The Future of Career and Technical Education

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Career and technical education (CTE) has weathered many storms in the recent past, but it will face substantial new challenges as a result of the federal *No Child Left Behind* (NCLB) legislation. If CTE leaders are to meet these challenges, they must build upon the lessons learned and successes they have experienced with such initiatives as Tech Prep, career academies, High Schools That Work, applied academics, school-to-work, and school-to-career programs.

As states, school districts, and schools come to grips with the new NCLB requirement of 100 percent of students – in each of nine subgroups – achieving proficiency in their academic requirements, CTE programs will, once again, be at risk. CTE will be increasingly squeezed off the plate in terms of student enrollment in courses unless CTE champions and leaders can clearly show that these programs

- are contributing to the academic success of students as measured by the state academic tests
- serve as a motivation for students to stay in school and help students perform better in their academic courses.

The Age of School Reform

NCLB is the latest in a two-decades-long call for higher academic standards in K-12 education. In 1983, the government report, *A Nation at Risk*, began this call, and it was followed by efforts to bring business concepts such as Total Quality Management into schools, by the standards movement, by the call for accountability through state testing, and now by the adequate yearly progress (AYP) mandates in the legislation.

Each of these demands on schools to raise academic standards came largely from the business community. The calls for higher academic standards did not come from our universities or from K-12 academic teachers. Why? The answer, I believe, is that the academic skills underpinning our technologically driven, increasingly global and competitively intense workplace are higher than and different from the requirements for entry into most four-year postsecondary programs. In our research here at the International Center for Leadership in Education with both the business and academic sectors, it is clear to us that this apparent disconnect has occurred, although the notion is contrary to the American mind-set.

Americans have long believed that the highest academic standards that our students will ever need to meet are those required for higher education. Parents put great pressure on schools to "Get my child ready for college." But this cultural belief of our past has not kept pace with the realities of the 21st century.

Consider the seemingly contradictory employment situation that exists today. A student can drop out of high school and go to any number of public and private colleges. But, ironically, high school dropouts cannot enter the military, and they will find a very limited number of decent-paying and rewarding career opportunities available to them in the employment sector. In addition, despite the fact that we have had relatively low unemployment for nearly a decade, businesses continue to provide signing bonuses for entry- and mid-level positions, and there is continued pressure to increase the number of H1B Visas (visas for skilled workers) offered to prospective immigrants. While all of these demands for qualified workers

exist, many of our college graduates are unable to find work commensurate with their education. What is wrong with this picture?

What is wrong is that America has changed. That change can be seen most dramatically in our workplace. Strong academic skills and the ability to apply those skills to solve real-world predictable and unpredictable problems and situations has become a minimum requirement for the vast majority of American jobs. There is little room for the academically inept in today's contemporary workplace.

CTE and the Realities of Accountability

Career and technical education has attempted to respond to this call for higher academic standards in a number of ways over the past 20 years. Tech Prep emphasized academics in such areas as applied communications and contextual mathematics and physics. High Schools That Work focused on eliminating the "general" track and the need to document students' academic success in these programs. School-to-work and school-to-career attempted to create a better understanding of the growing sophistication of the American workplace and the need to connect education and work. Vocational education changed its name and, in many cases, its program direction, from low-skill "occupational training" to career and technical education with transferable skills that are applicable to many occupations and anchored in strong academics.

Career and technical educators have worked hard to modify and enrich the academic base of their programs. Unfortunately, despite all the efforts put forth by the CTE leadership, despite the name change and wide array of initiatives, CTE is still widely perceived as vocational education, a great program "for somebody else's child, because *my* child is going to college."

While the workplace has brought increasingly rigorous academic and technology-related skill requirements as criteria for career success, *No Child Left Behind* will bring enormous pressures from *within* the test-driven education system to raise the proficiency standards for all students. The NCLB legislation totals more than 1,400 pages. The salient points, however, are fairly straightforward. They are:

- by 2004-05, *all* students must reach a specified proficiency level in reading, writing, and mathematics and soon thereafter in science

- beginning in 2002-03, schools must identify for nine subgroups (students with disabilities, LEP, by gender, ethnic minorities, low socioeconomic status, etc.) where all students are today and then demonstrate adequate yearly progress (AYP) for each subgroup for each of the next 12 years until they all achieve 100 percent proficiency. This proficiency will be measured in large part by satisfactory performance – including demonstrable improvement – on state tests in reading, writing, mathematics, and science

- any school that does not achieve AYP for all students two years in a row will face serious consequences from both state and federal authorities; this will raise the anxiety level of all administrators dramatically.

Therefore, it is more essential than ever for career and technical education to be able to prove that it contributes not just to the applied workplace competency demands of business, but also to the academic proficiencies of served student populations on state academic tests — if CTE is to remain a viable program in our secondary schools.

Solution: No CTE Program Left Behind

Fortunately, some wonderful success stories have emerged out of CTE's extensive reform efforts over the last several years. Unfortunately, these success stories are more random local acts of excellence than systemic initiatives across the national CTE landscape.

Over the past several years, the International Center, in consultation with governors, state boards of education, state departments of education, and major foundations such as the Bill and Melinda Gates Foundation, has had the opportunity to work with and study the best of this nation's CTE — in terms of programs that have dramatically and demonstrably improved the academic performance of its students. Having analyzed these success stories, we have found that, while there is no single magical formula, the successful programs passed through three stages in moving toward models that are heavily focused on raising the academic performance of their students.

The three stages are:

1. Developing a clear, shared understanding among teachers, administrators, board members, and the general public as to ***why*** schools need to raise the academic standards of all students.

2. Using data to determine ***what*** should be the instructional priorities.

3. Determining ***how*** to improve students' academic performance through CTE.

Most CTE programs, and schools in general, do not move from *why* to *what* to *how*. Instead, they begin with *how*. They devise a wonderful and well-thought-through new program, such as Tech Prep and School-to-Work, and then try to convince teachers and districts to embrace it. But what they are often doing is applying a solution to a problem that educators and the public have not yet even recognized *is* a true problem. Therefore, while the program may be appropriate, it is dismissed as being an unnecessary component of school improvement.

The programs that have not just changed but sustained meaningful improvement begin with the answer as to *why* we must raise standards. They have a clear understanding that technology is increasingly performing tasks that are routine, concrete, and sequential, the kinds of tasks that were often taught in CTE programs. As technology takes over jobs for the unskilled that pay good wages and benefits are disappearing; unskilled labor is no longer an economic commodity in the 21st century. The tasks that remain for humans to do involve unpredictable elements that the technology cannot deal with directly.

In working with technology corporations such as Microsoft and Apple, the International Center has gained a clear understanding of how profoundly technology will continue to change what workers and citizens in general will need to be able to do in the future. According to Bill Gates' keynote address to the Consumer Electronics Conference in January 2002, the "old" concept of Moore's Law (computer processing capacity doubles every 18 months) is now replaced by a new theory that envisions processing capacity doubling every six to nine months.

Consider, for example, the following.

Emerging scientific applications such as real-time nuclear magnetic resonance imaging during surgery, computer-based drug design, astrophysical simulation, the modeling of environmental pollution, and the study of long-term climate changes require the manipulation of incomprehensibly large numbers and related operations. In aid of this research, the National Science Foundation, along with NASA and the Defense Advanced Research Projects Agency (DARPA) has funded eight research projects for

envisioning a petaflop computer. (A petaflop equals a thousand trillion FLOPS — floating point operations per second.) A petaflop computer would involve a large number of connected supercomputers working in parallel on the same problem. Such a feat is amazing to contemplate, but research on its development is already underway.

Furthermore, with the integration of technology into the biological sciences, lines among the sciences are becoming blurred. IBM, which we think of primarily as a computer corporation, has invested itself with the corporate mission of becoming a *life science company* by 2010.

In fact, with nanotechnology dramatically changing the entire manufacturing process and with work tasks now assignable to (and receivable from) workers anywhere in the world instantaneously, we find that the old rules of employment and our economic base have been irrevocably altered.

These technological advances are without parallel or precedent in our history. All education stakeholders must internalize the magnitude of change involved – the *why* in the three-stage process.

The Need for Data: The *What* of School Reform

Once people are convinced that change is needed and that the academic skills of the 21st century must indeed be higher than and different from those now taught in schools, highly successful programs have moved on to helping faculty, parents, and other stakeholders to understand *what* we should prioritize in the curriculum. The International Center has conducted two major projects to bring focus to that discussion.

The first one compares the academic skills needed in the workplace and society in general with the state standards and state tests in English, math, and science, on a state-by-state basis. Several career and technical education programs have used or are using this International Center data on the Curriculum Matrix and Essential Skills survey as a foundation for embedding in their programs the relevant academic standards that are most tested and the skills identified as most valuable in national survey of 21,000 educators, community members, and business leaders.

In addition to analyzing the relationship of the academic requirements of various state standards and tests to career and technical education programs, the International Center has also undertaken a detailed study of workplace reading requirements. To perform this analysis, we used MetaMetrics' Lexile Framework, which measures the readability of text passages on an evenly incremented scale of 0-2000. Using the computerized Lexile Analyzer, we examined the readability levels of a wide array of print materials typically encountered and used in the workplace. These occupational materials were linked to three job levels (entry, intermediate, advanced) in all 16 Career Clusters as defined by the U.S. Department of Education.

Our analysis reveals that a large number of entry-level jobs have higher reading requirements than many high school tests required for graduation. The table on the next page shows the range of text measures for entry-level occupations in the 13 Career Clusters for which we have adequate samples of reading materials.

Text Measures of Entry-level Occupational Reading Materials

Career Cluster	**Lexile Text Measure (3rd Quartile Range*)**
Agriculture and Natural Resources	1270 – 1510L
Architecture and Construction	1210 – 1340L
Arts, AV Technology and Communications	1110 – 1190L
Business and Administration	1210 – 1310L
Education and Training	1320 – 1370L
Health Science	1260 – 1300L
Hospitality and Tourism	1230 – 1260L
Human Services	1050 – 1200L
Law and Public Safety	1420 – 1740L
Manufacturing	1200 – 1310L
Retail/Wholesale Sales and Service	1180 – 1270L
Scientific Research/Engineering	1190 – 1250L
Transportation, Distribution and Logistics	1170 – 1350L

* The third quartile Lexile range was used because any reading sample includes very easy material and very difficult material that is not representative of the majority of the reading required. Moreover, employees need to be able to read at least 50% of workplace documents to be successful on the job. In the table above, the lower end of the range is the 50th percentile and the upper end is the 75th percentile.

By comparison with the entry-level occupational reading requirements shown above, consider the reading ability levels — as measured in Lexiles — of our mid-range students in grades 10 and 11, as shown in the table on the next page. There is clearly a disparity between what our students have achieved in reading skills and the reading proficiency they need for entry-level jobs and for much of the reading they will do in their personal lives.

States need to be sure that the proficiency levels they set under NCLB reflect not just traditional measures of academic reading competence but also the larger picture of employability and life after graduation. Reading competency is an example of the academics that must become part of the *what* of program improvement in CTE.

***How* to Change**

It is important to note that although improving students' reading proficiency has been a target of school reform for nearly two decades, few schools teach reading beyond grade six. Reading instruction in grades 7-12 is generally reserved for those students who have not yet attained a sixth-grade reading proficiency. The research on improving reading skills for secondary students recommends teaching reading in the content areas as the most effective way to raise reading and information literacy levels, so students can achieve more in their subjects, in research, on tests, and in other tasks. If this country is serious about increasing literacy for students, then districts must look not just to their elementary teachers and remedial reading specialists, but also to their middle school and high school teachers, including CTE teachers, to make that improvement happen.

Equipped with an understanding of what needs to change and why, CTE can then consider *how* to change. The new accountability and adequate yearly progress requirements of NCLB have set a direction that could have a major impact on CTE. But these demands also present career and technical educators with an opportunity.

Reading Comparison

Lexile	High School Students	Sampled HS Instructional Materials	Personal Use Reading	Newspapers	Career Clusters (75th Percentile)
1800L					
					Law/Public Safety (1740)
1700L					
1600L					
					Ag./Natural Resources (1510)
1500L					
				Reuters (1440)	
1400L			Safety Manual for Spa (1390) Aetna Health Care Discount Form (1360)	NY Times (1380) Washington Post (1350) Wall Street Journal (1320) Associated Press (1310)	Education and Training (1370) Transport./Distr./Log. (1350) Architecture/Construct. (1340) Business and Admin. (1310)
1300L		Grade 11 (1100-1300)	Medical Ins. Benefit Pkg (1280) Student Loan Application(1270) Federal Tax Form W-4 (1260)		Manufacturing (1310) Health Science (1300) Retail/Wholesale (1270) Hospitality/Tourism (1260) Scientific Res./Engr. (1250)
1200L	Grade 11 (940-1210)	Grade 10 (1100-1200)	G.M. Protection Plan (1150)	USA Today (1200)	Human Services (1200) Arts/AV Tech/Comm. (1190)
1100L	Grade 10 (905-1195)				
1000L					
900L					

For CTE programs to flourish in this challenging new environment of educational accountability, CTE leaders must:

- continue to find meaningful ways to equip students with the competencies that employment requires
- develop and reinforce with both rigor and relevance the academic standards that are tested on state assessments by embedding and reinforcing these skills in CTE courses.

In the high-tech, information-based workplace of today, individuals must be able to apply higher-order cognitive skills and academic skills — including information and quantitative literacy — to work and in other problem-solving situations. This reality must become a prime factor in shaping CTE programs in this decade.

It is the responsibility of every educator – including CTE educators – to help all students to achieve the proficiency levels required under NCLB. To reach AYP benchmarks, educators must internalize the issues at hand (the *why*), use data-driven decision making to determine new program directions (the *what*), and use models of best practices to implement the required changes (the *how*).

No Child Left Behind is an opportunity that must be seized to ensure not just CTE's full participation in the broader education process, but also CTE's continued acceptance, credibility and success.

Resources from the International Center to Support CTE Educators

Each year, the International Center for Leadership in Education brings together approximately 30 of the nation's most outstanding examples of schools that have raised the academic standards for all students in ways that, in the spirit of our mission, are both rigorous and relevant. These leaders share their models and experiences with other educators from across the country at our annual conference. The 2003 Model Schools Conference is in Orlando on June 29 — July 2.

We also share some best practices for CTE in a professional development resource: *Academic Excellence Through Career and Technical Education — A Resource Kit Incorporating the CTE Curriculum Matrix.* This resource provides state-specific data that crosswalks CTE programs to high-priority academic standards in English, math, and science. This kit can be used to help focus and refine CTE program content and instruction to address your state's academic standards.

Leading with Reading in Grades 7-12 makes a compelling case for strategic reading and hence for content area reading instruction in secondary programs, including CTE. Informational reading is perhaps the most neglected yet critical skill area in all of K-12 instruction.

The International Center has recently issued several other "white papers" written by Dr. Daggett, including "Technology 2008—Preparing Students for a Changing World" and "Jobs and the Skills Gap."

Dr. Daggett is also available to work with you or your district. Please contact the International Center to learn more about any of these resources.

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