Globalization and World-Class Schools

by Joseph O. Milner

Lou Dobbs, the anchor for CNN's evening news, regularly decries the rush of jobs from the United States to other nations. The Bush administration's chairman of the Council of Economic Advisers responds somewhat coolly, claiming that off-shore outsourcing is "just a way of doing international trade" (Lohr 2004).

Free trade is an economic reality that, in its best light, has been explained by presidents Clinton and Bush as a win-win situation for both technically advanced and developing countries. The free-market argument claims that the more-sophisticated, complex jobs generated by an avalanche of new industries will be won by a well-trained, highly educated labor force, while the less-complex jobs will be left to workers in less-developed nations (Friedman 2004). If this free-trade utopia were to emerge, the responsibility for preparing such an advanced competitive work force would fall to America's schools. The problem then becomes one of education. America's schools must become more serious about teaching advanced knowledge to all or most students; otherwise, nations that are pressing their students to reach higher academic standards will take the new jobs, and our students will fall behind.

Assessment Matrix

To understand this pressure for world-class schools in a "flat world economy" (Friedman 2005), it seems more important than ever to find out what advanced knowledge and academic skills leaders in business and industry expect from America's high school graduates. A leadership organization of business and community representatives in Winston-Salem, North Carolina, a city of 200,000, provides an excellent pool from which to measure such individuals' expectations about the knowledge and skills needed in the workplace. This small group of CEOs, elected officials, school leaders, and health administrators meets throughout the year to learn more about the economic and social well-being of the community and to consider ways to increase its general welfare.

To measure this group's ideas about education, a survey was developed in 1993 to allow the community leaders to articulate what knowledge and skills they believed graduating high school students should possess. Employers have long known that personal qualities such as perseverance and teamwork are extremely important to success in the workplace (Dreeben 1968), but it seems critically important for schools to learn what specific academic content and skills they need to make students highly competitive in the global economy. The survey contained a set of twenty-four statements that asked community leaders to determine what advanced content in math, science, English, social studies, and computer science should be required for satisfactory job performance; which part of the work force (All-Most-Some-None) would need this knowledge or skill; and at what level of competence (Entry Level, Technically Skilled, Supervisory) the knowledge and skills found in the statements would be needed. A sample math item from the 1993 survey looked like this:

(Check one box for each level)	All		Most		Some		None		Responses	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
Use algebraic formulas to solve for unknowns:										
Entry Level	3	2	0	7	12	14	11	9	26	32
Technically Skilled	7	6	7	11	9	11	3	4	26	32
Supervisory	6	9	5	10	12	8	3	5	26	32
Percent of Total Work Force	21	18	15	29	42	34	22	19		

The number of leaders who believed that this math knowledge was needed by all, most, or some employees at entry-level, skilled, or supervisory positions appears in the boxes above for the 1993 and the 2003 surveys. The remainder of the twenty-four-item survey asked leaders to respond to similar statements in the other four areas of the high school curriculum.

Glacial Change

The leadership group was asked to respond to this survey in 1993, when the issue of world-class schools in a global economy was first receiving attention. Ten years later, after the issue of schools and economic success had truly heated up, leaders from the same businesses and work-force sectors again participated in the assessment, and unaccountably, the results were remarkably much the same.

During this decade of widespread talk about what schools need to do to compete globally, one might have anticipated a noticeable increase in leaders' expectations for high school graduates, but in fact that did not occur. The most notable finding, perhaps, is that in 1993 a majority of

these leaders did not identify any knowledge or skill needed by all entry-level employees in any area of the high school curriculum. Ten years later, things were not much changed: only two areas of the curriculum ("correct usage, punctuation, and spelling," and "use of the calculator or computer") were believed by a majority of these respondents to be essential for all entry-level employees. From 1993 to 2003, the community leaders' sense of what academic knowledge entry-level employees needed remained almost unchanged. In 1993, there were two or fewer leaders who believed that entry-level employees needed the knowledge and skills embedded in the majority of these statements, and that slim number diminished in 2003.

When we look at these civic leaders' expectations for all or most of the employee pool, the report was much the same. In 1993, the leaders deemed only six of the twenty-four statements necessary for all or most employees. In 2003, after ten years of talk about higher standards for world-class schools, the bar had not been raised. The same six statements were the only ones to receive a majority of responses for "all" or "most" employees. In fact, the percentage of "all" or "most" responses often remained surprisingly constant. The percentage of those responses for math knowledge and skills was 72 percent in 1993 and 74 percent in 2003. Likewise, the statement on English knowledge and skills received consistent support: the percentage of "all" or "most" was 86 percent in 1993 and 89 percent in 2003. The statements that received less than 50 percent "all" or "most" responses were equally unchanged over the ten years. The chemistry statement had 7 percent support in 1993 and 6 percent in 2003; the physics statement was 14 percent "all" or "most" in 1993 and 15 percent in 2003. Over the ten-year span, little change occurred in the community leaders' expectations in the crucial area of science for graduating students. This was a response that seems hard to reconcile with the public's increased demand for higher standards in education.

Winners and Losers

Although there was no increased demand for knowledge and skills in most areas of the curriculum, the leaders did display a solid commitment to English knowledge and skills. All five of the English-related statements registered 50 percent or more on "all" or "most" choices for all three levels of employees in both 1993 and 2003. Support of English was commendable, but not what one might expect in a high-tech world where support for increased science and math knowledge received unprecedented attention in the media. In spite of that push, in both surveys science skills were neglected by the civic leaders in all ten statements related to science. The demand for science and math knowledge for "all" or "most" employees at all three levels of employment ranged

from a meager 1 to 18 percent. In contrast, computer knowledge and skills, which some people (wrongly) conflate with science and math knowledge, approached the emphasis placed on English knowledge and skills. In the 1993 survey, the statements on the use of decimals and percentages and use of calculators and computers were also given high priority by the civic leaders. In 2003, the same statements were again the only non-English-related statements to receive 50 percent for "all" or "most" employees by the civic leaders. Therefore, English skills, not the high-tech world, seemed to be the curricular area of greatest concern to survey respondents. One statement about math knowledge and skills and one related to computer knowledge had high responses, but the rest were neglected.

Global Change

These specific findings can be generalized in six statements about which of the five curricular areas were emphasized by these leaders and, more important, how little things had changed in ten years:

- Change was not the watchword: the responses from 1993 and 2003 were in almost complete agreement. The only curricular area in which important change was recorded was strong support for computer knowledge.
- Math was shortchanged: of the four math skills, only knowledge and skills related to percentages and decimals were supported by 50 percent of the respondents for all employees at all three levels. The increase from 1993 to 2003 was only 54 percent to 55 percent.
- Science emphasis was a fiction: none of the science skills and knowledge statements from physics, chemistry, or biology was ranked as important for all, most, or some employees at all three levels of work. "None" of the employees was the predominant response.
- English remained the priority: for each of the five items in the English area, from reading complex directions to writing an error-free message for a supervisor, "all" employees was the overwhelming choice for all respondents.
- Social studies was ignored: social studies items were much like math and science. None of the employees at any level were believed to need this kind of knowledge.
- Computers were hot: in computer science, the preponderance of respondents said that each of the three levels of employees needed computer skills. However, there was very little demand for programming skills for any level of employees.

What's Wrong with This Picture

The six findings can be more finely tuned and might be interpreted in a number of subtle ways, but generally, the knowledge and skills these leaders thought necessary for unskilled to supervisory employees remained unchanged over ten years. Reading and writing skills were given somewhat greater emphasis, and computer and calculator skills gained even more support over that time. Although recent school reforms have pushed for a much greater emphasis on science (Cochran-Smith 2004), there is still resistance to this role for the schools. In spite of the fact that science is the area in which we are thought to be falling behind, little has changed.

The community leaders seem to have a casual attitude about what schools must do to prepare students for Friedman's fast-approaching flat world of work. The leaders in this study did not seem to be caught up in breaking the mold; they instead seemed to perceive schools as less than essential to our economic well-being. Like the general public, they spoke up for higher standards, but in determining what schools should teach and how rigorous the standards should be, they seemed to think that today's schools need only continue to resemble the ones they knew. Instead of realizing the need to press for more advanced knowledge and skills from the core curricular areas of science and math to prepare our students for a complex global economy, the leaders seemed complacent.

This study focused on one small metropolitan area, but its implications may be broad, because Winston-Salem is arguably a representative community. So one wonders if our schools, America's schools, will change only if the flat world's highly trained and deeply disciplined students from countries like India and China, where science and math are believed crucial to success, begin to take away those jobs we thought would be our children's.

References

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Appendix: Survey of School-Developed Skills

(Check one box for each level)	All		Most		Some		None		Responses	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
1. Calculate percentages and convert fractions to decimals:										
Entry Level	12	12	3	9	9	8	2	3	26	32
Technically Skilled	15	19	5	8	6	3	0	2	26	32
Supervisory	15	22	6	5	5	4	0	1	26	32
Percent of Total Work Force	54	55	18	23	26	16	3	6		
2. Use algebraic formulas to solve for unknowns:										
Entry Level	3	2	0	7	12	14	11	9	26	32
Technically Skilled	7	6	7	11	9	11	3	4	26	32
Supervisory	6	9	5	10	12	8	3	5	26	32
Percent of Total Work Force	21	18	15	29	42	34	22	19		
3. Use trigonometric functions to calculate angles:										
Entry Level	0	0	0	2	9	7	17	23	26	32
Technically Skilled	2	2	6	5	6	8	12	17	26	32
Supervisory	2	1	2	5	8	9	13	17	25	32
Percent of Total Work Force	5	3	10	13	29	25	54	59		
4. Use calculus to solve for rates of change:										
Entry Level	0	0	1	4	5	10	20	18	26	32
Technically Skilled	1	2	4	6	9	14	12	15	26	37
Supervisory	2	3	3	7	9	13	12	14	26	37
Percent of Total Work Force	4	5	10	12	29	24	56	26		
5. Calculate the force of an object of a given mass accelerating at a given rate:										
Entry Level	0	1	0	2	5	6	21	22	26	31
Technically Skilled	1	1	3	2	4	10	18	19	26	32
Supervisory	2	2	1	4	5	7	18	19	26	32
Percent of Total Work Force	4	4	5	9	18	25	73	65		
6. Determine the mechanical advantage created by the use of a pulley to hoist an object of a given weight:										
Entry Level	0	1	1	2	5	9	18	20	24	32
Technically Skilled	2	1	3	5	7	10	12	16	24	32
Supervisory	3	2	1	4	3	8	17	18	24	32
Percent of Total Work Force	7	4	7	11	21	28	65	56		
7. Determine how much weight the unsupported end of a counterbalance beam will support:										
Entry Level	0	1	0	3	5	6	19	21	24	21
Technically Skilled	1	2	5	4	6	8	12	17	24	17
Supervisory	2	3	1	3	5	7	16	18	24	18
Percent of Total Work Force	4	10	8	16	22	33	65	89		
8. Calculate the electromagnetic force upon an electron 0.4 millimeters from a proton:										
Entry Level	0	0	0	0	2	7	22	25	24	32
Technically Skilled	1	0	0	0	7	8	16	24	24	32
Supervisory	1	1	1	1	6	6	16	24	24	32
Percent of Total Work Force	3	1	1	1	21	22	75	76		

(Check one box for each level)	All		Most		Some		None		Responses	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
9. Determine the valence of the chemical bonding of two elements:										
Entry Level	0	1	0	0	5	5	19	26	24	32
Technically Skilled	1	1	0	2	7	9	16	20	24	32
Supervisory	0	1	2	2	7	8	15	21	24	32
Percent of Total Work Force	1	3	3	4	26	23	69	70		
10. Determine the pH level of a given acid or base:										
Entry Level	0	1	0	1	7	6	18	24	25	32
Technically Skilled	1	1	1	2	8	8	15	21	25	32
Supervisory	2	1	0	0	7	9	16	21	25	31
Percent of Total Work Force	4	3	1	3	29	24	65	69		
11. Calculate the oxidation number of an element in an ionic compound:										
Entry Level	0	1	0	0	5	6	20	25	25	32
Technically Skilled	1	1	1	1	5	7	18	23	25	32
Supervisory	1	2	2	1	4	5	18	24	25	32
Percent of Total Work Force	3	4	4	2	19	19	75	75		
12. Explain the difference between mitosis and meiosis:										
Entry Level	0	1	0	5	6	2	19	24	25	32
Technically Skilled	1	2	2	3	4	7	18	20	25	32
Supervisory	3	2	0	4	4	5	18	21	25	32
Percent of Total Work Force	5	5	3	13	19	15	73	68		
13. Describe the electrical conduction of an impulse along a single neuron:										
Entry Level	0	0	0	0	7	5	18	27	25	32
Technically Skilled	1	0	0	1	7	7	17	24	25	32
Supervisory	1	1	2	0	5	7	17	24	25	32
Percent of Total Work Force	3	1	3	1	25	20	69	78		
14. Predict the effect of a large land-clearing project on a given ecosystem:										
Entry Level	0	0	2	4	6	4	17	24	25	32
Technically Skilled	2	2	3	3	9	12	11	15	25	32
Supervisory	7	1	0	3	7	11	11	17	25	32
Percent of Total Work Force	12	3	7	10	29	28	52	58		
15. Write a simple set of directions for a routine operation in the workplace:										
Entry Level	6	11	4	8	10	11	3	2	23	32
Technically Skilled	9	17	7	9	7	5	0	1	23	32
Supervisory	12	24	4	5	6	3	0	0	22	32
Percent of Total Work Force	39	54	22	23	33	20	4	3		
16. Develop a written analysis of a production process:										
Entry Level	0	5	3	4	12	14	8	9	23	32
Technically Skilled	3	8	11	14	7	6	2	4	23	32
Supervisory	12	16	5	7	4	6	2	3	23	32
Percent of Total Work Force	22	30	28	26	33	27	17	17		

(Check one box for each level)	All		Most		Some		None		Responses	
	1993	2003	1993	2003	1993	2003	1993	2003	1993	2003
17. Produce a clearly written memo reporting a series of problems:										
Entry Level	11	13	5	4	6	14	2	1	24	32
Technically Skilled	16	21	8	7	1	4	0	0	25	32
Supervisory	20	24	3	4	0	4	0	0	23	32
Percent of Total Work Force	28	60	10	16	4	23	1	1		
18. Read a complex set of operating procedures and simplify them for a team of workers:										
Entry Level	2	4	3	11	12	10	5	7	22	32
Technically Skilled	6	13	9	13	6	5	0	1	21	32
Supervisory	14	22	2	6	4	4	1	0	21	32
Percent of Total Work Force	33	41	21	31	33	20	9	8		
19. Write a simple message to a supervisor with no usage, punctuation, or spelling errors:										
Entry Level	9	17	9	9	3	3	1	2	22	31
Technically Skilled	15	20	4	8	2	3	1	0	22	31
Supervisory	19	21	1	8	1	3	1	0	22	32
Percent of Total Work Force	65	62	21	27	9	10	5	2		
20. Explain to a foreign national how United States laws are passed:										
Entry Level	1	2	0	4	11	9	12	17	24	32
Technically Skilled	2	6	1	4	9	8	12	14	24	32
Supervisory	3	6	3	5	9	8	10	13	25	32
Percent of Total Work Force	8	15	6	14	40	26	47	46		
21. Tell a group of employees the difference between the Declaration of Independence and the United States Constitution.										
Entry Level	1	4	1	3	7	7	14	18	23	32
Technically Skilled	2	8	3	2	5	5	14	17	24	32
Supervisory	4	9	3	2	5	5	12	16	24	32
Percent of Total Work Force	10	22	10	7	25	18	58	53		
22. Use a calculator and computer as a tool to solve work related problems:										
Entry Level	12	21	4	4	6	6	2	1	24	32
Technically Skilled	15	25	6	6	2	1	1	0	24	32
Supervisory	15	27	6	3	2	2	1	0	24	32
Percent of Total Work Force	58	76	22	14	14	9	6	1		
23. Use computer-based CAD programs to communicate design ideas:										
Entry Level	2	1	1	4	13	7	7	20	23	32
Technically Skilled	4	5	5	7	11	10	3	11	23	33
Supervisory	4	2	4	5	12	11	3	14	23	32
Percent of Total Work Force	14	8	14	17	52	29	19	47		
24. Write a simple program in Java or another language to perform a basic task:										
Entry Level	1	1	0	2	6	8	17	21	24	32
Technically Skilled	2	2	2	6	13	12	7	12	24	32
Supervisory	1	1	1	3	10	13	12	15	24	32
Percent of Total Work Force	6	4	4	11	40	34	50	50		