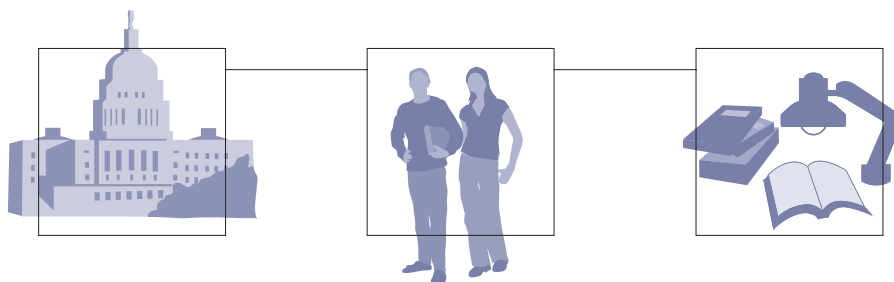


Essentials of High School Reform: New Forms of Assessment and Contextual Teaching and Learning

Edited by Betsy Brand

September 2003

BRIDGING YOUTH POLICY, PRACTICE AND RESEARCH



AMERICAN YOUTH POLICY FORUM



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- Bridging Youth Policy, Practice, and Research

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Betsy Brand

Co-Director

September 2003

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Introduction

The American Youth Policy Forum (AYPF) and the Center for Workforce Development, Institute for Educational Leadership (IEL) are committed to raising awareness of policies and practices that will lead to improved learning opportunities for youth in high school. Career and college preparation for all students has always been an important policy goal for AYPF and IEL. Both organizations have focused their policy work on how to make high school more rigorous, meaningful, and connected to students' needs and future plans. AYPF and IEL have long recognized that in order to meet this goal, the structure and design of high schools and of the teaching and learning that takes place in those high schools need to change. Both organizations recognize that schools alone cannot be expected to prepare youth for the challenges of the global marketplace, thus partnerships with communities and industries are needed to assist in redesigning and restructuring of high schools.

AYPF's and IEL's perspective on high school reform starts from the position that every student should be prepared to face the challenges of today's global, knowledge-based economy which now requires some postsecondary education. In order for young people to be prepared both for postsecondary education and high skill careers, they need not only strong academic skills, but also the "ability to apply academic concepts and skills, to solve complicated interdisciplinary problems, to work collaboratively, to understand systems, and to communicate effectively."¹ High school students also need to learn about potential careers, have a familiarity with the world of work beyond the classroom walls, and develop some occupational competencies.

Many high schools do not prepare their students well for the challenges of the global labor market. One has only to look at the poor performance of U.S. high school students on the National Assessment of Educational Progress (NAEP) reading and mathematics tests, as well as the staggering dropout rates in some urban school systems. In addition, many employers complain that they cannot find skilled employees or that their young workers lack the rudimentary communication, interpersonal, and analytic skills desired in the workplace.

Since the report *A Nation At Risk* was released in

1983, policymakers have focused on increasing academic course taking and improving the academic competencies of youth (without as much improvement as hoped for). This attention on academic skills is appropriate, and hopefully the new stage of standards-based reform fueled by the No Child Left Behind Act (NCLB) will result in greater academic achievement. But this attention on improved academic outcomes in a limited number of core competencies has meant little attention has been paid to how best expand the range of expected outcomes that include other valued skills, such as communication, teamwork, analytical, and interpersonal skills, that youth also need to be successful. And only recently has there been any policy interest in providing alternative learning approaches to those provided in comprehensive high schools most students attend.

Research indicates that the important attitudinal, behavioral, and occupational skills needed for work and life are best learned in the workplace or through applied, contextual settings which mirror workplace environments, as opposed to traditional classrooms.² This argues for creating much stronger relationships between high schools, their communities, and employers to provide a range of authentic learning opportunities.

Over the past decade, reform-minded career and technical education, school-to-work, and alterna-

1 Medrich, Elliott, Sarah Calderon, and Gary Hoachlander. *Contextual Teaching and Learning Strategies in High Schools: Developing a Vision for Support and Evaluation*. MPR Associates, Inc. Berkeley, CA: 2002

tive education programs have created new learning options for high school students that (1) help meet their learning needs, (2) facilitate learning a wide range of skills, and (3) offer different pedagogical approaches. Many of these learning options are described in two previous publications, *Looking Forward: School-to-Work Principles and Strategies for Sustainability* (AYPF and IEL, 2000) and *High Schools of the Millennium* (AYPF, 2000). These two publications provide a case for reforming large comprehensive high schools into smaller, more personalized schools, with more adult contact and more rigorous academics and high standards for all students set in the context of a career or a theme (e.g. the arts). Teaching and learning that is connected to the real world, that incorporates how knowledge is applied in work settings, and that leads to the development of academic, occupational, and employability skills are critical aspects of these effective high schools.

To build on the earlier work identifying effective education policies and practices that result in improved learning and outcomes for high school students, AYPF and IEL organized two roundtable meetings on aspects of high school reform critical to helping students develop the range of skills needed to be successful and that take into account the varied learning styles, preferences, and needs of youth today. The topics for the roundtables were new forms of assessments (held on May 9, 2002) and contextual teaching and learning (held on July 23, 2002). Both practices support and enhance the development of academic competencies, as well as help students acquire and demonstrate other skill attainment. The two practices have led to the creation of new forms of learning options and instructional reform that have positive benefits for students.

To provide the context for the roundtables, papers were developed on each subject. The paper by Sri Ananda, WestEd, on *Supporting High School Students Through Assessment of Academic and Industry-Valued Skills*, addresses four assessment-

related questions that need to be considered as educators and policymakers refine and build upon existing assessment systems, given the requirements of NCLB. The paper looks at issues such as: the impact of high stakes testing on career and technical education programs and the students they serve; the success of using additional assessments beyond academic-focused tests; how career-related and other employability skills can be incorporated into states' academic standards and assessments; and how assessments can help support and improve contextual teaching and learning.

The paper for the second roundtable by Elliott Medrich, Sarah Calderon, and Gary Hoachlander of MPR Associates, Inc., *Contextual Teaching and Learning Strategies in High Schools: Developing a Vision for Support and Evaluation*, concentrates on one possible approach for strengthening instructional practice – contextual teaching and learning – with particular attention paid to its potential role in high school reform. The paper aims to define more clearly what contextual teaching and learning is; looks at the roots of contextual teaching and learning and how it has evolved; examines the research on the effectiveness of contextual teaching and learning; and concludes with a discussion of the role public policy might play in better assessing contextual teaching and learning as a school improvement strategy.

Other major issues raised by the roundtable participants focused on what skills should be measured, how they should be measured, and the impact of using new forms of assessments and contextual teaching and learning on students. For example, most recently developed high school exit exams and state tests measure academic skills, generally with multiple choice tests. This trend is reinforced by NCLB. As such, they have not been designed to measure employability, technical, or occupational skills. Without other types of assessments to supplement and complement standardized tests, measuring student performance in these other skill areas will be nearly impossible.

Standardized tests, particularly multiple choice tests, also limit the way students express their knowledge and competencies. Alternative assessments provide an opportunity for students to demonstrate a wider array of knowledge in performance-related ways. Having a range of assessments, from multiple choice tests to demonstrations of work products to portfolios, leads to a more complete picture of what students have learned and are able to do. Poor test-takers may be more motivated to know there are other avenues than standardized tests to showcase their skills and knowledge. Carefully designed forms of assessment can measure the attainment of a wide range of student competencies and engage the student in the demonstration of those skills in a more meaningful way than standardized tests.

Additional forms of assessments are also needed to determine how much learning occurs through contextual teaching and learning. Because contextual teaching and learning is delivered through models such as work-based learning, service learning, and cooperative learning, it does not align well with standardized tests. Using assessments that are more closely aligned to the learning objectives and the pedagogy will result in a better understanding not only of student performance, but teacher competence as well.

Contextual teaching and learning is based on the abundant research that shows that we learn in a variety of ways and that when new information is set in a familiar context or applied to actual problem solving, the learning process is more successful. There is also evidence that contextual teaching and learning supports students and keeps them engaged, motivated, and coming to school. Contextual teaching and learning can also help students learn attitudinal and behavioral skills that will help them succeed in postsecondary education and the workplace.

Ensuring the alignment of contextual teaching and learning strategies with more standardized accountability systems is a challenge, particularly

given the press of NCLB and was discussed at the roundtables. As author Sri Ananda notes, “While states and localities have made progress over the past decade in expanding contextual learning choices for all students (such as 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.”³

The issues of additional forms of assessment and contextual teaching and learning are very much intertwined, as we found during the presentation of the papers and the ensuing discussion at the roundtables. Assessment and teaching and learning are at the heart of high school reform. They influence teacher preparation and quality, the structure of classes and of schools, and the connections to experts in the wider community, most particularly employers. AYPF and IEL believe these issues need to be closely linked in policy discussions, which is why they are addressed together in this report.

The two papers and the summaries of the roundtables are presented here. The papers include many excellent policy recommendations as well as practical advice on how to structure contextual teaching and learning and alternative assessments activities at the high school level. The summaries of the roundtable discussions provide a multifaceted look at the two topics, based on input from the authors, panelists, and participants, and how they relate to educational leadership, professional development, and federal education policy. The summaries also include descriptions of effective policies, practices, and programs for improving student learning. The publication ends with a summary of the recommendations that emerged from the papers and the roundtable discussions.

³ Ananda, Sri. *Supporting High School Students Through Assessment of Academic and Industry-Valued Skills: What Have We Learned?* San Francisco, CA. WestEd. 2002

Supporting High School Students Through Assessment of Academic and Industry-valued Skills: What Have We Learned?

by Sri Ananda, WestEd

June 28, 2003

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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.

INTRODUCTION

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 subject 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 magnets) 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 system-wide 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	INSTRUCTIONS
<p data-bbox="174 342 736 375">SCENARIO</p> <p data-bbox="174 401 736 615">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.</p> <p data-bbox="174 646 736 932">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.</p> <p data-bbox="174 963 736 1031">[adapted from the Career-Technical Assessment Program (Ananda, 1999)]</p>	<p data-bbox="802 401 1364 548">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..</p> <p data-bbox="802 579 1364 646">To receive a Proficient rating on this task, you must show all of the following:</p> <ol data-bbox="802 678 1364 968" style="list-style-type: none"> <li data-bbox="802 678 1364 863">1. Knowledge of: <ul data-bbox="843 737 1364 863" style="list-style-type: none"> <li data-bbox="843 737 1364 770">• Earning potential in animal production <li data-bbox="843 781 1364 814">• Range management <li data-bbox="843 825 1364 858">• Animal facilities <li data-bbox="802 873 1364 907">2. Ability to propose a solution to this scenario <li data-bbox="802 932 1364 968">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 meets 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, sce-

narios 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.

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 stu-

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.

dents 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 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, industry wide 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

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

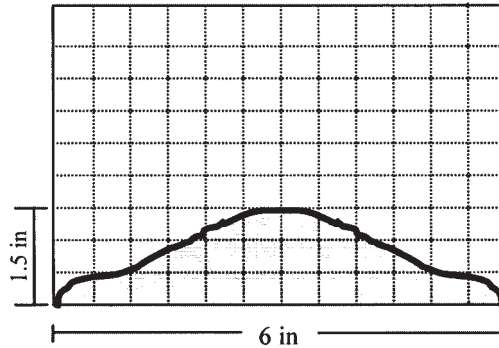
1. According to the passage, what is the first thing you should do when you answer the phone or make a call?
 - A. take careful notes on your message pad
 - B. invite the caller to identify himself or herself
 - C. give the caller your full attention
 - D. say who you are and where you work
2. The passage 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.

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.

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 recommen-

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.

Parent plants (P)	<u>Cross</u>	
	Resistant to disease	Not resistant to disease
	Number of plants resistant to disease (healthy)	Number of plants not resistant to disease (disease/dying)
First generation (F₁):	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 (F₁) plants with each other. the results are show below.

Offspring (F ₁)	<u>Cross</u>	
	Resistant to disease	Not resistant to disease
	Number of plants resistant to disease (healthy)	Number of plants not resistant to disease (diseased/dying)
Second generation (F₂):	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.

dations to farmers. Table 5 shows the first three questions of this nine-part task.

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 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 diag-

nostic 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 learn-

ing 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.

1. Are we ready?

2. What data do we have and need?

3. Who are we?

4. What is our student performance and achievement?

5. Why is our achievement as it is?

6. What are our priorities?

7. What are effective strategies to meet our priorities?

8. What is our plan for program and instructional improvement?

9. Are we doing what we said we would do?

10. How effective was our plan?

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 assess-

ments 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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Improving Teaching and Learning Through Assessment Summary of the First Roundtable

May 9, 2002

How will the growing emphasis on high stakes assessments and the No Child Left Behind Act affect high school programs that mesh academic and industry-valued skills? How can the employability skills so valued by employers, be included in high school assessment systems? What effective strategies can be adapted, and what ongoing challenges must be addressed, to refine and enhance assessment systems so that they measure student performance in a variety of ways?

These are some of the questions discussed in a paper by Sri Ananda, WestEd, entitled, *Supporting High School Students Through Assessment of Academic and Industry-Valued Skills: What Have We Learned?* and at the roundtable on May 9, 2003.

As context for the roundtable, Ananda examined the likely impact of high-stakes testing on career and technology education (CTE) programs in high schools, the successes of alternative assessments, the challenges of integrating career-related and other employability skills into states' academic standards and assessments, and the ways in which assessment can support contextual teaching and learning.

According to Ananda, a common fear within high school reform circles is that the increased attention on academic, high-stakes testing and school accountability mandated by the No Child Left Behind Act (NCLB) may negatively impact some of the students served by high school reform programs and constrain the programs themselves. However, high school reform efforts that incorporate work-related requirements and industry-valued skills have led to important lessons that could serve to improve student assessment systems.

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, Ananda continues. Despite the emergence of promising assessment practices and based on her review of state practices and other data, Ananda concludes that today's commonly used assessment tools may not be sufficiently valid to capture what students learn through contextual learning situations. The virtually exclusive emphasis in federal education reform legislation concerning high-stakes testing and school accountability on the 'basic' skills of reading and math makes this problem even more formidable.

The assessment-related challenges faced by high school reform initiatives call for concerted, but differentiated, actions at the national, state, and local levels. - Ananda

Given the difficulty of creating one assessment that measures a host of skills and knowledge in a more authentic manner, Ananda's paper recommends that a framework combining state and local assessments be developed and that data-driven decision-making be incorporated along with the assessment structure. She notes that these strategies rely heavily on efforts at the local, rather than state or national levels, and that the assessment-related challenges faced by high school reform initiatives call for concerted, but differentiated, actions at the national, state, and local levels. Finally, some specific recommendations from Ananda include:

- At the local level, incorporate SCANS⁴ skills

into local assessments that are supported and monitored by the state.

- At the state level, refine state core academic assessments to reinforce SCANS-like skills.
- At the national level, provide leadership and support for instructors and assessment of SCANS-like and contextualized skills.

Following the presentation of Ananda's paper, three panels of experts addressed the challenges of developing an assessment framework and how differentiated assessments can support contextual teaching and learning.

PANEL I: ASSESSING ACADEMIC AND WORK-BASED SKILLS IN A HOLISTIC SYSTEM: LESSONS LEARNED

- *Linda Stelly, Assistant Director, Educational Issues, American Federation of Teachers*
- *Anna Critz, Director of the Washington Office, ACT*
- *Joan Wills, Center for Workforce Development, Institute for Educational Leadership, moderator*

An integrated assessment system that measures attainment of both academic and work-based skills is tremendously important for preparing a qualified workforce began **Joan Wills**. Many students will go on to postsecondary education and must be prepared to do so, but all students will enter the workforce, so work-based skills assessment is imperative. A high-quality system of standards should address both academic and work-based skills.

The American Federation of Teachers (AFT) has monitored the quality of standards as well as the quality of assessments. **Linda Stelly** suggested that a comprehensive assessment system needs to measure skills students learn through experiential education such as internships and simulated job

interviews. Referring to AFT's report, *Making Standards Matter*, Stelly encouraged states to pay attention to how standards are implemented as well as to ensure that standards are used to measure workplace skills as well as academic attainment.

One such measurement system is WorkKeys, a comprehensive approach that helps students build workplace skills and to measure those skills. Developed by ACT, provider of the nationally-validated college entrance test, WorkKeys provides objective data on individuals' work skills comparable to the academic skills data measured by ACT's Educational Planning and Assessment System, explained **Anna Critz**. To develop the assessments for various workplace skills, ACT profiled existing jobs on-site to determine skills and skill levels required for each job. By comparing the job profile with the applicant assessment, employers can determine whether applicants have the necessary skills for specific jobs and whether current employees may need to improve their skills.

WorkKeys highlights disconnects between what schools teach and what employers need, between skills employees have and skills employers need, and between young people's career plans and their workplace opportunities. Interviews with employers, for instance, show that 73 percent rate listening as an "extremely important" skill, yet WorkKeys data show that only 19 percent of high school graduates rate "highly prepared" in listening. ACT results show that one-third of college-bound students have not taken the core curriculum necessary to succeed in college courses without remedial instruction – a percentage comparable to the one-third of first-year college students requiring remedial courses. Consequently, WorkKeys results are valuable for multiple audiences: state and local policymakers, employers, school guidance counselors and teachers, and individual students and their families.

Critz emphasized that assessment systems should

4 U.S. Department of Labor. 1991 What Work Requires of Schools: Secretary's Commission on Achieving Necessary Skills (SCANS). Washington, DC: Author. This report examined the demands of the workplace and whether our young people are capable of meeting those demands. Specifically, the Commission was directed to advise the Secretary of Labor on the level and type of skills required to enter employment.

focus on continuous improvement, providing data that helps move students forward toward higher education and careers. Using testing simply as a school accountability tool misses the point that tests can help individual students learn and succeed.

PANEL II: USING ASSESSMENTS TO IMPROVE TEACHING AND LEARNING IN HIGH SCHOOLS

- *Bernard Pierorazio, Deputy Superintendent, Yonkers School District, NY*
- *Kathy O’Neill, Director, Leadership Initiative, High Schools That Work, Southern Regional Education Board*
- *Carlton Jordan, Senior Associate, The Education Trust*
- *Glenda Partee, American Youth Policy Forum, moderator*

When assessments are integrated into the learning process, they become a continuous improvement tool for elevating student outcomes rather than an end in themselves. **Glenda Partee** warned that school reform advocates need to be careful that high-stakes testing is not the only form of assessment and that it does not undermine creative teaching and learning.

In New York State, assessments help determine when a student needs assistance. The state requires that academic intervention services (AIS) be provided to any student who is failing a course. Although AIS may remedy a student’s academic deficits, according to **Bernard Pierorazio**, it sometimes does so at the expense of regularly scheduled school activities. Sometimes career and technical education courses suffer as a result: New York’s vocational/technical schools have reduced CTE to make room for AIS, and many comprehensive high schools do not offer CTE at all. From his experience, Pierorazio said that preventing students from taking high interest courses, like CTE, can reduce their motivation to learn.

Assessment and CTE do not have to be at odds, however, as demonstrated by Saunders Trades and Technical High School in Yonkers, NY. Designated as both a Blue Ribbon School and a

High numbers of students at Saunders High School pass the NY Regents, yet also are assessed on important skills valued by the community and employers, which students say, hold more meaning for them. - Pierorazio

New American High School, Saunders offers high skills academies (e.g., ChemTech, EnviroTech, and TechElec), with faculty working collaboratively across academic and vocational/ technical departments. To graduate, Saunders students develop a hypothesis, complete a two-year project to prove the hypothesis, and defend the project to a panel of industry representatives. One day in June is set aside for seniors to demonstrate their competencies through their project presentation. Panels of community experts come to the school to review and judge the projects and the level of competency and mastery of the students according to pre-determined rubrics. These alternative assessments are in addition to the requirement that every student pass the NY Regents. High numbers of students at Saunders pass the Regents, yet also are assessed on important skills valued by the community and employers, which students say, hold more meaning for them.

The Southern Regional Education Board’s (SREB) High Schools That Work (HSTW) model is built around high achievement for all students. **Kathy O’Neill** described how SREB collects evaluation data from several sources, including 12th grade academic achievement tests and surveys of classroom activities and uses those data as a guide for developing better classroom practices and instructional strategies. SREB uses the HSTW assessment data to improve the academic and technical performance of career-bound youth and to improve learning practices in classrooms, schools, and structured work-site experiences. By focusing on student success throughout the

high school years, the HSTW schools have found that their students are well prepared for high-stakes tests.

Don't focus on high stakes tests. High Schools That Work focuses on the success of students, day to day. And, guess what? The high stakes tests take care of themselves. – O'Neill

The approaches used by the Yonkers Public Schools and by High Schools That Work demonstrate the six elements identified by **Carlton Jordan** as essential for systemic school reform:

- Clear, coherent, and rigorous academic standards for all students at all levels, kindergarten through college, that are understood and embraced by the public;
- Curriculum aligned with standards for all students;
- Ongoing assessment to monitor the progress of students and of schools and colleges toward meeting the standards;
- Extra instructional time for students who need it to meet standards;
- Mechanisms to help faculty deepen their knowledge, evaluate the effects of their instruction on student work, and improve practice; and
- Accountability systems that demand results for and from all students and that report regularly to the public with honest data on the progress of all groups of students.

The Education Trust list of elements for systemic school reform demonstrate that assessment is an integral part of the reform process, not something added on as an afterthought.

PANEL III: NEXT STEPS FOR DEVELOPING A STANDARDS-BASED REFORM AND ASSESSMENT STRATEGY

- *Michael Cohen, Education in the Changing Society Program, Aspen Institute*
- *Kathy Mannes, NRF Foundation*
- *Linda Soderberg, School-to-Career Director, Rhode Island*
- *Betsy Brand, American Youth Policy Forum, moderator*

Any discussion of a standards-based reform and assessment strategy needs to start with an accurate picture of today's high schools and the problems they face in educating a very diverse student population, said **Betsy Brand**. Former Assistant Secretary for Elementary and Secondary Education, U.S. Department of Education **Michael Cohen** warned that the redesign process is just beginning. In fact, he said, high schools are largely the same as they were 30 years ago, even though the entire context in which they operate has changed. Today's economy calls for high schools to graduate 100 percent of their students, well-prepared for college and careers.

A Nation At Risk launched an era of school reform when it was issued in 1983. At the state level, Cohen observed, the main reform strategy since then has been a requirement for increased numbers of academic courses, plus an emphasis on standards, testing, and accountability. States have devoted insufficient time and resources to capacity-building – a self-defeating approach, since students in schools that focus on capacity-building tend to do well on state and other tests.

States need to insist upon rigorous courses for all students and align their standards to that rigorous curriculum, while at the same time developing alternative assessments and pathways that reflect the different needs and aspirations of their students. – Cohen

The contrast between needs identified in district-level school improvement plans and decisions about expenditure of professional development funds underscores the challenges surrounding capacity-building. Effective capacity-building needs to begin with the strengths and needs identified by specific schools and districts, yet few school districts spend their professional development funds according to local school improvement plans. Why is this so? Cohen explained that most professional development funds, especially in urban school districts, are federal Eisenhower funds, and are spent to meet federal rather than local goals. Boston's Plan for Excellence, for example, found that half the district's professional development funds were Eisenhower funds, but only 25 percent of professional development funds were being spent in ways that were consistent with the district's own school improvement plan.

Cohen identified several policy issues that states must address in the process of implementing standards-based reform and assessment:

- *Leadership.* There has been very little state leadership on high school reform. State policymakers need to begin to focus on what high schools need and how to accomplish it.
- *Assessment and testing programs.* States need to insist upon rigorous courses for all students and align their standards to that rigorous curriculum, while at the same time developing alternative assessments and pathways that reflect the different needs and aspirations of their students. The difficulty is that states need to move in two directions at once: they need to develop a clear system of standards with assessments that utilize both traditional tests and performance-based completion, and at the same time, they need end-of-course exams that are aligned with a rigorous curriculum.

Challenges at the federal level include:

- *Design issues in the No Child Left Behind Act.*

NCLB's incentives for 100 percent proficiency are likely to drive proficiency standards downward – a possibility that will undermine NCLB's goals.

- *Creating a seamless system.* The Carl D. Perkins Vocational and Technical Education Act and the Higher Education Act, both up for reauthorization, need to be coordinated to work well with NCLB.

If we change the schools, we will change the workplace, predicted **Kathy Mannes**. As a new kind of intermediary, NRF brokers not only programs but issues as well. By delving into skill standards and assessment issues, NRF has elevated workforce development on its membership's agenda. The rationale is obvious: As the source of many people's first job and the employer of 20 percent of the workforce, the retail sector serves as a training ground for the larger workforce, providing workers with portable skills for future employment in other sectors. Connections between schools and retailers make that skill development process more efficient.

The retail sector's Sales and Service Voluntary Partnership has developed customer service skill standards that include academics, occupational, and employability knowledge and skills. NRF offers the portable credential based on those skill standards to any school or college, as well as to its members and to public sector one-stop employment centers. NRF and its members plan to work directly with schools and colleges to align course content with industry standards and to document the return-on-investment of that approach. NRF encourages its members to attach value to the credential by offering benefits to credentialed employees (e.g., higher hourly wage, tuition benefits, career paths, etc.).

Linda Soderberg discussed ways in which industry been involved in high school reform in her state. Rhode Island's High School Redesign Summit in November 2000 led to a commitment to assess all students against the same standards, ending the separation between academic and CTE students.

Rhode Island's reform effort has worked in part because the high school standards were re-written in 1995 to include the SCANS foundation skills, with industry support. All students are held to these standards, known locally as the Common Core of Learning. The state's 36 independent school districts have now demanded that curriculum be revised based on the Common Core of Learning with those standards serving as the basis for performance-based as well as academic assessments.

ISSUES FOR THE FUTURE – GROUP DISCUSSION

Roundtable presenters and participants raised a number of thorny issues that illustrate the complex nature of the task at hand – how to ensure that promising and effective CTE strategies are retained and valued as high school reform proceeds in the current assessment-driven climate. The following discussion does not represent consensus of the group, rather, it chronicles issues that require further discussion and analysis.

The purposes, types, and uses of assessment need rethinking.

While most attention has recently been focused on developing assessments to measure student academic performance, measuring skills in other domains, such as technical, occupational, and employability, is equally important. Assessment systems and frameworks being developed now to respond to NCLB must mature to the point that they can measure multiple outcomes, not just academic ones. There is also a confusion of assessments at the local level, as old tests are phased out, new ones developed, and policymakers try to develop a rational and logical approach to measuring student performance on a variety of measures for a variety of purposes.

Participants agreed that work needs to be done to help define an ideal framework for assessments and help answer some design issues, such as:

- What knowledge and skill sets should be measured – academic, occupational, techni-

At its best, participants agreed that assessment is a continuous improvement tool, to be used to guide individual student learning and to improve schools and school systems. Assessment should be more than testing, and it should be tied to curriculum and professional development. NCLB raises concerns that high-stakes tests may be used more for punitive purposes than for continuous improvement. This is an issue that needs debate and clarification at the national level.

cal, employability, higher order thinking – and how are they best measured?

- At what level – national, state, or local – are certain knowledge and skills sets best measured, and why?
- What are the purposes of assessment – continuous improvement, instructional information, to meet individual student's needs, to report to stakeholders, policymakers or funders, or all of them? Do you need separate systems to respond to these different audiences or can one system do the job?

At its best, participants agreed that assessment is a continuous improvement tool, to be used to guide individual student learning and to improve schools and school systems. Assessment should be more than testing, and it should be tied to curriculum and professional development. NCLB raises concerns that high-stakes tests may be used more for punitive purposes than for continuous improvement. This is an issue that needs debate and clarification at the national level.

Assessments, the kinds that most effectively demonstrate workplace skills, should lead students to be more involved in their own learning, while also infusing rigor into the curriculum. At Saunders High School, for example, the two-year culminating project gives students an opportunity to delve deeply into something of interest to them, completing complex work that integrates academics with experiential education for an effective learning experience. The performance-based assessments used to measure the skills and knowledge supplement the more traditional assessments

that students take. At Saunders, students are required to pass the NY Regents, which they do in high numbers, but it is obvious that the performance assessments engage and interest them to a much higher degree.

Alignment among different assessment systems as well as alignment between curriculum, professional development, and assessment is needed as well. Participants expressed concerns that without alignment, the test burden on students and schools may be great (too many tests, too much time spent on testing) and test alignment may not occur (lack of alignment sends mixed messages to students and teachers about what is important to teach and to learn). A well-designed assessment system needs to reduce multiple layers of tests and create crosswalks between academic and occupational, technical, and employability skills.

Assessing employability skills is important but requires a more holistic assessment system.

A key issue yet to be resolved involves credentialing students for mastery of employability or “SCANS-like” skills, but the employability skills so valued by employers may not lend themselves to traditional assessment. Formative assessment seems more appropriate than high-stakes tests for measuring acquisition of employability skills. One suggestion for ensuring that students develop employability skills would be a graduation requirement for some type of internship, service-learning project, or other experiential activity.

If we agree that employability skills are important, it is necessary to develop assessment systems and document attainment of workplace skills. Yet many questions about employability skills remain unanswered: Can employability skills be taught in a classroom or must they be learned through experience? How can teacher preparation programs and in-service professional development prepare teachers to teach in contextual ways that support employability skill development? Can employability skills be incorporated into standardized state testing programs, or should that be left to school districts, with their greater flexibility? Research into these questions would be of great

interest to educators and employers.

Contextual teaching and learning and assessment

With many high schools using contextual teaching and learning approaches, not only as part of career and technical education but also service-learning programs, school leaders need to think how best to develop new assessments or use existing ones that recognize the integrated curriculum and measure what students have learned. Currently, the mismatch between state assessments and contextual teaching and learning is a challenge. Most state assessments consist of multiple choice and short answer items based on core academic content. Contextual teaching and learning, by contrast, focuses on integrated, hands-on learning often set in the context of solving a complex problem. Students who participate in a contextual teaching and learning experience may not be expected to perform as well on multiple choice testing because of its emphasis on isolated, fragmented concepts. Additionally, norm-referenced tests are often not well-aligned to a particular curriculum and may not measure what a student has learned through classes using a contextual approach. (Ananda, 2002)

Another challenge is that contextual teaching and learning can vary across school districts and within schools, so that assessments, to be meaningful, must be developed closely aligned with the curriculum. While this kind of “micro-assessment” would most likely lead to better diagnostic information about individual student performance and learning styles in a classroom, it makes comparing student performance across a group of students or schools impossible.

A final concern had to do with NCLB’s emphasis on academic skills testing. Participants agreed there is a need to ensure that the focus on academic achievement and remediation does not completely limit students’ participation in programs that use contextual teaching and learning, such as CTE or service learning. These classes are widely considered to be more engaging for students, helping to keep students in school.

Portable credentials would be useful, but may not be the first order of business.

There was little consensus about the extent of employer demand for portable credentials. On one hand, without employer demand for portable credentials, states have little incentive to develop them. Plus, industries may be more concerned with ensuring an adequate local supply of qualified applicants than with developing portable credentials for a mobile labor market. And should “portability” mean that credentials can be comparable or must they be exactly the same? Finally, there was skepticism about whether state and local education systems should develop portable workforce credentials given that the requirements for a high school diploma vary in different states and districts, and there is little consistency or portability among them.

On the other hand, some employers are beginning to understand how portable credentials could impact the emerging workforce. Industry partnerships around the 16 nationally-identified career clusters are being organized to develop curriculum leading to portable certificates. The retail industry offers a case in point. The National Retail Federation has developed its first set of portable credentials. The outcome is Customer Service and Sales skills that are portable not only within the retail cluster but among all industries.

In another example, the construction industry developed a portable certification program to satisfy employer demand for skilled workers: the industry projected an annual need for 250,000 new workers. The National Center for Construction Education and Research developed curriculum modules, including a core skills course that includes basic academic skills, and awards portable certificates. Teachers understand and appreciate this industry-developed approach because of its clarity and the fact that it offers students national recognition for their achievement.

If portability is indeed necessary, decisions need to be made about whether portable credentials should be developed and used at the state or local

level or whether this role should fall to private organizations with national reach, such as ACT. Comprehensive assessment systems, such as WorkKeys, demonstrate that portability is feasible. Ultimately, whether or not consensus is reached on the added value of portability, classroom learning needs to contribute to student mastery of industry-valued skills and knowledge. States and school districts must adopt strategies to build those linkages.

Developing high quality assessment systems will require ongoing and appropriate professional development.

Preparing teachers and education leaders for an era in which high schools hold every student to high academic standards will require a huge outlay of professional development funds, as well as a redirection of professional development initiatives. Professional development needs to be aligned with state and local priorities, with individual school improvement plans, and to help teachers understand how to use assessments to improve teaching and learning and student achievement.

Saunders Trades and Technical High School and the High Schools That Work network emphasize professional development as a linchpin for school redesign. HSTW prepares its school leaders to convince school staff that all students can learn, and to teach accordingly. By changing teachers’ behavior, the HSTW approach produces positive outcomes, and those early successes help change teachers’ beliefs. A large part of helping teachers change their beliefs about students is clearly demonstrating a clear link between teaching and student outcomes. By using assessment data on a regular basis, teachers can more easily adapt their teaching and instruction to meet the needs of individual students. This type of data and feedback should be supported by the school on a continuing basis.

Research into assessment strategies and structures is needed.

Participants agreed that while assessment is often the least well-understood part of school reform, it

is becoming increasingly important in this climate of accountability. Because policymakers and stakeholders are so focused on accountability, educators are, in many cases, scrambling to develop appropriate and high-quality assessments. But many issues remain to be resolved as to the most effective types of assessment systems. A number of suggestions for research were made:

- What types of assessments are most appropriate for students with particular learning styles and strengths?
- Are various skills (e.g. academic, occupational, employability) best measured separately or in some combination? If so, what combina-

tion is most effective and helpful to provide instructional guidance for teachers? For employers who want to hire? For policymakers and funders? For parents? For students themselves?

- What type of assessments (e.g. standardized, multiple choice, scenario, authentic, performance-based) are most effective at which level (national, state, or local) and to measure which skills?
- How are employability and higher order thinking skills best measured?

Contextual Teaching and Learning Strategies in High Schools: Developing a Vision for Support and Evaluation

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INTRODUCTION

Raising achievement, particularly among students who traditionally have not performed well in the nation's public schools, is the single greatest challenge on America's agenda for improving elementary and secondary education. Despite two decades of reform and a plethora of school improvement strategies, positive changes in test scores and other measures of student performance have been modest at best. The reasons for this slow pace are many, complex, and not well understood by researchers, educators, or policymakers. Almost certainly, there is no single strategy for accelerating student achievement. Realizing significant gains, especially by the lowest achieving students, will require attention on many fronts. Nevertheless, one essential piece of the achievement puzzle is finding ways to improve instructional practice – what actually happens in the classroom where teachers deliver curriculum and develop students' skills and capacities to learn. Teaching is the “black box between educational inputs and student outcomes.” (Mayer, Mullens, and Moore, 2000 from Mayer, 1999) Therefore, clarifying what constitutes good teaching and implementing improved practices in the nation's classrooms are essential elements of sound educational policy.

This paper concentrates on one possible approach for strengthening instructional practice, “contextual teaching and learning (CTL),” with particular attention to its potential role in high schools. We focus on CTL not because we believe it is the best or the only strategy for improving teaching. On the contrary, if there is one principle of good teaching that everyone can agree upon, hopefully

it is this: no single instructional strategy will support all subject matter or meet the learning needs of all students. As Linda Darling-Hammond has observed:

Effective teachers must understand how to present critical ideas in powerful ways, systematically organize a useful learning process and adapt instruction to the different learning styles and backgrounds of their students. Expert teachers need to be alert diagnosticians and flexible planners who teach in reciprocal relationship to their students' learning. (Darling-Hammond, 1999,3)

Darling-Hammond goes on to note that skilled teachers understand both learners and learning in ways that allow them to identify different strengths, intelligences, and approaches to learning and vary their behaviors across teaching situations depending on the type of learning they want to encourage (Darling-Hammond and Snyder, 2000; Stodolsky, 1988; Grossman and Stodolsky, 1995).

In short, good teachers have many tools at their disposal and are skilled at knowing when and how to use which ones and in what combinations. That maxim, however, is easier said than practiced. Too often, the “tools” available to teachers are so vaguely defined, poorly developed, and inadequately tested that teachers are hard pressed to know if they are using them well. Other times, perhaps at the urging of researchers or policymakers or perhaps simply out of desperation and frustration, teachers focus single-mindedly on one strategy in the classroom to the exclusion of others. The result is almost always backlash, some

thoughtful some largely polemic, that undermines whatever credibility a particular practice might have had if it had been used more carefully and sparingly.

Like many other proposed education reforms, CTL has suffered from vague definition, unrealistic expectations, and careless implementation. Advocates and critics alike have relied on hyperbole that serves mainly to politicize the practice rather than encourage systematic consideration of its strengths and weaknesses. This paper, therefore, has a few modest objectives. First, it aims to define more clearly what CTL is, describing specifically and concretely the various methods that fall under the CTL umbrella. Second, it looks briefly at the historical roots of CTL and how it has evolved. Third, it examines research on the effectiveness of CTL, summarizing key findings and suggesting some directions for future work. Finally, the paper concludes with a brief discussion of the role public policy might play in better assessing the potential of CTL as a school improvement strategy and, where warranted, encouraging more effective uses in classrooms.

I. WHAT IS CONTEXTUAL TEACHING AND LEARNING?

As with many other initiatives in educational improvement, contextual teaching and learning (CTL) means different things to different people. As used in the current milieu of educational reform, CTL typically addresses, singly or in combination, three aspects of schooling: 1) curriculum, 2) teaching or instructional practice, and 3) supporting organizational structures.

CTL as Curriculum Reform

In a strict sense, CTL is about curriculum, or more specifically, connecting the knowledge and skills that are the focus of a particular curriculum to a specific context that helps enhance meaning and understanding for students. Thus,

Contextual teaching and learning is a conception of teaching and learning that helps teachers relate subject matter to real world situa-

tions; and motivates students to make connections between knowledge and its applications to their lives as family members, citizens, and workers (Contextual Teaching and Learning, 2000).

Or, as restated by Berns and Erickson (2001), contextual teaching and learning “helps students connect the content they are learning to the life contexts in which that content could be used.”

“Context” can take many forms. It might mean, for example, relating certain principles of chemistry to the reactions occurring in baking or other aspects of cooking. It might involve exploring the lessons of a particular historical era by examining what happened in students’ local community during that same period. It could link certain mathematical properties to writing a musical score or developing a computer model to predict the weather. It could draw applications from nursing, medicine, or bioengineering to illustrate difficult concepts in advanced biology. Much more ambitiously, it can mean organizing an entire program of study around a major profession, industry, or particular theme, as is the practice in many post-secondary professional schools like architecture, business, medicine, or social welfare. One important feature of CTL, therefore, is its emphasis on concrete application – taking abstract ideas, concepts, and even factual knowledge and illustrating or creating opportunities for students to experience how these can be used in different facets of life.

If concrete application or illustration is a necessary feature of CTL, it is not sufficient. For this kind of concrete application to enhance meaning and understanding, then the specific context itself must also be of some interest to the student. Using Ohm’s Law or other applications in electronics to illustrate certain algebraic principles or manipulations is not likely to help a student who has no interest in electronics. CTL, therefore, as a curriculum strategy requires not only attention to concrete application but also to “contexts” that have meaning and can engage particular students.

CTL as Instructional Reform

For many of its advocates, CTL embraces much more than just curriculum. As important as linking content to context, CTL also requires teachers to change how they teach. In particular, CTL encompasses instructional methods intended to supplement traditional teaching styles that rely heavily on lecture, students' taking notes, watching teachers conduct experiments, memorizing facts and techniques, and using the written word (through papers and exams) to demonstrate learning. Instead of, or in addition to, these practices, CTL encourages teachers to allow students to design experiments themselves and engage in other forms of "hands on" learning; to carry out "projects" that tackle a complex problem requiring applications of cross-disciplinary knowledge and skills; collaborate with other students in analyzing problems and presenting solutions; and demonstrate mastery in ways other than paper and pencil tests.

On the one hand, this broader focus of CTL enhances its power as a school improvement strategy. But, on the other hand, it also can muddy its meaning, producing a sometimes confusing array of overlapping practices, not well understood by either its proponents or its critics. What follows, therefore, is a description of some of the primary strategies, that when employed with contextual curricula, fall under the CTL umbrella: collaborative and cooperative learning; curriculum integration; service learning; project-based learning; problem-based learning, and work-based learning. An important caveat: some of these strategies fit easily under the CTL umbrella (i.e. they are contextual by nature). Others become CTL only when they are executed in certain ways. As appropriate, the definitions below describe what conditions must be met in order for the strategy to become CTL practice.

Collaborative and Cooperative Learning

Teachers employ collaborative and cooperative learning to group and/or pair students for the purpose of working together to produce a product,

solve a problem, or undertake a task that meets one or more course standards. To ensure that students work as a cooperative team, rather than as individuals: a) group goals must be established; b) the task is designed so that the group has to rely on the contribution of each member c) the task promotes interpersonal skills by encouraging face-to-face interaction among students; d) students are individually accountable for their active participation and task completion, and e) the group reflects on the outcomes. Collaborative and cooperative learning is considered a CTL strategy when these conditions are met and when used to facilitate students' solutions to complex, contextual problems and completion of projects (Slavin, 1996; Cohen, 1994; Johnson and Johnson, 1994; Holubec, 2001).

Curriculum Integration

Sometimes called interdisciplinary teaching, thematic teaching, or synergistic teaching, curriculum integration has been defined in many different ways. The term has been used to mean connecting different domains of academic curriculum (math and science, for example), joining academic and vocational curriculum, linking classroom-based learning with work-based learning, and uniting theory with practical applications (Bonds, Cox, and Gantt-Bonds, 1993; Grubb, Davis, Lum, Plihal, and Morgaine, 1991; Bodilly, Ramsey, Stasz, and Eden, 1992). Even more broadly, integration can mean "learning in the context of students' life experiences or pre-existing knowledge" (Crawford, 2001).

Additionally, it is possible to introduce integration at many different levels of instructional organization (Grubb, W. N., 1995). A single teacher can use integration within a particular course or lesson plan. Teams of teachers may realign their courses to make connections across disciplines and to reinforce particular concepts or skills. Integration may be used to construct comprehensive programs of study, such as high school majors organized around a career cluster or industry (health, finance, or communications, for example). Integration can also be employed school-

wide to establish an overarching theme or mission for an academy, magnet, or charter school.

Service Learning

Service learning is an experiential activity that addresses a bona fide community need. Typically, it involves preparation for providing service through research and investigation, performing the service activity, and reflection on the service performed. Service learning differentiates itself from community service through its intentional connection of service activities to the academic curriculum. Service learning can include work-based learning, project-based learning, problem-based learning, collaborative/cooperative learning, and integrated curricula (Asler, 1993; McPherson, 2001, Cairn and Kielsmeier, 1991).

Project-Based Learning

Project-based learning is a strategy that teachers use to structure a complex project for students that involves planning, design, problem solving, and making decisions. Students work autonomously or in small groups, often over an extended period of time, in order to prepare a product or presentation. Well-designed projects reflect student interest but also promote clearly specified learning objectives. Projects are often interdisciplinary in focus and allow for student choice and decision-making (Buck Institute for Education, 2001).

Problem-Based Learning

Teachers use problem-based learning to pose a significant, real-world, contextual problem (drawn, for example, from personal experience, home, career, community, or society) or question in a way that allows students to develop and/or seek the content knowledge and skills necessary to provide a solution(s). Problems presented sometimes involve collaborative learning, are aligned with course standards, are academically rigorous, may or may not require a final presentation of results of the investigation, focus on research and inquiry, and are often interdisciplinary in focus (Moffitt, 2001; Barrow and Myers, 1993; Esch, 1998).

Work-Based Learning

Work-based learning joins structured experience in private and public sector settings outside of school with classroom-based academic instruction and career interests. These activities involve preparation for a work-site experience (including skill acquisition, learning about the issues surrounding the chosen work/career, and planning for the real work setting), designing a work-site program in collaboration with business/industry/labor, and reflecting on the activity performed. Work-based learning can take the form of an apprenticeship, internship, work-based tech-prep, school enterprise, or cooperative education (Smith, 2001).

Supporting Structures

Further adding to its scope, as well as to the confusion, CTL in high school often involves specific approaches to organizing instruction, particularly adoption of schools-within-schools and career academy frameworks. These are not CTL but rather ways of delivering instruction that can enhance CTL, making it easier for teachers to accomplish the kind of curriculum changes that coincide with CTL instructional strategies.

Schools-within-schools are structures that are relatively autonomous, have distinct identities and specific goals, are personalized for teachers and students, and have an instructional focus (Cotton, 2000; Raywid, 1999; Klonsky, 1995). Schools-within-schools strive to reduce student anonymity, create coherent programs of study for students with intensive guidance, lessen the isolation of teachers, and create high expectations for all students. Often schools within schools are formed around particular instructional themes.

A career academy is a school-within-a-school that offers students academic programs organized around broad career themes or a single career focus (Kerka, 2000). Often integrating classroom instruction with work-based learning, academies equip students with skills for both workforce entry and postsecondary admission. Staffed by teachers

from many disciplines, career academies often collaborate with business partners who assist in planning curricula, establishing program structure, providing classroom speakers, hosting school field trips, and providing mentors for individual students. Career academies, in their pure form, were intended to build classes around work-based learning and integrated curricula, and although they are structured in many different ways, they are an effective means for delivering many forms of instruction associated with CTL (Kemple and Snipes, 2000).

In theory, when classrooms are small enough so that students and teachers know one another well, schools take on a different feel. But as Irmsher (1997) points out, “downsizing cannot, by itself, guarantee that school transformation will unfold or that marvelous teacher and students performance will occur.” Even so, making schools smaller creates an environment where good things can happen (Visher, Teitelbaum and Emmanuel, 1998; Raywid, 1999; Gladden, 1998; Cotton, 2001). Compared with students in larger schools, students in small schools tend to have more positive attitudes toward school, behave better, are less likely to drop out, have better attendance, and have a greater sense of belonging. Cotton (2001) found that smaller schools typically utilize integrated curriculum, team teaching, cooperative learning, and performance assessments. Effective small schools can be places where a variety of instructional practices, such as CTL, can flourish.

The extensive research addressing these structures is beyond the scope of this paper, and it is important to understand that in and of themselves they do not assume that contextual teaching and learning strategies will be a primary form of instruction.

The Challenge of Delivering CTL in the Classroom

Each day, teachers make decisions about instruction. To be successful in the classroom, they must be equipped with a variety of pedagogical tools in addition to understanding course standards, cur-

ricular goals, and objectives. Their challenge is to choose the appropriate instructional strategy based on the course standards and performance goals as they relate to student aptitudes, skills, and interests (Tanner, Conway, Bottoms, Feagin, and Bearman, 2001). Good teachers are able to balance more traditional instruction with other strategies such as contextual teaching and learning. For example, if a teacher wants students to know that seven times three equals twenty-one, lecture, demonstration, drill, and practice may be the most effective instructional techniques. But, if the goal is to have students understand when one uses multiplication, contextual teaching and learning that emphasizes practical application and relevance to solving particular “real world” problems may be the preferred approach. Each pedagogy has its place in the teaching and learning process. By employing only one instructional approach, teachers may sacrifice gains that could be made by using other strategies.

All pedagogical approaches are used to achieve some overarching goals. Contextual teaching and learning allows a teacher to deliver academic content aligned with standards while at the same time building integrative knowledge, analytic and problem solving skills, and social skills. CTL can be especially appropriate when broader academic outcomes, such as those below, are the teaching objectives:

- Attitudinal outcomes—engagement, motivation, social relations, self direction, responsibility
- Behavioral outcomes—better attendance, discipline, lower dropout rates
- Skill acquisition outcomes—critical thinking skills, long term retention

To use CTL skillfully, teachers need to think and act in certain ways [Table 1 outlines some of these basic differences]. They must restructure traditional teacher/student interaction to emphasize hands-on, participatory learning by the student rather than didactic, teacher-directed instruction.

Teachers must provide students with a clear set of learning objectives and structures, and coach students with suggestions for further study or inquiry by using open-ended questions. They must be willing to work with students in teams or interdependent groups to deliver curricula. Students make connections with roles and responsibilities in the community, with students, as family members, and as workers by taking on a variety of leadership roles. Redesigning how teaching takes place often means that lessons are more difficult and more time-consuming for teachers to prepare.

With CTL, the teacher's role is to guide, discuss, question, listen, and clarify. The student's role is to explore, investigate, validate, discuss, and conduct (Souders, 2001). These roles are new for some teachers, and they can be difficult to deploy: students do not just carry out instructions, but they are also responsible for their own learning (Buck Institute, 2002). CTL is also new for most stu-

dents, and many may initially be uncomfortable with the ambiguity, open-endedness, and self-directed learning that CTL often entails.

To help overcome such obstacles and help students make connections to their own experiences, teachers may need to restructure curricula. Teachers implement contextual teaching strategies by organizing curricula around issues that are relevant to students including personal, home, career, community, society, and cultural contexts. The curriculum emphasizes depth of understanding and knowledge, development of complex problem-solving skills, mastery of integrated skills, and comprehension of concepts and principles (Buck Institute, 2002).

Finally, in order to evaluate what students have learned, teachers may need to adopt different kinds of assessment that accurately measure the desired educational objectives. As teachers focus

Table 1. Comparison of education features of traditional instruction and contextual teaching and learning.

EDUCATIONAL FEATURES	TRADITIONAL INSTRUCTION EMPHASIZES	CONTEXTUAL TEACHING AND LEARNING EMPHASIZES
Focus of curriculum	Breadth of content Knowledge of facts	Resource provider and participant in learning activities Provides student choice and student leadership opportunities
Teaching role	Lecturer and director of instruction Expert Answers questions Work in isolation	Advisor/coach Each students open-ended questions Work in teams with other staff both inside and outside discipline
Classroom context	Students working alone Students competing with one another Students receiving information from the instructor	Students working in groups Students collaborating with one another Students constructing, contributing, and synthesizing information
Student role	Carry out instructions Memorizer, transcriber, and repeater of facts Listen, behave, speak only when spoken to	Work within framework of project to define tasks and direct learning Discoverer, integrator, presenter of ideas Listen, behave, communicate, produce, take responsibility
Scope and sequence	Follow fixed curriculum Discipline-based focus	Incorporates student interest Broad, interdisciplinary focus

NOTE: Table adapted from <http://www.bie.org/pbl/overview/diffstraditional.html>, 1999 Buck Institute for Education

on process and products, criterion performance and gains over time, and demonstration of understanding (in addition to mastery of the knowledge and skills measured by standardized achievement tests), they may also opt for portfolios, the use of rubrics, exhibitions, and performance assessments to measure student outcomes.

II. HOW CONTEXTUAL TEACHING AND LEARNING HAS EVOLVED IN AMERICAN EDUCATION

Contextual teaching and learning rests at the convergence of an established and growing body of research from such diverse fields as developmental psychology, cultural anthropology, linguistics, cognitive psychology, and social psychology. Built on a set of theories and strategies for teaching that can be traced back to the work of John Dewey, John Francis Woodhull, and William Heard Kilpatrick in the early 1900s, CTL is not a “new” idea, but a concept that has continued to evolve over time at all levels of the education system.

Aspects of current CTL practice can be traced back many decades. Important studies in the 1930s noted that students in schools with integrated approaches to their curriculum and organized content around themes rather than subject areas performed better than control groups on standardized tests (Aiken and Tyler, 1942). After World War II, medical educators recognized that problem-based learning represented a particularly effective approach to educating young doctors. Also research by Lewin, Bruner, Piaget, Vygotsky and Erikson, among others, led many to adopt cooperative learning methods in classrooms. More recently work by Howard Gardner, and brain-based research (Brown and Campione, 1994, 1996), gave further support to CTL practices. At the federal level, the Carl D. Perkins Vocational Education Act and Amendments gave a particular boost to CTL related practices by mandating integration of vocational and academic programs. The School-to-Work Opportunities Act of 1994 supported integration practices along with work-based learning activities, and the National and Community Service Trust Act of 1993 expanded

the federal role in service learning by providing funds to develop service learning programs.

How ubiquitous are CTL-related practices? This question is not easy to answer. Because of the vagueness surrounding what constitutes CTL, as well as the absence of standards for determining precisely whether CTL practices are in use, data from national surveys provide a crude measure of the role CTL currently plays in the nation’s school. Here are some summary statistics.

The 1994-95 Schools and Staffing Survey (U.S. National Center for Education Statistics) reported that 86 percent of teachers said that during the semester preceding the survey they had worked with small groups of students on a weekly basis. Further, 91 percent of teachers led facilitated instruction and 85 percent of teachers said that they asked students open-ended questions. Sixty percent of teachers reported that in class they had students work on problems with several answers or with several methods of solutions. And, 63 percent of teachers had students work on tasks that linked school to the real world. But only 33 percent of students participated in group projects with an individual grade and only 18 percent of students were given group projects with a group grade. In another study, NCES (1998) found that 77 percent of full-time public school teachers participated in professional development activities that focused on new methods of teaching, and 53 percent of teachers participated in professional development about cooperative learning in the classroom.

Another NCES survey found that nearly half of all high schools report service-learning as part of their curriculum. (Skinner and Chapman, 1999). In the 1998-99 academic year, 49 percent of all middle schools and high schools required service-learning classes for students, and 79 percent offered voluntary service-learning. Seventy percent of schools with service-learning had students participating in grade-wide service-learning, where all students in one or more grades participated in a service project or program through academic coursework.

Taken together, then, there is evidence that several forms of CTL have found their way into many school classrooms. However, existing data convey relatively little about the quality of these activities or their impacts on student learning.

III. WHAT WE KNOW ABOUT THE IMPACT OF CTL ON STUDENT LEARNING AND OTHER OUTCOMES

While it is always dangerous to characterize a large body of work, research on instructional strategies related to CTL falls into several categories: research describing how we learn; research describing the impacts of CTL on student attitudes and behaviors; and research on student achievement outcomes.

What is most urgent we know little about: how well do students learn when receiving instruction with CTL strategies as compared with other, more traditional teaching methods; and how CTL strategies compare to one another across content areas. Systematic research of this kind, which would require studies in “treatment” versus “non-treatment” settings, could go a long way to raising the overall credibility of CTL among policymakers and educators. Why has this been hard to accomplish?

First, such research demands carefully designed, controlled experiments, which are complex and costly to execute. Many studies of CTL fail to include a control or comparison group; fail to include pre-testing in an experimental study design; do not describe the CTL strategy under study in terms that are clear and accepted among researchers and practitioners; do not systematically apply a true research methodology; or accept anecdotal evidence as conclusive.

Second, when CTL strategies are employed in classrooms, they are often intended to realize educational objectives that conventional standardized tests do not typically measure. As yet, there are not validated, widely accepted assessments of students’ abilities to apply academic knowledge and

skill; solve complex, interdisciplinary problems; work collaboratively, or demonstrate competency through actual performance.

Third, it is not easy to isolate the impact of CTL on student performance and to distinguish its contribution to learning from that of other instructional practices. Most teachers use a variety of instructional strategies, including aspects of CTL, in their classrooms, adapting to subject matter and student learning needs. Classrooms that use only CTL strategies are often hard to find. Further, since most teachers have not been formally trained in these strategies, there is a wide variety of competency in evidence (see e.g. Sparapani, Abel, Easton, Edwards, and Herbster, 1997). As such, the problem is not just assessing students, but also assessing instructional quality.

Fourth, it has been noted by Karnes and Collins (1997) that CTL strategies may be appropriate for some curricula or for some subjects within those curricula but not for others. For example, Albanese and Mitchell (1993), Vernon (1995), and Farnsworth (1994) have found that in science, problem-based learning is most successful when the curricular objectives are to foster problem-solving ability, interpersonal skills, reasoning, and self-motivation. In contrast, traditional instruction appears better suited to teaching general scientific content. This poses further challenges for researchers, who need to have a nuanced understanding of instructional practice and curriculum delivery in order to “tease out” the unique contributions of CTL, especially when it is embedded in the larger teaching and learning context.

Finally, some studies have suffered from inaccurate reporting of research results (Wade and Saxe, 1996) and sample size. Others have methodological shortcomings that undermine confidence in their findings.

A Sampling of the Research

Across the broad sweep of instructional strategies associated with CTL, much of the research has been conducted with reference to one particular

strategy, and it should not be assumed that the findings for that strategy hold across the entire spectrum of CTL practices. So, while “the actual concept of CTL is not addressed to any great extent in the literature ... there is a relevant research base in areas identified as strategies of CTL” (Conroy, Trumbell, and Johnson, 1999). That research, on a strategy-by-strategy basis, will be the focus of this section. It should be noted from the outset, however, that this literature does not read like a “body of work” but rather as a series of only sometimes related findings. For the CTL community – a clear set of research findings, linked and supporting one another, remains an elusive goal.

Learning Processes

Recent studies have contributed to new conceptions about how people learn. Specifically, cognitive research has tried to understand how and when learning occurs most effectively. Studies of the brain indicate that learning occurs faster and more thoroughly when what we are learning is presented in meaningful contexts, rather than as fragmented facts (Caine and Caine 1991; Resnick, 1991). This is the basis for the instructional strategies that comprise CTL. Generally, a substantial body of research notes that it is easier to develop skills if they are learned in a context in which they will be used (Hughes, Bailey, and Mechur, 2001).

By studying “experts” – individuals who have developed ways of thinking and reasoning effectively – scientists have come to understand how accomplished people learn. Research on expertise in areas such as chess, history, science and mathematics demonstrates that experts’ abilities to think and solve problems are derived from a rich body of subject matter knowledge (e.g. Chase and Simon, 1973; Chi et al., 1981; deGroot, 1965). However, the research also shows clearly that “usable knowledge” is not a set of disconnected facts. Experts’ knowledge is connected and organized around important concepts; it is “conditionalized” to specify the contexts in which it is applicable; and it supports understanding in and transfer to other contexts (Bransford et al., 1999, 4).

Another aspect of effective learning is the long-term impact in the ways it influences other kinds of learning or performance (Bransford et al., 1999, iii). Research studies on the concept of transfer are an important part of this literature. How tightly learning is tied to contexts depends on how the knowledge is acquired (Eich, 1985). Transfer across contexts is especially difficult when a subject is taught only in a single context rather than in multiple contexts (Bjork and Richardson-Klavhen, 1989). One frequently used teaching strategy is to encourage learners to elaborate on the examples presented during learning in order to facilitate retrieval at a later time. Ironically, this could make it more difficult to retrieve lesson material in other contexts, because knowledge tends to be context-bound when learners only elaborate new material with details of the context in which the material was learned (Eich, 1985). When a subject is taught in multiple contexts, however, and includes examples that demonstrate wide application of what is being taught, students are more likely to abstract the relevant features of concepts and to develop a flexible representation of knowledge (Gick and Holyoak, 1983; Bransford et al., 1999).

The problem of overly-contextualized knowledge has been studied in instructional programs that use case-based and problem-based learning. In these programs, information is presented in a context of attempting to solve complex, realistic problems (e.g., Barrows, 1985; Cognition and Technology Group at Vanderbilt, 1997; Gragg, 1940; Hmelo, 1995; Williams, 1992). For example, fifth- and sixth-grade students may learn mathematical concepts of distance-rate-time as part of a case involving planning for a boat trip. If students learn only in this context, they often are not able to transfer the knowledge to new situations (Cognition and Technology Group at Vanderbilt, 1997). The issue is how to promote wide transfer of new learning (Bransford et al., 1999). One way is to ask learners to solve a specific case and then provide them with an additional, similar case. The goal is to help them abstract general principles that lead to more flexible transfer (Gick and

Holyoak, 1983; Bransford et al., 1999).

There is considerable evidence that cooperative-collaborative learning promotes an important aspect of information processing. Retention requires some sort of cognitive restructuring or elaboration. One of the most effective ways of achieving this synthesis is to explain what has been learned to someone else – solidifying what has been learned by the tutor, and providing new knowledge to the other learner (Devin-Sheehan, Feldman, and Allen 1976; Dansereau, 1985, Slavin, 1991; Aronson, Blaney, Stephen, Sikes, and Snapp, 1978; Johnson and Johnson, 1986).

The use of manipulatives, or objects that can be touched and moved by students to introduce or reinforce a concept (usually used in mathematics), have been found to increase mathematics achievement, especially if used over an extended period of time (Suydam and Higgins, 1977; Sowell, 1989). There is not, however, research on related strategies that use “hands on” experience to promote other kinds of learning. Although medical students engaged in project-based learning may do less well on standardized test scores, they remember the information much longer (Norman and Schmidt, 1992), and they are more likely to apply scientific knowledge appropriately (Allen, Duch, and Groh, 1996).

Research on “situated cognition,” indicates that learning is maximized if the context for learning resembles the real-life context in which the to-be-learned material will be used; learning is minimized if the context in which learning occurs is dissimilar to the context in which the learning will be used (Brown, Collins, and Duguid, 1989).

There is a good deal of evidence that learning is enhanced when teachers pay attention to the knowledge and beliefs that learners bring to a learning task, and use this as a starting point for new instruction. For example, sixth graders in a suburban school who were given inquiry-based physics instruction were shown to do better on conceptual physics problems than eleventh and twelfth grade physics students taught by conven-

tional methods in the same school system. A second study comparing seventh-ninth grade urban students with the eleventh and twelfth grade suburban physics students again showed that the younger students, taught by an inquiry-based approach, had a better grasp of the fundamental principles of physics (White and Frederickson, 1997, 1998; Bransford et al., 1999).

Engagement and Motivation

If an important objective of any instructional strategy is to inspire students to want to learn, CTL is consistent with that objective. Evidence indicates that when students are actively engaged in working on “real issues” – a common focus of the CTL pedagogy – they are more motivated to master content (Vars, 1965; Covington, 1992; Lampert, 1986; Newman, Wehlage, and Lamborn, 1992). Exposure to CTL seems to improve motivation and self-direction, thereby reducing behavior problems (MacIver, 1990). Similarly, when students can see the relevance of their studies, they are more persistent and tend to be more focused in the classroom (Pintrich and Schunk, 1996).

Studies of service-learning note that well-designed programs produce positive changes in students, including increased social and personal responsibility, growth in moral and ego development, and improved self-esteem (Shaffer, 1993; Switzer, et. al., 1995), all contributing to improved attitudes towards school and sense of classroom competence (Conrad and Hedin, 1991; Weiler et. al., 1998).

Researchers have documented other aspects of engagement, an important indicator of academic instruction. Individuals, who are interested in particular activities or topics pay closer attention, persist for longer periods of time, learn more, and enjoy participating to a greater degree than individuals without such interest (Ainley, 1994, 1998; Prenzel, 1988; Renninger, 1987, 1990, 1998; Schiefele, 1991). Although it may be difficult for teachers to design their lesson plans around the personal interests of every student, many are able to foster situational interest and utilize cooperative learning tech-

niques to increase academic motivation.

Researchers have argued that situational interest is important because it motivates students who are academically uninterested (Bergin, 1999; Hidi, 1990; Lepper, 1985; Haussler and Hoffmann, 1998). They have demonstrated the strength of situational interest through text-based studies – examining what makes texts less or more interesting. They have found that those texts that have easier character identification and compelling text segments produce superior reading comprehension and recall (Anderson, 1982; Anderson, Shirey, Wilson, and Fielding, 1987; Hidi and Baird, 1988). Some researchers have focused on how changing teaching strategies can contribute to the development of situational interest (Hidi and Berndorff, 1998; Lepper and Cordova, 1992; Lepper and Henderlong, 2000). For example, when researchers presented material in ways that illustrate the utility of learning or making it more personally relevant, students absorb more (Cordova and Lepper, 1996; Parker and Lepper, 1999). In various literature reviews of project-based learning, Norman and Schmidt (1992) found that students engaged in project-based programs seem to be motivated and self-directed learners, more likely to acquire deep understanding of issues. Albanese and Mitchell (1993) concluded that students engaged in problem-based learning were more likely to study for understanding and learn information needed to solve problems than were other students.

Similarly, service-learning has been found to positively affect students' engagement and motivation. Students who participated in high quality service-learning programs showed an increase in measures of school engagement and achievement in mathematics compared to control groups (Melchoir, 1999). Melchoir and Orr (1995), Luchs (1980), and Brill (1994), all observed increases in attendance and Melchoir and Orr found increases in time spent doing homework. Students who engaged in service-learning came to class on time more often, completed more classroom assignments and took the initiative to ask

questions more often (Loesch-Griffin et al, 1995).

Critical Thinking Skills

Studies in cooperative and collaborative learning settings (Bruner, 1985) suggest that students' problem-solving skills improve when they are confronted with different interpretations of a problem and must use critical thinking skills to arrive at answers and conclusions. For example, Qin, Johnson, and Johnson (1995) conducted a meta-analysis of 46 studies published between 1929 and 1993 and found that members of cooperative teams outperformed individuals competing with each other on four types of problem-solving.

Gallagher, Stepien, and Rosenthal (1992) also found that participants in a problem-based course for gifted high school students exhibited significant improvement in problem-solving skills compared to a group of gifted non-participants. In 1999, U.S. eighth graders exceeded the international average of 38 countries in mathematics and science on the Third International Mathematics and Science Study (TIMSS), but performed lower than their peers in 14 countries, including Japan. One explanation for these differences might be found in a TIMSS study of 231 classrooms in a videotape classroom study of eighth grade mathematics in Germany, Japan, and the United States. The study found that most lessons in the U.S. (83 percent) contained tasks in which the teacher demonstrated a solution, and students were asked to replicate it as opposed to tasks in which the teacher encouraged students to find alternative solution paths on their own. In contrast, 48 percent of German lessons and 17 percent of Japanese lessons contained exclusively teacher-demonstrated tasks. Similarly, the German and Japanese teachers often included deductive reasoning as part of their lessons, whereas the U.S. teachers did not (Condition of Education, 2001).

Attitudes and Behaviors in the Classroom

There is a small body of research concerning the impact of an integrated curriculum, common in many CTL classrooms, on student attitudes.

MacIver (1990) found that students in integrated programs developed team spirit and improved their attitudes and work habits. This was attributed, in part, to the fact that teachers met in teams and were able to quickly recognize and deal with a student's problem. Jacobs (1989) also reports that an integrated curriculum is associated with better student self-direction, higher attendance, higher levels of homework completion, and better attitudes toward school. Students are engaged in their learning as they make connections across disciplines and with the world outside the classroom.

A well-designed study of an interdisciplinary, thematic high school humanities program in Los Angeles compared participating students with those in 16 other schools that used more traditional approaches to teaching humanities. Students in the interdisciplinary program stayed in school longer, liked school better, and tended to "work harder" (by objective measurement) than those who were not in the program (Aschbacher, 1991). In a five-year study, researchers at SRI found that technology-using students in Challenge 2000 Multimedia Project classrooms (which involved completing one to four interdisciplinary multimedia projects a year that integrated real-world issues and practices) outperformed non-technology-using students in communication skills, teamwork, and problem solving. Penuel et al. (2001) found increased student engagement, greater responsibility for learning, increased peer collaboration skills, and greater achievement gains by students who had been labeled low achievers.

Service-learning as an instructional strategy may also contribute to improvements in students' attitudes and behaviors. Weiler et al. (1998) found that middle and high school students who engaged in quality service-learning programs showed increases in measures of personal and social responsibility, communication and sense of educational competence. Students were more likely to treat each other kindly, help each other, and care about doing their best (Berkas, 1997). In another study, students in service-learning programs exhibited fewer behavioral problems, and

received fewer office referrals for discipline than other students (Stephens, 1995; Yates and Youniss, 1996; Follman and Muldoon 1997; Follman, 1998).

In a laboratory research study on cooperation, one of the strongest findings was that when people cooperate, they learn to like one another. Similar findings were found in cooperative learning classroom studies (Slavin, 1977, 1983, 1990). Yet, as mentioned earlier, often students must be taught the social skills they need to have to work successfully in a group. In two other studies (Nelson and Johnson, 1996; Prater, Bruhl, and Serna, 1998), researchers found that students with behavior disorders who did not receive social skills instruction performed better with direct instructional methods than cooperative group methods, and those students who did receive social skills instruction performed better with cooperative group methods.

A study by Stepien et al. (1993) describes research conducted in two secondary school settings, an elective science course for seniors and a more traditional course in American Studies for sophomores. In this study, the problem used in the science course was one designed to prompt students' consideration of ethical as well as biological issues. Likewise, the social studies problem combined historical with ethical issues. Students enrolled in the problem-solving course for seniors, along with a matched group of control seniors, were given an ill-structured problem as a pretest and another such problem as a posttest. Students were told to outline a process they might use to arrive at a resolution to the problem. According to the scoring procedure employed in this study, students who took the problem-solving courses outperformed control students in the breadth of their ethical appeals and in the extent to which they tended to support their appeals with reasoned arguments (Thomas, 2000).

Attendance and School Retention

Service-learning studies have shown positive impacts on behavioral engagement as measured

by attendance. Melchoir and Orr (1995), Luchs (1980), and Brill (1994) found increases in attendance when students participated in service-learning. Leming (1998) found that students are likely to feel connected to their community and more resilient when involved in service-learning and have a higher sense of responsibility to their school than comparison groups.

Work-based learning strategies have demonstrated improved attendance and decreased dropout rates as well. In a study of 1,169 Boston students enrolled in a career pathway during the 1996-97 school year and a sample from 3,924 students who were not enrolled, the career pathway students were more engaged in school, had a lower dropout rate, better attendance, and fewer suspensions than their peers (Boston School-to-Career, 1997). Another study of Boston's Pro Tech program, which links students enrolled in career pathways to internships in seven industries, found that ProTech students were more likely to attend college, to remain in college, or to be working (and earning higher wages) than their peers (Jobs for the Future, 1997).

In a 1998 study, after controlling for the effects of students' prior grades, attendance, year in school, and school attended, researchers found that work-based learning, "significantly improved a student's grade point average and attendance" (Linnehan, 1998). Bishop (2000) also found that students who were in internships and apprenticeship programs enrolled in Algebra I and higher level math courses as well as biology, chemistry, and lab sciences more often than peers who did not participate in those programs.

Grades and Achievement

Cooperative and collaborative learning researchers have looked at the achievement pay-offs of this instructional strategy. Slavin (1991) examined 67 studies of cooperative learning achievement outcomes. Sixty-one percent of the studies found significantly greater achievement among students in cooperative-collaborative classes than in traditionally taught control groups.

Positive effects were found across grade levels, urbanicity, and among students at all achievement levels. Thirty-seven percent of the studies found no differences, and in only one study did the control group outperform the experimental group. Similarly robust findings are reported by Johnson, Johnson, and Stanne (2000). A survey for the U.S. Department of Education (1992) found generally positive achievement outcomes for students in collaborative-cooperative learning environments. In a meta-analysis, Slavin (1990) notes positive effects of cooperative learning on achievement, as compared with control groups, especially when there are both clear group goals and students are individually accountable for subject matter mastery.

Stevens et al. (1989) investigated the impact of direct instruction on reading comprehension strategies and the degree to which cooperative learning enhances students' mastery. They found that students in a cooperative learning setting with direct instruction performed significantly better than those in a traditionally instructed control group. In addition, the students in cooperative learning groups performed significantly better than the students who received only direct instruction.

Problem-based learning has been studied extensively at the postsecondary level, and it shares many features in common with secondary level practices (Barrows, 1996; Schmidt, 1994; Williams, 1992). Recognizing that high school students are very different from advanced postsecondary students in terms of motivation and maturity, reviews of 20 years of research on problem-based learning in medical schools (Albanese and Mitchell, 1993; Vernon and Blake, 1993), found that medical students in problem-based learning programs perform as well as students in traditional programs on conventional tests of knowledge. Further, project-based learning students did better on tests of clinical problem-solving skills.

A small, but significant study of science classes in middle schools of two classes using problem-based learning strategies and two using traditional classroom pedagogy, looked specifically at content mastery across identical curriculum units

(Krynock and Robb, 1996). Using a common instrument, all four classes scored at the same level, but the problem-based learning classes scored slightly higher on the content assessment. Although difficult to generalize, this study represents one of a few that examined content mastery in a controlled, experimental environment.

Newmann and his colleagues studied 130 classrooms in 24 restructured elementary, middle, and secondary schools. After controlling for gender, race, ethnicity, socioeconomic status, and academic skill level, the researchers found remarkable improvements in performance in both math and social studies among students in classes taught with “authentic pedagogy” (instructional practices rooted in the real world). In another study of 140 classrooms in 15 schools serving disadvantaged students, Knapp, Shields and Turnbull (1992) found that when teachers taught for understanding and meaning rather than memorization, and when they connected instruction to students’ experiences, their students consistently outperformed students in conventional classrooms on advanced skills and did as well or better on traditional tests.

A three-year 1997 study of two British secondary schools (Boaler, 1998) – one that used open-ended projects and one that used more traditional, direct instruction to teach mathematics – found striking differences in understanding and standardized achievement scores in mathematics. Students at the project-based school did better than those at the more traditional school both on math problems requiring analytical or conceptual thought and on those considered rote, that is, those requiring memory of a rule or formula. Three times as many students at the project-based school received the top grade that could be achieved on the national examination in math. The study was conducted by following a cohort of students from each school (300 students in all) for three years as they moved from Year 9 (age 13) to Year 11 (age 16). Boaler observed approximately 90 one-hour lessons in each school, and she interviewed students in the second and third year of the study, administered questionnaires to all students in each year of the

study, and interviewed teachers at the beginning and the end of the research period.

An earlier study reported by the Cognition and Technology Group at Vanderbilt (1992) involved over 700 students from eleven school districts, with five of the sites employing matched control groups. Students were given three adventure “projects” over the course of three weeks (the “Jasper” series: videotaped problems that package all the information required for project work, but allow some autonomous activity), two on trip planning and one on using statistics to create a business plan. The effectiveness of these projects was measured by a series of tasks administered after three weeks of project work. Scores were recorded in five areas: basic math concepts, word problems, planning capabilities, attitudes, and teacher feedback. As expected, the largest gains were observed in planning capabilities, word problem performance, and attitudes towards mathematics. Students exposed to the Jasper problems showed positive gains in all areas compared to control students. According to the researchers, the study demonstrated that a brief project-based learning experience (“anchored instruction,” in their terminology) can have a significant impact on students’ problem-solving skills, metacognitive strategies, and attitudes towards learning. Results from the attitude surveys were similar to those reported by Boaler (1997). In comparison to the gains made by untreated control students, experience with a project approach to mathematics was associated with a reduction in anxiety toward mathematics, greater willingness to see mathematics as relevant to everyday life, and increased willingness to approach mathematical challenges with a positive attitude (Thomas, 2000).

Although few studies of service-learning have focused on academic achievement measured in narrow terms, there are several that deserve mentioning (Conrad, 1991). Silcox (1993) found that students showed significant gains in scientific knowledge after taking part in an international environmental project. Hamilton and Zeldin (1987) found that students taking part in a local

government project increased their knowledge of local government more than students in traditional classes. Dewsbury-White (1993) found that students who served in a food bank were better informed about the issues of hunger than other students. In a larger evaluation of federally-funded Learn and Serve America in 17 high and middle schools Melchoir (1997) found that participants scored significantly higher than comparison group students on four of ten measures of impact – school engagement, school grades, core grade point average, and aspiration to graduate from a four-year college. Learn and Serve included all components of an advanced, fully implemented service-learning program.

In another study, Anderson (1991) found that service-learning participation was associated with higher scores on the state test of basic skills and higher grades (Shumer, 1994; Dean and Murdock, 1992; Shaffer, 1993; O’Bannon, 1999).

Vars (1965) summarized five major research studies and reported that in middle school programs that adhered to block time and core programs – both forerunners of integrated curriculum – there was no loss of learning of subject matter and that overall, students in the integrated programs did as well or better than students in separate subject programs.

Students in the Humanitas program, an interdisciplinary, thematic, team-based approach to high school humanities in Los Angeles (Aschbacher 1991), have been compared to students in 16 other schools, which are more traditional in their approach. The Humanitas program had a statistically significant effect on writing and content knowledge, even after students have been enrolled for only one year. The largest gains were in conceptual understanding. The control groups of students made no gains in conceptual understanding during the same time period.

While the evaluation of the Humanitas project involved large numbers of students and a control group, there are also smaller-scale studies reporting positive achievement outcomes for students

who participate in an integrated curriculum. Levitan (1991) found that a change from a literature-based language arts program to a science-literature-based program for sixth graders resulted in achievement increases for the majority of the students. Willett (1992) reports similar results in a study of 87 fifth graders. Integrating the study of math with art resulted in higher post-test scores than those students who were taught mathematical concepts in isolation by the regular classroom teacher. “The data indicate that the integration of art activities into mathematics and reading can enhance the learning of specific concepts” (Levitan, 1991, 12). Similar results were reported by Friend (1984) in a study of mathematics and science integration at the seventh grade level.

What We Do Not Know

This eclectic summary of research findings reflects the nature of the literature. It is often methodologically vague and hardly conclusive. To place CTL and related instructional practices in proper perspective, researchers need to do much more. First, the various CTL strategies need to be tested in controlled experiments and across curricula. In fact, we do not even know how frequently and in what circumstances teachers use these strategies. The quality of data on teachers’ pedagogy is poor because the gathering of this data is complex and “it is difficult to isolate and measure critical elements of pedagogy because the teaching process consists of a complex set of interactions between students, the teacher, and the curriculum” (Mayer, Mullens, and Moore, 2000). Nor do we know why the strategies are used when they are. As noted earlier, data indicate that they have found a place in many classrooms, i.e. teachers are using them to build content and learning skills, but not much is known about that. Who is using these strategies, when, and to what end?

With regard to teaching and learning, are these strategies more appropriate in certain subject areas than others? Do they produce more robust student outcomes in some subject areas than others? There is a real need for well-designed research and experiments to see exactly what dif-

ferences there are, controlling for strategy, teacher quality, student ability and background, subject matter, grade level and more. Until we gather evidence of this sort, many of our discussions will continue to be polemical and driven less by data and more by personal opinion and preference.

At the same time, it is not entirely surprising that the research base remains somewhat thin, at least in terms of outcomes. By and large, CTL and the related instructional strategies are not taught to most teachers; they are most often “backed into” as teachers look for ways to meet needs in the classroom. They are done well by some, not so well by others. At their best, they are not simply designed to convey content. As such, measuring only achievement outcomes is insufficient. Clearly the value of CTL is often not measured well or understood particularly in the current environment, which is so completely focused on student achievement in the narrowest sense.

Indeed, CTL strategies must demonstrate their worth in terms of achievement outcomes, and researchers must use tried and true methodologies to test their efficacy and make comparisons with other forms of pedagogy. Despite the complexity of delivering and researching CTL, in the current policy environment, CTL practitioners must answer some hard questions:

- Do students master required curriculum content in classes taught with CTL strategies?
- How do we come to understand the potential of CTL in a standards-based environment and high stakes testing?
- How do we assess the outcomes associated with CTL unless the objectives of the strategy are clearly defined?
- Without agreed upon definitions of each strategy associated with CTL, how does one research the effects of teacher education and professional development on instructional practice and student learning?

IV. CTL AND PUBLIC POLICY

What role can public policy generally, and federal policy more specifically, play in better understanding the strengths and weaknesses of CTL and in promoting more effective implementation? It seems clear that while much has been learned about the effectiveness of certain aspects of CTL, there is not as yet sufficient evidence to justify wholesale adoption of CTL as a proven strategy for raising student achievement. Consequently, policy needs to proceed carefully and deliberately on several different fronts. One possible framework for organizing the policy agenda would include the following topics: 1) Definition of CTL and standards for determining whether and the extent to which its various components are being implemented; 2) curriculum development that grounds CTL in content and performance standards and models effective linkages between contextual applications and instructional practices; 3) programs and demonstrations designed to advance understanding of what works, why, and for whom; and 4) priorities for pre-service teacher training and professional development with existing teachers.

Defining CTL and Standards for Implementation

Whether CTL is an effective school improvement strategy cannot be determined if policy is not clear about what CTL is and how to determine whether schools have implemented one or more of its components. Policy needs to be as clear as possible about the kinds of changes it is seeking in curriculum, teaching practices, and organization. Vague calls for “curriculum integration,” “hands-on learning,” “smaller learning communities,” “learning through doing,” and so forth are not productive. Not only do they fail to offer teachers well developed tools for raising student achievement, but also they encourage protracted ideological debates that divert attention from the difficult tasks of determining what works and what does not.

Policies designed to strengthen effective CTL might require that selected approaches to CTL meet, at a minimum, the following criteria:

1. *Clearly stated educational objectives grounded in rigorous content and performance standards.* CTL is a means to an end, not an end in itself. How it addresses priorities for student learning should be clearly and specifically articulated.
2. *A well-developed rationale, based on sound learning theory and ideally on empirical research, for the choice of CTL over alternative instructional practices.* CTL is one of many tools available to teachers and is better suited for achieving some educational objectives than others. Why it is best suited to a particular aim or learning situation should be carefully stated.
3. *A credible strategy for assessing that the intended learning occurs.* CTL may be most appropriate for teaching knowledge and skills that are not easily measured by conventional assessment instruments. The availability and credibility of alternative assessments should be an explicit feature of plans to use CTL.

Grounding CTL in Content and Performance Standards

During the past two decades, a great deal of work has been done to develop clearer standards for what students are expected to know and be able to do. Some of the academic disciplines, particularly mathematics and science, have paid more attention to CTL than have others. Parallel work focused on advancing CTL has almost always claimed to be “standards-driven,” but precisely what this means has often been unclear. Even many of the efforts to develop industry and occupational standards for career and technical education, where the practice of CTL is more firmly established, have failed to address explicitly the role of CTL in curriculum and instruction. Model curriculum in each of the major academic disciplines, with comprehensive and tested content, would help many teachers pursue CTL without having to constantly reinvent the proverbial wheel. Similarly, model curriculum in career and technical education that emphasized application

of challenging academics and guided teachers on which of the academic standards were best suited for particular industries and occupations could be an important priority for public policy.

As these curriculum efforts proceed, they may also present an opportunity for debating more systematically what the nation expects students to know and be able to do. Whether it is in fact important for students to know how to apply academic knowledge and skill in particular contexts is by no means clear. Similarly, despite pleas from the business community for more emphasis on problem-solving, understanding of systems, ability to work collaboratively, and better understanding of principles of technology, these learning objectives and clear standards of performance have yet to find their way into mainstream discussions about curriculum content and assessment. Whether they should receive greater emphasis is an open question, but one that could be examined more purposefully as a part of CTL initiatives.

Moreover, even if there is agreement on the desirability of these additional learning outcomes, there are not widely accepted assessment instruments for determining whether these objectives are being met. Another potential focus of public policy, therefore, could be systematic development of better assessment instruments for gauging students’ ability to apply academic concepts and skills, to solve complicated interdisciplinary problems, to work collaboratively, to understand systems, and to communicate effectively in the modern world.

Demonstration Programs Linked to Rigorous Research and Evaluation

With safeguards to avoid experimentation that can do harm to students, it should be possible to proceed with demonstrations carefully designed to better understand what forms of CTL are effective, under what conditions, for what types of subject matter, and in what kinds of combinations with other instructional strategies, including traditional approaches to teaching and learning. It is not easy in most education situations to construct

experiments that duplicate the rigor of clinical trials and related research methods in medicine and other fields. Not only are such studies costly, but also requirements for random assignment and withholding treatment from some "subjects" can pose insurmountable ethical problems when young people are involved. Nevertheless, increasing opportunities for parents and students to exercise choice in selecting schools and instructional programs may also create more situations that lend themselves to "naturally occurring" experiments, especially where waiting lists and admission by lottery are present. Public policy should exploit the most promising of these experimental opportunities.

Additionally, federal policy should give direction to the various agencies charged with collecting data on schools, teachers, students, and instructional practice so that implementation of CTL can be more precisely monitored. Clearer and more specific definitions of CTL would improve data collection, as would better estimates of the numbers of students engaged in different kinds of CTL activities.

Priorities for Pre-Service and In-Service Professional Development

Although much remains to be learned about the effectiveness of CTL, helping educators use what is already known is another potential goal for public policy. CTL is not easy to do well, and ensuring more effective implementation will depend, in part, on developing the capacities of teachers to use these strategies in the classroom. Work is needed simultaneously on two fronts: 1) in-service development for those already teaching and constituting the overwhelming majority of teachers who will be teaching during the next decade, and 2) pre-service development for new teachers

who will join the ranks of academic and technical teachers in the future. One way in which policy could help strengthen both these aspects of professional development would be to lend support to more comprehensive reflection on what both academic and CTE teachers need to know and be able to do in order to get the most out of school improvement strategies that combine different forms of technical and academic instruction.

V. CONCLUSION

CTL is one of several instructional practices that good teachers need to better understand in order to help young people learn. Strictly speaking, it is not a new idea. Teachers have long known what cognitive science is now documenting more thoroughly: using students' personal experiences and creating opportunities for applying knowledge and skills to concrete, practical situations can enhance learning. It is not a substitute for other teaching techniques, but rather an additional tool for engaging students both inside and outside the classroom and deepening their understanding of important ideas and methods for comprehending their worlds.

However, if CTL is not new to schools, neither is it well developed nor ably practiced by most teachers. Much remains to be learned about how and when to best use CTL, singly and in combination with other instructional methods. Public policy can play an important role in advancing research on CTL, sponsoring well-designed demonstrations and evaluations, furthering the relationship between CTL and achievement of curriculum and performance standards, and improving the abilities of existing and prospective teachers to use these instructional practices more effectively.

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Appendix

Examples of Contextual Teaching and Learning Lessons

PROBLEM-BASED LEARNING

Example:

The High School Food Court

Students are presented with the following problem. The high school is going to choose five restaurants from 12 bidders who want space in the high school's new food court. A memo from the school principal explains to the students that the school board expects them to pick the restaurants and justify their selection. A percentage of the restaurants' profits will go to the student council to pay for council-sponsored student activities. The memo notes that this is the only revenue the student council has. The principal also sends along a memo from the PTA president who is concerned about the students eating fast food; another from the school counselor who is concerned about low-income students having access to low cost, good food; a third from the Gourmet Club who want the quality of food to be above average; the others from the "Vital Vegetarians," and the woman who donated the new student center requesting specific foods to be served at the food court. Students must weigh the needs of these competing constituencies against the restaurants' profits, which pays for their activities. Students work in groups to define a solution and make a class presentation and report to the school board.

Outcomes:

Economic/Mathematics content: percentages, opportunity costs, revenue, profit, equity, trade-offs, scarcity, public policy costs, market systems, economic systems, basic economic theory

English/Language Arts content: report writing, persuasive arguments, comparing and contrasting

Analytic and problem solving skills: construc-

tion of selection criteria, decision-making, utilizing data

Social skills: adult roles, teamwork, and presentation skills

Components of Problem Based Learning:

Purposeful, real world problem

Centered around skills; interdisciplinary focus

Student collaboration/cooperation

Academic rigor

Student choice throughout investigation

Teachers provide support throughout the process

Assessment:

A *rubric* is presented to students when the problem is introduced. The rubric outlines the ratings that the student will receive for demonstrating the specific knowledge of economic/mathematics content, ability to propose a solution to the problem, ability to communicate effectively in both writing and presenting of proposal, and their level of participation in their group.

SERVICE-LEARNING

Example:

Taking Care of Water Pollution

In response to a recent increase in reporting on pollution as a major problem presented in the local paper, this project involves students in the issue of pollution in their community as part of a biology curriculum. Students take water samples from their local waterway. They analyze the amount and nature of the pollutants in the water and look for the source of that pollution. They write letters to their local government to inform the city officials of the problem and encourage them to take action. They also make presentations at the local environmental group meetings and at school

board meetings to educate the public about water pollution. There are discussions to reflect on the service at all stages of this project. Topics for discussion include education, pollution, ethics, government agencies, public health, and waste management.

Outcomes:

Science content: biology of water, causes of and solutions to pollution, health

Social Studies content: current events, government

English/Language Arts content: letter writing, presentations

Analytic and problem solving skills: critical thinking, utilizing data, creating viable solutions

Social skills: adult roles, teamwork, presentation skills, and civic responsibility

Components of Service Learning:

Meaningful service connected to the curriculum

Genuine need in the community is addressed

Students involved in planning of service and presentation

Student collaboration/cooperation

Connection to academic class

Reflection

Assessment:

Students are expected to keep a portfolio including the various water samples and analysis, investigation into sources of pollution, letters written, and their presentation.

Community members are asked to assess the effects of students' service.

PROJECT-BASED LEARNING

Example:

Geometry in the Real World

Students are presented with a project for the national organization We Remember that promotes activities that educate past, present, and future generations about the Holocaust. One of their goals is to erect a memorial to commemorate Holocaust victims and survivors. They have asked the class to prepare proposals for a national monument for the Holocaust. Students are divided into small groups. Students must explore the history of the Holocaust including Judaism and WWII in order to first create a timeline of events of the Holocaust. They must then explore existing Holocaust memorials including their goals/purpose, where they are built, and type of buildings/memorials. The students must then design the memorial and include the design in a proposal. The proposal must include a site plan, scale model, floor plans (if a building), perspective drawings, cost estimates, and a written proposal including the goal of the memorial, where it will be located, what features it will have, and what the students are trying to achieve. Proposals will be presented to judges from the architecture profession and not-for-profit sector and other groups of students.

Outcomes:

Geometry content: scale, perspective, geometry concepts found in construction

History content: World War II, the Holocaust, Judaism

English/Language Arts content: proposal writing, presentations

Visual Arts content: graphic design, perspective drawing

Analytic and problem solving skills: critical thinking, utilizing data, creating viable solutions

Social skills: adult roles, teamwork, presentation skills

Components of Project-Based Learning:

Complex task introduced that requires in-depth investigation

Student choice throughout design of memorial

Student collaboration/cooperation

Presentation

Assessment:

A *rubric* is presented to students when the problem is introduced. The rubric outlines the ratings that the student will receive for demonstrating the specific knowledge of geometry concepts, ability to propose a creative solution, ability to communicate effectively in both writing and presenting of proposal, and their level of participation in their group

Architects, members from community not-for-profits, and students will be asked to assess projects based on real-world applicability.

CURRICULUM INTEGRATION

Example #1:

Thematic Unit on Fire

Fire is the theme for the entire grade for three weeks. Each subject focuses on this theme. In mathematics, students learn about scale and mapping; in health, students learn about the effects of burning and smoke; in English, students write a puppet show about the Chicago Fire; in foreign language, students learn about fire in different cultures; in social studies, students learn about the Great Chicago Fire and the history of Chicago; in art, students make puppets for the puppet show; in music class, students compose a dance interpreting fire; and in science, students learn why things burn.

Example #2:

Integrating Academic and Career and Technical Education

Two teachers work together to develop and jointly teach an applied biology/chemistry course and

a health occupations course. The curricula for the two courses are aligned. When health occupations students study nutrition and the digestive system, they perform related lab experiments in applied biology/chemistry laboratories. For example, they study the energy released when the body burns certain foods, use chromatography to separate amino acids, and explore the effects of enzyme activity on various foods. When health occupation students study chemical addiction, they analyze drugs and poisons in applied biology/chemistry lab. The courses are often scheduled to offer teachers the flexibility to plan engaging and sophisticated activities. Back-to-back course scheduling provides time for students in the lab and the ability for teachers to team-teach.

Outcomes:

Content is addressed in every subject area.

Components of Integrated Curricula:

Depth and breadth of content is the focus

Cuts across subject lines

Team teaching and planning

Assessment:

Student assessment emphasizes projects and presentations rather than conventional tests. Students are graded on how they organize their work and keep permanent records of activities. Students earn separate credit for each course.

WORK-BASED LEARNING

Example:

Transportation Internship Class

As part of a Transportation Career Academy, students are placed in 45 hour-long internships at the Federal Aviation Administration. Each student is assigned to a workplace mentor who helps them see first-hand what the career field is really like. Students are placed in an internship class, a year-long course that culminates in the internship conducted during the second semester. The course

includes career exploration, personal testing and investigation of self and careers, resume writing, job applications, mock job interviewing, how to dress for interviews and work, career interest assessments, cover letters and other forms of business communications that are all kept in student portfolios. Guest speakers visit the classes to talk about careers and education. The classes also take field trips including trips to the local airport, the coast guard, a nearby university, and the local hospital. Students are required to complete a final project and present it on Senior Exhibition Day. During the second semester, students spend two days a week in class, and the other three days of the week are spent in the workplace interning. Students are placed in different areas of the FAA for approximately three weeks and then rotate positions. The areas include the human resources department, law department, medical services department, and the inspection department. The on-the-job learning experiences are reinforced by the lessons in all of the classes in the Transportation Career Academy where students are learning about all aspects of the industry. Students are required to keep a journal and write a report on the internship experience.

Outcomes:

Language Arts/English content: report writing, journal writing

Social skills: relationships with adults, responsibility

Workplace competencies: Awareness of the world of work and understanding of the world of academic learning for their future

Components of Work-Based Learning:

Planned program of job training

Experiences in all aspects of an industry

Workplace mentoring

Instruction on workplace competencies

Connection to academic classes

Assessment:

A *rubric* is presented to students at the beginning of the class. The rubric outlines the ratings that the student will receive for their journal writing, final report, and final presentation.

Workplace mentors will be asked to assess students on their workplace competencies.

COLLABORATIVE/COOPERATIVE LEARNING

Example:

Inuit Peoples

Students answer the question: How do Inuit on Baffin Island live and how does Arctic life resemble and differ from ours? Students are shown a video clip on life in the arctic. They are then divided into pairs and asked to brainstorm with their partner everything that they noticed about life in the Arctic. Students are then asked to share what they discussed in their pairs with the entire class. Students are then divided into larger groups with three-five students and presented with a topic to explore in order to learn more about the Inuit and the Arctic. Topics include: researching and describing the legend of the Inukshuk; using numbers, statistics, and graphs to describe and represent Inuit populations and resources; and research on an Inuit who made a positive contribution in Canada's Arctic over the past two decades. They create and produce a mock radio or TV interview to introduce the person to the class, write a one-week journal as an Inuit teenager that includes seven entries describing life in Inuit community; describe the seasons of the Arctic, explaining and/or demonstrating why the Arctic is so cold, dangers of the Arctic seas, reasons for long periods of dark and light, damages to the Arctic land, and summer and autumn colors from tundra blooms. Each group presents their findings to the other groups.

Outcomes:

Social studies content: *Inuit, Arctic life and geography*

English/Language arts content: *creative writing, journal writing*

Social skills: *relationships between students, teamwork, interpersonal skills, presentation skills*

Depending on the group, creativity skills, mathematics content skills, research skills, biology content skills are explored

Components of Collaborative/Cooperative Learning:

Shared goals and shared outcomes

Positive interdependence and individual accountability

Engagement, exploration, transformation, presentation, and reflection

Grouping and pairing students

Assessment:

Individual students write a report on their groups' presentation, including the process of working with others. Students are assessed based on their groups' work and individual work (as assessed by peers, their individual reports, and teacher observation).

Instructional Strategies and Structures For Improved Learning in High Schools Summary of Second Roundtable

July 23, 2002

Many successful schools and sub-school programs use contextual teaching and learning (CTL) as a core high school reform approach. Over the past decade, CTL strategies have been incorporated into innovative programs, have contributed to high school restructuring, and have increased student engagement and motivation. In addition to changing instruction and curriculum, these strategies have been central elements of new structures such as career academies, articulation, small schools, and student internships.

To shed new light on contextual teaching and learning and to begin identifying strategies, structures, and policies that support CTL, the American Youth Policy Forum and the Institute for Educational Leadership convened a roundtable of leading educational thinkers and practitioners on July 23, 2002 in Washington DC. This paper summarizes the main points of that discussion.

OVERVIEW OF THE ISSUE

As background for the roundtable, MPR Associates, Inc. reviewed the research base on contextual teaching and learning, what defines CTL, how CTL impacts student outcomes, and identified appropriate roles for public policy relative to CTL. In his statement summarizing that paper, MPR President *Gary Hoachlander* characterized CTL as a three-part approach, reforming curriculum and individualizing it according to student interest; reforming instructional practices to include high expectations, new structures for student/teacher interaction, and collaborative work; and supporting organizational and professional development structures. The overriding goal of CTL is to raise students' academic and technical achievement. He challenged CTL to demonstrate its effectiveness for students who have not per-

formed well with conventional curriculum and instruction, and to develop authentic assessments for determining attitudinal, behavioral, and skill acquisition outcomes.

Expanded use of CTL requires teachers to have a better understanding of its value and its use. MPR Research Associate *Sarah Calderon* explained the six most common approaches to CTL in high school:

- collaborative and cooperative learning,
- curriculum integration,
- project-based learning,
- problem-based learning,
- work-based learning, and
- service-learning.

The six approaches to CTL share several characteristics:

- They restructure the nature of student/teacher interaction to include high expectations of student achievement, new learning structures, and collaborative work among students and between students and adults.
- They restructure the curriculum, connecting subject matter to real-world applications.
- They determine learning outcomes differently, aiming for attitudinal and behavioral changes as well as skill acquisition.
- They strive for authentic assessment rather than paper-and-pencil tests.

CTL is not a new approach; good teachers have

been using some CTL strategies for years to reach some students some of the time. Nonetheless, there is a lack of data on CTL's impact on student achievement. MPR's Director of Policy Analysis and Development, **Elliott Medrich**, explained that most of what is known about CTL comes from research on some of the individual strategies that comprise CTL, rather than on CTL as a comprehensive approach. Medrich summarized what we do know about CTL:

- The abundance of literature on the learning process – how people learn – is consistent with CTL instructional strategies.
- There is considerable evidence that CTL helps engage and motivate students; there is less certainty that engagement and motivation are necessary prerequisites for learning.
- Little evidence shows that CTL contributes to the development of critical thinking skills, which is surprising, given CTL's emphasis on critical thinking as a CTL outcome.
- There is some evidence that CTL may increase school attendance and reduce the dropout rate, but it is difficult to establish causality.
- CTL appears to contribute to higher grades and student achievement.

Medrich recommended several issues on which further research is needed:

- Paramount is the need for controlled experiments to determine the effectiveness of CTL as a comprehensive approach relative to traditional teaching and learning.
- Studies of CTL effectiveness need to control for student background, school structure, teacher effectiveness, and other variables.
- Documentation of effective classroom use of CTL is needed.

Following the presentation of the MPR paper, three panels provided information on how CTL is being used in schools and the policy environment needed to support CTL.

PANEL I: EXAMPLES OF INNOVATIVE HIGH SCHOOL PROGRAMS

- *James McPartland, Director of the Center for Social Organization of Schools and professor of sociology, Johns Hopkins University*
- *Gregg Betheil, Vice President for Academy Programs, National Academy Foundation*
- *Terry Grobe, Senior Program Manager, Center for Youth Development and Education, Commonwealth Corporation*
- *Betsy Brand, American Youth Policy Forum, moderator*

A number of programs for high school age youth have begun incorporating CTL strategies and structures to support student learning, **Betsy Brand** summarized. Representatives from three of these schools presented their experiences.

Talent Development High Schools. From its 1994 beginning as a partnership between the Johns Hopkins University Center for Research on the Education of Students Placed At Risk (CRESPAR) and Baltimore's Patterson High School, the Talent Development High School (TDHS) model has expanded to high schools in 11 states. A comprehensive reform model for large high schools with substantial numbers of low-performing students, TDHS schools use CTL to guide their organizational structure, their instructional program, and their support systems for teachers, explained **Jim McPartland**.

The TDHS model organizes high schools into academies that provide students with a personalized climate and a career context. The career academies provide students with core academic and elective courses. All students benefit from blended instruction in their core academic courses, all students take algebra, and all courses are at the

college prep level. The career academies utilize CTL strategies such as internships, enterprises, and simulations. Identifying sufficient numbers of real-world experiences is a constant challenge, so many students gain those experiences through student-run businesses.

Instruction is designed to bring students up to grade level and to enhance their understanding of what they learn. With block scheduling, students gain intensive time on task in reading for fluency and comprehension and in math for reasoning and problem-solving. Both reading and math emphasize applied learning; for example, each student takes “Reading and Writing in Your Career” in tenth grade. TDHS students have demonstrated impressive achievement in reading and math on standardized tests.

As freshmen, the students enroll in the Ninth Grade Success Academy, where they are grouped in teams for four 90-minute periods a day over two 18-week semesters. Each student takes a one-semester Freshman Seminar focusing on social skills for cooperative learning, note-taking and study skills for different assessments, and career awareness for career program choice. The Freshman Seminar prepares students to select (and succeed in) a career academy during grades 10-12.

Federal funds are disproportionately spent on elementary education (the vaccination theory), but high school is the booster shot. High school reform that includes an increased emphasis on literacy, reasoning, and math, should be a federal spending priority. – McPartland

The TDHS model requires substantial teacher support systems to help teachers with the challenges of this type of instruction. Staff are involved in academy planning; they receive specific, complete, daily lessons to guide their teaching; and they are provided with workshops and follow-up in-class coaching. Each high school has a team of four coaches – one each for literature, math, freshman seminar, and organizational and professional

development issues.

Career Academies. The National Academy Foundation (NAF) promotes the career academy approach as a platform on which other strategies can be built, explained **Gregg Betheil**. For example, NAF career academies all utilize smaller learning communities, partnerships, and intensive professional development for faculty and partners.

NAF academies provide three career themes – travel and tourism, finance, and information technology – each with a required sequence of courses. These career themes provide students with a context for learning and for building upon what students already know. In the finance academies, for example, students participate in the Federal Challenge, sponsored by the Federal Reserve Board. They learn about interest rates, and then conduct research every six weeks to determine whether (and why) the Fed should raise, lower, or hold steady on interest rates.

The academies’ career contexts do not limit students’ subsequent employment options – only 25 percent of NAF students end up working in their career academy field – but it does prepare students for postsecondary endeavors. NAF graduates enter and succeed in college at greater rates than their non-academy peers.

Teacher support, even more than professional development, is the most important element in career academy effectiveness, Betheil said. Peer support is critical, which is why NAF career academies include common planning time and teacher teams.

Diploma Plus. Unlike Talent Development High Schools and career academies, Diploma Plus operates in a variety of settings: district-run alternative schools, charter schools, satellite high school programs run by community-based organizations, GED programs, and community colleges, as well as academies and other school-within-a-school programs. **Terry Grobe** characterized Diploma Plus as an intensive senior year approach that improves academic rigor without sacrificing

the nurturing aspects that contribute to the effectiveness of alternative education.

Diploma Plus programs target students who have been unsuccessful in high school and are at risk of dropping out. Their reading and math levels hover between 7th and 9th grade. By linking earning with learning, Diploma Plus helps reduce the high dropout rate typical of such students.

Emphasizing the use of project-based learning and portfolios, Diploma Plus features a performance-based route to a high school diploma, with instruction and assessment tied to competencies and connected to state and national standards. The program's enriched senior year experience is a diploma requirement involving three complex projects – community action, an autobiographical project, and an 80+ hour internship with dual enrollment in community college.

Currently being evaluated by Jobs for the Future, Diploma Plus has demonstrated promising early results. The program's widespread use of portfolios, competencies, and authentic assessments appear to translate into higher aspirations among students, with 70-80 percent of them going on to college.

The ongoing evaluation of Diploma Plus suggests support for an enriched senior year and dual enrollment in high school and community college. Overage youths with few high school course credits do better with a competency-based program rather than one based on class hours, and with portfolios and other alternative assessments rather than traditional ones.

Roundtable issues. Roundtable participants raised the following issues in response to the presentation of innovative programs:

- Developing, implementing, and gaining district acceptance for a new curriculum, with skills and competencies that go beyond traditional course boundaries, is difficult to achieve. Teachers lack time and support to tailor the curriculum to meet the needs of specific groups of students.
- The impetus for CTL varies in different circumstances. The Talent Development High Schools, for example, intentionally blend the academic with the technical; CTL evolved as an effective way to combat student apathy and anonymity. In contrast, the National Academy Foundation's finance program found that CTL emerged as a product of student enthusiasm for Wall Street internships.
- Carnegie units are one of the most significant obstacles to high school reform. Among other problems, Carnegie units assume one adult per classroom, which works against the strategy of connecting two or more adults with a group of students.
- Scheduling is often a major logistical roadblock to reform, especially in large high school settings.
- Overemphasis on test preparation can undercut the experimentation inherent in reform.
- Reform requires substantially more resources for professional development supports such as coaches and learning communities.
- The emphasis on teacher certification in the No Child Left Behind Act (NCLB) could work against CTL since certification for high school teachers emphasizes strategies for discipline over strategies for teaching. Certification also emphasizes subject orientation over crosscutting skills and pedagogy over real-world experience. The shortage of qualified teachers suggests an urgency to develop and support alternative certification routes that attract teachers from other careers.
- Predetermined lesson plans that are complete and specific can give teachers a starting point from which they can adapt. There was less support for scripted lesson plans from which teachers cannot deviate than for flexible lesson plans tied to specific learning objectives.

PANEL II: POLICIES TO SUPPORT HIGH SCHOOL INNOVATION AND CTL

- *Carmen Russo, CEO, Baltimore City Public Schools*
- *June Atkinson, Director of Instructional Services, North Carolina Department of Public Instruction*
- *Tom Holdsworth, Director of Communications and Government Relations, SkillsUSA-VICA*
- *Joan Wills, Center for Workforce Development, Institute for Educational Leadership, moderator*

Contextual teaching and learning strategies are not new in high school classrooms and related settings, and their use seems to be on the rise. Although assessment of CTL as compared to traditional teaching remains difficult at best, outcomes from educational structures such as Talent Development High Schools, career academies, and Diploma Plus have demonstrated its effectiveness, *Joan Wills* said. What national, state, and local policies are necessary to support and expand the use of CTL strategies and structures?

Local level. Policy is informal in practice, but it becomes institutionalized when it has been approved, in writing, at high levels. *Carmen Russo* named three policy challenges: bringing the policy decision to scale, institutionalizing it at the local level, and making sure it is reflected in the budget. Overcoming those three challenges helps ensure that the policy will outlast individual superintendents and become institutionalized at the level of principal and staff.

Russo described how Baltimore overcame those three challenges. An important step was using the master plan to formalize high school reform policies in support of CTL. Concurrently, CTL gained policy support through Baltimore's Blueprint for High School Reform that was developed to guide the system's \$20 million Gates Foundation grant.

Policymakers decided that both the master plan and the blueprint had be very specific – “naming names, setting standards, holding people accountable, with no guesswork and no amnesia.” Those plans created a crosswalk between district-level policy and local-level implementation, supported by budget decisions – in Russo's view, the most effective way to make policy. “You have to start with the plan and the money,” she advised. “Find a model that works, invite people to the table, and negotiate to convert all the high schools.”

Lack of policy support at the school system level is responsible for most failed high school reform, Russo observed. Necessary policies to undergird CTL structures and strategies include:

- **Promotion policy.** Rejecting the possibility of social promotion is critical for success, because promotion policies directly affect students.
- **Budget policies.** Unless the financing formulas change to support new staffing models, smaller learning communities that use CTL cannot survive.
- **Non-instructional standards.** Policy must affirm lower class sizes and school sizes.
- **Personnel and hiring.** Higher standards for hiring, teacher certification, and professional development need to be codified.

State level. “Policy tells you where you're going,” according to *June Atkinson*. Policy support makes the difference between reforms that last and reforms that evaporate. Even research-based innovation is unlikely to last without state and/or local policy to support it. In North Carolina, policymakers obtain extensive input, from educators and administrators as well as from the diverse stakeholders who care about the public schools.

Atkinson identified five components of effective high school reform policy, drawn from North Carolina's tech prep experience:

- Courses of study must change. North Carolina’s strategic plan institutionalized tech prep as a course of study a student can complete. One benchmark toward tech prep completion is high school completion with four years of language arts, three years of math, and four career prep units within a career pathway.
- Graduation requirements need to change to accommodate reform.
- Curriculum standards need to relate to the world of work.
- Professional development needs to take place in a school context, with networks of support, and mechanisms for sustainability.
- Accountability for the reform needs to be institutionalized. North Carolina law now counts students who complete a tech prep course along with students who complete a two- or four-year college or university when evaluating school performance.

National level. SkillsUSA-VICA is a career-technical student organization that prepares more than 250,000 high school and college students annually for high performance work in technical, skilled, and service occupations. **Tom Holdsworth** explained that SkillsUSA uses an applied method of contextual learning to teach total quality, high ethical standards, superior work skills, life-long education and pride in the dignity of work.

In partnership with 1,000+ corporations, trade associations and labor unions, and 267,000 member instructors, SkillsUSA designs and implements programs that help

establish industry standards for job skill training in the classroom. These programs include local, state, and national competitions in which students demonstrate occupational and leadership skills individually and in teams. More than 4,100 students compete in 73 occupational and leadership skill areas. The programs use applied teaching to emphasize employability skills such as: resource

management, interpersonal communication, technology, systems, information management, literacy, occupational skills, and attitude.

Students need all three kinds of skills – academic, employability, and occupational – and they need to be prepared at early ages to read, write, and compute so they will be ready for those higher skills. – Holdsworth

The Perkins legislation supported CTL’s growth at the federal level in recent years, Holdsworth said, as did the education policies in some states. Policies emphasizing accountability standards, such as the industry standards to which SkillsUSA has contributed, have also helped CTE and opportunities for career and technical education to thrive. The national framework for these policies is important to continuing to offer high quality programs.

Roundtable issues. Roundtable participants raised additional policy issues that relate to career and technical education and CTL. The responses of the group are summarized below:

The role of unions. Any school reform effort has a better chance to succeed if unions are brought in as partners from the beginning. In Baltimore’s school reform experience, a written Memorandum of Understanding that specified each party’s responsibilities was an effective strategy. “Never ask teachers to do anything you don’t pay them for,” Baltimore’s Superintendent Russo cautioned.

Hiring policies. Given the dearth of research on hiring policies, what should districts do? Baltimore responded by making hiring more flexible, within limits. The district personnel department clears applicants, for example, but the school principal makes the hiring decision. Baltimore requires all teachers to be certified, although alternative certification is acceptable. Uncertified teachers must gain certification within four years.

Sustaining the reforms. Public outreach is essential, to identify and educate “champions” of the reform in all segments of the constituency.

Building a base of support in advance worked well in Baltimore (in Russo’s words, “make friends before you need them”).

PANEL III: POLICY CONSIDERATIONS FOR PERKINS REAUTHORIZATION AND HIGH SCHOOL REFORM

- *Hans Meeder, Deputy Assistant Secretary, Office of Vocational and Adult Education, U.S. Department of Education*
- *Susan Sclafani, Advisor to Secretary of Education Rod Paige, U.S. Department of Education*
- *Betsy Brand, American Youth Policy Forum, moderator*

Federal officials, panelists from earlier sessions, and roundtable participants examined national, state, and local policy options for supporting CTL in the context of the upcoming reauthorization of the Perkins Act and the widespread interest in high school reform.

“In today’s world, you can’t deal with Perkins in a vacuum,” according to *Hans Meeder*. If entire high schools focus on raising academic achievement for all students, people will inevitably turn to career and technical education as a strategy for learning. Meeder described OVAE’s Preparing America’s Future as an initiative linking the various offices of the Department of Education in support of workforce preparation for the 21st Century. The vision for the initiative is an education system in which:

- Every American youth completes high school well prepared for postsecondary education and employment;
- Community and technical colleges fulfill their potential as an engine of education, career preparation, workforce development, and economic development; and
- Adult learning is expanded to bring higher levels of literacy and English fluency to mil-

lions of underserved Americans.

Meeder listed the elements that need to be in place to achieve the vision inherent in Preparing America’s Future:

- Aligned standards – challenging core academic standards for all students that are aligned with assessments.
- Accountability systems – meaningful to teachers, districts, and students.
- Teacher quality – professional development linked to standards and curriculum.
- Quality instruction – developing and implementing evidence-based instructional strategies.
- Intensive interventions – extra help for the 800,000 high school graduates who are non-readers and the 1.2 million dropouts.
- High quality CTE programs of study – real, meaningful articulation agreements and early transition options based on mastery.

The Department of Education’s strategic plan addresses high school reform by specifying four tasks: holding schools accountable, increasing the rigor of every student’s course of study, strengthening research and development, and expanding learning options for students. The Department continues to seek comments on the appropriate federal role in leveraging change and working with states.

The principles behind the No Child Left Behind Act will also guide the Perkins reauthorization, according to *Susan Sclafani*:

- Accountability for every student. Of all levels of school, high school is effective for the lowest proportion of students, Sclafani said. That must change, and schools will be held accountable for “adequate yearly progress.” By holding schools accountable for the outcomes of their lowest-performing subpopulations, Perkins will force people to analyze

school success in different ways.

- High quality professional development. The Department is planning a research agenda that can gain funding support from the National Science Foundation, the National Research Council, and others. This careful examination of what works will result in a database of promising and effective practices.
- Local control. Districts and schools will have the flexibility to adopt strategies and approaches based on student needs.
- Parental choice. Schools need to respond to the stated needs of parents, students, and society, providing what Peter Drucker calls “mass customization.” At the high school level, student choice will be taken into account.

Participants raised the issue of the lack of comprehensive standards in most states as a major concern. Most state standards address only academic and occasionally SCANS skills, but not occupational or employer-certified skills. Academic standards are not necessarily the same as employer standards, but both are important because high school reform is being driven by the changing nature of work. Assessments need to be a three-legged stool, taking into account academic standards, employability standards, and industry-specific occupational or technical standards. Many states developed employability standards to supplement their academic standards, but some are reverting back to a reliance on academic standards only because of No Child Left Behind, which would be a setback for CTL.

Discussion also focused on the need for greater understanding of CTL and student outcomes. High schools need to use, and evaluate, a variety of pedagogical strategies. CTL seems better suited to helping students learn certain skills, such as SCANS skills, than others, and there was some question as to the role of CTL in a high standards environment. Participants cautioned that using SAT scores as the sole measure of CTL’s impact would not provide information about employabil-

ity skills, since standardized tests and SATs are an inappropriate measure of that.

Measuring outcomes for students in CTL programs with those of students taught by traditional methods is also a research and evaluation challenge. Even with controlled experiments, it is difficult to determine what elements caused the distribution of results. Disparities in district resources need to be taken into account when such research is designed. For example, while many suburban school districts outperform their urban counterparts, many urban districts serving high-need students lack the basic tools to achieve (e.g., books, adequate class size, early reading supports, etc.)

Other questions that must be factored into any research regarding the effectiveness of CTL should include the role of youth development and differential student learning styles. School-to-work initiatives, for example, which relied heavily on CTL, increased student attendance and graduation rates because students became more engaged in learning. Yet, the importance of student engagement and motivation is often left out in much research into teaching and learning.

Finally, definitional issues are key. Participants called for better definitions of CTL, of standards, and of authentic assessment, and agreed that knowledge gaps in this arena remain huge. What research there is supports CTL as an effective strategy for students who have been failed by traditional pedagogies. More work is needed to determine what constitutes a “good” education for all students and what elements are most successful in helping students learn certain skills.

Summary of Recommendations

The following recommendations on contextual teaching and learning and alternative assessments were drawn from the two research papers and from the roundtable discussions.

Important elements in high school reform include holding schools accountable, increasing the rigor of every student's course of study, providing the necessary supports to students and teachers to help students learn, strengthening research and development, and expanding learning options for students. The following recommendations are more specifically related to contextual teaching and learning and additional forms of assessment.

Public policy can play an important role in (1) advancing research on contextual teaching and learning by sponsoring well-designed demonstrations and evaluations to better understand the relationship between contextual teaching and learning, curriculum, and performance standards; (2) in improving the ability of existing and prospective teachers to use these instructional practices more effectively, and (3) to help frame an overall assessment strategy.

Define more specifically what students should know and be able to do. Despite pleas from the business community for more emphasis on problem-solving, understanding of systems, ability to work collaboratively, and better understanding of principles of technology, these learning objectives and standards of performance have yet to find their way into mainstream discussions about curriculum content and assessment. Measuring skills in other domains, such as technical, occupational, employability, and higher order, is equally important.

Define contextual teaching and learning so it is less ambiguous. We need better definitions of contextual teaching and learning (CTL). Clearer and more specific definitions of CTL would improve data collections, such as the numbers of students engaged in different kinds of CTL activities.

Consider creating a framework for student assessment that clarifies the most effective roles for federal and state governments and local school districts. This would require determining at what level – national, state, or local – certain knowledge and skill sets are best measured and why, then aligning the assessments to the respective knowledge and skill sets required. This would also call for a clarification about the different purposes of assessment at the different levels: to provide information to teachers about how individual students are learning, to improve teaching strategies based on that information, or to provide reports to stakeholders, policymakers, parents, or funders, or all of them. Assessment systems call for concerted, but differentiated, actions at the national, state, and local levels and the assessment framework should be designed to generate valid and valuable data at these various levels to inform decision-making. A well-designed assessment system needs to reduce multiple layers of tests and create crosswalks between levels, as well as between academic and occupational, technical and employability skills. It is hoped that assessment systems being developed to respond to NCLB can mature to the point where they can measure multiple outcomes, not just academic ones.

Better assessment instruments for gauging students' ability to apply academic concepts and skills, to solve complicated interdisciplinary problems, to work collaboratively, to understand systems, and to communicate effectively are needed. Current assessments generally measure skills and knowledge in only one domain. More sophisticated assessments that bridge these domains are needed.

States should highlight and reinforce SCANS-like skills on their statewide assessments. The state core academic assessments should be refined to reflect SCANS-like skills, with the overarching and longer-term goal of formally incorporating workplace readiness skills measurement into statewide assessment systems. State systems

could build from promising approaches developed through local and state efforts, such as those that incorporate industry-sponsored assessments in the state core assessment system or those that adopt a statewide system of end-of-course high school exams, including exams that cover workplace readiness skills.

There is a need for state oversight and support to ensure the viability and quality of any local assessment 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.

The framework should assign the local level more flexibility in the use of assessments to include the more ambitious performance-based assessment methods, such as portfolios and projects. Employability skills can also be incorporated into local assessments, with monitoring by the state to ensure validity and consistency.

Assessments should be used as a diagnostic tool. Assessment systems should be used to improve teaching and learning, not in a punitive manner. Providing useful diagnostic information on individual students on a regular basis will allow teachers to more easily adapt their teaching and instruction to meet the needs of individual students. Using testing simply as a school accountability tool misses the point that tests can help individual students learn and succeed.

Teacher preparation and professional development programs should help teachers understand contextual teaching and learning and how to effectively use new forms of assessments. Using CTL and developing high quality assessment systems will require ongoing and appropriate professional development to help teachers understand how to use assessments to improve teaching and learning and student achievement. In-service and pre-service development in these areas is needed.

National research and leadership are needed in numerous areas. National research and leadership are essential to enhance our existing knowledge base about the relationships among contextual teaching and learning, assessment methodology, workplace readiness, and academic achievement. Some of the research issues to be explored include:

- What type of assessments (e.g. standardized, multiple choice, scenario, authentic, performance-based) are most effective at which level (national, state, or local) and to measure which skills?
- What types of assessments are most appropriate for students with particular learning styles and strengths?
- Are various skills (e.g. academic, occupations, and employability) best measured separately or in some combination? If so, what combination is most effective and helpful to provide instructional guidance for teachers? For students themselves?
- What are the outcomes for students who participate in CTL? Does participation in contextual teaching and learning programs during high school affect what students do after leaving high school?
- How can teacher preparation and in-service professional development programs best prepare teachers to teach in contextual ways that support employability skill development?
- Documentation of effective classroom use of CTL is needed.
- 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, and math)?

Building a base of solid empirical research is no easy feat and could take a number of years to accomplish. Paramount is the need for controlled experiments to determine the effectiveness of CTL as a comprehensive approach relative to tra-

ditional teaching and learning. Studies of CTL effectiveness need to control for student background, school structure, teacher effectiveness, and other variables.

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 employability 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 to help ensure that such legislation supports incorporating workplace readiness skills into assessment systems for high school students. National leadership is also necessary to continue building the infrastructure that supports connections between industry and education, including the collaborations necessary to ensure high quality assessment systems.



About the Editor

Betsy Brand started her policy career in 1977 as a Legislative Associate for the Committee on Education and Labor, U.S. House of Representatives, and subsequently served as Professional Staff Member on the U.S. Senate Labor and Human Resources Committee (1984-1989). In 1989, she was appointed by President George Bush as Assistant Secretary for Vocational and Adult Education at the U.S. Department of Education and held that position until 1993. She then operated her own consulting firm, Workforce Futures, Inc., focusing on policy and best practices affecting education, workforce preparation and youth development. Betsy has served as AYPF Co-Director since November 1998.

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