

[ISIS Focus Oct-Dec 2004]

Second East Asia Congress

Raising the Standard: Towards Educational Excellence and Innovation in East Asia

It is often said that a good education is highly prized among Asians. But the classroom, much like “the real world” today, has grown in complexity. There is increasing debate on numerous issues: what defines an effective education, how is education affected by globalisation, and what is the link between sociopolitical systems and education. Susan Teoh reports.

The first speaker, Dr Nirwan Idrus, provided a general perspective. Dr Idrus began by stating the fact that education in Asia, and especially in East Asia, is and has been an important agenda. Asians value education above all else.

Dr Idrus, a consultant with Quality in Higher Education, Indonesia, then framed the key issues in the form of questions: What is meant by “standard”, “excellence” and “innovation”? Why raise the standard? What is wrong with East Asian education, Asian values and Confucianism? What is the impact of social transformation and education transformation?

Definitions and benchmarks

The first question relates to the definition of such terms as “standards”, “excellence”, “innovation” and even “invention”, which may also be considered a relevant measure. Only when the various terms are defined can there be a common understanding of the terms used. When comparing the standards of education, it is the standards in East Asia that are our focus.

On the question of “why raise the standard”, we must again define the benchmark. If we are talking about raising the standard in East Asia, are we saying that standards of education in Europe, America, Australia and perhaps other parts of Asia are perhaps better than that in East Asia? Other questions might also be asked: Are we behind in this particular benchmark? If so, how far behind, and does it matter if we are far behind? Given the technology at the moment, perhaps East Asia can leapfrog or overtake in those benchmarks chosen.

Probing further, Dr Idrus suggested we ask: What is the motivation behind raising the standard? What is the impact of globalisation? At a time when the Western world is talking about globalisation, are East Asians – in our effort to raise education standards – trying to differentiate ourselves from the rest of the world?

In the micro sense of benchmarking, we have to ask: What are we trying to do, and what measurement should we use? The number of Nobel prizes won by East Asians? The number of top musicians and PhDs in East Asia? The number of patents or inventors, even the number of research papers quoted internationally? Only by answering these questions can we understand how to improve educational excellence.

Dr Idrus highlighted some cases to illustrate his point about benchmarking. Bill Gates is extremely wealthy, a former computer whiz kid, an entrepreneur – but a college dropout. Dr Charles Kao was responsible for fiber optics in digital communication; he is not the world's richest man, but he was one time Vice Chancellor of Hong Kong Chinese University. One can see the dichotomy between Gates and Dr Kao. Which benchmark should we be using here?

Sociopolitical systems and education

Dr Idrus also touched on the relation between educational improvement and socio-political systems. He noted that the ranking of Vietnamese education went up from 13th to ninth place among the ASEAN group, (Political and Economic Research Center Survey 2002). This has been attributed to the policy of *Doi Moi* (“renewal”), a combination of liberalism and some guided control (a legacy of the socialist system). In 1996, there were also some 280 Vietnamese Americans with at least three US patents each; one held 72 US patents. There are now many Vietnamese university professors around the world in various disciplines. All this was achieved in the 25 years following the Vietnamese migration to the US in the early 70s.

Dr Idrus also cited some achievements of countries with similar sociopolitical systems. The Hong Kong scientists and engineers produced DNA chips, which simplified the early diagnosis of cancer; the ramifications of such detection clearly being very important. Others examples include HIV treatment using scrub typhus in Thailand, wastewater treatment system using solar energy, and conversion of industrial effluent into potable water designed and produced in Singapore. And recently, Malaysia with the help of Australian academics designed and produced reflective pipe lighting which allows natural lighting in deep floor space in a building.

Dr Idrus suggested that the similar sociopolitical systems of these countries are related to their achievements in the area of inventions and innovations.

These examples, said Dr Idrus, are illustrative of a few issues. First, sociopolitical systems have an impact on human potential. Second, social values, social class, and the size of that class, all have an impact on human potential. In other words, if any of these factors –sociopolitical system, social values or social class – is changed in a country or region, it will undoubtedly impact on human potential. If the changes are efficacious, then the impact will be positive.

Dr. Idrus summed up this idea by quoting Sin-Ming Shaw in *Time* (August 23-30, 1999): “To bring out the best and most creative in human beings, a society should be organized democratically in its economy and its politics.”

Social values, social class and education

Social values, whether in East Asia or elsewhere in Asia, are influenced by Confucianism to some extent. Sin-Ming Shaw, in fact, summarised the concept of Confucianism as follows: “It is top down, it is privileged, it is predetermined moral and behavioural roles.”

Through his years of experience in education, Dr Idrus has observed that this attitude is still prevalent, especially among Asian students who go to countries like Australia and New Zealand. They are very respectful of teachers but very shy in discussions. In today’s world, unless these students are involved in discussions, which in turn will build their confidence in learning, they will be left behind.

In terms of social class, Dr Idrus supported his idea with a quote from Andrew Marshall’s article “Small Wonder” in *Time* (February 17, 2003): “This much is clear: ethnicity and geography are irrelevant. Prodigies can materialize anywhere, and Asia produces more than its share of the super precocious. In the past, poverty, lack of education and absence of opportunities meant their abilities may have gone undiscovered or undeveloped. But bigger incomes and the rise of an ambitious middle class have produced a boom in accomplished youngsters.”

In his concluding remarks, he again quoted Sin-Ming Shaw, in the same article: “The issue of losing the Asian soul by embracing democracy and capitalism does not exist, for those systems are both Asian and universal. Once freed from the shackles of bankrupt ideas and arbitrary governance, the talents of Asians will flourish in the next millennium...”

Dr Idrus’s final conclusion was that East Asians must move from rote learning to what he termed as “understanding”. We also need to move in terms of social values from accepting to reconceptualising. Only by moving from the quadrant of rote learning and accepting (passive learning) to the quadrant of reconceptualising and understanding (active learning or transformative learning) can we then expect the students to start to transform things. The key is to have both teachers and learners engage with each other on the subject matter and to encourage the students to be questioning.

Science education in a changing world

The second speaker, Prof Leo WH Tan, started with a quotation from Asian Nobel Laureate Abdul Salam: “It is basically mastery and utilisation of science and technology that distinguishes the North and the South.” Most of East Asia would be included in that South. Prof Tan, who is Director of the National Institute of Education, Nanyang Technological University, Singapore, focused his presentation on science education, but its essence was no less pertinent to the liberal arts and all other disciplines.

A scientifically aware or literate East Asia depends on the education of its people in science and technology. Goals must therefore be defined; we must also determine the kind of workforce required in this new order.

The goal of science education is to prepare the student to access, generate and process information. It is therefore not only the acquisition of scientific knowledge and understanding, but also lifelong skills, from the discreet process skills or thinking skills, to processes such as decision-making and problem-solving. New entrants into the workforce will be required, upon leaving school or university, to consider the kind of jobs they would be able to obtain in a world that is constantly changing because of increasing global competition, and rapid advances in science and technology (including the use of ICT in all aspects of life). More importantly, they must manage ambiguity and uncertainty in a changing economic, social and technological environment. They must also come to grips with today's world security problem. We must therefore ensure relevance through lifelong learning; knowledge half-life is approximately two years and 18 months.

One frequently disregarded issue in science education is that of ethics and values in individuals and society. Post-Enron, the new workforce can expect to be placed under more intense scrutiny from shareholders, customers and other stakeholders.

In relation to society as a whole, genetically modified organisms (GMO), cloning, and euthanasia were issues not considered in science education to be important. The general public was not alerted to mad-cow disease until a few years after it first broke out. Ethics in education should therefore be an integral component of education reform.

Trends in science education

Prof Tan discussed key trends in science education. Notable among these are the increasing emphasis in science education on the acquisition of knowledge through the use of higher order thinking skills, and also the emphasis on processes over the classical rote learning that is so prevalent in East Asia. The increasing use of learning tasks stimulate and promote complex and holistic problem-solving, and also critical and creative thinking. This learning task can be simple and can be started in schools. An example is the science practical examinations, which can be carried out throughout the year rather than at year-end. It can be a school-based activity where children learn about planning, evaluating and carrying out practical exercises on their own.

There is also an increasing emphasis on deep knowledge. While a broader-based knowledge is required for a good worker, specialists are equally required, particularly in new areas of life sciences like neurobiology. Striving towards a more meaningful connection between and across subjects, learning tasks and inter-disciplines are vital to the new order. Steps are taken to link learning to everyday experiences. The non-formal education will merge with the formal in the curriculum.

There is a greater emphasis on collaboration, sharing, developing people skills and team building. These are essential in today's world, where one individual cannot know everything. There is also greater emphasis on a system in which children will decide which experiments they wish to conduct, formulate their own hypotheses, determine why they do it in such-and-such a way, and what conclusions they can draw. And teachers, rather than just set examinations, would discuss the "why's and wherefores" with students.

Greater emphasis is also placed on relating science with global issues, for example linking life sciences with biotechnology, global warming and climate change, the aging problem and population problem, loss of biodiversity – not to mention fundamental concerns such as clean air, clean food and clean water.

The challenge of teaching science

While there is no shortage of trends, Prof Tan cautioned that the main challenge is the actualising of these identified trends, which is a challenge for science educators everywhere.

One of the biggest challenges is the introduction of computers in the learning of science. Although ICT has been incorporated in the teaching-and-learning interaction, a real increase in the ability of ICT to impact individualised learning is still far off. The role of teachers must be correspondingly transformed. The teacher has to be both facilitator and learner, and ultimately, change agent.

A holistic approach in science education is therefore necessary. This means a coordinated effort on several fronts - most crucially with regard to changing the mindsets of teachers, students and parents. School leadership is most critical as it determines the prevailing school culture; if the headmasters are seen as mere heads of individual buildings, they will be left behind. Both the learning environment, and the physical environment must be changed. Assessment of students has to be reviewed and research has to be conducted on teaching methods and learning interactions.

Prof Tan highlighted some specific examples of science in education. One such example in Singapore concerns the manner in which school principals are trained today. It is no longer just about obtaining a diploma to be a high school principal. Singapore has adopted the Leaders in Education Programme (LEP), fashioned after the Harvard Executive Programme. This entails a six-month intensive training period in the US to see how the best schools are run. There is no syllabus; the principals have to write their own. They go beyond best practices, with the purpose of preparing themselves for a world five years from now. Through such observation, they must then synthesise this information and come up with a book that describes the future school for the next five years.

Another example is the Orchid Hybridisation Programme (OHP), which allows for students to be fully involved, from the growing stage of the plants, to tissue culture, plant breeding, marketing the plant or setting up an online auction site. The new hybrid that

will be produced will be registered in Kew Gardens, and the property will belong to the student, who is at liberty to name the plant after the teacher, the school or himself.. He can then raise the auction money and give it to charity. Such a project combines the values, attitudes and skills of a student.

The Japanese experience

The third speaker, Prof Tsutomu Kimura dealt with the practical side of the subject, concentrating specifically on how to attract children to science and technology. Prof Kimura is President of the National Institution for Degrees and University Evaluation, Japan.

As discussed earlier the progress of science and technology is extremely important for the development of a country. By registering the Science and Technology Fundamental Law in 1997, Japan showed its determination to contribute to the welfare and peace of the world through science and technology. The country has invested an estimated US\$150 billion in the past four years; this has been expanded to US\$220 billion for the next four years. This huge investment has greatly boosted the country's activity in the field of science and technology. This in turn may have increased the resiliency of the Japanese economy.

Prof Kimura presented some detailed data of the academic performance of some children in this region. He used two international comparisons to illustrate academic achievement. The first is the International Association for Evaluation of Educational Achievement (IEA), which makes international comparisons on a regular basis. The IEA examines the extent to which children have mastered courses of study taught at school.

On the other hand, PISA (Programme for International Student Assessment), organised by the OECD, checks children's ability to find out problems related to their own future life and to apply their knowledge and skills to solve them. It can be said that ability checked by PISA is more with regard to a daily life-based situation, and thus broader than the knowledge examined by IEA.

The IEA was used in a survey to show the academic performance of Japanese children in mathematics and science over a period. In 1999, there was a slight decline for Japanese junior high school students aged between 13 and 15 for mathematics; they placed fifth among 38 countries. Performance on the whole was good, though there were some problems as Japan was lower in the international average.

The results of another survey using the international comparison by IEA for 14 year olds in 1999 were as follows. The top five in country performance were: Singapore, Korea, Taiwan, Hong Kong and Japan. However, when matched against the percentage of school children who like mathematics, the top five countries were ranked very much lower, with Singapore ranking ninth (79 percent like mathematics), and Japan 36th (48 percent like mathematics). Malaysia with a country performance score of 16 became the top country

with the highest in the survey, with 95 percent of kids liking mathematics. Indonesia, ranking at 34, became number two with 92 percent liking mathematics.

An almost similar situation is seen by the IEA comparison of 14 year olds who like science. Singapore was ranked tenth (86 percent like science) while Japan ranked 22nd (55 percent like science). Malaysia, ranking 22nd on the country performance score, held second place with 96 percent liking science, and Indonesia, 32 on the country performance score, emerged tops with 96 percent liking science.

Using the second standard of comparison, PISA, the results of a survey were as follows: In terms of reading comprehension, Finland was the first, followed by Canada, New Zealand, Australia, Ireland, Korea and Japan. In the mathematical literacy survey, Japan, Korea and New Zealand topped the list.

Another survey, using PISA, sought to determine how much time school children spend doing homework and voluntary study. 27 countries were surveyed. Japan was at the bottom of the list. Korea and Finland did quite well.

In another national survey held in Japan, more than 2,000 kids were asked two questions: Do you think that studying is important? Do you like to study? Among the twelfth grade category, about 80 percent appreciated the importance of studying itself. But when asked whether they like to study, only 20 percent indicated yes. This discrepancy in the replies of these two questions has prompted the Japanese to devise new teaching skills and techniques, and to undertake innovation in the field of pedagogy.

Prof Kimura highlighted some initiatives (See Tables 1 and 2). For this year, the Japanese government has put aside over 5 billion yen for the purpose of increasing the number of children who like science and technology. A second project aims to increase public acceptance of science and technology; for this the Japanese government has allocated over 8 billion yen. These projects hopefully will help Japan to raise the level of interest in science and technology, not only in the education programme but also in the workforce.

Table 1: Japan’s project to increase the number of children who like science and technology

Initiative	Allocation
Establishing 60 super-science high schools with a priority on teaching science and mathematics	1.35 billion yen
Promoting liaison between elementary and junior high schools in science education (ten schools in 20 model districts will be involved)	0.22 billion yen
Networking of science volunteers	0.30 billion yen
Establishing the Science Partnership Programme. Lectures will be conducted by leading scientists and engineers while teachers will be given training at	1.27 billion yen

leading institutions	
Constructing infrastructure for science teaching using information technology	0.64 billion yen
Upgrading equipment and apparatus necessary for experiments and field observations	1.28 billion yen

Table 2: Japan's project to increase public acceptance of science and technology

Initiative	Allocation
Upgrading the National Science Museum	4.03 billion yen
Upgrading the National Museum of Emerging Science and Innovation	2.98 billion yen
Financial support for efforts to increase public acceptance of science and technology	1.19 billion yen