Spring 2011
Industry Study

Final Report
Education Industry

The Industrial College of the Armed Forces
National Defense University
Fort McNair, Washington, D.C. 20319-5062

EDUCATION 2011

ABSTRACT: The U.S. Education system is a major industry in and of itself, but more importantly, its product of trained and educated individuals becomes the feeder to each and every other industry, a point that is increasingly germane as we move into the knowledge-based global economy of the 21st century. The 2011 Education Industry Study chose to analyze education holistically as a complex system of systems, with the premise that the overall strength of America's education system lies within the flexible and adaptable nature of the entire system, rather than within one specific segment. Accordingly, optimizing the performance of the entire system requires not only analysis of challenges within individual component systems, but recognition of the inherent interdependence between them. Leveraging this interdependence by improving the linkages and transitions throughout the system, while enhancing the quality of our metrics for assessing performance, are essential to generating the most productive and globally competitive citizenry.

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PLACES VISITED

Domestic

American Express Corporate University, New York, NY
American Federation of Teachers, Washington, DC
American Council of Higher Education, Washington, DC
Bureau of Labor and Statistics, Washington, DC
Boston Latin School, Boston, MA
Century Foundation, Washington, DC
Commissioner, Massachusetts Elementary and Secondary Education, Boston, MA
Council of Great City Schools, Washington, DC
Educational Testing Service, Washington, DC
Embassy of France, Washington, DC
Embassy of Germany, Washington, DC
Embassy of the Republic of Korea, Washington, DC
Early Education Initiative, New America Foundation, Washington, DC
Harvard University Graduate School of Education, Cambridge, MA
Harvard University, Former Superintendent of Boston Public Schools, Cambridge, MA
Home School Legal Defense Association, Washington, DC
Knowledge is Power Program (KIPP) Infinity Charter School, New York, NY
Maryland State Department of Education, Baltimore, MD
Minuteman Regional High School of Applied Arts and Sciences, Lexington, MA
Montgomery County Public Schools, Rockville, MD
Montgomery College/Montgomery County Public Schools Partnership, Rockville, MD
Mountain View Alternative High School, Centreville, VA
National Governors Association, Washington, DC
National Defense Industrial Association, Washington, DC
New York City Department of Education, New York, NY
Northern Essex Community College, Haverhill, MA
Northern Virginia Community College, Annandale, VA
Potomac Job Corps Center, Washington, DC
Raytheon Corporation, Andover, MA
School of One, New York, NY
Teachers Panel, Washington, DC
Thomas Jefferson High School for Science and Technology, Alexandria, VA
US Department of Education, Washington, DC
US House of Representatives, Committee on Education and Labor, Washington, DC
University of Maryland, College Park, Maryland
Virtual High School (VHS, Inc), Maynard, MA
Washington DC Public Schools, Washington, DC
The Bill & Melinda Gates Foundation, Washington, DC
The Washington Post, Education Reporter, Washington, DC
The George Washington University, Chairman, Department of Teacher Preparation and Special Education, Washington, DC

International

Cambridge University, London, England
Department of Children, Family and Schools, London, England
Enfield County Girls' School, London, England
Ecole Maternelle, Paris, France
Ecole des Mines, Paris, France
Humboldt University, Berlin, Germany
John F. Kennedy High School, Berlin, Germany
Lycée Louis le Grand, Paris France
Office for Standards in Education, Children's Services and Skills (Ofsted), London, England
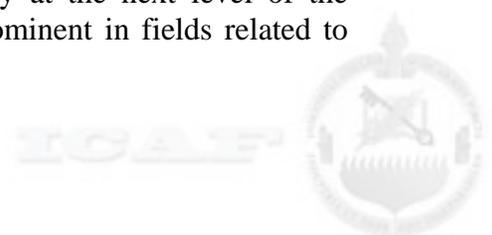Sachsen State House, Berlin, Germany

"And so the question is whether all of us — as citizens, and as parents — are willing to do what's necessary to give every child a chance to succeed. That responsibility begins not in our classrooms, but in our homes and communities. It's family that first instills the love of learning in a child….Our schools share this responsibility."[1]- President Barack Obama

Introduction

In the mid 1800s, Charles Dickens observed that "If its individual citizens, to a man, are to be believed, [the United States] always is depressed, and always is stagnated, and always at an alarming crisis, and never was otherwise."[2] To a great extent, however, the "realistic pessimism" that Dickens described has been balanced by America's "supreme optimism" in the resilience of its enduring values and belief in the American dream. In many ways, the United States education system is the embodiment of this tension. Our education system has, indeed, continuously adapted to new mandates and challenges despite a near-constant perception that it is in crisis. As a critical component of U.S. national security, this system must continue to improve to meet ever-increasing demands for highly skilled and productive citizens and workers. While recognizing the system's shortcomings and the impossibility of fully meeting all its goals, our Industry Study found cause for optimism in many of the innovations and reforms currently underway in U.S. education.

A brief historical overview demonstrates the dynamic nature of the U.S. education environment. Over the past half-century, U.S. education has undergone distinct phases, each characterized by different goals and definitions of success. Beginning with the landmark 1954 Supreme Court *Brown v. Board of Education* ruling that the concept of "separate but equal" was unconstitutional, the primary focus became *access* to public education. The Civil Rights Act of 1964 and the Elementary and Secondary Education Act of 1965 solidified America's commitment to provide free, compulsory, and equitable elementary and secondary education to <u>all</u> of its citizens. When a consensus later developed that access alone was not sufficient, President Reagan convened a commission to study the *quality* of education in America. In the 1983 *A Nation at Risk* report, this commission found that we were failing to ensure the quality of public education. America essentially followed the *Nation at Risk* roadmap during the "quality phase" for almost 20 years until bipartisan consensus was reached on a new mandate. In 2001, President George W. Bush signed the reauthorization of the Elementary and Secondary Education Act, commonly referred to as "No Child Left Behind" (NCLB) which focused on *accountability* in education. This "accountability phase" was intended to ensure "that all children …reach, at a minimum, proficiency on challenging state academic achievement standards and state academic assessments." This Act highlighted the achievement gap between the nation's social strata, differences in academic achievement among students in the 50 states, and stagnating U.S. achievement compared to students in other nations.

Today, our education system appears to be entering into yet another new phase that focuses on *outputs* and productivity, often expressed as the goal that graduates be "college or career ready", i.e. ready to perform successfully at the next level of the system or in the workforce. This concern is particularly prominent in fields related to

science, technology, engineering, and mathematics (STEM), where an increasing supply of qualified graduates is necessary to maintain future competitiveness.

Most education research focuses on conditions and opportunities resident within specific segments of the overall education system (e.g. elementary or secondary education). In contrast, our industry study chose to analyze education holistically as a complex system of systems, with the premise that the overall strength of America's education system is the flexible and adaptable nature of the entire system, not one specific segment. Accordingly, optimizing the performance of the entire system requires not only analysis of challenges within individual component systems, but recognition of the inherent interdependence between them. Leveraging this interdependence by improving the linkages and transitions throughout the system, while enhancing the quality of our metrics for assessing performance, is essential to generating the most productive and globally competitive citizenry. Our examination of America's education system proceeds by: defining the industry as a *decentralized system of systems*; examining current trends and promising initiatives; examining challenges and opportunities; and providing recommendations to enhance the performance of the overall education system. The paper concludes with four essays on representative topics from across the full spectrum of the education continuum.

Industry Defined: A Decentralized System of Systems

This study defines the education industry as "P-20+" (pre-kindergarten through career) to properly capture the full continuum of life-long learning. Within this continuum, there are four main components, each containing its own internal sectors, organizations, and methods of market delivery. The four components are: (1) *Early Childhood Education/Pre-K* (including child care services, public and private pre-kindergarten programs); (2) *Elementary and Secondary Education* (public, private, charter, magnet, home schooling, career and technical, alternative high schools, and virtual or online learning services); (3) *Post-Secondary Education* (public community colleges, other 2-year institutions, 4-year public and private universities, graduate institutions, and for-profit universities); and (4) *Life-Long Learning* (corporate training, online educational services, and job training centers for transitions and re-entry services). Figure 1 depicts these 4 components, as well as examples of the controls and mechanisms influencing the conduct and performance of the system. Highlighted in red within this model are arrows demonstrating the linkages and transitions between the components, with the overall desired output from the system being a productive and competitive workforce meeting the demands of the modern economy.
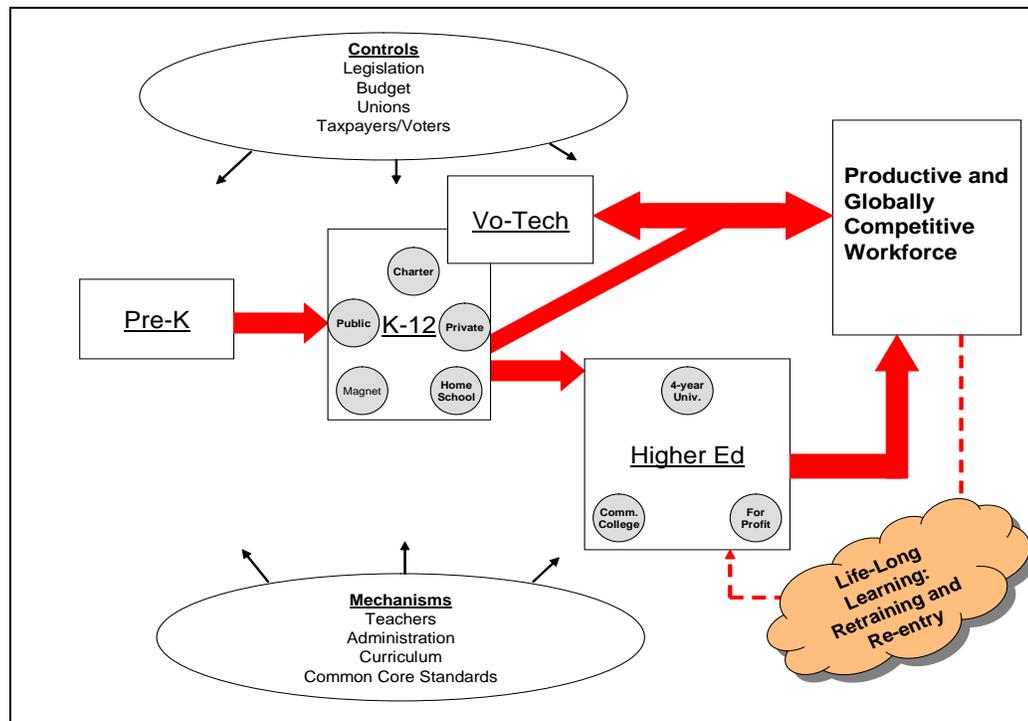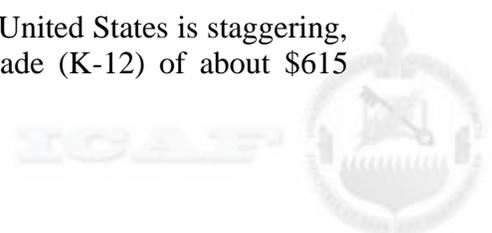
Figure 1: U.S. Education: A Decentralized System of Systems

Our domestic and international field studies illuminate the fact that each nation's education system is unique and heavily influenced by historical, cultural, and political factors. The American approach to education derives directly from the U.S. Constitution's Tenth Amendment, which states that "powers not delegated to the United States by the Constitution… are reserved to the States respectively, or to the people."[3] Thus, the defining characteristic of this American institution is its decentralization. By design it places most responsibility with state and local officials/organizations. The role of the federal government to influence education at the tactical and operational levels, i.e. in the classroom, is relatively small. While initiatives at the strategic level, such as requiring compulsory elementary and secondary education, improving access to higher education, and the current push towards greater accountability for performance, have been promoted by the federal government, the details of their application are largely determined at the state and local levels. Logically, therefore, "one size fits all" solutions to education problems tend to be unrealistic and unworkable in practice.

Another defining characteristic of the education industry is the large number of stakeholders involved in each of its subsystems, all of whom have different priorities and definitions of success. In the K-12 sector alone, for example, students, parents, teachers (often represented by unions), school administrators, school board members, county, district, state and federal education officials, politicians at all levels, and employers all bring unique and often passionate points of view to education debates. The multitude of stakeholders presents a truly "wicked" problem, requiring a holistic and long-term approach to address problems in order to truly make progress.

The scale and scope of education as an industry in the United States is staggering, with expenditures in public kindergarten through twelfth grade (K-12) of about $615

billion in 2011, servicing an estimated 50 million students.[4] Within higher education, 2010 expenditures were $431.8 billion, amongst colleges and universities, junior colleges, and for-profit universities.[5] In contrast, the requested DOD budget is $553 billion for FY2012.[6] Public school systems are supported by a patchwork of local, state and federal funding, with roughly 90 percent of funding from either state or local governments.[7] Moreover, because a large portion of local revenues come from property taxes, public schools even within the same state or metropolitan area vary widely in the resources they have available per student. Federal funding, while only roughly 10% of the total, tries to bridge these gaps by supplementing local budgets with additional dollars to provide, for example, additional resources to special education students or to provide disadvantaged students with additional resources to mitigate the impacts of poverty.

Not only is education a major U.S. industry in and of itself, but more importantly, its product of trained and educated individuals becomes the feeder to each and every other industry, a point that is increasingly germane as we move into the knowledge-based global economy of the 21st century.
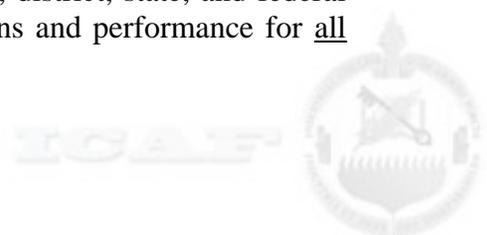
Current Conditions: Trends and Promising Initiatives

Throughout our study, we have been struck by the significant challenges associated with providing a high-quality education to every American, regardless of socio-economic status, learning abilities, or language capability. Achievement gaps, particularly for African-American and Hispanic students, remain high despite some narrowing over the past generation.[8] Attendance and completion of post-secondary education also shows significant achievement gaps.[9] Moreover, international assessments indicate that U.S. students' skills lag behind those of many other developed countries.[10] At the same time, we have been encouraged by the multitude of positive initiatives that are currently underway to address these challenges. As discussed earlier, the current drive for measurably improved outcomes in education has produced a great many successful and innovative programs. Whether these programs can succeed where previous initiatives have failed will depend, to a large degree, on commitment, persistence and consistency in carrying them out.

The scope of this study is not sufficient to conduct a systematic review of the hundreds of education initiatives ongoing nationwide in all the component systems. Instead, we will highlight several of what we believe to be the most promising program types. These initiatives can serve as examples and best practice models for replication and/or scaling up. Specifically, two key trends of note include: an emerging consensus among stakeholders on the importance of setting high expectations and measuring performance; and the flexibility presented by multiple pathways to educational attainment.

High Expectations and Measuring Performance
In the 2011 State of the Union address, President Obama stated that our nation's schools "should be[a] place[s] of high expectations and high performance."[11] Throughout our visits, this belief was reiterated at the school, district, state, and federal levels. There is renewed emphasis on raising the expectations and performance for all

students, parents, teachers, and administrators. This paradigm shift is an extremely positive trend in education.
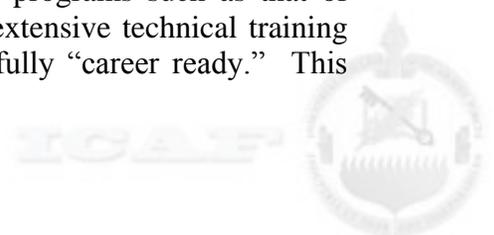
Setting high expectations requires great leadership in administration and quality teachers in the classroom. The common theme demonstrated by the systems and programs with the greatest improvement has been the emphasis on school leadership, particularly empowerment in the teacher hiring and assignment process.[12] Successful strategies include devolving as much power as possible to the school level, to be accompanied by strict accountability and the willingness to identify failure. The New York City public school system, under reforms initiated by former Chancellor Joe Klein, has shown great success in allowing individual school principals to control their own budgets and hiring in exchange for accountability for student performance.[13]

There is clear evidence that these high expectations can succeed in producing high performance. In many schools, failure is no longer acceptable nor tolerated. The Knowledge is Power Program (KIPP) charter schools provide an example of this new mentality, accepting "no excuses" for student failure to perform. These schools are succeeding in some of the poorest neighborhoods in the largest metropolitan areas, and they are outscoring schools with more resources who serve students from more affluent backgrounds.[14] While charter schools akin to the KIPP model are difficult to replicate on a large scale, many of their practices can be adapted for broader use in public schools (i.e. instilling students even at the early grades with the expectation that they will attend college, and providing information on pathways for them to do so).

Measuring performance accurately is a critical component of any reform effort. In this area as well, great progress is being made. The Common Core State Standards (CCSS) Initiative is a state-led, multi-faceted effort coordinated by the National Governors Association and the Council of Chief State School Officers (CCSSO) that resulted in a common core of state K-12 English/Language arts and math standards. To date, 43 states have committed to implementing the common core standards. The trend towards establishing a common point of reference for measuring student achievement supports the ultimate goal of optimizing the performance of our students, teachers, and schools across the nation. (See separate essay for more information on this initiative).

Multiple Pathways to Educational Attainment

Another promising trend is that of increased flexibility, including non-traditional options, to pursue education at all levels. In the K-12 component system, innovations include multiple programs aimed at leveraging technology to tailor individual learning programs. The School of One, developed by the New York City public schools, provides individual students a daily customized schedule that includes online exercises, one-on-one tutoring, small-group collaboration, and traditional teacher-delivered lessons. Progress is tracked through daily online assessments, enabling subsequent lessons to be tailored to areas of difficulty.[15] Companies such as Virtual High School provide hundreds of high school courses online to increase curriculum offerings for students regardless of location. So-called alternative high schools provide pathways for re-entry for those who have dropped out (Fairfax County, Virginia's Mountain View High School is a highly successful example of this model).[16] Technical programs such as that of Lexington, Massachusetts Minuteman High School provide extensive technical training as well as academic courses, producing graduates who are fully "career ready." This

technical curriculum, akin to Germany's well-developed apprenticeship system, provides a valuable model for success outside of traditional higher education.
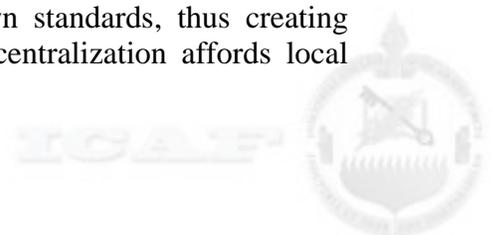
At the higher education level, the recent recession exposed the harsh reality of the modern economy – that "nearly half of all new jobs will require education that goes beyond a high school education."[17] In order to meet this demand, the nation's community colleges and for profit universities are playing an increasingly important role. The historical stigma associated with community colleges is dissipating as more and more students see them as providing good educational value at relatively low cost. In fact, community colleges now serve almost half of the undergraduate students in the United States. Through their affordability and active liaison with the high schools in the communities they serve, these colleges play a key role in improving the transitions and linkages between secondary and post-secondary levels of study. In a similar manner, the for-profit universities have made a tangible impact in post-secondary education by reaching out to previously underserved populations. Despite recent controversy about misleading marketing by some actors in the for-profit field, which needs to addressed, their strength lies in the fact that they offer flexible programs and, by investing in learning technology, can meet the needs of individuals in the workforce, military members, and other students for whom a traditional education is not an option.[18] (See separate essays for more detail on these institutions).

Challenges and Opportunities

The U.S. education system is clearly in a dynamic era. For sure, there is much work to be done, but there are shining examples of reform, innovation, and adaptability can be found in almost every state. Strong administrators and teachers exhibiting transformational leadership and effective teaching skills prove every day that socio-economic status, race, and gender do not have to be correlated to low achievement. So why does the 'crisis' persist? The challenges, and thus the opportunities, lie in three main areas: a staunchly decentralized system of service delivery, with huge disparities among the thousands of jurisdictions; a lack of alignment across the curriculum blocks even within each decentralized piece; and a stunning absence of metrics and assessment tools to determine the efficacy of education spending. As noted earlier, we believe the component subsystems of education are inherently interdependent, and therefore attempts to modify them must recognize and incorporate these critical linkages among components of the system of systems.

Decentralization

Decentralization poses a number of challenges in a nation concerned with ensuring both access and quality. In addition to inevitable funding disparities, school curricula, teacher employment, and other policies are set through locally elected or appointed school boards with jurisdiction over school districts and often with directives from state legislatures. School districts are usually separate from other local jurisdictions, with independent officials and budgets. Educational standards and standardized testing decisions are made at the state level. So while NCLB demanded accountability through assessments, it allowed each state to come up with its own standards, thus creating potentially fifty different definitions of success. While decentralization affords local
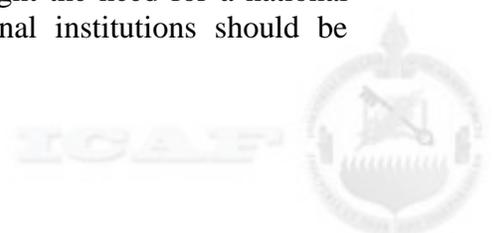
autonomy and can encourage innovation, this system makes it nearly impossible to ensure that all children in the U.S. are being afforded equal access to quality education.

Linkages and Transitions

Reframing the focus and discussion to define America's education system as a system of systems is a challenge. Unfortunately, the conventional approach looks at education through the lens of stove-pipes. Legislation, funding, and metrics tend to be focused within these stovepipes as well. Each stovepipe has powerful advocacy groups lobbying for their respective pieces of the puzzle. In reality, a primary source of strength of America's education model is the full system, not one specific segment. Unfortunately, because the component sub-systems operate largely in isolation from one another, at key transition points -- from pre-school to kindergarten, elementary to middle school, middle school to high school and high school to college and career -- gaps occur, leaving students ill-prepared for success at the next level (this is a phenomenon also noted in the United Kingdom, where the primary to secondary school gap is of particular concern).[19] Consequently, the effects of substandard preparation and poor alignment between high schools and colleges in particular, persist in college. Remediation is a far too common experience for many postsecondary students, with 40 percent of all college students taking at least one remedial course, at an estimated cost to the taxpayers of $1 billion.[20] Similarly, high school dropout rates remain unacceptably and persistently high for some groups. Youths at high risk of dropping out can and should be identified in middle school to allow for intervention that can improve their chances of success in high school. This presents an opportunity for creating strong, binding linkages that can smooth out these critical transition points, while providing a more cohesive and integrated educational experience that focuses value on student progress rather than on meeting minimums to push them into the next grade. Establishment of a progressive set of rigorous standards that are consistent across the nation would provide students, teachers and parents with a clear set of expectations and an uninterrupted path from elementary to middle to high school and then on to higher education. Adopting a systems approach will reduce the focus on the stovepipes, while pinpointing critical points of transition between the various levels in the system.

Metrics

How do we know how well or poorly we are doing in educating our citizens? The truth is we have little to no clear picture of achievement or gaps – there is no transparent feedback loop. All levels of the system lack consistent metrics to provide the tools necessary to measure the performance of our students, teachers and schools. Performance can't be improved effectively if we don't have meaningful metrics. For example, our industry study found that the current method of calculating post-secondary school graduation rates is not an adequate measure of how well these institutions are performing. Another barrier to measuring student achievement is the lack of robust, multidimensional measures of teacher effectiveness. Institutions at each educational level also need to be assessed. While the Adequate Yearly Progress (AYP) metric imposed by NCLB has many weaknesses, it serves to highlight the need for a national consensus on how our public schools and other educational institutions should be

measured. At the K-12 level, adoption of the CCSS and completion of common assessments based on the standards will be a step in the right direction.
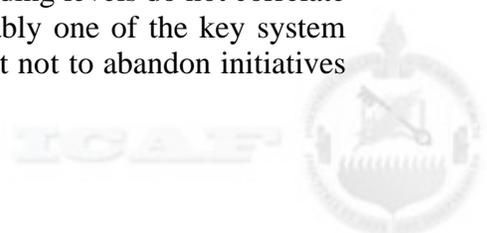
There has been movement on all of these fronts within the last three years. For example, The Bill & Melinda Gates Foundation funds ongoing projects to study multiple measures of teacher effectiveness. Meaningful measures will include, but not be limited to, student achievement and growth over time. The Gates Foundation's progress on teacher assessment already has key recommendations that can be followed; such as implementation of the common core standards and associated testing, and the Gates Foundation's efforts to create a data clearing house will bring needed transparency to what happens to students as they move from school to school in our highly mobile society. Teachers' unions, particularly the American Federation of Teachers (AFT), have recognized that the void in teacher professional development programs and evaluation negatively impacts the profession. While the AFT and other unions are not quick to assert individual responsibility for their teachers, their inclination to support professional development for teachers and a re-working of evaluation procedures is a huge step in the right direction.[21] Recognizing that a diploma may not be the only or the best measurement of student success or workforce preparedness, the Department of Education, through its Committee on Measures of Student Success, is working on formulating final recommendations (due by April 2012) that will provide alternative ways to measure success.[22]

Due to the decentralized nature of the U.S. education system, it is unlikely that one solution or silver bullet will be found to any of these key challenges. Rather, by improving linkages, transitions, and metrics used across these education systems, stakeholders will have better tools for analysis and better understanding of problem points in the various subsystems. This information, if properly understood and applied, will enable better policy choices.

Outlook

The U.S. education system of systems will continue to change and adapt in the coming years, likely at an accelerated pace. Five significant trends driving change will include severe federal, state, and local budget difficulties; demographic changes in the U.S. population; the implementation of common core standards, better metrics and methods of evaluation; development of new models and technologies which enable greater flexibility in educational delivery; and evolving definitions of success among stakeholders. Despite progress in meeting various goals, success will never fully be declared nor stakeholders satisfied, leading to yet more initiatives and efforts. Over time, however, this ongoing cycle will lead to qualitative improvements in U.S. education at all levels, particularly for under-achieving groups.

Over the short term, budget constraints are likely to be a hugely important variable in education policy. With all levels of government experiencing serious shortfalls, funding for education is already being cut in many places and levels of the system. Differing philosophies regarding the proper federal role (if any) in education are also closely linked to these budget debates. While higher spending levels do not correlate directly to higher levels of achievement, spending is undeniably one of the key system inputs. In trying to reduce costs, it will be critically important not to abandon initiatives

that have proven successful in raising achievement and improving quality. A common theme among successful education systems is the importance of consistency and perseverance in sustaining improvement.[23] To the extent that budget cuts force systems to reduce or abandon their goals, therefore, they will be detrimental. However, if the crisis serves to focus attention on obtaining maximum return on investment and better measuring success, it can be beneficial in focusing on higher-value investments. In higher education, continuously rising costs and reduced financial aid threaten to make college out of reach for an increasing number of students.

A second trend will be the need for education to adapt to meet the U.S. population's increasing diversity. Immigration growth will fuel greater demand for English as a Second Language (ESOL) instruction[24] and may challenge systems' capacity in some areas, while other areas will see student populations fall and face pressures for consolidation. The definition of "disadvantaged" will increasingly be related to socio-economic indicators and less to race or ethnicity. Demand for higher education, particularly at the community college level, is also expected to continue to grow (see essay on this topic).
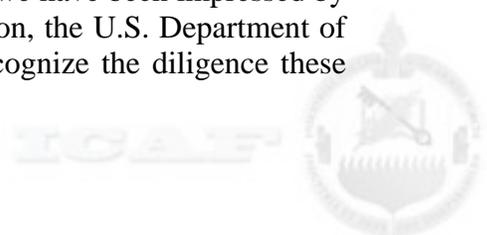
The implementation phase of the common core standards, including development of assessments and curricula that align with the standards, will be a major factor in K-12 education policy. As states begin to measure their students' progress using assessments based on the core standards, it is likely many will see decreasing proficiency rates, a phenomenon with potentially large political implications. There is a risk of backlash against the standards, possibly leading some states to abandon them. This would represent a serious step backwards in measuring educational achievement.

Innovation and greater flexibility in education is likely to continue, as more systems adopt tailored or individualized education plans for students, and more experiment with charter schools and other means to provide greater educational choice. An increased emphasis on incentivizing progress, such as Race to the Top, (as opposed to strict measures of proficiency such as those mandated by NCLB) is likely to continue. To the extent that these trends lead to measurable gains in achievement, they can be positive, especially in providing alternatives for under-achieving or at-risk students. However, rigorous evaluation and data will be critical to measuring success.

As we have seen, different stakeholders in education do not necessarily define success in the same way, nor are their definitions of success static over time. It is therefore inevitable that regardless of political changes, education will continue to be the subject of high-level attention and policy debate. While the trend toward defining success in terms of output (college and career ready) is likely to continue, debates and controversy over system success or failure (and who is to blame) will undoubtedly also continue. Such debates will be more productive if they can be informed by valid measurements, and if they can be conducted in a spirit of shared interest among stakeholders.

Recommendations

Throughout our study of America's education system, we have been impressed by the efforts demonstrated by the National Governors Association, the U.S. Department of Education, as well as state and local policy makers. We recognize the diligence these
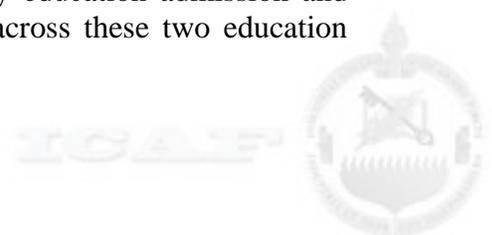
organizations apply towards advancing the education dialogue and sharing best practices among the states, in order to improve the performance of our schools. Our recommendations intend to complement these efforts.

At the national level, we feel it is essential to enhance our education system through continued bipartisan efforts to reauthorize the Elementary and Secondary Education Act. This reauthorization should include bold steps to introduce the implementation of long-term restructuring remedies that will endure beyond the current administration. As Congress and the administration undertake this comprehensive review, we recommend that policy makers view and evaluate the U.S. education as a system of systems that transcends the traditional model of educational stove pipes. Further, because we truly do not know how well or poorly we are doing in educating our citizens, we also recommend enhancing the metrics that are used to measure the strength and limitations in our education system.

Linkages and Transitions

Complementing the systems analysis approach to education, we recommend that the federal government and the states place a greater emphasis on the "P-20+ continuum" for policy making, funding, and start integrating the stovepipes together as a cohesive whole. To do that, the federal government should provide incentives, through education funding, to establish councils in every state and local school district with the charter to ensure seamless alignment and connectivity between coursework and expectations, at all grade levels, but most acutely at the secondary to post-secondary juncture. Examples of this integration exist in Montgomery County, Maryland and the state of Georgia. Montgomery County's model is built around the Montgomery College/Montgomery County Public Schools Partnership.[25] Recently, Georgia implemented the "Georgia P-16 Initiative," which includes state and local councils comprised of teachers, community leaders, and representatives from the business community. Georgia's initiative is "aimed at raising expectations and ensuring student success from pre-school through post-secondary education,…helping students move more smoothly from one education sector to the next."[26]

Additionally, programs such as Advanced Placement (AP) and International Baccalaureate (IB), as well as college dual enrollment opportunities for high school students, provide students with more realistic expectations of college level coursework. Expanding these programs, particularly to traditionally lower-performing groups, raises the performance bar for all and thus helps to shrink the existing achievement gap. Rigorous high school course content, targeted academic counseling, college outreach programs, and other programming needs to reflect this so that students are clear about what it takes to succeed in college, including community college. The U.S. focus on access to entrance to college while admirable, must be expanded to focus beyond entrance and more on outputs; i.e. success. Real college opportunity must include having a high probability of program completion. Furthermore, routine communication between secondary and post-secondary educators must be enhanced through policymaking forums. As K-12 standards are developed, college stakeholders must be brought into the process. Likewise, K-12 educators must be engaged as postsecondary education admission and placement policies are under review. Meaningful reforms across these two education

systems will be difficult if not impossible to implement without formally established communication and policymaking between them.
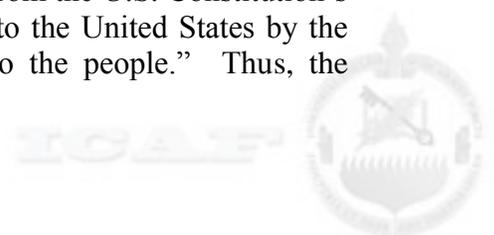
Metrics

It is clear that America needs standardized performance metrics for student, teacher, and educational institution performance so objective judgments can be made about preparing our children to be competitive and productive in the current and future global economy. Education in America cannot improve until we have appropriate metrics in place that indicate how we are doing and what, if any, progress we are making.

Our recommendations that specifically address metrics include:

1. Linking common assessment tests to the common core standards will ensure that children in every school district strive for the same objectives and take the same assessment tests.
2. Embracing formative assessment along with summative assessment in the overall student assessment process will allow both students and teachers to continuously evaluate how well students are doing without waiting for end-of-year summative assessments. This paves the way for an individualized education experience where students can advance or remediate depending on their level of comfort with a subject area.
3. Teacher assessments should be approached in a holistic and standardized manner that has been accepted by the unions. These assessments should be as objective as possible, based on the new students assessment test scores previously discussed, quarterly observations by school administrators and master teacher peers, as well as from student feedback.
4. Implementing tracking of students across districts and between schools (while protecting the privacy of personal information) will enable states to maximize their education dollars by encouraging greater alignment across grades, thus reducing the need to remediate students.
5. Redefining what it means to be successful in post-secondary education in order to gauge career readiness and not just college completion by reforms to systems such as the Graduation Rate Survey (GRS) and the Integrated Postsecondary Education Data System (IPEDS) would allow for the completion of career certificates linked to gainful employment (such as EMT certifications) to be counted towards a post-secondary institution's rating of success. In addition, better tracking systems can correct for the current anomaly in which college transfer students who graduate from their second school of higher education are considered "failures" in the first institution into which they originally matriculated. It is this metric that makes it appear that the U.S. graduation rate from post-secondary school is lower than it actually is.

Conclusion

The American approach to education derives directly from the U.S. Constitution's Tenth Amendment, which states that "powers not delegated to the United States by the Constitution …are reserved to the States respectively, or to the people." Thus, the

defining characteristic of U.S. education is its decentralization; by design it places most responsibility at the state and local levels.

Collectively, this U.S. education "system of systems" is a major industry in and of itself in which billions of dollars are spent annually on both K-12 and higher education. More importantly, its product of trained and educated individuals becomes the feeder to each and every other industry, a point that is increasingly germane as we move into the knowledge-based global economy of the 21st century. Accordingly, President Obama has called for our nation's schools to be places of high expectations and high performance.

Unfortunately, achievement gaps, particularly for students in high poverty areas, remain high despite some narrowing over the past generation. Attendance and completion of post-secondary education also show significant achievement gaps, and some international assessments indicate that U.S. students' skills lag behind those of many other developed countries.

At the same time, however, we have been encouraged by the multitude of positive initiatives that are currently underway to address these challenges. The current drive for measurably improved outcomes in education has produced a great many successful and innovative programs. Whether these programs can succeed where previous initiatives have failed will depend, to a large degree on commitment, persistence, and consistency in carrying them out.

Due to the decentralized nature of the U.S. education system, however, no one solution will be found to address existing challenges. Rather, multiple mutually supporting initiatives across the system of systems will enhance the overall performance of the system. By improving linkages, transitions, and metrics used in education, stakeholders across the country will have better tools for analysis and better understanding of problem points within the various component subsystems.
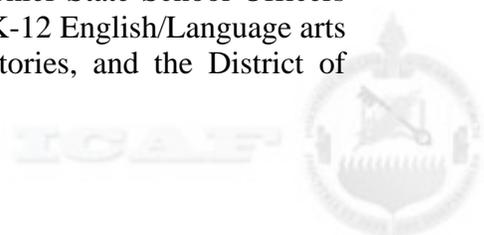
Essays on Major Issues

We are including the following essays because they highlight some of the major issues that our education "systems of systems" is facing today. The first essay calls for the adoption of common core standards. The next two essays identify approaches to higher education that can support our national objectives for students to attain post-secondary credentials. Finally, our fourth essay identifies education concerns and actions of our nation's national security employers.

THE COMMON CORE STATE STANDARDS INITIATIVE

The Common Core State Standards (CCSS) Initiative represents one of the most significant reforms to U.S. education in recent history. This essay describes the historical evolution of the common core standards and identifies recommendations for the way ahead.

To ensure that all students, no matter where they live, are prepared for success in post secondary education and the workplace, a state-led effort coordinated by the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO) resulted in development of a common core of state K-12 English/Language arts and math standards. Participants from 48 states, two territories, and the District of

Columbia came to a consensus on the essential knowledge and skills necessary for the nation's students to be college and career ready.
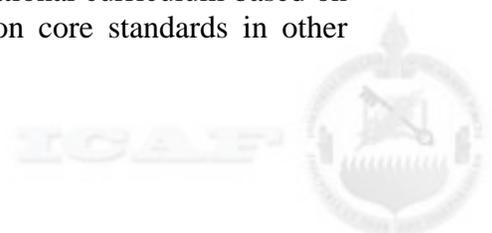
The CCSS process began in the summer of 2009 with the development of college and career readiness standards for math and English/ language arts. From the standards, a K-12 learning progression was developed, and the final version of the Common Core State Standards was released on June 2, 2010. They are an outgrowth of the 1994 congressional reauthorization of ESEA that took the step of suggesting that states establish clear content standards defining what students should know at each grade, administer rigorous tests to see whether students have mastered the material, and hold students, teachers and school administrators accountable for results.[27] Over the course of the 1990s, states drafted and adopted their own sets of standards.

No Child Left Behind (NCLB) then took the standards-based reform movement one step further by requiring states to (1) publish content standards in English/Language arts and math for each grade 3 through 8 and one secondary grade, as well as standards for science in three grades, and to (2) assess students in these grades and subjects annually and to hold schools accountable for making adequate yearly progress (AYP). The NCLB Act required states to develop their own standards, assessments to measure performance, and performance standards to determine proficiency. The problem is that a student scoring "proficient" in Michigan on the states 4th grade math assessment might not be able to pass the 4th grade math assessment in California. Michigan sets its "proficiency passing score" among the lowest in the country. In fact, a student scoring "proficient" in Michigan may be scoring worse than five-sixths of the other 4th graders in the country. This has been referred to as the "proficiency illusion."[28]

Research shows state standards and associated state testing does not correlate well with the NAEP testing NCLB mandated in the 4th and 8th grades. Data shows in 2009 87.9% of 4th graders scored as proficient on the Michigan state test for math and 82.8% scored as proficient on the state test for reading. However, only 35.1% and 29.7% of 4th grade students scored as proficient on the NAEP for math and reading respectively. When a state's education funding is tied to its own standards and evaluation, there is little motivation for excellence. The data presented shows over the period from 2003 to 2009 Michigan 4th graders have gone from 65% proficient to 87.9% proficient which would seem to indicate more than adequate yearly progress. However, reviewing the NAEP data indicates that Michigan 4th graders moved from 34% to 37.7% from 2003 to 2005 but since then have slid to 35.1% proficient – some would say less than adequate yearly performance.

The amount of contradictory data on the effects of NCLB is astounding. Most researchers have found that NCLB has failed to live up to its goals of substantially increasing academic achievement and closing the achievement gap between racial, ethnic and income groups. They agree that the greatest affect of the standards-based reform movement is that it has led to greater awareness of and attention to the academic performance of disadvantaged students.

As of January 2011, 43 states and DC have voluntarily adopted the CCSS.[29] This study's recommendations include: (1) development of a single common core assessment and associated performance standard; (2) development of a national curriculum based on the CCSS; and (3) continuing the effort to develop common core standards in other subject areas, particularly science and world history.

Currently two multi-state consortiums, PARCC and SBAC, funded with $330M in federal grants, are developing both common assessments aligned to the CCSS, and associated performance standards that will provide a common metric for measuring student performance and will enable cross-state comparisons of results.[30] The main objective of both groups is to provide formative and summative assessments that can help students and teachers know exactly what students learned and whether they are on track for college or career readiness when they graduate.[31] The leaders of these consortia need to join forces to develop a single assessment system. The advantages of a single CCSS are eroded by having more than one set of assessments, and dual assessment systems could jeopardize cross-state comparisons of results.

The U.S. is one of only a few countries that do not have a national curriculum. According to the Shanker Institute, a more centralized national curriculum would lead to higher student achievement which would in turn lead to increased economic competitiveness.[32] A common core curriculum would bring coherence to the whole educational reform endeavor, providing teachers with the tools they need to teach to the CCSS. Federal grant money should be provided to a state consortium to develop a coherent, sequential set of guidelines, based on the CCSS, specifying the content knowledge and skills that all students should be expected to learn in K-12.

Finally, the government should encourage the NGA and CCSSO to develop common core standards in other subject areas, particularly science and world history. For our students to be competitive globally, they must understand the world around them. Our economic prosperity and national security depend on the ability of our education system to prepare students for career and college readiness.
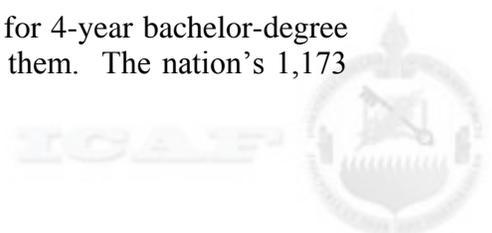
<div align="right">Richelle Sweeney</div>

COMMUNITY COLLEGES: AN OVERLOOKED NATIONAL RESOURCE

Once we are better able to ensure that our students are prepared to be successful in our institutions of higher learning, investing more heavily in public community colleges, which traditionally have been under funded, holds promise not only for attracting students who might not otherwise apply to college, but also for helping them attain their completion degrees and certificates. This essay explores the growing niche of our community colleges among our institutions of higher learning.

The need for an educated workforce in our country has never been greater, in that the majority of new jobs that will be created by 2014 will require some amount of postsecondary education.[33] The May 2010 U.S. National Security Strategy, in fact, recognized this need when it stated that the United States will…restore leadership in higher education by seeking the goal of leading the world in the proportion of college graduates by 2020.[34] The question that arises, however, is whether America's colleges are positioned to regain the world lead, because doing so would require adding an additional 5 million graduates during the next decade. According to the Bill and Melinda Gates Foundation, currently only about 53 percent of Americans go on to earn a degree or credential after high school and only about 38 percent of students who enter 2-year community colleges leave them with a certificate of completion or an associate's degree.[35]

Certainly, policy makers can continue federal support for 4-year bachelor-degree institutions and financial support for the students who attend them. The nation's 1,173
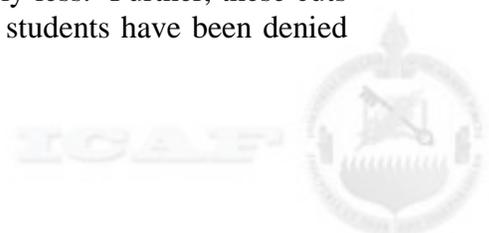
community colleges, however, already serve almost half of the undergraduate students in the United States, provide open access to postsecondary education, prepare students for transfer to 4-year institutions, and provide workforce development and skills training.[36]

Further, the rising costs to attend a 4-year college make it financially difficult, if not impossible for many potential students to attend college, and also makes dedicating more federal financial resources to 4-year institutions a less viable option for achieving the National Security Strategy higher education attainment goal. According to combined data from the Bureau of Labor Statistics and the College Board, while the cost of living increased roughly 2.5-fold between 1978 and 2008, college tuition and fees for a bachelor's degree increased almost 10-fold. Even after controlling for inflation, 2008 college tuition and fees still posed three times the burden as they did in 1978.[37] Data from the National Center for Education Statistics show that tuition and room and board rates for combined private and public 4-year institutions increased 136 percent between 1980 and 2009. For comparison, their data show that the rate of increase at 2-year public community colleges was 51 percent during the same time period.[38]

Adding to this dilemma are the limitations in the Pell Grant program that Congress has authorized to provide support to students in financial need who are pursuing a college education. According to the Department of Education, Pell Grants are considered a foundation for financial aid, to which aid from other federal and nonfederal sources might be added. The maximum Pell Grant award for academic years 2010-11 and 2011-12 is $5,500.[39] In academic year 2008-09, however, it cost, for public institutions alone, $14,256 to attend a 4-year institution and $7,567 to attend a 2-year institution. That the largest Pell Grant currently awarded is $5,500 suggests that the Grant program, by itself, may not be succeeding with its original mission to provide students who might not otherwise attend college with sufficient financial aid that would make college attendance possible, and that some other form of remedy might be needed.

Investing more heavily in community colleges, therefore, represents a viable option, given their relative affordability. Doing this, however, will be a paradigm shift in that community colleges have historically received approximately 20 percent of state appropriations for higher education when compared to 4-year public institutions.[40] Further, the increasing enrollments at local community colleges suggest that this level of funding is no longer sustainable. In late October 2010, the American Association of Community Colleges conducted a survey among its member schools and found that enrollment in community college grew in 8 out of 10 years between 2002 and 2010, and by more than 20 percent to around 8.2 million students between 2007 and 2010 alone. Due to this growth, 1.4 million more students were enrolled in community colleges in the fall of 2010 than in the fall of 2007.[41] For balance, it is important to note that, by 2009, college enrollment overall was at its highest levels across the board.[42] The growth during the recession, however, was greatest among community colleges. The data also found a larger percentage increase at community colleges in full-time enrollment than in part-time enrollment.[43]

These surging enrollments at community colleges over the past few years have not been met with proportional increases in fiscal support, however, leading the public 2-year institutions to do more with less, or, in some cases, simply less. Further, these cuts are beginning to hit core educational services; in some cases students have been denied

access, in a system traditionally known for its open access, to classes through course reductions and limitations on enrollment.[44]

It is the recommendation of this essay that federal policymakers reconsider a decision that would have given greater funding our nation's community colleges at a time when we most need these schools for the roles that they play. In July 2009, President Obama announced his American Graduate Initiative, a plan that would place community colleges at the forefront of the country's effort to regain global prominence in higher education attainment, and he also discussed funding to help accomplish that task. Among other things, the American Graduate Initiative specifically would have provided $12 billion over the next decade as part of a financial package that would cut waste out of the student loan program and increase Pell grants; offered competitive grants for community colleges to pursue innovative, results-oriented strategies in exchange for federal funding; funded programs that connect students seeking jobs with businesses that are looking to hire; challenged schools to find new and better ways to help students catch up on the basics, such as math and science; and proposed new funding for innovative strategies that promote not only enrollment in a community college program but also program completion.[45] While President Obama endorsed the Initiative as a higher education game changer, Congressional lawmakers dropped the bill as part of a political compromise on health care and education reform in March of 2010.[46]

Increasing the proportion of Americans whose achieve educational attainment extend beyond a high school diploma is a national priority, and community colleges, which educate nearly half of all undergraduates, are committed to being a part of the solution. If properly supported, they can play a critical role in meeting the national priority. Asking community colleges, however, to graduate more students with insufficient funding runs counter to that goal. Failure to support our community colleges financially will lead to an outcome that we, as a nation, cannot afford.
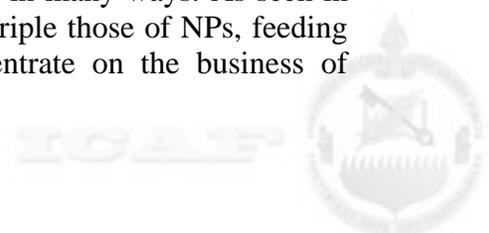
David Moser

FOR-PROFIT UNIVERSITIES' RELATIONSHIP TO IMPROVING U.S. EDUCATION VALUE: PART OF THE PROBLEM OR PART OF THE SOLUTION?

Beyond providing support for our nation's 1,000+ community colleges, this essay examines the role that For-profit (FP) universities can play in our nation's higher education system and enhancements to improve the services they provide. FPs are a critical part of value creation and support national objectives with their innovation, competitiveness, and diversity as a higher education alternative.

FP universities are one of the fastest growing institutions with a booming, 225 percent increase in enrollment over the past decade.[47] The FP industry consists of 622 institutions competing in a $24.8b market, where the University of Phoenix (UOP), Devry, and the Career Education Group lead with one quarter of its share.[48] Unfortunately, their rapid growth has outpaced their oversight of student loans, recruiting practices, and degree quality and they have come under increased scrutiny from the government, non-profits (NPs), and taxpayers alike.

FPs create value for the U.S. higher education system in many ways. As seen in Table 1, the two year degree graduation rates of FPs almost triple those of NPs, feeding many four year candidates to NP institutions. FPs concentrate on the business of
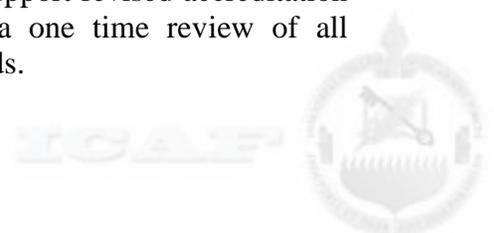
education and investment in learning technology and teachers, yielding improved learning environments and smaller teacher to student ratios. UOP is a prime example of this, leading the education industry in learning development for on-line courses, live, on-line tutors, and a teacher to student ratio of one to fifteen for most courses. FPs also provide a great opportunity for students who are either unable or unwilling to attend the traditional NP institutions, and serve the most diverse populations, with over 50 percent working adults, 40 percent minorities, and 66 percent women.[49] They offer flexibility for U.S military members with their global reach and provide opportunity for the most low income students, as 88 percent of their full time, low income students secured Pell Grants, compared to a 68 percent average at NPs.[50] Lastly, they are agile and adapt quickly to the demands of the higher education and business sectors with whom they partner. With less bureaucracy, new curricula design and teaching methods can be implemented rapidly.   As seen in Measure of Proficiency and Progress (MAPP) testing, this flexibility enables FPs to close students' relative knowledge gaps, between freshman and senior years, better than the national average.[51]

In order for them to continue to create value, FPs must use a "whole-of-education" approach as illustrated in Figure 2, closely coordinating with the Department of Education, and other stakeholders such as state and local governments, alumni, and other higher education institutions. As UOP President and CEO, Bill Pepicello stated, "A successful for-profit higher education enterprise has to survive on the tension between the academic side and the business side of the house."[52] Ultimately, this approach must focus on improving the accreditation process, enhancing loan stewardship, and supporting gainful employment.

Accreditation is at the center of all academic institutions and is the greatest issue that impacts the core characteristics of FPs. A legitimate accreditation, enables them to confer quality degrees and certifications, qualify for Title IV funding, and achieve credibility with their stakeholders, especially the education and business sectors. But the current accreditation process is opaque, impairs student mobility (only 18 percent of FP students are able to transfer successfully into NPs), and impedes quality of FP degrees.[53] Accreditations are conducted by 77 different organizations (7 Regional and 70 national), using varying metrics, largely dependent on self reporting, with most final reports designated confidential. FPs span several states, regions, or countries, therefore it is more practical and economic for them to align with a majority of the national agencies. Due to their large numbers and relative youth to regional agencies, national agencies encumber FPs from accreditation parity with NPs. Currently, there are initiatives from most stakeholders in the higher education industry to address these issues, but they are being conducted in uncoordinated, parallel paths. Inconsistency on credit hour definition and the Department of Education's initiative to hire 60 additional staff members to develop an undercover program to probe FP accreditation, recruiting, and loan practices are negatively impacting forward progress.[54]

This essay identifies several recommendations to address these issues. First, through a Whole of Education Approach, the Department of Education needs to lead a more effective capitalization of favorable stakeholder will, such as the Senate and House Education Committees, for reform by coordinating them to support revised accreditation benchmarks, open source final accreditation reports, and a one time review of all accrediting agencies to verify they are upholding U.S. standards.

Second, enhancing loan stewardship by FPs is progressing forward and must continue in order to succeed. Although FPs comprise less than ten percent of the overall higher education population, they account for 43 percent of student loan defaults with 98 percent of all students graduating with debt.[55,56,57] Despite this relatively small share of total federal loans, it has still destroyed many students' credit ratings, degraded their ability to access future loans, and given a black eye to the FP community. Unfortunately, this stems from a combination of bad acting FPs, hard economic times, and lenient government regulations. However, the Department of Education and the higher education community as a whole are demonstrating a positive whole of education approach for this issue. For example, new legislation requires that tuition rates are on all websites as well as loan eligibility constraints. And FPs are self starting reforms such as improving recruiting practices and financial counseling for prospective students. For example, UOP now requires students with less than 24 credit hours to take a three week, no cost orientation course to become familiar with all these issues.[58] With all these positive efforts, the Department of Education must continue to build on this wave of loan reform by aggressively monitoring these new policies and ensure students are continually educated and assessed in the loan process by university loan officers.
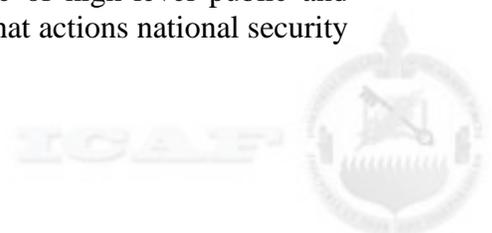
Third, Gainful Employment is a concept that is essential to the success of all higher education graduates, but still being defined by the Department of Education. This important initiative will increase transparency of FPs through the posting of job placement rates and expected salaries. Its value as a metric for accreditation and Title IV loans is being nationally debated, and opinion polls show an even split between its support and opposition. The Department of Education needs to capitalize on the current support of the President, as well as 38 major nongovernmental organizations, hailing it as a major step to improve FP transparency and loan stewardship.[59] The Department of Education must move forward and define this as the "estimated job availability and salary for a student, at the time of graduation." If the Department of Education is successful, these efforts will improve the degree of student graduation expectations, provide for more prudent loans, and establish a powerful metric in the accreditation process.

The success of FP universities is critical to national security to provide the best educated citizens in the world and reach the President's goal of over five million college graduates by 2020. They provide critical educational capacity as an alternative higher education choice, serving a majority of lower income, minority, and working adult candidates. By improving their transparency through accreditation, continuing with loan stewardship reforms, and adopting gainful employment, FPs will regain their credibility. With the support of the Department of Education through a whole of education approach, they will continue to create value through their innovation, flexibility, and quality degrees.

Stephen Blasch

EMPLOYER INVESTMENTS IN THE FUTURE U.S. NATIONAL SECURITY STEM WORKFORCE

Concerns about the quality of education in fields related to science, technology, engineering, and mathematics (STEM) are a constant source of high-level public and policy attention in the United States. This essay focuses on what actions national security

employers (both public and private sector) are taking to ensure today's students will meet tomorrow's workforce needs.

While employers have a high level of commitment to improving STEM education and hundreds of initiatives are underway, data on their effectiveness is lacking, making it difficult to identify the highest-value investments. Despite budget constraints, sustained federal policy leadership is vital and should include better coordination of federal STEM programs.

There are dozens, if not hundreds, of studies available that compare the United States' future workforce needs with the output of our education system. Most share the conclusion that in the STEM fields, the U.S. has too few graduates with the skills necessary for the technology-intensive jobs of the future. Moreover, other research indicates increasing gaps between the STEM skills of U.S. students and those of other countries.[60] On the other hand, skeptics point out that the "looming shortage" of scientists and engineers has been a perennial theme in U.S. education since the 1960's, with the predicted crisis never materializing.[61] Regardless of the severity of the future shortfall, this study indicates that national security employers are not waiting to take action, but are proactively working to improve STEM education.
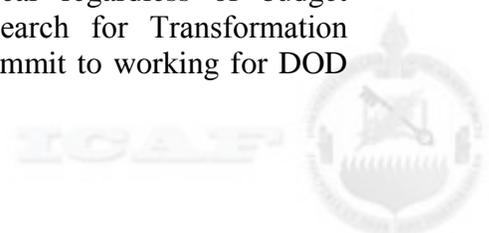
This study is not a comprehensive review of ongoing STEM initiatives. Rather, it seeks to highlight representative samples of the efforts of a key stakeholder group in the belief that employers, as consumers of the education system's output, have a uniquely valuable perspective on its quantity and quality.

National security employers are working to increase *quantity* by attracting more students to STEM careers and to improve *quality* by ensuring curricula match future workforce needs. These efforts can be broadly divided into five categories:

K – 12 Direct Outreach to Students: Direct contact with students is a popular investment. At the lower grade levels, the goal is to excite and interest children in science.[62] Initiatives such as the DOD STARBASE Program provide "hands-on, minds-on" activities.[63] NASA's Explorer Schools offer classroom-based activities designed around actual NASA missions.[64] At the high school level, many initiatives involve science or engineering contests. For example, the Air Force Association's CyberPatriot Program, sponsored by Northrop Grumman, is billed as "the world's largest cyber defense competition."[65] While this category has great potential to increase the future STEM workforce, it is one of the most difficult in which to track how program participation affects individual students' choices over time.

Outreach to Teachers: Increasing the number of "STEM-capable" teachers is considered a high-return investment in quality. Current programs include Change the Equation, a CEO-led business coalition, which has a special emphasis on teacher development.[66] Lockheed Martin has partnered with the University of Central Florida to create TeachME, an innovative teacher training classroom simulation.[67] Such programs show great promise, and should be studied to identify linkages between teacher training and increased student proficiency.

Scholarships and Internships: Most national security employers have such programs, often targeted toward under-represented groups. For example, United Launch Alliance (ULA) hires dozens of college interns each year regardless of budget fluctuations.[68] NDEP's Science, Mathematics, And Research for Transformation (SMART) program provides scholarships to students who commit to working for DOD

after graduation.[69] Some who promote STEM education, however, see scholarships as less valuable investments because they do not widen the STEM pipeline and represent relatively large resource investments for few students.[70]

Partnerships with Educational Institutions: Through partnerships, national security employers are directly influencing the education system. The intelligence community's largest partnership is the National Centers for Academic Excellence (CAE), jointly sponsored by the National Security Agency and the Department of Homeland Security.[71] Designation as a CAE involves certification that the institution's IA programs meet specific requirements, and enables faculty to collaborate directly with the intelligence community and students to receive scholarships and grants.[72] Many technology firms sponsor Project Lead the Way. Its partnerships with schools include science curricula with complete course materials and training opportunities for teachers.[73]
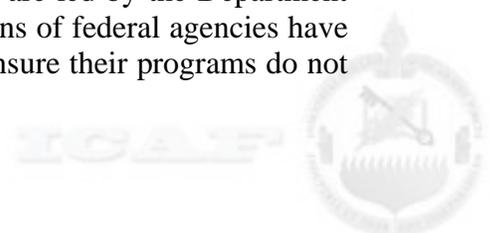
STEM Advocacy: Employers are actively engaging with all levels of government to ensure support for STEM survives in an era of severe budget constraints. The National Defense Industrial Association has its own STEM Workforce Division that is active in promoting pro-STEM legislation,[74] and has created the Business and Industry STEM Education Coalition (BISEC), open to other business associations, to form a "unified front" for STEM initiatives.[75] STEM priorities traditionally tend to attract bipartisan support, and the Congressional STEM Education Caucus is dedicated to strengthening STEM at all educational levels.[76] Current efforts aim to ensure that STEM initiatives, including a variety of programs in individual agency budget proposals,[77] are protected despite tight budgets and that the Common Core Standards include science.

All these areas of employer involvement in STEM education represent valuable opportunities to improve the future U.S. workforce. To maximize the value of their efforts, this essay recommends that national security employers consider the following actions:

Develop Metrics to Track Effectiveness: In order to obtain the best return on their STEM investments, employers need to design and use meaningful metrics to track effectiveness. Current measurements too often focus only on the program budget and number of participants. More intensive means are required, including maintaining contact with participants to track educational performance and choices; creation of comparison control groups; and use of external evaluations. Employers are working to improve such metrics. Raytheon and the Business – Higher Education Forum have developed a systems dynamics STEM Education Model to identify the highest-leverage investments.[78] Another promising approach is that of Shades of Blue, an aerospace non-profit which invites students to become members. The organization maintains long-term contact with members by holding periodic events; providing career guidance; assisting with college applications; and even helping with job placement after graduation.[79]

Work in Industry – Education Partnerships for Maximum Impact: Partnerships between industry and academia offer great potential to leverage the strengths of each stakeholder by integrating their efforts. Because U.S. education is so decentralized, partnerships at the local level are especially important. Collaboration between business associations and academic consortia can attract maximum political leverage.

Better Coordinate Federal Programs: Federal efforts are led by the Department of Education and the National Science Foundation,[80] but dozens of federal agencies have their own initiatives and budgets.[81] These agencies need to ensure their programs do not

overlap or duplicate the work of other agencies, and that they are employing common or compatible evaluation metrics. Most do not currently meet this standard,[82] leaving them vulnerable to budget cuts.

National security employers' leadership and creativity in working with other stakeholders to improve STEM education is commendable. Such partnerships should be encouraged and program effectiveness should be rigorously evaluated. When successful programs are identified, they should be replicated and expanded. Employers should continue to advocate for STEM priorities; state and local implementation of rigorous science and mathematics programs; and for greater integration of federal STEM programs to reduce duplication and increase efficiency.

<div align="right">Karin Lang</div>

End Notes

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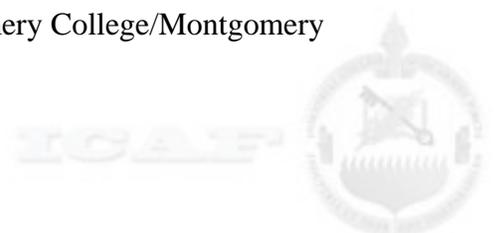
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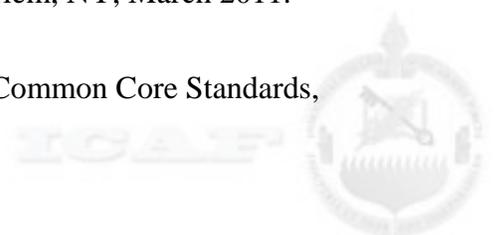   Public Schools Partnership, 31 March 2011.

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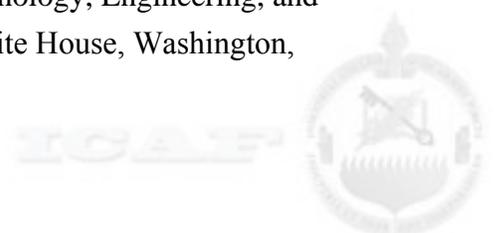03PBL, http://www.aacc.org, September 2010.

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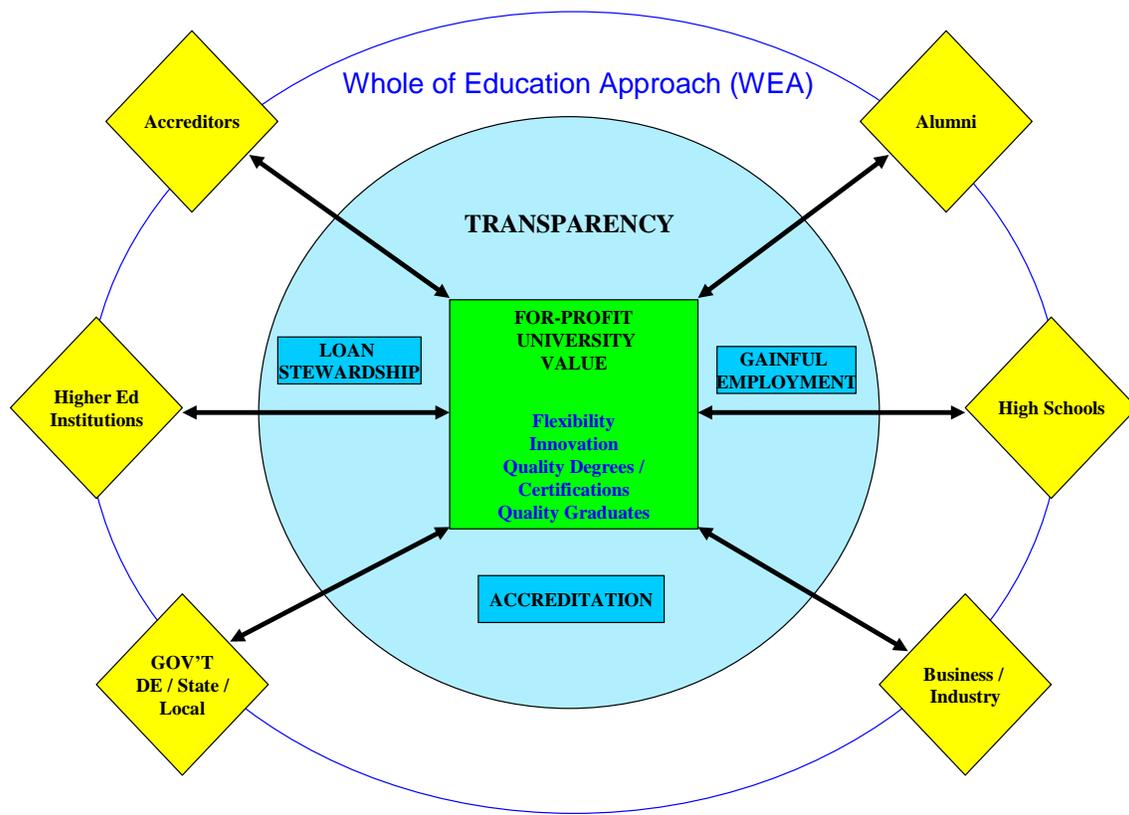http://www.whitehouse.gov/administration/eop/ostp, March 2011.

Figure 2: For-Profit Value Creation Framework

Table 1: For Profit and Non Profit Comparison Statistics

Category	FP	NP
Average Tuition Cost (in state resident)	$14k[82]	$7k[82]
Student Population (Undergraduate)	1.5m[82]	15.3m[82]
Student Population (Graduate)	.2m[82]	2.4m[82]
Total number of Institutions	622[82]	5,136[82]
Student Loan Default Rate	11.6%[82]	4%[82]
Graduation Rate 4 Year Degree (within 6 years)	16%[82]	60%[82]
Graduation Rate 2 Year Degree (Within 4 years)	60%[82]	22%[82]
Title IV aid	23%[82]	77%