

BETTER SCHOOLS FOR THE 21ST CENTURY

WHAT IS NEEDED AND WHAT WILL IT TAKE TO GET IMPROVEMENT

Alan Lesgold,¹ University of Pittsburgh, Draft of April 1, 2009

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INTRODUCTION

In recent years, there has been a substantial effort to improve education in the United States. This effort is well motivated. We all can see that U.S. students do not score as well as those from many competitor countries. Also, we have seen the rapid disappearance of many of the decent-paying jobs that were available to those who were reliable and hard working but might not have learned all that much in school. Jobs have more education requirements today. In addition, there has been a widening of the gap between the well-paid and the poorly-paid portions of our society, with the well-paid portion generally exhibiting a high level of education. Further, in many urban areas, a flight of affluent students from the public school system – to suburbs or to private

¹ AL@pitt.edu; School of Education, 5605 Posvar Hall, University of Pittsburgh, Pittsburgh, PA 15260

schools – has left urban systems demoralized and without the high performing students who might have made the overall average performance less troubling and who might have helped their less able peers.

We can, of course, quarrel with any of the specific assumptions behind the widely shared desire to improve schooling. Many who complete years of education successfully still fail to get jobs. There is uncertainty over whether the number of jobs available for well educated people will exceed supply. By some measures, schools are doing at least as well today as they ever did, since universal success was not a high-stakes matter until quite recently. Still, overall, there is a case to be made that we need to do much better and, I argue, to do differently in our education system if our children are to fare well in later life.

The primary effort to improve U. S. schooling in recent years has been the No Child Left Behind Act. The act requires school districts to give tests developed by the States, to report the proportion of students reaching a threshold of proficiency (set by the States), and to break down reports to show whether protected subgroups are faring adequately. The Act mandates annual progress. Each year, there are progressively higher proportions of each subgroup and of the overall student population that must exceed specified thresholds. School districts that fail to meet the minimum proportions are publicly identified and subject to various sanctions.

The whole approach assumes that States, school districts, and individual teachers know what good schooling is and merely need incentives to better performance. States should invest more in education and hold districts accountable, districts should hold teachers accountable, and teachers should work harder and stay focused on teaching the content we all know is important.

In this essay, I argue that this fundamental assumption is incorrect. I suggest that in fact there is no widely shared public understanding of what is needed for schooling to be adequate preparation for life in our times. There is, instead, a strong entrenchment of the traditional school curriculum, backed up by the experiences of those who succeeded in previous generations through success in that curriculum, and further supported by strong groups in each subject-matter area. In addition, the tests used by states to comply with NCLB, while being good predictors of a wider range of capabilities, send poor signals about how children who are not learning adequately might achieve the competences they really need. As a result, while the current efforts may yield modestly positive test-score effects for some of our children, they are putting many of them on a path that will not prepare them for successful life and that, in some cases, may divert them from pursuits that would teach them more. I also attempt below to

suggest what is missing from the overall national plan and how we might begin to change course.²

GOALS OF EDUCATION IN THE PAST

Born just prior to the beginning of the baby boom, I attended schools that knew what they were supposed to teach and did a reasonably good job of teaching it – to students who were from the same cultural background as their teachers and who, in general, had no serious learning problems. All of us – teachers, students, parents – lived in a culture that believed that schooling was important, necessary to later success, and what “good” children did each day. People who had done well in school, as a group, did well in later life. While it was not unusual for a top achiever to have done only mediocre work in school, even in such cases, the person likely finished high school successfully and probably even made it through some or all of college. It is worth considering briefly both what it is that schools were trying to do and why they were successful at it.

Jackson³ coined the term “hidden curriculum” to refer to the goals of schooling that were not explicitly represented in tested subject matter. Schools, for folks my age, had a very clear hidden curriculum. Part of it was citizenship. To this day, we see trappings of this element – almost every public school classroom has a pledge to the U. S. flag as part of the beginning of each day. Moreover, the content of social studies curriculum clearly reflects a parochial canon of history that is part of the shared view that binds together the U. S. citizenry (compare U.S. and Canadian texts in their references to the War of 1812 if you have any doubts about this).

Another aspect of the hidden curriculum was preparation for work. The view of work in the years I attended school was clearly one of a large cadre of workers who followed the instructions set out for them by a small set of business leaders and industrial engineers. In order to carry out one’s work orders, though, several things were needed. One had to be reliable, showing up on time and diligently carrying out the instructions given by supervisors, even during periods one was not being watched. Homework was structured in large part to be preparation for the worker role. There were lots of worksheets. Even though these do little in the way of promoting learning of content, they do provide practice in following instructions and producing work to

² I note that a recent effort by Microsoft, Intel and Cisco Corporations is pursuing many of the issues I raise in this essay. See, for example, Kozma, R. (2009). Assessing and teaching 21st century skills assessment call to action, In F. Scheuermann & J. Björnsson (Eds.), *The transition to computer-based assessment: New approaches to skills assessment and implications for large-scale testing*, Luxembourg: Office for Official Publications of the European Communities. Downloaded from <http://crell.jrc.ec.europa.eu/RP/reporttransition.pdf> on 1 April 2009.

³ Jackson, P. (1968). *Life in classrooms*. New York: Holt, Rinehart & Winston

someone else's schedule (and they may contribute to facility in doing tasks one understands already). As one progressed through school, assignments became longer. Grades on such assignments reflected more than achievement of learning goals. Neatness counted. Spelling counted. Work had to be in the exact format that the teacher instructed.

One could quarrel over whether all of this nitpicking was needed for learning success, but there was no question that it was good preparation for the work world. Even today, many young people need to be instructed in preparation of a résumé because they don't realize that employers check these documents for signs of being a reliable worker and not just for information about past accomplishments. Moreover, explicit and implicit compliance with directions was clearly part of the curriculum in many different ways. Tardiness, for example, was treated seriously. Society expected that by the time they completed school, children would have learned to show up on time.

It also was important for students to leave school with the "basic skills." First, students needed to be able to receive instructions. Supervisors could not always be present at each work station, so written instructions were important. This meant that students needed to learn to read (obviously, reading facilitated learning in class and following the instructions of teachers, too). Second, before computers, all mathematical calculations were done by workers. Large businesses had huge rooms full of people working at desks with calculators carrying out the routine numerical work needed to keep the business functioning. If students could do algebra, they could get a wider range of jobs, since algebraic calculations were needed to estimate costs for a job, order materials, work out financing, etc. A bit of trigonometry facilitated work as a machinist, too. Knowing formulas for computing various derivable quantities also was important, since many who went to these schools later needed to estimate the amount of paint needed to cover a room, or figure out the monthly payment for a car, or determine how long a trip of given distance would take at a given speed.

A smaller group of students was expected to go further, to be prepared for college. Partly, readiness for college was indicated by general verbal facility and by acquisition of basic knowledge taught throughout the curriculum. College entrance tests were developed to measure this. It is important to note that they were designed originally as aptitude tests, not achievement tests. They reliably measured the basic capabilities that predicted first-year college success, and first-year college grades were largely determined by successful memorization of substantial amounts of information. Good test scores signaled not only a readiness for college but also a readiness for later participation in a work world where the top players shared verbal facility and high levels of routine skills.

There also was an element of shared cultural knowledge in school curriculum content, aptitude tests, and college teaching. For example, one aptitude test that was commonly used as a

gatekeeper into some professions for my generation included items such as *“Napoleon is to brandy as Caesar is to _____.”* While such items measured the verbal facility needed to search memory for analogical possibilities, they also obviously required a body of cultural knowledge. That knowledge was not essential to the professional tasks that would be performed by someone once they passed the test, completed college, and completed professional education, but it did index membership in the intellectual culture for which colleges were adapted.

Thus, there was both an explicit curricular canon and also an implicit curricular canon for schooling. Those who completed schooling successfully were prepared with the basic skills they would need for later success, proven to be of high verbal facility, and well grounded in a cultural base that would make it possible for them to interact easily with others who would work with them in more demanding professional roles.

None of this was necessarily bad. Indeed, throughout most of history, there has been a complete blurring of any distinction between schooling in needed work skills and schooling as assimilation into the broader culture. If one advanced in formal education, future employers could be certain that one was fully grounded in the culture as well as specifically educated for a range of professional and work roles. Only a small proportion of students made it to the end of the educational path, but generally, all who made it through secondary education had good prospects for life.

Today, though, a lot has changed. In the next section, I review some of the important changes that have occurred in the past few decades.

WHAT HAS CHANGED?

The biggest single change has been the advent of the information age. While those who completed school with me could always count on a job doing some of the routine computation and decision making that was the backbone of the economy, today those tasks are done by computer systems. Consider just one example, a bank’s decision about granting credit. In the past, that decision required gathering considerable data and then evaluating that data holistically. Today, the gathering of data is done by computer and a scoring algorithm is then used by the computer to produce a credit score; sometimes a human says yes or no based upon that score. Instead of requiring strong schooling as well as substantial experience applying what was learned in school, the process today requires, at most, the ability to copy information from a set of documents into a web form. Further, since the score no has value independent of the behaviors that led to it, people are starting to learn and teach ways to quickly manipulate the score. As with NCLB testing, the score becomes the valued commodity, and if the score can be manipulated without changing the underlying dispositions that once were the basis for scoring, then pathological outcomes can occur.

ROUTINE INFORMATION PROCESSING. There are really two related changes behind the information age. First, we now have *machines that do routine work*. This means that there is no direct value to being able to do such computations mentally or on paper (facility in number or symbol manipulation may, of course, underpin deeper mathematical conceptual knowledge). Second, we live in a world where there is *instant access to huge amounts of information and substantial ability to search it*. This means that routine information processing skills, such as old-fashioned “library research” skills, are no longer valuable. Instead, people need skills of effectively using automated search processes and of evaluating the credibility of information sources. It also means that automated summaries and scores often have more influence than detailed, nuanced understanding.

Of course, some jobs requiring routine basic skills competence will not be automated yet, either (a) because the specific need is new and automation has not yet been completed, or (b) because the demand is low making automation not worth the cost, or (c) because a human service component is inextricably linked to the routine performance. In the case of new jobs, the routine skills demand will be temporary, ending once software has been developed. In the case of low-demand jobs, there won't be many jobs requiring the routine skills. In the case of service jobs involving some routine skills, the situation is more complex. To a large extent, the service component can be separated from the routine component, with the service provider using computer tools and thus needing mainly the “soft” skills of human service. In general, though, routine manipulations remain justified in the curriculum primarily if they underpin broader conceptual learning. Therefore, it is broader understanding and ability to do more complex and richer cognitive tasks that should be the object of testing. Particular routine manipulations should not occupy a substantial part of the curriculum absent specific research findings that those manipulations support deeper capability.

In addition to being supplanted by automation, routine work that has not yet been automated is a prime candidate for outsourcing to parts of the world where its lesser economic value is still attractive relative to local living standards. Even complex tasks can be outsourced, of course (routine radiological diagnosis is a prime example⁴). However, the greatest impact of outsourcing so far has been on the routine tasks that used to be the mainstay of much of the middle class workforce in the U. S. It is tragic that the core focus of U.S. educational goals is on routine facility that is easy to measure but that is being taken over quickly by machines and, via information networks, by low-paid workers in other parts of the world. Arguably, in some States, if all students meet the requirements for No Child Left Behind, all will be fully prepared primarily for jobs that have migrated already to computers or to the developing world.

⁴ Blinder, Alan S. (2006, March/April). Offshoring: The Next Industrial Revolution?" *Foreign Affairs*, 113-128.

RAPID CHANGE. A third change in our world with implications for educational goals comes from a side effect of automation and ubiquitous networked information systems. This is the continuing rapid change in jobs. New technologies displace and transform jobs. The displacement, as just noted, comes from automation and outsourcing. The transformation comes from innovations spurred by the information technology explosion. Both mean that *successful life requires continual learning and relearning*.

Consider, for example, the role of a shop clerk. I recently ordered several items from a small shop over the Internet. The clerk there noted that one of the items was out of stock and emailed me with pictures of two alternatives. I picked one, she completed the order, and it got shipped. Note that all aspects of computing the cost of the transaction were handled by a computer system. Indeed, while the clerk provided personalized service in proposing alternatives, the changes this required in the order were handled by a program that took the old sales record, updated it, and sent an email listing the changes made. The personal service part of being a clerk was even more important than before, since I could not browse the shelves of the store but rather ordered from an online catalog. So, when something was out of stock, a personalized interaction of greater depth was required. However, what was not needed was any of the old clerical competence of adding up the order, figuring out shipping charges, figuring tax, handling the payment process, etc. And, I have no doubt that the software supporting the online portion of this shop's business has changed multiple times, requiring the clerk to learn new procedures and approaches quickly.

THAT LEAVES PERSONALIZED SERVICE. Another change is the increased role, in developed economies like ours, of personalized service.⁵ While machines are beginning to be able to detect emotion and we now have expert systems that are sensitive to individual and cultural differences, it remains the case that personal service is an important part of our economy. Some of this personal service is tied to professions – consider doctors and lawyers, for example. Much, even beyond the traditional professions, requires advanced education.⁶ In the commercial sector, we see an increasing number of retail establishments, both online and traditional, that offer such personal services as shopping assistance.

In order to provide high end personal service, a person must be well versed in the domain of that service – e.g., know the products offered in a store, know the relevant physiology of exercise, know the cultural needs of potential customers. In addition, because it partly is delegated

⁵ See also Footnote 4.

⁶ For example, many of the master's degree recipients in the Department of Health and Physical Activity in the School of Education at the University of Pittsburgh where I am dean will spend some or all of their careers as personal trainers.

learning, those who work in personal service also must be quick studies. Even relatively low end sales people constantly need to learn about new products, and sometimes that learning is substantial (consider computer sales people or cell phone sales people). While not all people in the sales world are well versed in their products, the best ones certainly are. And virtually all who are successful have highly developed personal skills. If we believe that the hidden curriculum of schools should include preparation for productive life, then certainly there is a greater need today than ever before for that hidden curriculum to include preparation in the soft skills. The best high schools today do provide preparation in job interviewing and a few other targeted social skills, but a case could be made for doing much more.⁷

MULTICULTURAL SOCIETY. Another important factor is that the society that schools serve now is much more multicultural. Both from the standpoint of effective schooling and from the standpoint of goals of education, the multicultural character of our society is extremely important. What is occurring in the United States and beginning to occur elsewhere in the developed world is a dramatic shift from anything seen before in world history.

Characteristically, societies functioned in large part by developing a common culture. When people from a different culture were absorbed into a society, they needed to assimilate the common culture before they could be served well by such institutions as schools. When my uncle arrived here in 1918 – almost a teenager, speaking no English and from a small village in Eastern Europe – he was able to succeed in becoming a physician only by quickly learning both the language and the culture of the place to which he had moved.

Today, part of the American way of life is to accept that a school will have children who come from multiple cultures and may not even speak English. Now, it is the job of schools to teach those children effectively, whether or not they assimilate to the culture of power from which their teachers and school leaders mostly come. Just as important, today's children will be more successful in life if they acquire the ability to relate to and connect with people of many different cultures. This is a double challenge. No society in history has run schools that did not implicitly require children to assimilate to a majority culture as a condition of success. And, no society in history has taken on the task of preparing all of its children to be successful in a strongly multicultural world. Surely, a piece of the hidden curriculum must include attention to the multicultural realities of modern America.

CONNECTING ACROSS DIFFERENT CULTURAL UNDERSTANDINGS. A related change in our world comes partly from our multicultural character and partly from the rapid rate of change in

⁷ Ironically, some of that soft skill training can be provided by machine. See, for example, the program called Tactical Iraqi that teaches junior military officers how to interact with local tribal leaders. The website for Alelo, Inc. provides examples of this training: <http://www.tacticallanguage.com/>.

technology. Because what is valued and what requires human effort keeps changing, there is a premium on being able to explain the unfamiliar to others, relating the novel to what they already know. Put another way, many roles require being good teachers, and what needs to be taught in those many roles keeps changing. Consider just one area where this is manifest, nursing. Today, many of the top nursing jobs are for nurse-educators, people who will teach patients how to deal with a medical problem such as diabetes. These people not only have to be well educated nurses, they also have to be skilled at teaching complex procedures and providing clear understanding. They must be ready to work with people whose education may be limited and who come from many different backgrounds. And, they have to stay current on the medical knowledge related to the education they do, since we keep discovering more about the best ways to manage various medical problems.

RAPID CHANGE. In a world of rapid change, enterprises need continually to be invented and reinvented.⁸ Because what is valued keeps changing, the skills of developing new enterprises, at multiple levels of scale, are highly valuable. This puts a premium on the whole range of capabilities needed to develop new enterprises. That, too, is a major sea change for our society and hence for our education system. The world in which I was educated was remarkably stable. Many friends joined businesses begun by parents or grandparents, and the rest of us generally went from school and university to established institutions. This has changed dramatically. New technologies, new information pathways, and new needs create new opportunities continually, and they also dry up some of the opportunities previously being exploited by existing institutions. The recent problems of the American automobile industry shows the difficulty existing enterprises have in adapting to changes in need and opportunity.

Not only does the increased speed of invention or reinvention have implications for the training needed to be successful in the modern economy, it also has implications for citizenship. As DeLong has observed, “one great test of our era will be whether creative destruction can flourish alongside public order and political liberty.”⁹ There is much thrashing of our political system, with a poor quality of public discussion of appropriate policy, as large economic institutions flounder and as we deal with inadequate regulation of certain recent enterprises that were enabled by new technologies. This suggests that we have a lot of work to do in education to prepare our children to live in the kind of fast paced world enabled by these technologies.

⁸ One could instead refer to Schumpeter’s concept of creative destruction, of course. See Schumpeter, J. (1994). *Capitalism, Socialism and Democracy*, 3rd edition, London and New York: Routledge, or earlier works of his.

⁹ DeLong, J. B. (2007). Creative Destruction’s Reconstruction: Joseph Schumpeter Revisited. Essay in the Chronicle of Higher Education, accessed from <http://chronicle.com/free/v54/i15/15b00801.htm>

FENDING FOR ONESELF. The rapid increase in productivity enabled by modern technology also leads inevitably to an increased value for basic personal living skills. In the past, much of what we needed to know to live well was embedded in shared cultural understanding. Moreover, there was a range of social services established to help those who could not make use of this culturally embedded knowledge. However, today, the need is much greater, as the world changes more quickly, and the social service resources that are available keep shrinking. This kind of personal service is becoming too expensive, a victim of Baumol's "cost disease."¹⁰ Governments are cutting back on this kind of support just as it is needed more. The only long-term solution is education that helps prepare people to be more responsible for their own lives and continually to seek out information that relates to their needs. The basics of budgeting, healthy living, finding and digesting new information on living well, and long-term planning will need to be part of a sound 21st century education system.

HONESTY. Finally, and perhaps most important, in a more complex society in which change is rapid, honesty and integrity – as well as the ability to ask hard questions just in case integrity is partly lacking – become more important. At any given moment, there will be important things that only a few people know, and there will be a premium placed upon the integrity of those who develop and promote new enterprises and new products. Because reputations will have less time to develop in a fast changing world, the ability to be truthful will become more valued. And, the cost of being known as dishonest will be higher than ever. Just as public databases of sex offenders now follow people for decades after a single indiscretion, we can expect shortly to see similar databases of financial cheats and other honesty lapses that will follow people for a very long time. Credit reporting is a step in that direction.

DEALING DIRECTLY WITH THE INFORMATION REVOLUTION

Thus far, I have discussed changes partly driven by the information revolution but have not considered the specific skills needed to take advantage of new information technologies, nor have I dealt with challenges produced by the information revolution. The ubiquity of information is a source of both. Information tools of little or no cost permit anyone anywhere to make new information available to all. While a few countries make it somewhat more difficult for most people to see certain information, the reality is that neither schools nor other institutions have

¹⁰ Baumol, W. J., & Bowen, W. G. (1965). On the Performing Arts: The Anatomy of Their Economic Problems. *American Economic Review*, 55(1/2), 495-502. In this and other papers, Baumol argues that because certain kinds of human services (the arts and in-person teaching and coaching, among others) still require the same amount of worker time per unit of outcome as in the past, they tend to become more expensive relative to other goods and services. An interesting side effect of Baumol's cost disease is the increased reliance of society on multiple choice tests, largely because they are much cheaper than tests that require human judgment, while also creating a sense of being cheat-proof because they rely upon automated systems rather than large cadres of human scorers.

any control over what content people see. To a very large extent, this means that people know what they choose to know and see what they choose to see. One strong and simple example is cable television. Homes have access to many news channels, and some have specific biases. If one wants only to hear news that matches a particular viewpoint, one simply chooses the channel with that bias. Of course, nothing other than the authority of that channel warrants the reliability of the statements it might contain. More generally, whether listening to television, searching the Internet, or reading mail, people today face much more difficult work in deciding on the quality of the information they access – whether by quality we mean accuracy or consistency with communal standards. Much of the new basic skills must involve evaluation of information and verification of warrants for claims.

A particularly difficult kind of evaluation is for results derived through massive computing. Consider, as a theoretical example, a portfolio of mortgages. Conceivably, for each mortgage there might be a credit score for the debtor, the appraised value of the property, trend data on property values in the neighborhood, and who knows what else. Given adequate computer power, any of a range of models might be applied to such data to derive a value for the portfolio along with estimates of the likely range of error for that value. Indeed, with enough computer power, the value of the entire portfolio of mortgages throughout the United States might be estimated. As we have learned, though, it is extremely difficult to determine whether the valuing process carried out by massive computation was done reasonably, especially when some of the data used for evaluation and scoring can be falsified. More broadly, the scale of society and of the information space in which we live far exceeds our ability to understand and manage it. So, if one can model an important process or phenomenon on a larger scale than others, that will likely pay off. Regrettably, from both an economic and a political standpoint, our children get no exposure to them modeling of large amounts of information and precious little experience evaluating claims about bodies of data that are warranted by extensive computation. Whether applied to evaluating mortgage portfolios or appraising evidence for weapons of mass destruction or deciding whether China's currency is undervalued in international commerce, whatever capabilities we may have across our society are not yet buttressed by anything that occurs in our education system.

In the following two sections, I have tried to capture some of the changes in our world that may require new approaches to education. In the next section, I discuss some basic problems that make it hard to change the education system.

RESISTANCE TO CHANGE

Historically, education systems were meant to be conservative and resistant to change. At the university level, this goes back to the very origins of universities. The first universities were

collections of scholars in Italy, and later in Europe and the British Isles who possessed the remnants of knowledge that largely had been destroyed in the dark ages. They were seen as the places that would protect the cumulative knowledge of society from being lost again. Indeed, the very process of recognizing “masters of arts,” those who were entitled to teach, involved a two-step process in which first the Chancellor of Notre Dame Cathedral or the Chancellor of St. Genevieve would grant the right to teach and then a faculty would admit the new teacher by having him give an inaugural lecture.¹¹ This process was meant to provide a double check that the person only taught the accepted canon and that he taught it in the accepted way. This two-stage process continues in some European countries where the government, sometimes even the head of state, grants a professorship, after which the new professor gives an inaugural lecture as a symbol of acceptance by a specific faculty.

SCHOOLS REFLECT PUBLIC UNDERSTANDING OF EDUCATION. While public school curriculum is not controlled by quasi-religious authority any more, it is still an extremely slow-changing beast. Every State now has instructional standards, specific lists of the goals to be achieved by its school systems. These standards are set variously through legislation or through rule making by State boards of education or similar entities. However, because they are enacted through complex social structures involving school boards, principals, teachers, parents, and students, what actually can be achieved successfully is only what the community in general understands. Standards can change quickly, but practices can change only slowly and only in ways the public deeply understands. Public understanding of education generally is anchored in a previous generation’s experiences with schooling and with subsequent successes and failures. Moreover, that understanding is quite incomplete and often seriously wrong.¹²

Currently, most State standards are derived from the New Standards Project.¹³ Below, I discuss the stresses that were placed on the New Standards Project by its desire to actually influence practice. I also consider how an important component of the New Standards never made it into

¹¹ Burns, J. (1907). Master of Arts. In *The Catholic Encyclopedia*. New York: Robert Appleton Company. Retrieved December 30, 2008 from New Advent: <http://www.newadvent.org/cathen/01759a.htm>. It is worth noting that the license granted was not only to teach but also to decide disputes about what is true and correct and what is not.

¹² See Lesgold, A. (1996). Quality control for educating a smart work force. In L. B. Resnick, J. Wirt, (Eds.), *Linking school and work: Roles for standards and assessment*, (pp. 147-191). San Francisco: Jossey-Bass. In it, I give examples of very inaccurate beliefs held by successful people about where they learned important knowledge. Machinists, for example, end up believing that the math they use was learned in traditional math classes, even though the math in question is nowhere in the curriculum.

¹³ National Center on Education and the Economy. (1998). New Standards: Performance standards and assessments for the schools. Available online as of January 2, 2009, from <http://www.ncee.org/store/products/index.jsp?setProtocol=true&stSection=1>.

the standards of most States, much less into schooling practice. The bottom line is that schools try to teach what we, the adult public, think worked for us. In reality, though, the knowledge we were taught didn't work for us all that completely and is nowhere close to what our children need. But, there is one group of people who learned the stuff they were taught in school and succeeded largely because of that learning. These are the current teachers in our schools. Simply by being teachers, they live in a world where what was taught in the last generation worked perfectly well for them. This is another conservative force.

HIGH STAKES TESTING ALSO CAN BE A CONSERVATIVE FORCE. The incompleteness of current standards is itself problematic, but it is made even more so by the desire to have simple measures so the public can evaluate the success of schools. Most of the recent evaluation of educational outcomes, and hence much of the recent efforts of schools, has been via standardized tests of basic skills of reading and mathematics. The choice of these two curricular areas is driven by two factors. First, there seems to be the greatest agreement that every child should become able to read and should have arithmetic facility.¹⁴ Second, if that is seen as the first goal for schools, then if schools do not produce uniformly high outcomes on these basic measures, public attention naturally will focus on improvements aimed at producing better scores. Further, current low-cost mass testing technology aims at aspects of those basic skills that can be demonstrated with short multiple-choice items. There is a clear primacy of ability to recall facts and do short procedures over the ability to apply basic facilities in novel situations that require more extended cognitive activity. Also, dealing with novelty is politically difficult to test, since it is virtually impossible to create situations that are equally novel for every child.¹⁵ So, what is tested is largely the enacting of specific, short, practiced performances – exactly what machines already do instead of humans in the real world.

As tougher economic times are now with us, it is quite likely that States will be even more reluctant to part with the cheap tests they now use. Any new approach will be costly, will be hard to implement, and likely will have initial glitches that are politically embarrassing. There is no way beyond this state of affairs other than to create an educated public that insists upon better approaches to measuring educational success.

¹⁴ Compare the general public acceptance of these basic tests with dramatic public outcry over recent proposals in Pennsylvania that the basic goals of specific high school courses should be tested by the State.

¹⁵ An important part, now virtually a legal necessity, for producing a standardized test is a demonstration that the individual test items do not function differentially (see Holland, P. W., & Wainer, H. (1993). *Differential Item Functioning*. Hillsdale, N. J., Erlbaum) for students from different protected cultural groups. But, it is hard to produce tasks that are novel, in the sense of not having been taught directly to the students in advance, but still accessible, which requires some anchoring in the students' prior experience. Regrettably, the only universally shared experience for many students is the more sterile part of schooling.

Consider also that the children of the wealthy increasingly are educated outside the public system or in suburban enclaves. Wealthy parents trust outcome measures for their children such as proportion of graduates accepted to top universities. But, for the bulk of children, we don't want to rock the boat and we certainly don't want to invest in better tests right now while we're feeling poor. And, no one trusts teachers or principals to develop locally their own indicators and apply them without the costly apparatus now in place for state-wide testing.

Now, it is generally true that the high stakes tests currently used will predict broader academic success, but only when they are imposed on existing school practices. When these tests become goal objects in themselves, they act by limiting schooling to only drill on what the tests measure. That is, they no longer are predictors of broader capability but rather just indices of low-level facility.

Put another way, current tests give poor signals about what to teach. The situation is improving slightly, with somewhat more sophisticated tools now available to suggest instructional approaches and goals based upon student test performance. Overall, though, the whole system – standards, curriculum, tests, and sanctions for low test scores – aims at preserving exactly the aspects of traditional schooling that capture only what machines can do better than people. This is not a way for schools to create valuable outcomes for their students.

The indicators we now use not only fail to capture all that should be part of successful education, they also underestimate the attainment of less privileged subgroups. While it is possible that any test might be prone to the same problems, at least some theoretical accounts suggest that assessment of larger-scale performances that take place in less threatening circumstances might have less of this problem.¹⁶ One could also imagine that if the needed facility is the ability to use information tools as extensions of human capability, then the tests should include the use of such tools and schooling should include substantial opportunity to use them as well.

A partial exception to the current focus on basic skills testing arises in career and technical education. In principle, career and technical education is an ideal way to provide opportunities to learn to apply basic skills to new situations and to learn to be more enterprising and adaptive. Unfortunately, too much of career and technical education presently suffers from the same problems just discussed. It emphasizes basic skills better exercised by machines. Also, much of

¹⁶ This is true even when there is no differential item functioning. This work is analyzed in Cohen, G. L., & Garcia, J. (2008). Identity, Belonging, and Achievement: A Model, Interventions, Implications. *Current Directions in Psychological Science*, 17 (6), 365-369. Perhaps the best-known work on this topic is Steele, C.M., Spencer, S.J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 34, pp. 379–440). New York: Academic Press.

current career education focuses on the specific requirements of today's jobs. Students are prepared for jobs that exist today.

The problem is that the jobs that fall in the realm of career and technical education – those that could be filled right out of high school – have a rather short expected lifetime. And, since the actual learning takes time, it is not unusual for the apparent job surplus to be gone by the time graduates are produced to fill the jobs that led to the career curriculum. Where the core goal of learning should be ability to be trained quickly in each new job that emerges in an occupational area, a focus on that which can be tested easily with relatively automated testing emphasizes only the specific details of a specific job, rather than deeper understanding and the ability to generalize and expand one's knowledge base.

Before discussing implications of the issues I have raised for future educational practice, I briefly review one aspect of the New Standards Project that should have led to better State standards and stronger efforts to improve schooling.

WHY A SENSIBLE EFFORT WAS NOT WHOLLY SUCCESSFUL

The New Standards Project¹⁷ was a major effort to upgrade the curriculum to take account of what our children will need to succeed in the new global information economy. Teams of subject matter experts were assembled to work on each of the four main curriculum areas (mathematics, science, social studies, and English/language arts), and standards were produced for elementary, middle, and high school. Moreover, reference tasks were specified for each of the standards. Finally, a separate set of standards was produced called the Applied Learning Standards. These consisted of capabilities that did not fall into one of the four subject matter areas, such as making a strong presentation of a business proposal or other argument, developing a business plan, etc. In all, there were five areas of standards under the Applied Learning heading: problem solving; communication tools and techniques, information tools and techniques, learning and self-management tools and techniques, and tools and techniques for working with others.¹⁸

The fate of the Applied Learning standards is worthy of note. Some states that adopted the New Standards almost verbatim for their state standards did not include the Applied Learning

¹⁷ See Footnote 13 on Page 11.

¹⁸ These were taken from the New York State standards, as recovered on January 2, 2009, from <http://schools.nyc.gov/offices/teachlearn/documents/standards/applied/preface/9aplearnps.html>. While these may vary slightly from the originals, they capture the original intent and most of the original wording pretty closely. See Footnote 13 on Page 11 for access to the original applied learning standards as part of the complete standards sets available through that site.

standards. Even in those that did, very little emphasis is placed on them in any state policy activity. The New Standards Project itself found it necessary to develop a set of standardized, multiple-choice tests to complement the bigger performances (and associated scoring rubrics) that were meant to be the core of standards assessment. These are the New Standards Reference Examinations. They did this because it was politically necessary to have standardized tests to get acceptance by the states. In reality, relatively few districts have used the New Standards standardized tests, and even fewer attend seriously to the Applied Learning standards. The labels from the New Standards effort too often are used to reinforce sticking with what has always been done in the past.

While major business groups, such as the Partnership for 21st Century Skills,¹⁹ have called for capabilities that fit well within the overall New Standards, especially when the Applied Learning standards are included, the general public has not yet grasped that we need something more and somewhat different from schools today than was needed before. Indeed, even the use of New Standards Reference Examinations has been attacked in more than one locale as a substitution of fuzzy education thinking for the tried and true. As long as this lack of public understanding continues, it is unlikely that we will be able to build school systems that truly prepare all of our children for success in the modern global information world.

There are, of course, plenty of issues beyond setting appropriate curricular goals. Most notably, Bryk and Gomez²⁰ have written about other needed changes. They focused on changes needed to stimulate a body of applied and translational research that would be sufficient to guide the development of school systems that can reliably and robustly assure effective education for all students. Their purpose was to identify the work needed to assure that schools can achieve any plausible set of curricular goals. In this essay, I restrict myself mostly to what the appropriate learning outcome goals should be, leaving for others the question of how to achieve those goals. We can be quite sure that we will not achieve goals that the public does not understand and that have not been achieved broadly for the current teacher corps. In the next section, I consider what needs to be done to shape broad understanding and acceptance of curricular goals sufficient to give our children a chance at the standard of living my generation enjoyed.

¹⁹ See <http://www.21stcenturyskills.org/> (checked on January 2, 2009).

²⁰ Bryk, A. S., & Gomez, L. (2007). *Ruminations on Reinventing an R&D Capacity for Educational Improvement*. Paper presented at the American Enterprise Institute Conference, The Supply Side of School Reform and the Future of Educational Entrepreneurship. January 2008 version downloaded from http://www.carnegiefoundation.org/files/assets/DED_paper.pdf.

IMPLICATIONS FOR EDUCATION

SHARED PUBLIC UNDERSTANDING. The first implication of the points made above is clear. We need to build a clear and publicly shared understanding of what we want out of education and why it is necessary. In order for this to occur successfully, we need to help the American public understand more of how people qualify for careers or for career training and what really happens when workers are displaced and need to learn a new career. As individual experiences are quite idiosyncratic and because people attribute successes to schooling that did not in fact address the capabilities they needed to apply to succeed,²¹ this will require considerable work. One possibility is to develop a set of documentary videos that explore the struggles faced by people who are having difficulty getting trained or retrained and the difficulties that companies experience finding qualified workers and trainees. But, more will be needed. Most probably, it will take months or years of continual focus on the mismatch between what children practice in school and what they need for modern life.

The Partnership for 21st Century Skills²² is trying hard to do some of the needed work, and the new task force funded by three information technology companies is as well.²³ They have a fine website and are becoming more visible. However, they are not yet penetrating the understanding of the general citizenry, and policy makers still tend to feel that following the currently envisioned paths to school quality, based upon the currently measured outcomes is, at a minimum, the next needed step, with broader curricular goals to come later. Given the extent of needed changes, which includes developing consensus for the new skills,²⁴ assuring that teachers themselves have them, learning how to teach them well, and learning how to build school systems that reliably and robustly do teach them well, we must start very soon to build a consensus of where we need to end up. Our competitors are certainly already hard at work on this.²⁵

NEW APPROACHES TO TESTING. Another part of the needed mass re-education of the American public may require the development of new forms of testing. A test whose items are

²¹ See Footnote 12 on Page 11.

²² See Footnote 19 on Page 14.

²³ See Footnote 2 on Page 3.

²⁴ Call them what you like: Applied Learning Standards or 21st Century Skills.

²⁵ Consider, as one example among many, the Thailand Ministry of Education efforts to develop public understanding of the 21st century skills, discuss how to implement teaching of them, and recognize individual schools making progress, as available (as of January 2, 2009) on

http://www.bic.moe.go.th/fileadmin/BIC_Document/book/MOEleaflet/develop21stcentskills.pdf.

face valid indicators of 21st century skills and that can be shown not to match current curriculum could be valuable. Tests that involve using ubiquitous information tools also could contribute positively. One could even imagine asking teachers to test themselves and to reflect on whether what they are teaching could prepare students to do the tasks that companies say validly mirror current and future work. There is a good chance that existing performances from the New Standards Applied Learning standards could be tapped for this purpose if they were extended to involve more use of information tools in tests of the Standards, so it might not require major work.

A related approach that might be used to galvanize public concern is to start doing “customer surveys” aimed at evaluating the quality of graduates from our schools. Some number of students finishing school end up applying to apprenticeship programs for the trades, for example. Would it be worthwhile to develop a survey that apprenticeship program recruiters could fill out for each applicant that provided a quick evaluation of their capabilities, perhaps using the Applied Learning standards as a starting point for developing survey items? After all, in addition to a range of statistics and technical specifications on new cars, our sense of where the vehicle world is headed is driven in considerable part by customer surveys of vehicle quality. One can compare current public discussion of No Child Left Behind test results to ads from American car manufacturers that give traditional measures such as time to accelerate to 60 mi/hr, even though the public has figured out that safety indicators and economy indicators may be more important. We need to reframe the public discussion, or schools may get better at doing what they were supposed to do half a century ago but still not serve their students well.

Recently, Noguera and Rothstein have written about the need for new testing as well.²⁶ Their core argument is that existing tests focus only on basic skills, ignoring creativity, higher-order thinking skills, and subjects outside of reading and mathematics. They also discuss the inequities produced by focusing on low-threshold measures that omit important schooling outcomes and call for a new program of research on better approaches to accountability assessment. My arguments in this essay represent a specialization of their assertions, to a large extent.

Our society has taken an approach to testing that, while anchored in continually improving mathematics, still rests upon some assumptions that may not be true in the information age. Fundamentally, the approach we take is driven by traditional approaches to task analysis. We take activities that we believe reflect a particular level of competence, and we reduce them to a series of relatively small performances that represent what we perceive to be the components of

²⁶ Noguera, P., & Rothstein, R. (2008, December 19). Education accountability policy in the new administration. Policy Memorandum #137. Washington: Economic Policy Institute. Available, as of January 9, 2009 from <http://www.epi.org/policy/EPIPpolicyMemorandum137.pdf>

expertise. We then try to describe each component clearly. These descriptions then become the instructions to test item developers, who develop specific little microtests for each of the components. We then add these microtests to a larger set of candidate items for an overall test of capability. Finally, we use techniques such as Item-Response Theory to decide which items to use in any given version of the standardized test.

This approach was needed in the past because we needed to develop very simple approaches to testing that applied scoring templates to answer sheets that recorded only choices made on multiple choice items. The idea was to automate the process and to eliminate human judgment, since such judgment was prone both to error and, when applied locally by people interested in testing outcomes, to corruption.

Today, though, there is another option, which has been demonstrated in some of the intelligent tutoring systems now extant.²⁷ It now is possible, in many cases, to do detailed cognitive task analyses of complex performances and then to develop student modeling systems that determine, from the performance of a student on a complex task, which of the microcapabilities the student has and which are incomplete or missing.²⁸ Now, to date this only has been possible for tasks that can be completed in a computer-based environment, but there is quite a range of possibility even with this limitation. For example, a program called Tactical Iraqi²⁹ interacts, via spoken language in a language the student is still learning, with a student and decides what the student needs to learn about complex social interactions with a culture the student is just beginning to understand. Certainly, this kind of achievement suggests that it might be possible to capture student activity in substantial tasks and derive from a collection of such activities some measure of student competences.

This kind of approach would turn testing on its head. Using substantial computer power, but not that much more than is used to do an automated credit assessment, we would tear apart real student performances of real 21st century tasks to analyze which competences are clearly exhibited and which are still lacking. We would do this instead of taking apart old-fashioned

²⁷ Connelly, J., & Lesgold, A. (1999). Intelligent tutoring systems. In J. G. Webster (Ed.), *Encyclopedia of electrical and electronics engineering* (Vol. 10, pp. 529-541). New York: Wiley.

²⁸ See also Feng, M., Heffernan, N.T., & Koedinger, K.R. (in press). Addressing the assessment challenge in an Online System that tutors as it assesses. To appear in *User Modeling and User-Adapted Interaction: The Journal of Personalization Research* (UMUAI journal). Available on April 1, 2009 from <http://web.cs.wpi.edu/~mfeng/pub/USER562.pdf>. In addition, Bayesian inference network schemes have also shown promise. See, for example, Conati, C., Gertner, A., and VanLehn, K. (2002). Using Bayesian Networks to Manage Uncertainty in Student Modeling. *User Modeling and User-Adapted Interaction*, 12, 4, 371-417.

²⁹ See <http://www.tacticallanguage.com/approach.html> for details of Tactical Iraqi (link checked on January 2, 2009).

school-based performances and then making abstracted little microtests of each of the identified subcomponents. We would need to change some aspects of standard testing theories, but not all that many. In both the current approach and this proposed approach, we have, after all, a series of opportunities for students to exhibit various little aspects of capability. Surely, with a bit of research, we can figure out both how to build the proposed tests and how to efficiently, reliably, rigorously, and robustly accumulate information across the individual “items” on which we have data. The big change would be that items were discovered within meatier cognitive performances rather than contrived by test item writers. Moreover, as libraries of larger tasks accumulated, it would be quite possible for a student to have performance on a series of tasks analyzed with the result of not only an accountability score but also a personally tailored curriculum of other tasks that might exercise the capabilities not yet fully developed, along with some specific suggestions about how the missing competence might be taught/learned.

A helpful by-product of the proposed approach to testing is that it could be done in a form that Shute refers to as “stealth assessment.”³⁰ That is, much of the testing could be done by having students (or parents or teachers for younger students) designate specific performances to be part of their evaluation. Given a portfolio of performances to analyze, the testing system could then select one or two additional performances to be done on a more proctored basis as a confirmation that the original set was not done with inappropriate coaching. Shute has asserted that if students can do the performances to be assessed in contexts other than high-stakes testing, some of the problems of depressed performance by minority groups might be eliminated. Even a confirmatory task or two would not be as stressful as the usual high-stakes test, since the student would know that he has the basic capabilities to do the new task and thus would be more likely to persist in completing it.

There are some side benefits from this kind of approach that seem worthy of note as well. Most important, subject matter knowledge can be assessed through the same tasks that allow a demonstration of the new 21st century skills. Thus, testing for the new skills would not be yet another case of “one more test” to be seen as taking time away from learning. Second, it would be possible to design online tasks that were amenable to assessment that also included either automated coaching on missing skills or prompting to teachers who could provide real-time help to students as needed. That is, the test could also be part of the learning process, again working to overcome the belief that testing takes away from learning. Obviously, coached capability would also be marked as needing subsequent demonstration on some other task.

³⁰ Shute, V. J. (2008, August). *Games, stealth assessment, and learning*. Invited paper to be presented at the annual meeting of the American Psychological Association (APA), Boston, MA, August 14-17, 2008. I should note that the overall proposal I have made clearly derives from Shute’s ideas.

TEACHING TEACHERS THE HIDDEN CURRICULUM. Just having a means for assessing the 21st century skills will not, of itself, cause curriculum and schooling to include them. It will have some impact, since each meatier performance used in the testing system will be a direct demonstration of the kinds of capabilities students need to develop and will likely confront teachers with the gap between readiness for traditional tests and full acquisition of the 21st century skills and related subject matter. Nonetheless, it is quite likely that there will need to be a substantial program of both subject matter education and pedagogical coaching to bring teachers fully up to speed. Unfortunately, in some cases, the education world is a sheltered workshop for those facile in and able to teach the traditional subject matters who may not be well prepared otherwise for the global information economy. It won't take long for teachers to discover that simple drill on the "covered content" in the new assessments is inadequate preparation for the tasks that will be used. But, helping them gain mastery of the additional content and how to teach it will require substantial new efforts, including some applied research and substantial translational³¹ research.

MORE "LEARNING BY DOING." One broad area of curricular improvement that has multiple advantages is the addition of major tasks with a large component of learning by doing. Historically, teachers have done occasional capstone "project" tasks in their classrooms, but such tasks tend not to be on the menu in the more scripted approaches being taken to assure that each item in a district's curriculum is being given attention. It is much easier to develop a small instructional component for each curriculum item than to count on a large-scale project to cover many such items. The same basic logic described above for development of meatier testing approaches can also apply to development of more large-scale learning-by-doing projects. That is, modestly intelligent database systems can keep track of what curriculum elements should next be addressed for a given student and propose, from a catalog of project specifications, appropriate projects or categories of projects that might be appropriate for the student.

This approach will likely be necessary if schooling is to include a larger component of cognitive work on the scale of real life demands. Teachers tend to believe that projects are important, but they are cowed by the demands of such instruction. Those who do assign major projects do so sparingly, often with little detailed connection to an instructional plan for a given student, and generally with reliance on parents to help students manage the needed work. This works in some communities where most of the students have parents equipped with the time and cognitive resources to provide such support and fails elsewhere. So, projects are found in the classes of the best teachers in private and wealthy-suburb schools and are seldom found in inner

³¹ I use the term "translational research" in the way that it is used in medicine, namely research on how to get the treatments proven to work best to actually be used effectively in practice.

cities. As a result, even though no one intended it to be so, students in inner city schools are deprived of whatever benefits might ensue from learning that involved regular immersion in bigger and more meaningful tasks.

And, the benefits, at least for adults and most likely for children, of such immersion are substantial. In my decade or longer of work training technicians with little education past high school to do the hardest jobs in the electronics world, I had great success with an approach that provided meaty tasks that involved on the order of an hour or so of focused, intelligently-coached (by a computer) problem-solving work.³² Such tasks also would have been unmanageable in the Air Force and industrial training facilities where they were used, except for the availability of intelligent software to select appropriate tasks and provide appropriate coaching so that a major load was not placed on a human teacher.

To summarize this last point, people learn to apply their learning to real tasks that humans can do better than machines by doing such tasks. Teachers instinctively know this but generally cannot manage either the task of selecting and tracking performance in such major tasks or the coaching needed so that students don't get stuck in the middle of a task because a piece of knowledge doesn't come to mind when needed. Extant examples from the world of worker training suggest that intelligent systems might provide exactly what teachers cannot manage while leaving teachers free to focus on what are the essential human skills of teaching, including motivation, broad decision making about overall progress, and responding to questions that go beyond what a book, instruction sheet, or intelligent coach can provide.

Developing the needed infrastructure of learning tasks and related intelligent coaching will be difficult, but it is neither impossible nor unaffordable. On this point, too, we have some evidence.³³ Over the course of developing five generations of what we called intelligent coached apprenticeship systems, the cost to develop such a system – namely a collection of tasks that, taken together, prepared a person for the hardest work in a given electronics area – dropped from \$2.5 million for the whole system to about \$70,000. If we, as a nation, take on similar development of project-based learning systems for the school world, we can anticipate a similar pattern. The first ones that are developed will be costly and possibly slightly cumbersome. After persistent effort through a few generations of system development, we will have affordable

³² See, for example, Lesgold, A., & Nahemow, M. (2001). Tools to assist learning by doing: Achieving and assessing efficient technology for learning. In D. Klahr & S. Carver (Eds.), *Cognition and instruction: Twenty-five years of progress*. Mahwah, NJ: Erlbaum. Also, see Gott, S. P., & Lesgold, A. M. (2000). Competence in the Workplace: How Cognitive Performance Models and Situated Instruction Can Accelerate Skill Acquisition. In R. Glaser (Ed.), *Advances in instructional psychology*. Hillsdale, NJ: Erlbaum.

³³ See Footnote 32 on Page 18.

technology, replicable by others, that is quite affordable and that is doable at least partly by the private sector.³⁴ We just have to decide as a nation that schooling that truly prepares people for productive life is one of our goals.

IT'S MORE THAN JUST LEARNING SPECIFIC THINGS. Another reason to move more of schooling to bigger tasks is that the hidden curriculum needs to change. Current scripts and script-like approaches provide students with focused, structured, small tasks to do, with a lot of supervision. Success either comes very quickly or not at all. Larger tasks teach more than subject matters. They teach that persistence is important, that often one confronts tasks that initially look impossible but that can be managed, that productive life involves sticking to a task until it is completed. The tasks that worked in my intelligent training systems activity were provided to students under a regime in which every student was expected to complete every task correctly. Help was provided, with enough inertia to encourage trying to solve problems without too much assistance, but failure or being partially correct was not an option. That was part of our hidden curriculum, too.

A central aspect of schooling has been the implicit understanding that partial learning and partial performance is sufficient. Only in athletics is it unacceptable for stars to perform only 90% of the time and the average student to perform only 70-85% of the time. An important by-product of the kind of project-based learning I am suggesting is that every project gets done and, by the end, is done right. Persistence, getting help from others or from intelligent systems, is fine but simply skipping a problem is not. And, if we extend the intelligent coached apprenticeship idea from being entirely machine mediated to being partly done in social arrangements involving social organizations of students, the hidden curriculum also can include clear framing of problems and clear explanations, two other components of the Applied Learning standards.

INVOLVING THE BUSINESS WORLD. I close this essay with one last bit of learned wisdom, or perhaps more accurately learned humility. We in the education world believe that we know what needs to be taught in school and how to teach it. Indeed, we have succeeded in convincing generations of our former students that we have it right. We can apply various task analysis techniques to performances that people say are valued and from such analyses decide which elements in our existing curricula need to be taught. And, indeed, under ideal circumstances, we get this mostly right. However, the kinds of experiences that companies have when they can't find trainable work force in our country suggest that we aren't getting it all right nearly often enough, especially for students who are poor and whose hard-working parents may not have the

³⁴ The work discussed in Lesgold and Nahemow (see Footnote 32 on Page 18) was, for Generations 3, 4, and 5, done jointly with Intel Corporation. By the fifth generation, Intel was doing most of the design work with only modest input and evaluation from my project team at the University of Pittsburgh.

time or the capability to fill in for what teachers can't do. When we fail to get it right, we doom students to a lifetime of inability to get decent jobs or get themselves retrained for new jobs when current ones disappear.

We need regular advice and feedback from the world of work and the world of public service if we are to restructure our schools to be places that prepare all our children to be productive citizens. This feedback needs to be gathered at multiple levels. Ideally, every school district should have an advisory committee of some of the best community leaders from the business and public service worlds, as should every state department of education and the U. S. Department of Education. The advice of these advisors should not be anchored in the assumption that educators know what to do and just need help building systems of management and accountability. Rather, it should include continual comparison of the methods of schooling to the most successful methods of learning and teaching in the productive adult world. On the output side, it should include the kinds of ideas being shaped by groups such as the Partnership for 21st Century Skills, as well as similar partnerships with more input from the world of public service.

American education today is like an athletic team with a wonderful history that has not been winning enough lately. To become a winning team again, we will need to look hard at what the best teams are doing today and change our strategies. This will not be easy. However, the cost of failure is high, so we cannot shrink from the task. We Americans are used to a higher standard of living than is possible in most of the world. In the long run, our children and grandchildren will have only the standard of living that their productivity – as both workers and citizens – can earn. Our education systems must prepare them to earn a decent life.