are not accustomed to an assessment that requires a high level of initiative and commitment. Moreover, in practice many senior projects tend to sacrifice academic rigor for showy presentations. This is especially true during the early years of project assessment implementation when students are not yet accustomed to projects as a vehicle for showcasing their knowledge and skills on key academic and industry-valued standards.

There are benefits and drawbacks associated with project assessment not only for students, but also for teachers. Some teachers welcome the shift in their roles from lecturer to mentor, coach, and advisor that accompanies incorporation of project assessments into the curriculum. For others, this shift is uncomfortable and somewhat difficult. Moreover, certain logistical aspects of project assessment can be overwhelming to teachers, such as identifying and bringing in a larger audience (parents, other teachers, community members) to watch students present their projects. Nonetheless, project assessments have great potential for integrating academic and hands-on learning — they help create and foster an interdependence between learning that is hands-on and minds-on (Long & Crepeau, 2000).

Portfolios

A portfolio assessment involves the structured collection of student work that documents students' application of knowledge and skills in a variety of authentic contexts. In contrast to projects that typically require students to produce one product related to a few standards or themes, portfolios generally require a variety of student work related to multiple standards or themes. Therefore, portfolio assessment can usually provide a more comprehensive view than projects of students' standards-based knowledge and skills (Ananda, 2000).

There are many examples of portfolios in place today across all levels of the education system. Writing portfolios abound at the elementary, middle, and high school levels. Math portfolios, although less popular than writing portfolios, are used not only as an assessment tool, but also to encourage students to work with and engage in mathematics in meaningful and nontraditional ways.

Although the use of portfolios to promote academic content learning has received the lion's share of attention in education circles, many career-related portfolio models have also been developed over the last 12 years or so. Michigan's Employability Skills Assessment Kit (ESAK) is considered a pioneer effort in career-related portfolios for secondary-level students (Michigan State Board of Education, 1993). Although no longer in statewide use, it is briefly described here because it was one of the first career-related portfolio models to gain widespread visibility and recognition. This portfolio model was designed to assess students' attainment of 12 employability skills benchmarks and provide feedback to students about their work readiness. ESAK used a "legal approach" — students were presumed "innocent until proven skilled." They acted as their own "prosecuting attorneys" and gathered evidence to prove they were skilled, basing their "case" on evidence related to the set of 12 employability skills benchmarks.

A career-related portfolio is the centerpiece of California's Career-Technical Assessment Program (C-TAP). C-TAP's original purpose was to certify and formally recognize students demonstrating mastery of important career-technical and related academic skills consistent with California's Model Curriculum Standards for programs in Agriculture, Business, Health Careers, Home Economics, and Industrial and Technology Education. Because it was intended as part of a statewide skills certification system, the C-TAP portfolio is somewhat prescriptive in comparison to other high school portfolio models. It consists of five required sections (table of contents; letter introducing the portfolio; career development package of resume, completed college or job application, and letter of recommendation; work samples; and writing sample) and one optional section (evaluation of employability skills by supervisor). Beginning in the mid-1990s, thousands of career-technical students in California produced C-TAP portfolios. However, because of the high cost of large-scale implementation, coupled with California's move away from statewide performance-based assessment, C-TAP never was implemented statewide as a skill certification system (Ananda, 1999).

Despite the fact that the C-TAP portfolio was never incorporated into a statewide system, the C-TAP model and variants of it took hold in districts and schools throughout California as well as in Arizona and Oregon. Specifically, the C-TAP model gave rise to the Career Preparation Assessment (CPA), a portfolio designed to measure learning relative to generic workplace readiness skills (Personal Skills, Interpersonal Skills, Thinking and Problem Solving, Communication, Employment Literacy, and Technology Literacy) and academic standards. This more generic measure of workplace readiness was aimed at a larger cross-section of high school students, including those involved in career-technical education, career academies, and school-to-work, as well as students not involved in such programs. As more and more sites began using the CPA, they sought to tailor the general model to their own local needs. Hence, CPA evolved into the Custom Portfolio (CP), which allows for some variation from the general model, while maintaining the advantages of a largely standardized portfolio model (e.g., use of common portfolio scoring rubrics, use of common exemplars of student work).

The evolution of the C-TAP portfolio illustrates some of the strengths and limitations of the portfolio as an assessment tool. A major strength is its inherent appeal to a range of programs that seek to integrate academic and "real-world" learning. Numerous sites across California, Oregon, and Arizona were attracted to C-TAP and its variants. In many ways, the career-related portfolio represents an ideal curriculum-embedded assessment because of its ability to address multiple standards in interesting, meaningful, and compelling ways. Like projects, students typically take pride in their portfolios, demonstrating increased autonomy, self-reflection, and initiative as they develop their own unique collection of work.

However, as the C-TAP experience demonstrates, portfolio models in general have not proven sustainable for statewide assessment purposes. They are very expensive to administer and score, and raise a host of logistical issues (e.g., where to store portfolios). Use of portfolios also requires significant professional development for teachers. And sometimes portfolios do not survive public scrutiny. That is, some factions in the general public consider portfolios as intrusive, non-rigorous measures. Nevertheless, for local instructional and assessment purposes, portfolio assessments fill a niche not easily addressed by other methods.

Incorporation of national industry-endorsed credentials

Given the significant development and administration costs associated with new assessments that attempt to address industry-valued skills, some states have decided to meet assessment needs by drawing directly from industry. For example, Virginia has developed a multifaceted process to incorporate industry-validated assessments into the state assessment system and provide students with portable credentials. Substantial effort has been made in systematically identifying the academic requirements embedded in nationally validated skill standards certification programs. Using an instrument called the Snyder Taxonomy, made available through the Vocational-Technical Education Consortium of the States (V-

TECS), Virginia cross-referenced (or cross-walked) industry standards with its own state academic standards. Although this effort required some investment in software, it avoided substantial assessment development and implementation costs.

In short, Virginia's approach is to address academic standards through their state tests and ensure linkage to industry requirements by using the assessments developed by industry. This approach has provided additional benefits for career-technical education programs. The state, through the documentation of academic requirements in materials based on industry standards, has also been able to expand dual enrollment opportunities for some students in post-secondary institutions. While this assessment approach is certainly promising, one possible limitation relates to its total reliance on industry-endorsed credentials for measurement of SCANS-like skills. Just as high-stakes academic assessments may not represent the most instructionally sensitive measures of student learning, industry assessments may be too focused on a single occupation to reflect the broader, industrywide focus of many high school programs.

Computer-based assessment

Some of the performance-based assessment methods described above (projects, portfolios) have experienced success at the local level, but have proven harder to implement as high-stakes assessments at the state level because of cost and administration considerations. Now, with the advent of computer-based assessment, comes the potential for vastly improving how assessments are delivered and scored as well as the quality of information they generate. There are several advantages of computer-based assessment over the traditional paper-and-pencil mode of assessment delivery. A computer-based delivery system makes it possible to include a range of assessment methodologies that allow for dynamic interaction between students and assessment items, including different stimuli for questions that are difficult or cost-prohibitive to use with a paper-and-pencil assessment system (e.g., complex diagrams, color photographs, audio and video clips). With use of computer-adaptive models, assessment administration time is cut short and the assessment process is better targeted to the individual student's needs because each student is presented with assessment items tailored to his or her ability level. Further efficiencies are achieved because computer-administered tests require no printing and shipping of test booklets and answer forms. Moreover, computer-based tests can produce instantaneous results, even for assessment programs that require student writing because of new breakthroughs in artificial intelligence and other models that allow timely computer scoring of essays. (For a full discussion of the benefits and drawbacks of computer-based assessment, see Rabinowitz & Brandt, 2001.)

There are many possible variations of computer-based assessment models, many of which are being explored and developed to measure career-related and other SCANS-like skills. For example, the Sales and Services Voluntary Partnership, facilitated by the National Retail Federation with support from the National Skill Standards Board, is in the early stages of implementing a computer-based

assessment to measure customer service skills. This assessment uses a multiple-choice item format exclusively, but includes video and audio clips as stimuli for some of the questions. Another national skill standards-related project is developing an online, computer-adaptive assessment based on the National Health Care Skill Standards. With a U.S. Department of Education Grant, the National Consortium on Health Science and Technology Education has partnered with Brainbench to develop this assessment, which features the adaptive capability of branching to harder or easier assessment questions based on the individual examinee's answers to previous questions.

In conclusion, the field has demonstrated a range of assessment methods that can be used for particular assessment purposes. Some of these purposes are about reinforcing good teaching and learning, whereas others emphasize student recognition and certification. Unfortunately, the current focus on high-stakes, large-scale academic testing may deter attention from these other purposes and forms of assessment (American Youth Policy Forum, 2000).

How can career-related and other SCANS-like skills be incorporated into states' academic standards and assessments?

It is commonly acknowledged that the so-called "soft" skills, including work readiness and career-related skills (e.g., those identified by the Secretary's Commission on Achieving Necessary Skills, or SCANS) are neither broadly nor systematically covered in the vast majority of state core academic standards and assessments (WestEd, 2001a). Instead of being addressed in states' core student assessment systems, workplace readiness and career-related skills have typically been relegated to third-party assessments, such as state licensure exams offered by the National Occupational Competency Testing Institute; industry-sponsored certification exams, such as Automotive Service Excellence; and more recently, workplace readiness assessments, such as WorkKeys (Wills, 2002).

However, some state systems are exceptions. They include workplace readiness and career-related skills in their state core academic standards and assessments. A few of these states are listed below.

California. Although workplace and other soft skills are not addressed in California's core assessments for grades 3 through 8, the statewide assessment system includes end-of-course/end-of-program exams at the secondary level in academic areas as well as five broad CTE areas (Agriculture Core, Computer Science and Information Technology, Food Service and Hospitality, Health Care Core, Technology Core). These CTE exams are part of the Assessments in Career Education program.

Kentucky. This state assesses Practical Living/Vocational Skills core content for all students as part of its school assessment and accountability system.

Maryland. Maryland's state assessment system includes World of Work and Survival Skills. However, plans are currently underway to replace the Maryland high school exit exam (where these career-related skills are covered) with end-of-course exams in English, government, algebra, geometry, and biology (Education Commission of the States, 2000).

Virginia. As previously described, Virginia incorporates national certification programs and their assessments into its overarching state assessment framework, allowing students to earn portable credentials.

Why aren't more states incorporating workplace readiness skills into their core standards and assessment systems? One reason is that while there has been growing public concern for the need to increase student learning with respect to *challenging* academic standards, there has been no comparable outcry from the general public for raising student achievement relative to workplace readiness or other SCANS-like skills (WestEd, 2001a). Nevertheless, employers in many states, along with like-minded policymakers and educators, continue to voice concern about the lack of workplace readiness competencies or SCANS-like skills. Many are advocating for formally incorporating SCANS or SCANS-like skills into core academic assessments so that all students are assessed on these important skills.

However, "adding on" SCANS-like skills may place a significant burden on these statewide assessments whose primary purpose is to measure student learning relative to academic standards. Moreover, it is not clear that the resources and widespread support needed to effect such a substantial change in these assessments would be forthcoming from the federal government, the education community, or the general public. Even if support and resources were available, it would take years to overhaul the existing state academic assessments in order for them to adequately address workplace readiness skills. First, the standards and curriculum upon which the assessments are based would need to formally incorporate SCANS-like skills. Then, students would need sufficient exposure to these new standards and curriculum before being subjected to high-stakes statewide testing on this new content. A final consideration is that the multiple-choice and short-answer format of statewide academic assessments limits their ability to adequately cover key aspects of SCANS-like skills, such as teamwork, exercising leadership, and other interpersonal skills. For all these reasons, it may be unrealistic to expect that state academic core assessments serve as the primary vehicles for assessing SCANS-like or other career-related skills (WestEd, 2001a).

However, these tests can and should serve to reinforce SCANS skills in a limited, yet purposive fashion. In fact, a recent analysis of a statewide academic assessment system showed that some academic assessment items are already cast in a workplace (or other "real-world") context or address SCANS skills (WestEd, 2001a). Although the study found that coverage of SCANS skills on the state tests was limited and uneven, it noted that academic assessment instruments could be infused with such items in a systematic way by building them into the assessment

blueprints (i.e., assessment plans) for academic tests. Described below are three examples of items on statewide academic assessments that measure student learning relative to academic standards and highlight workplace contexts or reinforce SCANS skills.

Example 1: Multiple-choice reading comprehension item

Table 3 shows an example of a functional reading passage — that is, one that contains procedural information for real-world tasks. Specifically, the passage details procedures for answering a business telephone call, followed by items testing students' comprehension of those procedures. Note that the first two items require students to comprehend details from the passage. In contrast, the third item requires students to draw an inference from what they read about the best reason for having telephone answering guidelines. As a group, this cluster of items is both cast in a workplace context and shows a partial match to the SCANS Reasoning skill.

Example 2: Multiple-choice mathematics item

Table 4 shows an item adapted from a high school exit exam. It is a carpentry problem that asks students to determine the appropriate factor for sketching the measurements of an entertainment center to scale. Students must use the accompanying graph to figure out a solution to the problem. Like the first sample item, this math item is both cast in a workplace context and requires the student to use the SCANS Reasoning skill.

Table 3: Reading comprehension prompt and multiple-choice items

Procedures for Answering a Call in Your Workplace

Do you know what to say when you answer the phone? Follow these guidelines:

- Identify yourself. State your workplace and your name. Say something like, "Apple Appliances, Sam speaking."
- Speak clearly and slowly because the caller cannot see you.
- Give the caller your full attention. Stop what you are doing before you answer the phone. Don't work and talk on the phone at the same time.
- Listen carefully to what the caller says.
- Take notes on your message pad. Write the caller's name and why he or she is calling.
- Ask questions if you aren't sure what the caller wants.
- At the end of your call, summarize what the caller has said. You can use your notes.

From *Communication*, Steck-Vaughn Company

1. According to the passage, what is the *first* thing you should do when you answer the phone or make a call?

   A. take careful notes on your message pad
   B. invite the caller to identify himself or herself
   C. give the caller your full attention
   D. say who you are and where you work

2. The passage says that because your caller cannot see you, you need to

   A. identify yourself.
   B. ask polite questions.
   C. speak slowly and clearly.
   D. make a good impression.

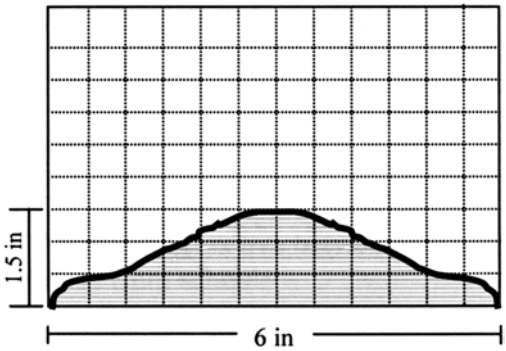
3. What is the best reason to have guidelines for answering a business call?

   A. to monitor the phone etiquette of employees
   B. to increase business through customer satisfaction
   C. to summarize a caller's request for assistance
   D. to practice taking complete notes over the phone

Note: the correct answers are: 1-D; 2-C; 3-B. This example was adapted from released items from the Nevada Proficiency Examination.

Table 4: Mathematics multiple-choice item

A carpenter sketched to scale the pattern for the decorative top for a new entertainment center. If the entertainment center is to be 72 inches wide, how many decorative tops could be cut from a 4' x 8' sheet of plywood?



A. 1

B. 2

C. 4

D. 12

Note: the correct answer is B. This example was based on a released item from the Kentucky Core Content Test.

Example 3: Performance task in laboratory science

While the first two examples are multiple-choice items, this final example is a performance task in laboratory science. It is an excerpt from a released item from one of California's end-of-course high school assessments, the Golden State Exam (GSE) in Laboratory Science. Besides multiple-choice items, GSE science exams feature multiple-part performance tasks. This example is cast as a problem farmers face as they endeavor to produce healthy rice plants. It requires students to apply their understanding of biology and genetics to explain disease resistance in rice. Moreover, students must use the scientific method to carry out and record observations and results of this lab task and, based on their findings, provide recommendations to farmers. Table 5 shows the first three questions of this nine-part task.

Table 5: Laboratory science performance task

Genetic Relationships in Rice Plants

Some farmers have crossed plants that are resistant to the bacteria with those that are not. After crossing the plants, they counted the number of offspring that had resistance to the bacteria (healthy) and those that did not (diseased/dying). Their results are shown below.

		Cross	
Parent plants (P)	Resistant to disease	X	Not resistant to disease

	Number of plants resistant to disease (healthy)	Number of plants not resistant to disease (diseased/dying)
First generation (F_1):	0	987

1. The farmers were disappointed with the results of the cross. Use your understanding of genetics to provide a possible explanation for these results.

   A child of one of the farmers had been learning about genetics in biology class and suggested that it was important to continue the experiment by crossing the offspring (F_1) plants with each other. The results are shown below.

		Cross	
Offspring (F_1)	Resistant to disease	X	Not resistant to disease

	Number of plants resistant to disease (healthy)	Number of plants not resistant to disease (diseased/dying)
Second generation (F_2):	227	760

2. Use your understanding of genetics to explain these results.

3. Describe a process the farmers might use to obtain a crop of rice that is entirely resistant to disease. Explain why this process would be successful.

Note: This is an excerpt from a released item from the Golden State Examination in Laboratory Sciences.

Compared to the previous examples of multiple-choice items, this performance task shows stronger connections to SCANS skills, due largely to the open-response format of this task as compared to the selected-response nature of multiple-choice items. Specifically, this excerpt of the performance task:

(1) is cast in a *workplace context*; and

(2) shows a full match to the SCANS skill of Reasoning in Questions 1 and 3 and a partial match to the skill of Acquires and Evaluates Information in Question 2.

The point of showing these sample items is simply that more of such items could be included in state academic core assessments in a purposeful, rather than happenstance, fashion. In order to accomplish this, the assessment blueprints for state core assessments should be updated to specify that some percentage of items should meet one or both of the following criteria:

(1) portray workplace or other "real-life" contexts; and

(2) reinforce SCANS skills (or other similar skills that overlap with academic skills), such as Reasoning, Acquires and Evaluates Information, and Creative Thinking.

State-sponsored content and development committees that include academic and CTE educators as well as community and business representatives should determine the appropriate percentage of items in a state assessment that should meet the above criteria for each content area and grade level.

In addition to infusing workplace readiness and other SCANS-like skills into existing statewide assessments, it is equally important that evaluation criteria be developed to measure these skills. To effectively assess such skills within existing test instruments, evaluation criteria and rubrics should be amended to explicitly specify the targeted skills. For example, to accurately evaluate student performance on the SCANS dimension of Improves and Designs Systems, the work product will need to be assessed in terms of how well the student has demonstrated this ability. Reliable assessment of such skills involves explicit incorporation of skills into the scoring system as opposed to merely assuming that a particular assessment item implies the use of certain skills.

Before incorporating SCANS-like skills into formal academic assessments, these skills must be infused into the core academic curriculum. There are many different ways of doing so. One way would be via curriculum-embedded instructional and assessment tasks that integrate learning of academic content and SCANS skills. Such curriculum-embedded tasks either could be added to existing academic standards and curriculum documents or be featured in new supplemental curriculum support materials. Tasks that explicitly integrate academic and workplace skills are much more commonly found in career-technical curricula than in core academic curricula (WestEd, 2001a).

Curriculum-embedded tasks that integrate academic learning and workplace preparation could take many forms. For example, a middle or high school language arts task could ask students to write a letter introducing themselves and their skills to prospective employers. A project assessment is a curriculum-embedded task of larger scope. An example would be a group community service project, such as organizing and executing a fund-raising drive to beautify a neighborhood park. Group projects of this sort require students to use their knowledge of civics as well as key SCANS interpersonal skills, such as teamwork and leadership.

Arguably, portfolios represent the most extensive type of curriculum-embedded assessment task. The aforementioned Career Preparation Assessment (CPA) portfolio is an example of a portfolio model that has been tailored to local needs and then incorporated into the curriculum of several districts and schools in California, Arizona, and Oregon. The CPA (and its most recent incarnation, known as the Custom Portfolio) is designed to measure generic workplace readiness standards that are SCANS-like, including Personal Skills, Interpersonal Skills, Thinking and Problem-Solving Skills, Communication Skills, Occupational Safety, Employment Literacy, and Technology Literacy. In tailoring the CPA to their own specific education objectives and needs, many local sites have chosen to infuse higher levels of academic learning with workforce preparation by explicitly linking portfolio components to their own challenging academic standards.

In summary, there is a range of possible curriculum-embedded assessment tasks that could help teachers effectively link academic and workforce preparation skills in their instruction. By featuring models of such tasks in core academic curriculum support documents, all students will benefit from meaningful reinforcement of academic learning through "real-world" applications.

How can assessment help support and improve contextual teaching and learning?

Assessment can either support contextual teaching and learning or hinder it. The significant mismatch between existing state assessment systems and contextual teaching and learning represents a major obstacle. Most state assessments consist mainly of decontextualized multiple-choice and short-answer items that address academic core content, whereas contextual teaching and learning emphasizes hands-on, integrated learning of academic and real-world skills. Until state assessment systems embrace tasks that measure SCANS-like and academic skills in context, large-scale core assessments will not be supportive of contextual teaching and learning. Nonetheless, there are specific ways in which assessment can be supportive of contextual teaching and learning. Described below are two strategies for fostering such support.

"Mixed" state-local assessment model

One strategy is to design an assessment framework that combines local and state assessments (Rabinowitz & Ananda, 2000). As statewide assessments focus increasingly on high-stakes student and school accountability concerns, they tend to rely increasingly on more conservative assessment methods, primarily multiple-choice tests. The draw of these instruments is their ability to reveal patterns of relative strengths and weaknesses across large groups of students in a valid, reliable, and efficient manner. However, they generally do not yield specific-enough data to use in targeting instruction for individual students. Moreover, for the reasons cited above, it is somewhat unreasonable to assume that such measures could be the primary vehicle for assessing SCANS-like skills.

Nevertheless, the limitations of state academic assessments suggest an important function for local assessment: assessing SCANS-like skills in contextually appropriate ways and providing diagnostic information about what students do well, where they are having difficulty, and how instruction might be adjusted to address their specific needs. Because they are not constrained by the same issues as state-level programs, local assessment programs have greater potential for generating such measures that are specifically tailored to local needs. Thus, the incorporation of local assessments into an overall statewide framework could strengthen the statewide system. However, it is important to note that under a mixed state-local assessment model, the state maintains critical responsibilities. Specifically, the state must provide oversight and monitoring of local efforts as well as professional development support, technical assistance, and dissemination of information on best practices.

There is precedent for a model that combines features of local and state assessments to measure SCANS-like skills. Oregon is designing such an approach for its Certificate of Advanced Mastery assessments. Under this model, substantial responsibility for assessment of SCANS-like skills would be delegated to local programs and schools, with the state's role being that of oversight, approval, and technical assistance. That is, the state would provide parameters and models for assessments that measure SCANS-like skills, allowing schools and local programs a choice for which assessment tools to select or develop. Specifically, the Oregon Department of Education would develop a list of approved assessment methods ranging from checklists up through more formal, curriculum-embedded methods (e.g., senior projects, portfolios). The list would include sufficiency criteria against which potential methods and instruments would be evaluated. The department of education would include approved instruments within each category of assessment methods. These instruments, reviewed against the criteria, could be locally developed or commercially available.

Data-driven decision-making

Despite the mismatch between state core academic assessments and contextual teaching and learning strategies, the data from such assessments should not be ignored. In fact, the results from statewide and local assessments should be used to inform and guide curricular and instructional decisions — including programs that emphasize contextual teaching and learning. Data-driven decision-making is a strategy that can help support and improve contextual teaching and learning. It refers to using quantitative and qualitative data to guide programmatic and instructional decisions. In a data-driven school or program, educators collect and use data on an ongoing basis to gauge their instructional practices and refine their strategies, as needed.

Data for program and instructional improvement should be broad-based and include indicators about students, teachers, parents, and others. Although assessment data are generally the major focus of analyses, consideration of the "whole picture" is necessary to make informed decisions. This entails interpretation of multiple data elements together (WestEd, 2001b).

Figure 1: Using data on the road to instructional improvement

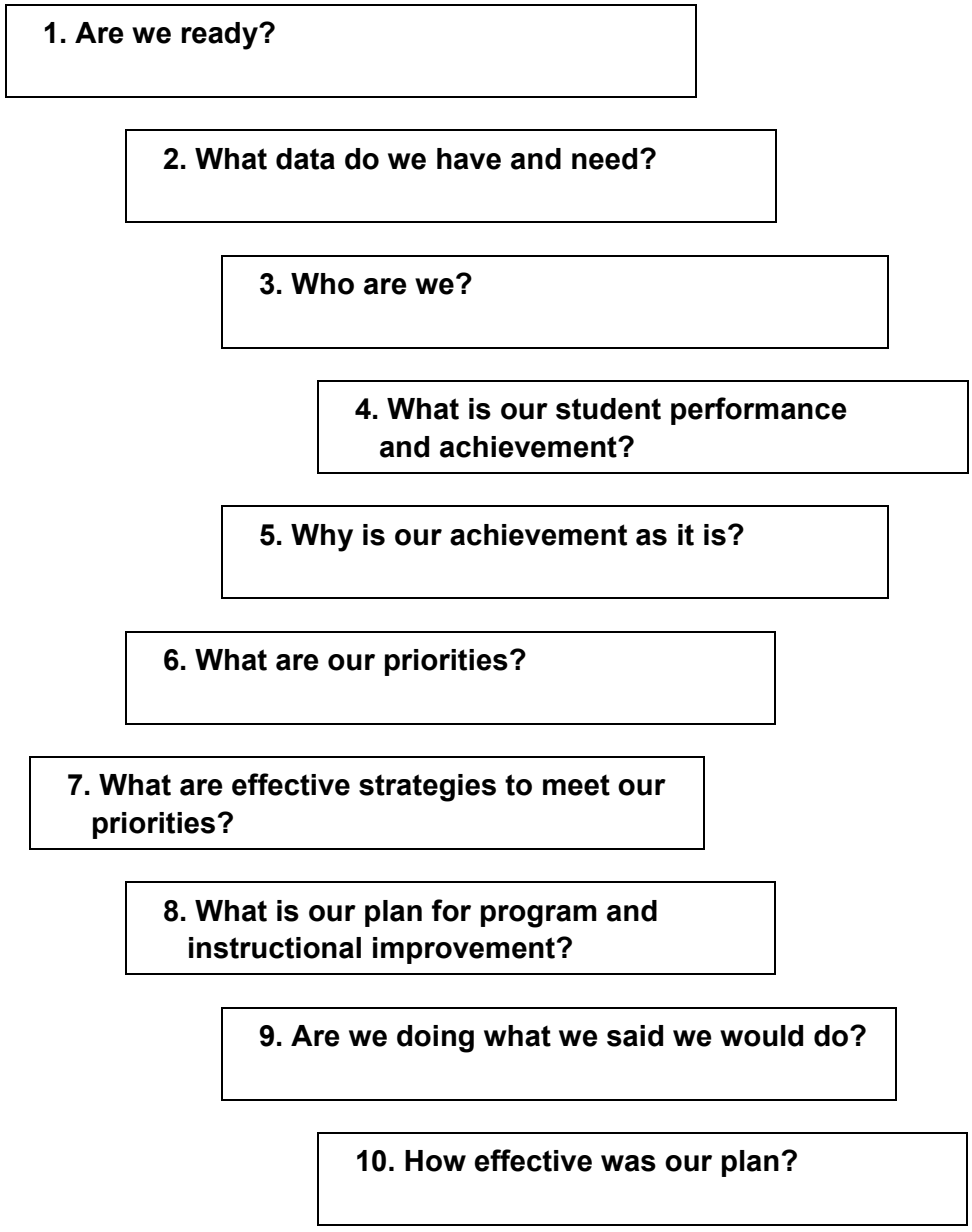


Figure 1 shows the major steps (or questions of interest) in a data-driven decision-making framework. Within each step, there are specific activities that program or school teams use to answer the questions posed. Through this systematic process, teachers working together and with others identify their programmatic data needs, engage with and understand the implications of their student assessment data results, identify necessary adjustments to instruction to meet goals and priorities, and gauge the effectiveness of the adjustments they make. In order to properly implement the decision-making process, it is important to establish both formal and informal feedback loops. The more fully developed data-driven systems include

multiple data sources that combine assessment and non-assessment indicators to make decisions about systems, instruction, and individual students.

The strategies described here — strengthening local assessments in a "mixed" state-local assessment model and incorporating assessment data-driven decision-making into program improvement efforts — are two concrete examples of ways to make assessment an integral and meaningful component of contextual teaching and learning reforms. Note that both strategies rely heavily on efforts at the local, rather than at the state and national levels. Indeed, the various assessment-related challenges faced by high school reform initiatives call for concerted, but differentiated, actions at the national, state, and local levels.

Concluding remarks and recommendations

This paper has argued that industry-valued high school reform efforts face various assessment-related challenges as well as promising options. While states and localities have made progress over the past decade in expanding contextual learning choices for all students (e.g., expanding career academies and service learning, creating small learning communities, and using communities as classrooms), a major source of tension is how to ensure these choices are consistent with accountability-driven assessments. Despite the emergence of promising assessment practices described in this paper, the assessment tools typically being used today to measure student achievement in the context of school accountability may not be sufficiently valid to capture the learning that occurs — particularly for students with different learning and response styles. This situation is being exacerbated by the virtually exclusive emphasis in federal education reform legislation concerning high-stakes testing and school accountability on the "basic" skills of reading and math.

What roles should be assumed at the local, state, and national levels to improve assessment systems for students in industry-valued high school reform programs? Based on the research conducted for this paper, specific recommendations are offered for roles that can be assumed and actions that can be taken at the local, state, and national levels. Some of these have been previously described, however, all warrant further delineation, particularly with respect to what can realistically be accomplished over the short and long terms.

(1) *Local responsibility: Incorporate SCANS-like skills into local assessments that are supported and monitored by the state.* A major observation described in this paper is that assessments selected, developed, and implemented at the local level are typically subject to fewer constraints than those at the state level. As such, local assessments have greater potential for innovation beyond the conservative, but efficient, multiple-choice assessment format. Moreover, local assessments have greater potential for measuring SCANS-like skills in contextually appropriate ways, and in the process, providing useful diagnostic information on individual students. Finally, an assessment system that prominently features locally determined assessments can better reflect local instructional practices

and priorities. For example, although career-technical portfolio assessments may be unwieldy to administer and score at the state level, they can be used effectively at the local level to reinforce and measure integrated academic and industry-valued learning. Likewise, high school programs may choose to incorporate project-based assessment or computer-based assessment, depending on their particular program foci or student needs.

While this recommendation argues that a strong local assessment component is an integral part of any comprehensive high school assessment system, it also recognizes the need for state oversight and support to ensure the viability and quality of the local component. An appropriate state role in support of local assessment should include technical assistance, fiscal support, and monitoring. Moreover, state involvement can help facilitate some degree of comparability of assessments across localities. Oregon's proposed assessment model for its Certificate of Advanced Mastery, which allows localities to select from state-approved assessment methods to measure industry-valued skills, represents a concrete example of an assessment framework that strives to balance local autonomy with across-state comparability.

Because many local programs and schools already have specific assessments of workplace readiness skills in place, this proposed model of local assessments that are supported at the state level represents a realistic and attainable framework for high school assessment that states should consider. Costs incurred by the state should be moderate as compared to designing and implementing a valid, reliable, and legally defensible statewide assessment of workplace readiness skills from scratch. Moreover, implementing such an assessment system could be accomplished in a relatively short amount of time (e.g., within a few years). Preparation for full implementation could include states and localities researching viable assessment methods, localities pilot-testing these assessment methods, and the state establishing a network for support, monitoring, and technical assistance (including facilitating the development of local consortia).

(2) *State responsibility: Refine state core academic assessments to reinforce SCANS-like skills.* In order to make large-scale assessment at the state level feasible, we must be willing to sacrifice some degree of validity in assessment of workplace readiness skills for technical adequacy and efficiency. Obviously, assessing "real-world" skills in "real-world" contexts is a more valid approach than assessing such skills out of context. However, if the goal is to incorporate SCANS-like skills in state assessment programs for all students, some adjustments will be needed to accommodate the large-scale, statewide assessment constraints. As previously described, this means relegating the more ambitious performance-based assessment methods, such as portfolios and projects, to the local level. Furthermore, it also means "settling" for more decontextualized measures at the state level, including multiple-choice and short-answer item formats.

Over the short-term, however, it may not be realistic to expect states to restructure their high-stakes, core academic assessment systems to serve as the primary means of assessing workplace readiness skills. As previously alluded to, the vast majority of state core assessments are not currently set up to measure workplace readiness skills, and there is currently insufficient political will to drastically overhaul state core assessments to measure these skills. Even if the will and resources were available, it would take years to fully realize such overhauls of core state assessments.

Nonetheless, states could and should work immediately to highlight and reinforce SCANS-like skills on these assessments. This paper includes examples of items that measure core academic skills, while also reinforcing SCANS-like skills presented in workplace and other "real-world" contexts. Infusion of items that reinforce workplace readiness skills could be phased into ongoing assessment item development and replenishment activities. This approach would not be likely to face public opposition because it does not detract from the major function of core assessments to measure core academic skills. In fact, this approach has the potential to strengthen and complement the measurement of academic skills by encouraging the inclusion of items that are contextually appropriate and cognitively demanding.

While highlighting and reinforcing SCANS-like skills on state academic core assessments is a realistic and worthwhile objective, it falls short of the overarching and longer-term goal of formally incorporating workplace readiness skills measurement into statewide assessment systems. In order to formally and comprehensively incorporate SCANS-like skills measurement, we must first build a compelling case for educators, policymakers, and the general public to recognize that SCANS-like skills matter and make a difference in student performance and achievement.

(3) *National responsibility: Provide leadership and support for instruction and assessment of SCANS-like and contextualized skills.* Strong national leadership and support are essential to improving assessment systems for high school students. Just as the state should assume a substantive role in the improvement and support of local assessment systems, national leadership and support are needed to help states, in collaboration with industries, develop viable statewide assessment systems that effectively address workplace readiness skills. Such systems could build off of promising approaches developed through local and state efforts, such as incorporating industry-sponsored assessments in the overall state core assessment system or adopting a statewide system of end-of-course high school exams, including exams that cover workplace readiness skills. Whatever the particular form taken by specific state assessment systems, national leadership is necessary to continue building the infrastructure that supports connections between industry and education, including the collaborations necessary to ensure high quality assessment systems.

National leadership is also needed to give voice in support of realistic, yet meaningful, ways for workplace readiness skills to be included in state and national assessment systems, particularly at the high school level. This means aggressively and strategically "making the case" for the importance of incorporating SCANS-like skills into high school curriculum and assessment. Moreover, it means following the development of key federal legislation that affects the design of state and national assessment systems (e.g., Elementary and Secondary Education Act) to help ensure that such legislation supports incorporating workplace readiness skills into assessment systems for high school students. The U.S. Department of Education's Office of Vocational and Adult Education, among others, would be a logical candidate for assuming a national leadership role in this regard.

Finally, national leadership is essential in order to enhance our existing knowledge base about the relationships among contextual teaching and learning, assessment methodology, workplace readiness, and academic achievement. Much of the literature over the past decade has argued eloquently for the importance of students acquiring workplace readiness as well as academic skills. Nevertheless, we still lack "scientifically based research" (a phrase now regularly used in federal education legislation as the major criterion for evaluating educational relevance and impact) and substantial empirical evidence about what works and doesn't work in supporting student achievement through contextual teaching and learning. Specifically, we need concerted, systematic research to help answer the following types of questions: How can the interjection of SCANS-like skills into the high school curriculum help increase student achievement in particular academic subject areas (e.g., reading, science, math)? Which assessment methodologies are most appropriate for students with particular learning strengths and styles? How does participation in contextual teaching and learning programs during high school affect what students do after leaving high school? Building a base of solid empirical research is no easy feat and could take a number of years to accomplish.

The recommendations offered above constitute a tall order for industry-valued high school reform efforts. However, the end goal — improved teaching and learning for all high school students — constitutes strong motivation.

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