Title	Shaping the education of the future: A Singapore experience
Author(s)	Leo W H Tan
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SHAPING THE EDUCATION OF THE FUTURE --- A SINGAPORE EXPERIENCE

Leo W H Tan
National Institute of Education, Nanyang Technological University

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Most East Asian nations with the exception of Japan (which started reform early and in its own culturally embedded ways) borrowed metropolitan i.e. "western-type" models based on an industrial-manufacturing model for their education systems – the curriculum, textbooks (often imported), the Cambridge 'O' and 'A' level examinations (which Singapore still retains), models of teacher training, school organisation, etc. These features were combined with some cultural attributes – a belief in the value of education, of merit in achievement, high levels of parental involvement, a common curriculum, frequent assessments to monitor standards, homework to ensure mastery of content, effective whole class teaching to reach all students, relatively high regard for teachers, etc.

Based on the above, Asian education systems which also emphasized values especially values of social cohesion, produced disciplined and hardworking workers who fitted well into the workplace of the past two to three decades.

To a visitor from another planet (assuming he has observed and understood our present educational, economic and cultural systems), it may appear strange if not paradoxical, that we Asians are making fundamental and even radical reforms to our educational system which has served us well till now.

He may well ask what we are asking at this international conference – why is there a need to restructure the knowledge base of education in Asia? Indeed, have our education systems not served us well? The past two decades have seen most countries in Asia showing impressive economic growth and social development. This success has often been attributed to our students doing well in examinations and integrating successfully into a disciplined workforce. In the industrial-manufacturing era, education systems which emphasized discipline and hard work, produced the appropriate type of workers for that age.

However, as we approach the close of the 20th Century, globalisation and the accelerated pace of technological development with accompanying socio-political and cultural changes, make it imperative for our educational systems to broaden the focus beyond examination results and discipline.

The Prime Minister of Singapore, Mr Goh Chok Tong, puts it this way. He said (at the opening of the 7th International Conference on Thinking, June 1997) :

> "We have to prepare ourselves for a bracing future – a future of intense (global) competition and shifting competitive advantages, a future where technologies and concepts are replaced at an increasing pace and a future of changing values. Education and training are central to how nations will fare in this future".

Thus, the workforce of the 21st Century will require creative and critical thinkers, change-adept individuals, innovative and science/technology savvy workers and life-long learners as the world of work is no longer manufacturing dominated and the nature of manufacturing itself has changed. Globalisation poses new economic challenges, especially the mobility of trained labour and those with entrepreneurial skills. The power of information and communication technology has already begun to and will continue to dramatically alter the workplace. Developments in science are challenging established values and creating ethical dilemmas. The cloning of Dolly the sheep and the stated intention by a US scientist to try human cloning; the insertion of human genes into animals to produce vaccines, hormones, etc. are but two examples of great scientific achievements that leave human civilisation with disturbing and unanswered questions.

How is the education system to respond? What parts of the old knowledge base are still relevant? What are the building blocks of the new knowledge base? What reservations to reform should we keep in mind such that the baby does not get thrown out with the bath water?

There are probably no Pan-Asian solutions to this issue, but permit me to present what Singapore is or is planning to do to prepare our students to meet the challenges of the future. I hope that despite the limited experience I can share, it will stimulate reflection and discussion among ourselves over the next few days and after we return to our respective institutions.

Singapore's Ministry of Education started the process of reform two years ago when it launched several major initiatives viz making greater use of IT, revising the curriculum and assessment, teaching creative thinking skills, revamping and increasing career paths for teachers, stressing national education and giving schools more resources and greater autonomy. Why did the Ministry embark on these steps? PM Goh explained at the Thinking Conference :

> "We cannot assume that what has worked well in the past will work for the future. The old formulae for success are unlikely to prepare our young for the new circumstances and new problems they will face. We do not even know what these problems will be, let alone be able to provide the answers and solutions to them. But we must ensure that our young can think for themselves, so that the next generation can find their own solutions to whatever new problems they may face. Singapore's vision for meeting this challenge is encapsulated in four words THINKING SCHOOLS, LEARNING NATION (TSLN). It is a vision for a total learning environment, including students, teachers, parents, workers, companies, community organisations and government".

The Deputy PM, BG Lee Hsien Loong, followed on in November 1997 at an education forum for Polytechnic students. He said :

> "Our schools and tertiary institutions must become learning organisations, not teaching factories. Teachers and lecturers should continuously seek to improve, to pick up best practices elsewhere and to challenge students to find better solutions. These changes in our education system need to be supported by a national environment that promotes a learning mindset and a society which upholds the fundamental values of equal opportunity and meritocracy. This is the way to become a learning nation".

Let me elaborate a little on the TSLN vision, the commitment to IT, why National Education has a special relevance to Singapore (values/responsible citizenship) and how school teachers and leaders are being prepared to meet the twin challenges of the future : how to make a successful transition to being a knowledge-based economy and how to ensure the citizens remain cohesive and develop collective instincts as Singaporeans.

The Thinking Schools, Learning Nation (TSLN) vision is the overall descriptor of an entire education system to meet the challenges of the 21st Century. The fundamental tenets of pursuing educational excellence (via a strong national curriculum and high national standards) and instilling values in the young to become responsible citizens will remain the cornerstone of Singapore education, but where it is necessary to change the form, delivery and substance of the education we provide, we must re-examine, revisit and even reinvent them.

Thus, several bold reforms have been, are and will be taking place. First, there is an on-going Curriculum Revision Masterplan which aims at forging a more forward-looking, relevant and suitable national curriculum. The Director-General of Education, Mr Wee Heng Tin, described in broad terms how the curriculum needs to be revised. These are :

> "Reduction of content in each subject, with emphasis on broad-based learning at the earlier stages and greater depth and specialisation at the higher stages of education;
>
> Emphasis on the joy of learning and development of habits of continual learning;
>
> Development of skills for higher order thinking, effective communication and teamwork at all levels, and
>
> Incorporation of National Education themes and the use of information technology in the curriculum"

He added :

> "for the curriculum revision to succeed, changes must be systematic; they cannot be piecemeal efforts independent of one another. Such major changes to the curriculum must be accompanied by adjustments to other areas in the context of teaching and learning. Teaching strategies will shift emphasis from teacher to learner, classroom cultures will change and our assessment and examination system will be transformed. Modifications to teacher training and ultimately school appraisal, will support the change in focus"

A small but highly significant step has been introduced in University admission criteria. Until recently, the Cambridge 'A' level examination results provided the sole basis for admission to our two Universities. Since 1996, winners of the National Science Talent Search (an initiative of the government to encourage bright high school students to do independent research projects) and since 1997, winners of International Science Olympiads (Mathematics, Physics, Chemistry, Computer Science) can obtain direct entry to science/engineering courses irrespective of their 'A' level results. This opens the door to alternative assessment modes for tertiary education admission and thus challenges the old mindset of relying solely on school leaving or University entrance examinations.

The reduction in curriculum is not an arbitrary exercise but rather a deliberate attempt to ensure core concepts and knowledge are retained while freeing curriculum time to include skills that are critical for the future of our young – creative thinking, the ability to learn independently and continuously and effective communication.

Thus, the Thinking Programme and the IT Masterplan for education take into consideration the needs of the future workforce which is expected to possess higher order thinking skills to be creative and innovative and also technology savvy "enough to be discerning and astute users of information as well as creators of knowledge" (RADM Teo Chee Hean, Minister of Education).

The government has committed S$2 billion to provide every school with sufficient computing power.

The IT Masterplan sets our national standards for the use of IT in schools by the year 2002. Schools will be expected and helped to use IT meaningfully to meet learning objectives. By 1999, a typical primary school will have at least 150 computers and a typical secondary school about 350. These numbers will allow primary schools IT-based learning for 10% of total curriculum time and 14% for secondary schools. By 2002, the Masterplan envisages a pupil-computer ratio of 2:1 in every school, allowing for up to 30% of the curriculum time to be IT-based. Teachers will also be provided with notebooks in school and given grants to purchase their own computers. They are also being trained to integrate IT in their teaching and learning.

National Education has a special relevance to Singapore which is small both in size and population. The Minister of Education said in Parliament (May 1997) :

> "Schools must focus on National Education to instil in our young a strong sense of shared identity and confidence in the future".

Singapore is unique in that it became an independent nation under very trying circumstances and hence its people must understand the constraints and vulnerabilities which make them different from other countries. Group spirit among pupils and commitment to self, family, community and nation to bring about social cohesion are imperative.

National Education notwithstanding, the ultimate goal of education in any society is to develop the total person, not just his/her academic abilities. Hence, the ethical/moral, cognitive, physical, social and aesthetic dimensions or qualities have to be nurtured as well. In an Asian culture, we also value integrity, character, positive attitude to work, willingness to be team-players, sense of responsibility and commitment to society.

The Ministry of Education, as a result of its review of education up to the present, has published a document that spells out a succinct and comprehensive list of desired education outcomes (**Appendix**). It identifies attributes the teaching profession feels every Singaporean should have and gives direction to the teaching, learning strategies to be adopted.

I now come to a critical area of the education chain – the education of the trainers i.e. the teachers and school leaders.

Teachers have so many roles to play in and out of the school that it is no wonder many are concerned about undue stress. They are didactors, mentors, motivators, facilitators, disciplinarians, counsellors, befrienders and

even surrogate parents. We have to help them to respond to their students', society's and their own needs. The teacher of the future must be knowledgeable, resourceful, collegial, adaptable, empowered, ethical and skilled in order to foster these same characteristics in their students. The State University of New York has an experimental programme to educate teachers for the 21st Century. This programme identifies 10 core teaching skills including teaching for values and character, developing good communication skills, fostering problem solving and inquiry, promoting cooperative learning, integrating curriculum, using media materials and technology soundly, organising and evaluating instruction effectively and understanding and meeting diverse needs of all students.

For teachers to respond to the call to adapt to the diverse, changing needs of their students and the workplace, the education of teachers must be a continuum from initial and beginning to trained teacher, to peer and organisational leader. Taking cognizance of these changing needs, Singapore has just begun another fundamental review of our teacher education system. The premises upon which this review will be conducted are :

1. The teacher is the key to all our efforts in education, and
2. Teacher training/education will make a critical difference to the quality of educators we produce, to whom we will entrust the responsibility of moulding the future of our nation.

I must hasten to add that while we are revisiting and re-examining our teacher education system, we have already embarked on major curricular changes to all the initial teacher education programmes at the National Institute of Education (NIE), revamped the management training programmes for school leaders (potential principals and heads of departments) and introduced new packages for training level and subject heads and senior teachers. The latter three promotional grades were introduced in 1996 and emphasises the commitment of the Ministry of Education to increase the career paths for teachers.

Where initial teacher training is concerned, we expect our student teachers to be active, collaborative, inter-disciplinary and reflective learners. This mindset should carry them throughout their careers. Not only has the curriculum to be restructured and modes of assessment re-evaluated, a radical shift in thinking is required to broaden the perspectives of the teacher and pupil, beyond the text, class and school to the community, nation and the world!

Hence, in the review of the undergraduate arts and science programmes (for a start), we are introducing what we term core skills which represent essential modules all students have to read, regardless of their discipline or specialisation e.g. Critical Reading and Writing (communication skills); Society and the Teacher (social responsibility, national education, values); Environmental Studies and Global Issues (inter-disciplinary learning, linking study to real world).

An essential component of a student teacher's training is the school practice. Just as in other professions (law, medicine, engineering, accounting) where practitioners take on the role of mentor and supervisor for interns, NIE is forging a stronger partnership with schools. The new category of senior teachers will be actively involved in the supervision of the practicum.

At the school leader's level, the current programmes for potential principals and heads of departments are based on the premise that the future school head must lead the school according to sound management principles. The current delivery strategy is based on the belief that reflective practice is the key to successful innovation. While the present programme seeks to introduce management principles and practices into the school organisation, the future one must seek to help principals design schools as learning organisations. Management principles and practices related to the top-down, command and control paradigm must give way to the disciplines of the learning organisation in a rapidly changing world.

The course for heads of departments will focus on departmental management and curriculum design, development and evaluation. The aim is to prepare them with the knowledge base and skills required for their role as instructional leaders and change agents in the school system.

Level and subject heads will be provided supervisory and curriculum management skills while senior teachers will be equipped with conceptual understanding and skills required for their professional roles as mentors to new and less experienced teachers.

Throughout their careers, the concept of life-long learning will permeate the profession and it is envisaged that teachers will spend about 5% of their working time per year on continual or in-service training. This works out to

be about 100 hours or 1 working day a month.

One of the characteristics of the learning organisation is that staff are encouraged to take responsibility for their own development and take part in decisions about it. The government introduced independent and autonomous schools to give selected institutions this level of ownership and autonomy and to ensure high standards through healthy competition and rivalry. It now wants to test the desirability and feasibility of devolving greater autonomy to more schools. The 'school cluster', introduced just a year ago, started with 24 schools grouped into 4 clusters of 5 – 7 schools each. The cluster concept permits schools to retain their individual identity and strengths while at the same time enhancing the pooling and sharing of resources and expertise according to need. Collaboration among schools is encouraged in this way that promotes collegiality and innovation.

Singapore is not the only nation trying to reshape its education system for the future. As I said at the beginning, there are no Pan-Asian solutions to the issues of educational reform (i.e. what should or should not go into it, what needs to be retained). We cannot predict with any measure of certainty what the future may bring, what types of job our grandchildren will have, but I hope, in sharing a Singapore experience with you, I have given an idea of the direction that education systems in Singapore, in the region and throughout the world are heading.

What is important to ensure the survival of nations and economic growth is that governments, the private sectors and the citizenry must have the will and determination to provide ample resources and even make sacrifices for education, especially the education of teachers.

In equipping teachers with the necessary mindsets and skills to put in place new teaching/learning and assessment methodologies and expanding their scope and horizons, they will help nurture among the young, the need for life-long learning, creativity and innovation, values, effective communication skills and confidence in themselves and their future!!