Educating for Global Competitiveness

A white paper on education in the 21st century
By Dr. Jim Goodnight, SAS

"In times of drastic change, it is the learners who inherit the future. The learned usually find themselves no longer equipped to live in a world that no longer exists." E. Hoffer

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Abstract: To meet global competition, it is often argued, a nation must spend more on education. While that is true, what is even more important is how the money gets spent. Five guiding principles for evaluating 21st Century educational policies are presented.

By Dr. Jim Goodnight

From Boston to Bangalore to Beijing, education is the engine of economic growth. Whether we are discussing poverty alleviation, anti-terrorism or innovation, the discussion must begin with education.

There is legitimate concern in both Europe and the US that our education systems are not fully preparing students and communities to thrive in today's knowledge-based economy. Indeed, if communities and countries want to prosper on the road ahead, we must support bold, innovative, and transformative education policies and practices.

In the political debate over education policy, "boldness" often gets translated into expensive. Certainly, governments must increase their investment in education at all levels – primary through life-long learning. The data suggest some regions of the world – including many European Union nations – simply aren't spending enough. The EU is currently considering increasing its own role in education through the formation of a European Institute of Technology (EIT).[2]

While the aim of creating a world-class research university is admirable, the overall question of funding of higher education is more critical to address. The success of the US university system is due in part to the alumni endowments and competition between universities for the best teachers and students. Harvard University's endowment is $29 billion. The Massachusetts Institute of Technology (MIT), often cited as a model for the EIT, has an endowment of $8.4 billion, which has grown on average 9% per year for the past 20 years. Oxford and Cambridge Universities are the only European institutions with endowments over $500,000.[3] While endowments and competition are important factors in the success of the US higher education system, other success factors include the openness and diversity of institutions, each with very different missions, as well as providing university faculty with the freedom and resources to pursue their academic interests. This culture of innovation and creativity is at the heart of the system's success.

* Dr. Goodnight is CEO and Founder of SAS, the leading company in business-intelligence software. Prof. Mark Milliron, University of Texas at Austin, contributed to this report. Correspondence to Dr. Goodnight at SAS, Worldwide Headquarters, Cary, North Carolina, USA. Phone: (1-919) 677-8000. Toll Free (US): (1-800) 727-0025. Fax: (1-919) 677-4444.

Wrong models for the information age

But the size of the educational budget is only one variable in the equation that translates knowledge into economic growth. Perhaps more important is how that money gets spent. The post-war tradition in Europe is to provide equal access to university education for all students. With a few shining examples, the practical result has been an increasingly mediocre university system. While the US system with its declining taxpayer support and commensurately skyrocketing tuition is not an acceptable alternative, what is indisputable is that competition in education creates world-class institutions, just as competition in business creates world-class companies.

A Lisbon Council study by OECD education expert Andreas Schleicher notes that Europe is falling behind in the quality and quantity of its graduates, in the openness of its systems to students from all social backgrounds and in the availability of education and training to those who need it most. According to the study, social background plays a larger role in determining a student's performance in Germany, France and Italy than in the US. For example, German children with parents in white-collar, high-skilled occupations are four times more likely to take the path leading to university than those with parents from blue-collar or low-skilled occupations, even if the students display the same level of educational performance at an early age[4]. You cannot create a pseudo-egalitarian university system in a culture still dominated by class differences and expect a different outcome. The goal ought not to be the creation on "MIT of Europe" that will educate the elite few; the goal must be to create a strong and inter-connected European university system that will compete with any other countries' university system.

Most of our schools in Europe and the US are using an industrial factory model on an agrarian calendar trying to meet the needs of an information age. We are trapped in old models designed for a very different time. Our arguments are too often about finding funding rather than fundamentally redesigning the educational system. We expend too much energy testing the outcomes or outdated models and too little energy trying new technologies.

Governments and stakeholders must examine the policies, programs, and practices in education systems and ask the hard questions about whether or not they are improving or expanding learning and, more importantly, how does one know. In the 19th century, countries that wanted to compete in the industrial economy founded and funded secondary schools, tertiary schools, community colleges, and adult-training courses. And as the creative economy emerges, we need to ask: What now should we initiate and fund?

In this paper, we have tried to identify the success factors for educating for global competitiveness.

Education matters for economic competitiveness

As the World Economic Forum recently underlined in its Global Competitiveness Report[5], "Education and training have emerged as key drivers of competitiveness, ensuring that the labor force has access to new knowledge and is trained in new processes and the latest technologies… A country's ability to absorb new technologies, to produce goods and services that can reach standards of quality and performance acceptable in international markets, to engage with the rest of the world in ways that are value-creating, is intimately linked to the quality of its schools, to the priority given to training in mathematics and science, and to the existence and accessibility of specialized research and training centres."

Günter Verheugen, European Commissioner for Enterprise and Industry and Vice President of the European Commission, recently[6] made a similar point: "For nations like the EU and the United States to be competitive going forward, we must compete on our strengths…Our strengths stem from our knowledge community/base, from our intellectual capital and how we as nations invest and nurture current and future intellectual assets."

Education is struggling to deliver what is needed

Governments, industry, and educators on both sides of the Atlantic have raised alarms about the inadequacies of their educational institutions in addressing the needs of the 21st century workforce. In the US, many are concerned with the deficiencies in science, technology, math, and engineering education; and they are calling for expansive legislation to address K-16 education reform, research, and immigration issues. Similar concerns exist in most EU countries: many are struggling to devise and gain the acceptance of reform programs by their educational establishments.

- The US Department of Education recently noted that "approximately 90% of the fastest growing jobs will require some postsecondary education."
- A recent report by the Conference Board and the Partnership for 21st Century Skills (a coalition of educationalists, business and government) indicated that a majority of US employers view new entrants in the workforce as deficient in key skills critical for job performance.
- Europe's universities, taken as a group, are failing to provide the intellectual and creative energy that is required to improve the Continent's poor economic performance, according to a report published this year by the Centre for European Reform.[7]
- A new study by the Educational Testing Service (ETS) in the US suggests that although university students appear fluent with technology, many are unable to use computers effectively to solve information problems. In the study, which surveyed more than 6,300 students, fewer than half correctly identified from several choices the Web site that was objective, authoritative, and timely.

What are the necessary skills for the 21st Century?

SAS is a global company with more than 10,000 employees worldwide in 425 offices and 51 countries around the globe. In its experience, students need at least three essential skills: **intelligence, creativity, and courage.** There is something about the confluence of these that holds the promise of making a difference for students, communities and countries. Intelligence is not defined in the classic sense; it's defined as the tough-minded tools for living and learning, the ability to absorb information and assess its sources, and the skills to synthesize, analyze, and use it to make decisions. More and more schools are looking to build these broader skill sets in their students' use of information from data-mining to analytics to decision-making. They need this intelligence —particularly analytical and critical-thinking skills—to be able to live in a world awash in information.

Analytic intelligence

The Harvard Business Review referred to this skill set as the ability to "compete on analytics." The phrase was drawn from the work of Tom Davenport at Babson College who analyzed a host of companies from Amazon.com to Marriott Hotels which are leveraging analytical intelligence skills to make a major difference in how they compete and win in the marketplace. Davenport makes the case for analytical intelligence by stating "analytical talent may be to the early 2000s what programming talent was to the late 1990s."

Some would argue that these skills have always been essential for science, technology, engineering, and math. To reach the highest levels of each, one needs to be able to analyze data, learn, and adapt. Now, because of the daily processing of massive amounts of information, these skills may represent the difference between success and failure.

Needs to be allied to creativity…

Students and citizens also need the creativity skills to be able to process and produce with this information. As social theorist Richard Florida argues[8], every person has a creative or artistic side. It is unleashing this creativity in the context of analytical intelligence that holds powerful promise. Unfortunately, this need for creative stimulation often gets lost in the hue and cry to make more scientists and mathematicians.

…and endowed with courage

The final step, however, is courage to take action, to dive into the sea of transformation that is flooding through our worlds. The hard work begins in boldly engaging difficult conversations, involving broad constituencies, and moving toward thoughtful solutions. In our business, we know that will fail without a hard turn in R&D or a change in sales strategy or a new approach to cost containment.

In the US, the Partnership for 21st Century Skills has developed a vision for learning in which students focus on core subjects including math, science, and foreign language. In addition, other content must be included and cover topics such as global awareness, finance, economics, business, and entrepreneurial literacy. There needs to be a strong emphasis on learning and thinking skills —critical thinking and problem-solving — communication, creativity and innovation, collaboration, contextual learning, information and media literacy, eSkills and life skills.

As part of teaching critical thinking and problem-solving, as well as fostering entrepreneurial literacy, young people have to be taught to take risks. And policymakers have to create a landscape that rewards those who take risk, as well as one that makes failure an acceptable cultural and financial option.

Policies for meeting the challenge

We need to take a step back and focus on policy and practice that will build a lifelong learning system for the 21st century. Our policy must be focused on the goals of student access and success, workforce readiness, research and development infrastructure, global literacy, and essential disciplines.

Moreover, we have to throw out our attachments to the way we have always done things in education. Our focus on practice needs to be driven by the tough-minded dual questions of (1) does this practice improve or advance learning? and (2) how do we know? Five priorities will help deliver the desired answers:

1. **Ensure access to education and training**
   - Make education and training widely available any time and anywhere (on-site, on-line, and just-in-time). We need to be open to supporting new models, different providers, and broad-based primary, secondary, post-secondary, and business partnerships that increase educational access.
   - Communities and policymakers must foster lifelong learning by providing flexible and varied educational opportunities and access to the necessary knowledge and skills at any point in an individual's lifetime.
   - Invest in pre-primary education programs which have historically provided the best return on investment. The earlier a child learns to read, the better. All other learning will hinge on the development of that one skill.
   - Ensure access to higher education for all by providing the economically disadvantaged with government-supported financial aid.
   - Ease transferability of students in higher education — both from country to country and from discipline to discipline.

2. **Continually assess education performance in relation to goals, i.e., learning and earning**
   - Create strong accountability and transparency in our education systems.
   - Put accountability systems in place that will provide educators with insights on what happens to our students after they complete, transfer, or take a job. Discern whether these students have the necessary skills to gain and maintain employment.
   - Support policy that rewards evidence-based educational transformation.
   - Enable governments and educators with the tools that will allow them to gather data, analyze that data, and create policies based on firm knowledge of which policies will create desired outcomes.

3. **Implement consistent policies that will ensure workforce availability**
   - Enact a "human capital" tax credit for employers who provide training and education for workers. This will have the dual effect of lowering the public cost for training and education while providing an incentive to employers to commit to lifelong learning.
   - Develop a curriculum that supports essential disciplines like science, technology, and engineering while addressing the emerging need for global literacy.
   - Provide scholarship assistance, teacher institutes and mentoring programs to encourage more participation of those with experience in business or civil society to become teachers.
   - Create a labour policy that has enough flexibility to allow for necessary worker redeployment.
   - Provide a tax structure that rewards companies for engaging in R&D activities.

4. **Advance innovative research and development**
   - Concentrate government funding on basic research. As cited in a League of European Research Universities study, "funds for basic research are spread too thinly."[9]
   - Ensure research results are open and available to the public via online databases that would allow access by companies and academics alike.
   - Allow university researchers to license and retain the intellectual property created in order to found a commercial venture.a

5. **Promote social, state, and global business/education partnerships**
   - Work together to enhance the use of technology in learning and to develop the information technology skills necessary for the workplace. Ensure that eSkills become a part of the education and life-long learning curricula.
   - Provide incentives for business to participate in school mentor programs, "adopt a school" programs, or community-based initiatives
   - Embrace best practices from other regions of the world that have hard data to back up results.
   - Foster a culture of innovation and reward risk-taking at all levels.

Conclusion

We must help in creating innovative, educational institutions of the 21st century where technology is infused in every part of the curriculum, where creativity and innovation is fostered in every discipline, and where students and educators are constantly striving to solve problems and think "outside the box". It is the creation of new ideas and solutions that, ultimately, will lead to new industries and jobs for the 21st century. The productivity and competitiveness of every nation depends on it.

According to the European Commission, on average, EU Member States spent 5% of their GDP on public expenditure for education as a whole. This figure is comparable to that of the US and higher than Japan (3.5%). If money bought parity, than the education outcomes in the EU and US would be equal. Research suggests that pre-primary spending in education brings the greatest return on investment, followed closely by spending in primary schools. Given that Europe spends more money than the US in pre-primary and primary education, then Europe ought to be able to spend less at higher levels to obtain similar outcomes as the US. If money were the answer than we would have already been able to calculate how much it would cost for an optimally educated student.

Our area of focus needs to be on fostering and growing creative capital. When we talk about creative capital, we're talking about people. Creative employees pioneer new technologies, give birth to new industries, and power economic growth. Today, as we talk about maximizing performance, be it educational or corporate, we must keep in mind that people — and the creative capital they represent — are a critical part of the equation. The creative economy is here to stay and societies that best educate for creativity will have a crucial advantage in the ever-increasing competition for global talent.

Educating for Creativity - Two initiatives from SAS

Cary Academy

SAS has created some innovative partnerships at home and abroad. For example, the company started Cary Academy, a private day school, grades 6-12 (middle and secondary school) located right next to the SAS World Headquarters in Cary, North Carolina. It is designed to do things very differently. The school has more computers than kids; faculty that are challenged to be innovative and students that push the boundaries of creativity and innovation in the classroom —and in online venues as well. Kids operate in technology studios; they design websites and engage in powerful project-based learning. Recently, SAS announced a new initiative with North Carolina State University to create an Institute of Analytics.

Information Evolution Model

SAS has developed an idea called the *Information Evolution Model* to help organizations think about how they use information. The model has five levels, each more developmentally mature than the last. Level One is referred to as “Operate”: Here, individuals who have specialized skills are the keepers and processors of information. Level Two is “Consolidate”: Departments or teams begin consolidating and sharing information to mine the past and report on the present. Level Three is “Integrate.” This represents a bold step forward where an organization begins pulling information together across the entire organization. Level Four is “Optimize”, where they finally begin using predictive analytics and higher-level skills to discover the best ways to operate. The final level is “Innovate,” and it is toward this stage of the model that we strive. The innovation level combines the science of analytics with the art of creativity - where the fuel of information meets the creative spark, which provokes transformation. When we have business leaders, policymakers, or education experts who understand, synthesize, and analyze their environment, coupled with the creativity to find new and novel solutions and strategies, we are almost there.

About SAS

SAS is the leader in business intelligence software and services. Customers at 40,000 sites use SAS software to improve performance through insight into vast amounts of data, resulting in faster, more accurate business decisions; more profitable relationships with customers and suppliers; compliance with governmental regulations; research breakthroughs; and better products. Only SAS offers leading data integration, intelligence storage, advanced analytics and business intelligence applications within a comprehensive enterprise intelligence platform. Since 1976, SAS has been giving customers around the world THE POWER TO KNOW®.

SAS (pronounced "sass"), which once stood for "statistical analysis software," was created by Jim Goodnight and N.C. State University colleagues, including John Sall, in the early 1970s to analyze agricultural-research data. SAS Institute was founded in 1976 to develop and sell the software as demand mushroomed. After evolving into the world's leading provider of software and services for business intelligence, the company dropped "Institute" from its name but kept the name SAS, no longer an acronym.

- **Number of Countries Installed**
  SAS has customers in 110 different countries
- **Total Worldwide Customer Sites**
  More than 40,000 business, government and university sites
- **SAS Customers or their Affiliates Represent:**
  96 of the top 100 companies on the 2006 Fortune Global 500 List
- **Worldwide Revenue**
  2005 Revenue: $1.68 billion
- **Reinvestment in R&D**
  2005 R&D investment: 24% of revenue
- **Worldwide Employees (Total** 10,087)
  - **SAS Americas:**
    - United States 5,160
    - Canada 219
    - Latin America 211
  - **SAS International:**
    - Europe, Middle East and Africa 3,165
    - Asia Pacific 1,332

SAS
Worldwide Headquarters
Cary, North Carolina
Phone: (1-919) 677-8000
Toll Free (in US): (1-800) 727-0025
Fax: (1-919) 677-4444

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