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Soroban to silicon chip: A look at Japanese education

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Introduction

DURING THE 1982-83 school year, the U.S. Department of Education released the report of the President's Commission on Excellence in Education. The report concluded that American education had deteriorated until there was "A Nation at Risk." The writer had also taken note of the fact that on international comparisons, American students were far behind Japanese in the areas of mathematics and in the sciences. He therefore decided to go to Japan and study their educational system. The objectives were to study (1) Japanese culture today, (2) Japanese language, (3) women in leadership roles, (4) characteristics of high-achieving Japanese students in the areas of mathematics and science, and (5) the reasons why Japanese students surpass their American counterparts in these areas.

This article will not give detailed analysis of the research conducted. The analysis process is not yet completed, but some major portions of the studies are discussed in general terms.

Japanese Culture Today

Bare essentials of understanding Japanese culture represent a necessary backdrop to understanding the education system the writer has been studying. The Japanese are a wonderfully fascinating people who are aggressive in business yet gracious in their life styles.

For many years Japan was very much an isolated and self-contained nation, and as a result of both physical and psychological isolation became a very insular society. The word shima means island, and the Japanese people speak of a "shima society" in which they refer to the geographic island as well as the isolated and insulated society.

The United States "knocked at the door" of Japan to open trade barriers, and in 1853 the U.S. Navy sent one-fourth of its strength under the command of Commodore Matthew Perry "to do the knocking." Reluctantly, the Japanese signed a trade treaty in 1854 and finally negotiated full trade treaties in 1858. This act opened the doors of Japan to the western world, and since that time Japan has struggled with the contrasting concepts of shima (isolation) vs. internationalism.

Large numbers of gaijins (foreigners, outsiders) are found in Japan, although Americans and other gaijins are novelties in many Japanese communities. Japanese themselves are frequently seen traveling in groups (always laden with excellent camera equipment) in most of the major tourist attractions of the world.

Thus, Japan is a modern study in contrasts: the shima on one hand and great efforts on the other hand by both government and individuals to internationalize the nation.

Anyone who has recently purchased a video cassette recorder, a stereo set, a television, an automobile, a watch, or a computer knows of the tremendous quality and price advantages to be found in products made in Japan. In 1982 Japan produced and exported 82 percent of the world's watches, 76 percent of the 35 mm cameras, 81 percent of the video cassette recorders, 77 percent of the table type electronic calculators, 59 percent of the microwave ovens, 52 percent of the color televisions, and 50 percent of the motorcycles. While Japan imports great amounts of goods from the United States and from all of the major countries of the world, the U.S. balance of payments with Japan is very much in a deficit situation.

Competition from Korea and China as well as Hong Kong and Singapore is now starting to claim much of Japan's industrial advantage because of Asia's generally lower wage scale. Japan, therefore, is moving rapidly from an industrial economy toward high technology. Government planners as well as industrial investors are designating a number of Japanese cities as high tech development areas. Japan is racing against the United States in development of the super computer (fifth generation) as well as in the personal computer field. Some American companies have purchased stock in Japanese computer companies.

Despite the modern industrial condition of Japan, many cottage factories are still employing one or two members of a family. Some of the writer's neighbors in Shizuoka City assembled automobile parts in their homes on a piecework basis. Still others made sandals and inexpensive shoes, the only employment for four members of the family. In the northern part of the main island (Honshu) in Hachinohe City, the writer visited a factory that employs about 20 people making souvenir wooden horses—one of Japan's most famous toys.

A journey to Hamamatsu in Shizuoka Prefecture provided an interesting contrast in Japan's factories. One tour was of the Honda factory where 3,000
A strange paradox is that Japanese are avid TV watchers, but they are also wildly enthusiastic about reading.

Radio and television are very much a part of the Japanese society. Both radio and TV stress traditional oriental values such as loyalty, politeness, and harmony, and music are preserved and promoted by the airwaves. There are no commercials on TV, and even foreign TV programs are culturally sanitized. Yet, the Japanese have all been avid TV watchers.

Japanese Language

Japan is a nation with a passion for learning—learning from formal education to the pursuit of hobbies and special interests.

In the formal educational structure, language education begins at age 3 through the elementary level and grades 1 through 6 in the primary and junior high schools.

The language is heard, written, and read at all levels of education. In schools, the mix between males and females is approximately equal. In junior colleges, women account for only 50 percent of the total enrollment.

Japanese education is divided into four years of college and three years of graduate school.

The majority (58.9 percent) of adult elementary school children receive a formal education.

Japanese culture is highly individualistic, and family is the basic unit of society. The Japanese language is an agglutinative language, and the written language is based upon Chinese characters.

Most adult education classes are oriented towards vocational and technical fields, such as cooking, typing, and business.

In Japan, an adult who does not have a high-school education is considered less competitive in the job market.

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Japanese newspapers are available in smaller American cities. The majority (58.9 percent) of adult elementary school children receive a formal education.

Japanese movies tend to depict kids as innocent, and in the United States, television stations have legal restrictions on the amount of violence that can be depicted.

Japanese universities do not require students to take college courses outside their major. They are required to complete a three-year course in 3, 4, and 5 years.

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elementary grades was observed; all of the few female members stand out in science classes in the tenth grade and math classes in the twelfth grade. Public as well as private schools are surveyed. In each of the schools surveyed, at least two classes were also observed. In all, about 20 teachers as well as principals were surveyed.

In addition, the writer interviewed in English (with a translator present) each of the teachers and the principals, some school authorities at citywide level and at the prefecture level, and a mathematician educator at the National Institute for Educational Research in Tokyo. Observations and interviews were conducted with other educators in different prefectures with the majority in Shizuoka Prefecture.

In all schools, teachers were asked to rank the students by achievement into three groups so the high-achieving, middle, and low-achieving students could be compared. Urban schools as well as suburban were included in the sample.

The analysis of questionnaires has just begun at this point, and final results of this study will not be available for several months.

Generally speaking, students who were employed by the low-achieving group had factors that parents and mothers who indicated that they too had difficulty with mathematics and science.

Students in the high group tended to spend the greatest amount of time in doing homework, whereas those at the bottom of the scale spent the next highest amount of time, and the middle group spent the least. A very large percentage of students received tutoring in mathematics and an even higher percentage attended kuroban and juku. Outside tutoring is not limited to those who are having difficulty in mathematics, but also to students who are doing excellently. Middle school students usually start juku about the fifth grade although many enter earlier.

To see why Japanese students surpass Americans, we need to understand the educational system in Japan at the elementary and junior high levels. The system is very different from that of the United States. In Japan, all students attend school from the age of five to seventeen, except for those who are home-schooled.

There are several reasons why Japanese students perform better than American students in mathematics and science.

1. **Curriculum and Instruction**
   - Japanese students are taught the same curriculum as American students, but they are taught more rigorously and in a more structured manner. They are expected to memorize and recite information, which is then tested through various assessments.
   - The Japanese education system is highly standardized, with a strong emphasis on testing and assessment.

2. **Parental Involvement**
   - Parents are highly involved in their children's education in Japan. They are expected to provide support and guidance, including helping with homework and attending parent-teacher meetings.

3. **Teaching Methods**
   - Japanese teachers are trained to be highly skilled and knowledgeable. They receive extensive professional development and are held to high standards.
   - Teaching in Japan is a very prestigious profession, and teachers are held in high regard by society.

4. **Exams and Examinations**
   - In Japan, there are many standardized tests, including entrance exams for college and university. These exams are highly competitive, and students are expected to perform well.
   - The National University Entrance Examination is a significant part of the education system, and students spend many hours studying for it.

5. **Culture and Attitudes**
   - Japanese culture emphasizes the importance of education and hard work. Students are encouraged to study hard and achieve high grades.
   - The notion of persistent study and effort is highly valued in Japanese society.

6. **Resources and Facilities**
   - Japanese schools are well equipped with modern facilities, including laboratories and computer rooms.
   - The country has invested heavily in educational infrastructure, including schools, libraries, and technology.

7. **Teacher Training and Development**
   - Teacher training is highly regarded in Japan, and teachers are provided with ongoing professional development opportunities.

Question 1: Are Japanese children more intelligent than Americans? No, but Japanese children work harder in school. They attend school five and one-half days each week and have an average of 1,800 hours of instruction per year. Students who do not pass the entrance examination for college are called renmin, which means "masterless samurai" or "unemployed man." It essentially means they have not been "employed," or in other words, they might possibly be adapted and utilized by American schools. So, let's hope they adopt this methodology and improve the system.

Question 2: Do cultural differences account for the achievement gaps? Perhaps the most important cultural factor that accounts for the achievement gaps is the way that parents and teachers view learning. In America, there is a strong emphasis on individual achievement, while in Japan, there is a strong emphasis on group achievement. This means that Japanese students are more likely to work together and help one another, while American students are more likely to work individually.

Question 3: What teaching strategies can be adapted from Japanese classrooms? There are several teaching strategies that can be adapted from Japanese classrooms, such as the use of group work and collaborative learning, the emphasis on learner-centered instruction, and the use of formative assessment. These strategies can be implemented in American classrooms to improve student achievement.

In conclusion, while there are many cultural differences between American and Japanese schools, the key to closing the achievement gap is to focus on improving the quality of education and providing students with the necessary tools to succeed.
Japanese children are not more intelligent than American children, but they work harder in school.

Question 12: Are children with special needs (handicaps) integrated into the regular classrooms in Japan? A

Integrating students with special needs into regular classrooms is a topic of discussion in Japan, similar to other countries. The integration of such students is a complex issue that involves considerations of education policies, resource availability, and community support.

Question 11: Are female members of the teaching staff given equal opportunities for advancement, and are they found in leadership roles? A

Women are often mentioned as occupations that are favorable in Japan, and there is an increasing number of female teachers in leadership roles. However, the number of female leaders in education remains relatively low compared to some countries.

Question 10: Are microcomputers an integral part of Japanese public school education? A

Microcomputers have been integrated into Japanese school curricula, with an emphasis on their use in teaching mathematics, science, and other subjects. The use of microcomputers in education is seen as a way to improve learning outcomes and prepare students for future careers.

Question 9: Does the Japanese curriculum won’t change except for the “unnecessary frills,” and their arguments are not unlike those with similar views in the United States. A

The Japanese curriculum is known for its stability and focus on core subjects, with limited changes to accommodate new trends or technologies. This approach is seen as a way to ensure a solid foundation in education.

Question 8: Do factors external to the school influence high achievement? A

Factors such as family background, cultural values, and community support are seen as contributing to high achievement in Japanese schools. The strong emphasis on education and the role of the extended family in Japan are factors that are believed to contribute to students' success.

Question 7: What are the attitudes of the Japanese pupils and their parents toward mathematics? A

Mathematics is considered an important subject in Japan, with a focus on mastery and problem-solving skills. Parents place a high value on their children's education, and there is a strong belief in the importance of education for future success.

Question 6: Do Japanese parents and students place more emphasis or importance on the study of mathematics than in American schools? A

In Japan, the study of mathematics is highly valued, with a strong emphasis on rote learning and problem-solving skills. This approach is seen as preparing students for future careers.

Question 5: What kinds of students enter the teaching field in Japan? A

The entry requirements for teaching in Japan are strict, with a focus on academic excellence and a strong commitment to education. This approach is seen as ensuring the quality of the teaching workforce.

Question 4: How are science and mathematics taught in Japanese schools? A

Science and mathematics are taught in Japanese schools with a focus on practical application and problem-solving. The curriculum is designed to prepare students for future careers in various fields.

Question 3: Do you believe that the high prestige and status of Japanese teachers are due to the fact that their professional lives are devoted to teaching? A

Japanese teachers are highly respected in Japanese society, and their work is seen as a noble profession. The high prestige of teachers is seen as a reflection of the importance of education in Japanese culture.

Question 2: Do students in Japanese schools find the curriculum too easy or too difficult? A

Students in Japanese schools are known for their hard work and dedication. The curriculum is designed to challenge students and prepare them for future careers.

Japan is making progress in the education of special needs children, but it is still behind the United States in this area.

The employment system (selecting graduates from better universities) and university entrance exams are factors in the success of Japanese students in science and math. However, the emphasis on rote learning and the lack of preparation for practical application are also concerns.

The writer suspects that this will be one of the major views produced sufficient data to draw conclusions outlined in this report. The writer believes that this will be a major point of discussion in the future study and analysis. However, the present question is why Japanese children excel in the fields of mathematics and science. Certainly no evidence was found that Japanese children are math whizzes, but they are sure of their intellect. Rather, some cultural practices work to the advantage of Japanese students. They are not afraid to make feeble gestures with small amounts of data, and they are not afraid to make mistakes.

Conclusions

Much of the data collected during the writer's trip, or from recent studies and surveys, indicates that the future of Japanese education is secure. This is a serious drawback, yet the progress is there, and Japan is making great strides in special education today.

From the perspective of this observer, Japanese schools do some things exceedingly well, and yet others are open to question. The Japanese education system is making great strides in special education.

Some American schools lean toward more science teacher takes his or her course one-half years ahead of American schools, and yet some others have not yet progressed to the point of integrating or mainstreaming special education children into the regular schools.

What Should Be Done?

Given the cultural differences and the difficulties of implementing recommendations properly, there are some suggestions worthy of consideration. Yes, America would do well to examine the Japanese system more closely. For example, just how serious are American parents about desiring an education for their children, and how do American parents value education to the extent that they are willing to monitor with a more critical eye the TV, reading, and other activities of their children? Do American parents check with children before they allow them to watch television, read comic books, or play video games? Do American parents actually watch their children's teachers working in the classroom? Is society ready to pay more attention to what schools and industry? Or are Americans content to make feeble gestures with small amounts of data, and yet not afraid to make mistakes?

A recent survey done to find out what are the best possible education the you can. The employment system (selecting graduates from better universities) and university entrance exams are factors in the success of Japanese students in science and math. However, the emphasis on rote learning and the lack of preparation for practical application are also concerns.

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the nation at risk. States might want to work toward more standardization of requirements in certain curriculum areas, particularly math and science.

The writer questions many of the features of the Japanese system, and yet students certainly take schooling seriously, and so do parents who are willing to pay for it. Can America afford to do less?

Currently the United States has clear leadership in the development and sales of computer software, but Japan's national policy plus keen competition is rapidly moving that country into a position of strength. Japan's race to produce fifth generation computers might well be successful and could mean that the United States will fall behind in computer technology. Unless Americans can successfully deal with the educational issues raised above, the educational system that has helped make America great may have failed the test. Japan might well be moving from the soroban to leadership with the silicon chip!


5 Reischauer, op. cit., p. 204.

6 Japan 1983: An International Comparison, p. 68.
