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THE CRISIS IN HUMAN CAPITAL

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ABSTRACT

If the United States is to regain the competitive edge, retain leadership in the international aerospace arena and achieve the national aerospace goals, we must have more well qualified scientists and engineers entering the workforce as well as the highly qualified technicians necessary to design, build, operate and maintain our aerospace hardware. The nation's educational system is not keeping pace with this demand for scientists and engineers. The necessary workforce will not be available unless prompt action is taken to ensure it.

This paper reviews shortfalls in our educational systems today, showing where the U.S. stands relative to the rest of the industrialized nations. The complex dimensions of these issues are discussed as well as initiatives that are in work around the country in an attempt to counteract some of the problems. The roles of aerospace workers as individuals and aerospace companies as major stakeholders in the nation's future are addressed. Some of the more effective approaches to the enhancement of our educational system which could be supported by the aerospace community are highlighted.

The growing global competition being experienced by American industry is threatening to render our standard of living and our place in the world to second class status. The seeds of this dilemma are said to lay in several quarters. The competition's more participative management style, cultural differences regarding work ethic, long term business perspectives, more strategic approaches to market acquisition and a more abiding regard for quality have been suggested as reasons for our falling behind. While each of these issues is no doubt a contributing factor, the deterioration of the US worker's basic skill level threatens to be the blow from which we may not rise. The dilemma is even more acute for the Aerospace community which relies so

heavily on a highly skilled engineering and technician workforce for its survival.

Poor scholastic performance in American schools today is reflected in various measures. In the 1989 report by the Aerospace Education Foundation "America's Next Crisis" they site that the high school completion rate is 75 percent overall and significantly less for minorities. Even among those students that do graduate, many are not prepared to either pursue a college education or enter the work force. As many as 27 million Americans over the age of 17 are functionally illiterate. The US Census Bureau predicts that at the current rate of increasing illiteracy, as many as 70 percent of the US population will be

Table 1.
STUDENT ACHIEVEMENT BY SUBJECT AREA
(U.S. 12th-Grade Equivalent)

| ADVANCED ALGEBRA | FUNTIONS/CALCULUS | GEOMETRY |
|----------------------|----------------------|----------------------|
| 1. Hong Kong | 1. Hong Kong | 1. Hong Kong |
| 2. Japan | 2. Japan | 2. Japan |
| 3. Finland | 3. England/Wales | 3. England/Wales |
| 4. England/Wales | 4. Finland | 4. Sweden |
| 5. Flemish Belgium | 5. Sweden | 5. Finland |
| 6. Israel | 6. New Zealand | 6. New Zealand |
| 7. Sweden | 7. Flemish Belgium | 7. Flemish Belgium |
| 8. Ontario | 8. Ontario | 8. Scotland |
| 9. New Zealand | 9. Israel | 9. Ontario |
| 10. French Belgium | 10. French Belgium | 10. French Belgium |
| 11. Scotland | 11. Scotland | 11. Israel |
| 12. British Columbia | 12. United States | 12. United States |
| 13. Hungary | 13. Thailand | 13. Hungary |
| 14. United States | 14. Hungary | 14. British Columbia |
| 15. Thailand | 15. British Columbia | 15. Thailand |

Source: "The Case for More School Days," *Atlantic Monthly*, November, 1990

functionally illiterate by the year 2000. The capabilities of the American population to understand basic math is also deteriorating. One study has shown that more than 25 percent of 13 year olds cannot handle elementary school arithmetic and only 6 percent of 17 year olds can handle algebra or multi-step math problems.¹ New York Telephone reports that in 1987 it tested 60,000 applicants to hire 3,000 people, testimony to the lagging quality of our high school graduates.²

During the 1850's, Americans had a literacy rate of 90 percent which was a major contribution to the industrialization of the country by providing an educated work force. With the continued technological development in our country the

demand exists for an even more highly educated work force to perform the complex tasks required to sustain the level of technology in our lives. The demand is even more acute in the Aerospace industry. The necessary work force is not being produced in today's environment. Even the best students in the United States are not learning as much math or science in school as most other major countries. Comparative results for math placement are shown in Table 1. Additionally, ten year old students from fifteen countries were tested for science achievement. The US tied for fourteenth out of seventeen with two other countries.³ The number of students interested in science majors in college declined by one-third between 1982 and 1987.⁴ The combination of poorly prepared students

and an increasing lack of interest in science and math fields significantly impacts the supply of technical manpower in the future.

According to Gerstner of American Express, the deficiencies go beyond the traditional skills. "Too many young job seekers are also deficient in fundamentals such as teamwork, initiative, problem solving, adaptability, even simple communication among themselves."⁵ The students of today are being ill prepared to enter the technological work force of tomorrow.

Conversely the demand for skilled workers by American industry is growing. By the year 2000 there will be approximately 20 million new entrants in the job market. The decline in 21 to 25 year olds will mean employers will have to dig deeper into the pool of poorly educated. In addition, 30 million current workers will require retraining. Through the 1980's 30 percent of the 2.3 million workers displaced each year lacked basic skills in reading, writing and arithmetic. Industry is currently spending upwards of \$30 billion per year on worker training. A significant portion of this cost is the result of poor performance by the educational system. The continuation of this trend alone will be a telling blow to the nation's ability to compete on the international scene.⁶

In education, as in all walks of life, you get what you pay for. The nation has clearly not been willing to pay for a quality educational system. Between 1983 and 1988 the federal government decreased spending for education 14 percent (in constant dollars). In 1987, the average starting salary for teachers was \$17,000. In forty

out of fifty states, a starting garbage collector made more money than a starting teacher. Not surprisingly there is an alarming lack of enthusiasm for teaching as a profession. Only 8 percent of college freshmen indicate they are interested in a teaching career; an average of only 50 percent will become teachers, and half of them will leave the profession in seven years.⁷ Notwithstanding the attempts by some school districts and states, the overall situation is not improving. With average annual funding variations across the nation's school systems varying from \$2900 to \$8300 per student we have a long way to go in providing adequate resources for education. This disparity is being challenged in some systems. Based on the pioneering effort by parents in San Antonio, Texas, many state supreme courts are declaring that inequities in funding represent an unconstitutional denial of a child's right to an equal education. Ten states in the past 19 months have had their systems ruled unconstitutional with thirteen cases pending. It is estimated that within the next decade, most states will have their systems ruled unconstitutional.⁸

A compounding effect is found in the children from poor and minority families who generally attend the most poorly funded schools. Those children which need additional educational support because of lack of educational support at home are the ones most frequently denied the help through lack of funds leading to crowded classrooms and inadequate teaching staff. The results are predictable. The 1986 data showed a 65 percent high school completion rate among Blacks aged 18 to 19 and the completion rate for Hispanic

youths was only 55 percent as compared to the national average of 75 percent.⁹ Thus those segments of the population that need the most help and upon whom worker availability is becoming increasingly dependent are the most undersupported by the educational system.

The need to improve the education of minority children becomes particularly important when you consider that by the year 2000 approximately one third of workers entering the work force will be minorities.¹⁰ By the year 2056, whites may comprise less than 50 percent of the population because of the higher birth rates among the minority groups and immigration.¹¹ Unless this growing majority is adequately educated, we will have an even larger segment of our population as an unemployable burden on society.

Early childhood intervention programs are particularly important for disadvantaged children. A one year pre-kindergarten program has shown to result in an increase of 17% in the achievement level.¹² For each \$1.00 invested in preschool education \$4.75 is avoided in downstream special education, welfare, and prison costs.¹³ Most widely known among this type of program are those funded as Head Start programs. Other programs have started to appear, however, such as Success-by-Six and HIPHY (Home Instruction Program for Preschool Youngsters).¹⁴ The need for preschool programs increases with the growing number of working mothers and single parent homes because of less time these parents have to spend with their children to teach them basics prior to entering school. Inadequate funding has limited

the numbers of children these programs can reach.

Other intervention programs are targeted at increasing the interest of female and minority students in math and science to increase the numbers of students pursuing math and science related fields by tapping a large resource. This becomes more important as the percentage of white males in the population decreases. By the year 2000, it is estimated that only 15 percent of new workers will be white males. Operation SMART (Science Math and Relevant Technologies) sponsored by Girls Club of America encourages girls to feel confident about and enjoy math and science by providing them hands-on experiences, field trips and counseling.¹⁵ EQUALS is a program in math, technology and career education for staff development, curriculum improvement and family learning sponsored by Lawrence Hall of Science, University of California, Berkeley. Over 23,000 educators have participated in EQUALS programs since 1977, increasing student enrollment in advanced mathematics classes, interest in math-related fields, and parent involvement in the schools. Expanding Your Horizons in Math and Science sponsored by the Math/Science Network are conferences which provide girls an opportunity for hands-on experiences in math and science related areas and role models from a variety of math and science related occupations.

On the corporation front, there are numerous adopt-a-school programs today. They provide the schools with resources, money and provide their employees time to assist in the classroom. Corporations are

going so far as to set up their own satellite learning centers and private schools to assure their employees children obtain the necessary education. They are sponsoring summer teacher academies to improve the capabilities of the science and math teachers. Potomac Edison formed a partnership with the school systems within their service area, providing computer hardware and software to install 6400 computers in the 7700 square mile area serviced by Potomac Edison in three states. This was initially in response to a Virginia State resolution to introduce technology into the schools.¹⁶

The science and technology government agencies are providing teaching resources such as lesson plans and audio/visual material, establishing teacher workshops, providing teacher in-service training and conducting educational conferences. They have established programs specifically geared to increasing the number of minorities who enter math and science related fields. NASA has done this through such programs as NURTURE (NASA's Unique Resident Tutoring for Up-and-Coming Replacement Engineers), SHARP (Summer High School Apprenticeship Research Program) and SEARCH (Science, Engineering and Research Career Help).

Efforts to date, while individually commendable, are insufficient to change the education level of the masses or to significantly increase the numbers of students entering science and engineering fields. As Elmer Kaelin, retired president of Potomac Edison recently stated "because education is a monopoly with a cul-

ture resistant to change, to get where we need to be, pressure must come from groups outside education." As a result of pressures from state legislatures and courts things are beginning to happen. In Kentucky, for instance, the state legislature has mandated that beginning in 1991 schools will be managed by a council comprised of three teachers, two parents and the principal. In return for allowing teachers to control things such as class size, length of school days and curriculum, the state legislature will hold the teachers responsible for the results. By 1995, teachers will receive up to 15 percent bonus if they are successful in improving student performance or a five percent decrease if student performance declines.¹⁷

In Maryland, teachers and administrators are being taught Total Quality Management methodologies in a partnership with Westinghouse. Through a set of quantitative student performance goals and accountability at the state, school district and individual school levels, Maryland is seeking not only to sustain their national rating as an excellent school system but to reach for significantly higher levels of student performance in order to meet the international challenge of the future.¹⁸ Other states are experimenting with voucher systems to allow students an opportunity to select their school, either public or private, and variations on the teacher pay based on student performance theme.

Given the many faceted nature of the educational dilemma, how do we go about galvanizing the various and often competing stakeholders to embrace a set of common goals or approaches that would

improve the situation? Clearly a new set of priorities must be considered by all stakeholders if we are to avoid losing status in world competition for a standard of living. The thread that runs through the fabric of our society and touches all the stakeholders at risk is the workplace. The dialogue between local communities and educators and between local, state and federal governments over resources, educational standards, or choosing the most effective programs can be uniquely facilitated by the local corporate community. Being based in the local communities across the nation they are aware of the issues impacting their employees. Whether it's day care for working mothers, flexible programs for high school completion, more meaningful educational standards or adequate financial support, the sensitivities of each community are well known by its employers. They are therefore uniquely positioned to offer effective local support and to lobby at state and national levels for the solutions best suited for their area. Indeed those corporations with operations in many locations across the country are in a position to integrate issues on a much larger scale and to provide a significant national impact.

The dependence on state and national government to be effective in this arena has proven to be unwise. Government has not been able to manage multidimensional issues effectively. Witness the Federal performance in dealing with the national budget, oversight of our financial institutions and the social security program. Indeed if the Congress would live up to its fiscal management responsibilities the resources for education would not be an

issue. On the state level issues of educational standards, funding inequities between school districts, state funding for education and sharing the tax base with local communities in the face of reducing federal support have gone begging.

The predicted shortfall in productive employees in general and the shortage in the scientific and technical work force in particular calls for a reordering of political priorities on the part of the nation. The most effective stakeholder in the arena of influencing federal and state government priorities, short of insurrection in the streets, is corporate America. Through the various political action activities, professional and technical associations and participation at the local, state and federal level, corporate America does influence the major outcomes of our society. It is therefore imperative that the boardrooms of corporate America re-evaluate their commitment to education on a national scale. Innovative participation on the local level will not be enough to accomplish the revolution in education necessary to close the gap between ourselves and the international competition. Effective tax incentives, national educational standards, more funding to enable education across the board and from the cradle throughout life are but a few of the issues which must be successfully addressed. Left to their own agendas the other stakeholders will not be able to rise to consensus. Only with the integration of corporate America enlightened by its unique vantage point and motivated by the need to survive in the face of international competition can we hope to succeed.

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