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EDUCATION FOR GLOBAL COMPETITIVENESS

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Education for Global Competitiveness

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Abstract

In order to enhance American competitiveness in the world market, the workforce must be able to adopt to new technologies and techniques of manufacturing. This cannot be achieved if the workforce does not have the basic learning, analytic, and reasoning skills necessary to apply these new methods. There is a gap between job requirements and available skills. America has a secondary education that is currently weaker than its German and Japanese counterparts despite having many of the top higher educational institutions in the world. The important projections, critical issues, and current and future workforce requirements are identified. This is necessary in order to take crucial steps in rebuilding or restructuring the American educational system. How the general population is educated now will be a critical factor in the quality of the future workforce.

I. Introduction

During the last several years, there has been an alarming decline in the manufacturing dominance of the United States. There is still the continuing trend of moving from a manufacturing-based economy to a service-based economy [11]. It has been widely accepted that economic strength is based on the ability to produce and not to provide services. Japan, Germany, and the upcoming developing countries in the Orient have been slowly chipping away on American dominance in the world markets. America is aware of the current situation. A positive development is the growing interest on the part of government and business in identifying and analyzing these trends which will affect the future workplace [2, p.10]. As times change, the workforce must adopt to the prevailing technology and techniques of manufacturing in order for local firms to stay in business and be competitive.

The main focus of this paper is to address the educational

issues that will eventually be a determining factor in world-class competitiveness. The most important resource of a company is its workers and if the quality of this resource continues to erode, then so will the final output. Furthermore, "it takes at least two decades to grow a new, intellectually adept worker, falling behind will be a virtual guarantee of something else: a guarantee of staying behind, perhaps for good" [6, p.13].

The more general and global issues that will affect the workforce of the future will be addressed. This paper will then make a critical comparison of the educational systems of the three most industrialized nations: USA, Japan, and Germany. Finally, the critical steps or courses of actions which must be taken by the United States will be evaluated.

II. Macroeconomic Issues

A. Globalization

Technological advancement and the proliferation of sophisticated communication capabilities have made competition fiercer than ever. Mergers and acquisitions will continue with more international participants [2]. Companies will search for the most productive locations to move their investments. Corporate ownerships will be more diversified and internationalized. Certain products can be disassembled to show that the different components were made in different countries. Countries which intend to attract manufacturing companies to locate in their boundaries must provide the best local pool of technically and intellectually qualified workers for a reasonable compensation. Although the

United States still leads in the number of technically educated workers, other countries are catching up [2]. This results in better worldwide technical and scientific competence, which then leads to even fiercer competition.

B. Important Issues in the United States

The aging of the American population will affect the type of goods and services that will be provided. The baby-boomers (individuals born between 1946 and 1964) account for a sizeable proportion of the American population and they are raising the median age of the American population [2]. They create both new opportunities and problems. Products can be designed to cater to this market segment. Older Americans have increased because of better health and medical advances. When the baby-bust generation (individuals born between 1965 and 1978) enter their prime working years, they have to carry the burden of providing for the senior citizens.

There will be increasing diversity in the workforce. More women and minorities will be occupying better jobs. The fastest growing minority population in the United States are the Hispanics. A number of scientific and engineering occupations are being filled-up by foreign national who were educated here. Universities and companies that rely on employees with PhD.'s are increasingly becoming more dependent of foreign nationals educated in the United States [2,5,12]. Low birth rates and a shrinking labor pool will give an opportunity for the country to move unemployment to its lowest levels in years as traditionally underemployed workers may

become a viable alternative [2].

The large budget deficit faced by the nation will influence national and international policies and decision-making. Educational programs, however necessary, may have to be reduced as a contribution a more streamlined national budget. States have difficulties reducing their overall spending and not decreasing funds for secondary and higher education. All these factors will contribute to the competitiveness of the United States in the global market.

C. Changes in the Workplace

The type of skills necessary for employment have changed due to the greater use of information technology [2]. The demand for unskilled labor has steadily declined due to the use of new technologies, most specifically robotics. Computer literacy is becoming a necessity in many occupations. But overall, there is an increasing need for workers who possess adequate thinking, reasoning, and analytical skills which will make them more trainable and adaptive to new changes and developments in the workplace [2]. Technology squeezes the non-thinking part out of work. It places emphasis on the worker's ability to acquire data, organize it in a logical manner, analyze and interpret the results, and convey the implications [1,20].

III. Educational Systems

Educational systems play a pivotal role in the global competitiveness and strong economy of a nation. The results may

not be evident in the near or short term, but will manifest itself in the next generation of workers. In recent years, there is a feeling of resignation that the American public school system is generally weak [13]. The secondary level of American education has been criticized for not being adequate to prepare the students for college. This has been echoed several times by articles comparing secondary education levels of Japan and Europe [1,8,13,19]. Bear in mind that the comparison is among the top industrialized countries in the world and that a majority of the other nations of the world will fare so much worse. American post-baccalaureate education still compares favorably with the best other countries can offer [5]. A major part of the discussion will focus on the American education system, but an overview of the Japanese and German will give a better perspective on the current situation. Each country has its own strengths, weaknesses, and problems.

A. The Japanese Education System

The best description for the Japanese education system is efficiency. It strives to provide a uniform curriculum as part of its effort to give equal treatment to the students. Despite having a public education spending which comprises a lower part of national income than any other rich nation, Japan boasts of a literacy rate of 99.7% [8, p.64]. Furthermore, in every international survey of academic achievement in mathematics and science, Japanese students have consistently placed at or near the top. According to Ikuo Amano [8, p.65], professor of education at Tokyo University, there are five main reasons for Japan's

scholastic success: highly-qualified well-trained teachers, group-oriented obedient students, grade-conscious parents, and fierce competition among secondary schools.

The fierce competition stems from the fact that there are too many students applying for limited slots at the top universities. Life-long employment (from college graduation to retirement) is still a strong practice in Japan, accounting for 27% of the total workforce. Getting a good job means entering the top universities. Consequently, doing well in the university entrance examinations is a national obsession. A good number of students who do not pass these once a year examinations spend the next year preparing for a second shot at the entrance examinations.

Universities give tough objective entrance examinations. The tougher their examinations, the higher their position becomes in the national ranking of universities [8, p.65]. The emphasis of their secondary education becomes the preparation for these objective university entrance examinations, since high schools get prestige for getting more of their students in the best universities. Japanese students are very competent on the basic learning skills. However, they are also known to lack creativity. This is a result of the excessive competition to pass objective examinations which are not meant to be outlets of creative thinking.

Once a student is accepted to a prestigious university of his or her choice, the student goes to "leisureland" [6,9]. While getting into a Japanese university is very difficult, graduating is a cinch. The students do not have to take any tests nor turn in

any papers. They do not have much incentive to study. Companies compete for these students even before they graduate, to the extent that the students are recruited much earlier [9, p.70]. Students are spoken for before their final year in the university. As a result, a narrower company-specific education is substituted for a broader university education.

Higher education in Japan needs more funding. Throughout the postwar period, higher education funding has been held down to a very parsimonious level. The supply of PhD.'s exceeds their demand. There is widespread academic "in-breeding" as many faculty members are graduates of their own departments [9]. As in many countries, reforms are encouraged, but the necessary funds to carry out these reforms fall short. Private companies finance 80% of Japan's total research. Observers claim that this has brought profitable products into the market, but has done little to promote scientific breakthroughs [6,p.8].

C. The German Education System

German students are only required to attend school full-time through tenth grade or at age 16. After this, they have a choice of entering three tracks: [4,p.70,17]

i) Hauptchulen: This track is for those students who do not want to pursue higher education. The students choosing this track are primarily interested in blue-collar jobs. They go for further training in the vocational system.

ii) Realschulen: This track leads to medium-diploma after tenth grade. The students usually go on to careers in more skilled white-collar professions like technicians. They often attend vocational colleges and take special courses and further education.

iii) Gymnasien: This is the college or university preparatory track which goes through the equivalent of two years university study in the United States. Upon completion, the students take the final examination called ABITUR which makes them qualified to apply to any university.

(A fourth type named Gesamschule or comprehensive school patterned after the American high-school system was introduced, but so far, only it has not proven to be very popular as only 3% of all German high-school students are enrolled in it.)

The strength of the German system of vocational education lies in the fact that students are prepared for work in technical jobs [4]. The German reverence for trade crafts is the heart of their high school system, which is considered the best in the world [17]. The students who wish to pursue an occupation at age 16 can either apply to a training institute or to companies that offer apprenticeship programs [4,17]. Companies that participate in these apprenticeship programs adhere to rules and regulations which are monitored by local industry associations. These students learn to work by dealing with actual problems early on in their training while being guided by the journeyman and sometimes by the master [4, p.71]. In other words, these students are being trained to be proficient in their professions and not in the particular company that they will work for.

Those entering the university do so at around age 19 or 20. German, as well as most European universities agree on a premise that general education is none of their business. It was supposed to have been finished at the gymnasium [19,p.55]. There are no undeclared majors nor electives outside one's field. Universities are for specialists, and any studies outside of their majors are done through self-education or with others who are interested in

the same subjects [19].

A current problem faced by the German Higher Education is overcrowding. This is because more and more German students are concluding that they must meet society's demands for higher qualifications. This is aggravated by the fact that on the average, graduates enter the job market at age 29 [14]. There has been a plan in the European community to have a common university system. This is a move to include higher education in the push for European economic unity [18]. This may open new opportunities for many Europeans, yet a major issue remains as to who will fund the effort.

C. The American System of Education

The American system of education strives to provide equal education opportunities through high school. We may think of this as "mass education" as contrasted to "general education" [19] where several subjects are taught in order to get a well-rounded education. Unlike their European counterparts, everyone has a change to finish high school, however imperfect the system maybe. It seems that there is a growing national pastime of berating the shortcomings of the education system, but is it really fair?

Several articles and publications show that America has a generally weak public school system [1,10,12,13,16,20]. For example, the following statistics show how bad high school students compare with other students from industrialized countries [1,pp.6-7]:

* In math, most high school graduates mastered no more than simple arithmetic.

* Only 7% of all high-school seniors are prepared for basic

college science courses, only 5% for beginning college math.

* Only 5% of high school seniors possess advanced mathematical problem-solving skills, barely 6% of all 11th graders can draw conclusions from scientific data.

* More than half of high school graduates lack the sophisticated information-processing, communications, teamwork, and analytical thinking skills that most of the coming decade's jobs will require.

Mathematics and Science are the two areas where the secondary schools in America really need improvement. These two areas also represent the subjects where thinking, analytical, and reasoning skills are developed. More than half of the students going to college here will not qualify for admission to any college in Europe or Japan [16]. This leads to the simple conclusion that a lot of "colleges" here will not qualify as colleges as the rest of the world defines it; they represent the highest-cost secondary schools in the world [16]. As we shall see later, this deficiency in basic skills has a big impact on the competitiveness of American manufacturing companies.

As much as secondary level education in American is much maligned, post-baccalaureate education still represent the envy of most nations. Foreign nationals go to American universities to pursue higher education not available in their countries. There are more than a dozen university campuses that receive more than $100 million from the federal government for research [15, p.68]. This, combined with the best students in the world accounts for the creative research and new findings in different fields. A drawback in many universities, though, is the low priority for teaching as contrasted to research [15]. Some prestigious universities have

the reputation for excellence, but in inner circles, it is widely accepted that many smaller less-known schools actually produce better graduates in some fields. This is not to say that they will make as much money as the graduates from the more prestigious schools [15].

IV. The Current Local Situation

The continuing shift from a manufacturing-based economy to a service-based economy exposed the weakness of the labor pool that has experienced layoff and displacements. The government has initiated several retraining programs as the labor skill requirements have changed. No longer do we need as much people in the tasks which require mostly manual labor. A problem with retraining is that a number of these displace workers do not have the basic learning and reasoning skills necessary to deal with the instruments of the information age. You cannot train someone who is basically not trainable! It takes several years to change the composition of the current labor pool. Jobs now require at least basic learning and analytical skills.

The globalization of markets has moved many manufacturing jobs overseas, not just because it is cheaper, but their pool of qualified workers have caught up with the United States. The dollar is still very strong against developing countries' currencies when you consider exchange rates. The existence of unions have contributed to the very narrow focus on job descriptions here which hinders cross training and obtaining more general and flexible skills.

The change in the demographics of the workplace also poses new challenges and problems for the United States. As the median age of the population gets older, more and more positions in entry level jobs are needed. This is also emphasized by the continuing sharp drop in young people aged 16 to 24 [11,p.71]. The greatest increase in the labor pool are composed of Hispanics. This may cause a problem because historically, this group occupy the lower income levels and are less likely to be as educated as the rest of the population that is already weakening in terms of basic skills. It is in direct contrast to the requirements of the information age. Over the last several years, the number of PhD.'s given in math and science have been increasingly obtained by foreign nationals. Although many stay here, a good number go back to their home countries. This stresses the need for more Americans to pursue academia, which is hardly the case. Lastly, immigration policies for immigration to the United States are based on family ties and not on skill requirements.

V. The Current Situation: Japan and Germany

The Japanese are proficient on basic skills but are not creative. Their top universities are more like engineering schools with small islands of liberal arts departments tacked on, as an afterthought. Consequently, Japan's education system was a good match for industrialization. Tominaga Keii, president of the Numazu College of Technology says that this situation produces top second-class engineers. The graduates will not be suited for the requirements of post-industrial Japan [9,p.72]. The lack of

creativity may explain why Japanese products are mostly refinements and improved versions of existing products. The United States still leads the world in providing new products in the market and owning and applying for patents. Japan recognizes its own education problems, but has difficulties in trying to change the prevailing system.

Germany has a workforce with arguably the strongest technical knowledge in their own areas of work. This is primarily due to their vocational education system which advocates "learning by doing". Germany's exports are spread widely among many industries, firms, and nations. In 1986, Peter Drucker pointed out that despite not having the international publicity Japan has had for there economic accomplishments, their performance has been every bit as impressive as that of the Japanese [4, p.68]. When Germans students finish their university studies, you can be assured that they are all very competent. Their teachers are paid handsomely and with many benefits since they are considered civil servants. This attract the brightest students to pursue teaching jobs [17].

The German reunification has cost the German government billions of dollars. If all goes well for them, they will be a very strong economic power. However, their universities do not have the capacity to accommodate all the students who want to enter them. Increased expenditures for education is necessary or else the government must state that the universities are not open anymore to all applicants.

V. American Education: Where to go?

If America is to remain competitive, it must set new directions for its educational system, primarily at the secondary level. The mediocre overall performance in science and mathematics are indicative of the deteriorating higher-level thinking skills [1, p.35]. If this is to be corrected, it should involve several stakeholders: business people, educators, academicians, politicians, and parents [3].

The bottomline of education is the creation of a workforce that will help American companies remain globally competitive. Business has to be more involved. Partnerships between business and education must go beyond simply sponsoring achievement programs.

It has always been said that the student can only be as good as the teacher. Educators must be sufficiently compensated and considered as professionals. As much as education has been emphasized, educators remain undercompensated and underappreciated, although improvements are being made. In return, educators must be accountable for the results. This is difficult. As Deming says, we cannot really gauge the success of programs until we see how these students perform in the workforce. It will take several years.

Academicians must not only be devoted in their subject matter, but also in teaching and learning methods. In higher level education, research still occupies a higher priority than teaching. Tenure positions are primarily based on publications and not on teaching proficiency. Sowell [15,p.69] asserts that in many prestigious research universities, receiving the Teacher of the

Year Award is a kiss of death.

Politicians have the difficult task of balancing the competing needs of the quality of education and the individuals who will pay for it [3]. Several districts vote on different measures designed to address the balance between tax payments and educational spending. Re-election is of primary importance to these people and policies may change, depending on public opinions.

Local school boards exist to further the education of students in their districts, and not on petty or tangential issues. In other words, address the main issues.

Finally, the parents must encourage and support their children's education. Education starts at home. The parents can help the children develop sound study habits and positive attitudes towards learning. They must actively participate by spending the time to personally assist their children's education instead of just leaving it to the schools.

With these stakeholders in mind, America must take definitive steps to improve the current education system. Numerous propositions and ideas have been expressed and they seem to agree on one most important goal: to improve the basic learning, thinking, and analytical skills necessary to compete in a competitive global economy. McKenna [13,p.16] outlines eight crucial steps for America to take:

1) Enhance an educational vision that allows each child to achieve all that he or she is capable of.
2) Start the schooling process before going to school.
3) Have a world-class curriculum that demand competency in basic skills and higher-level thinking.
4) Establish accountability methods for teachers, students, and schools.
5) Introduce technology early in the classroom.

6) Use restructuring tool for continuous improvement.
7) Involve government and business for increased education spending.
8) Accelerate business-education partnerships.

VI. Conclusion

Despite the current problems in American education, it remains one of the best in the world, especially in providing opportunities for most people. Several countries have caught up or are catching up in manufacturing proficiency. This has exposed the weak areas in American education which we now cannot push aside. America needs a wake up call, and the realization that manufacturing dominance cannot be sustained without a world-class education system should provide a collective effort to move ahead.

VII. Comparison With Other Presentations

The other presentations in class, especially OPT and Product Cost Management addressed particular areas in manufacturing which can benefit from new ideas and techniques. They involved a continuous evaluation of present ways or methods of doing things. Once problems are identified, new or borrowed techniques are applied and the results are evaluated. Some successful techniques evolve into "buzzwords" and many jump into the bandwagon. These techniques were developed by individuals or group of individuals who have the technical and intellectual capacity to represent problems into workable equations or procedures. Similarly, the persons responsible for the implementation and monitoring of the process must be adept and fully capable of interpreting the observations. These situations show that the significant jobswhich

play an important role in the improvement of manufacturing techniques require learning, thinking, and analytic skills.

Our presentation on education and training for the future workforce encompasses all the other presentations. We underscore the significance of the education and skills necessary to work these ideas and innovations. A company may have the best methods and technologies, but if their workforce do not have the basic skills necessary for training and use of these technologies, then nothing improves. We presented a more general yet more important issue and discussed its implications on American global competitiveness.

14. Menke-Gluckert, " Overcrowding Seen Likely to Continue in West German Higher Education", The Chronicle of Higher Education, vol. 35, no. 42, P.A28, June 28, 1989.

15. T. Sowell, "On the Higher Learning in America: Some Comments", Public Interest, Issue # 99, pp. 68-78, Spring 1990.

16. M. Tucker, "Many U.S. Colleges are Really Inefficient, High-priced Secondary Schools", The Chronicle of Higher Education, vol. 37, no. 38, p. A36, June 5, 1991.

17. T. Waldrop, "They are engineered like no other students in the world", Newsweek, vol. 118, no. 23, pp. 61-62, December 2, 1991.

18. D. Walker, "European Community Prepares to Establish a 'Common' Approach to Higher Education", The Chronicle of Higher Education, vol. 38, no. 44, p. A1(2), July 17, 1991.

19. E. White and R. Abrens, "European vs. American Higher Education", Change, vol. 21, no. 5, pp. 52-55, Sept-Oct 1989.

20. L. Williams, "Education and Training for the American Labor Market: A Labor Perspective", Looking Ahead, vol. 13, no. 1/2, pp. 18-25, 1992.