International Review

Tokyo impressed with IT use in Singapore schools

Kwan Weng Kin

The touring education officials are likely to emulate the Republic when they introduce IT [information technology] into Japanese classrooms

TOKYO - IT-based classes at three Singapore schools have opened the eyes of Japanese education officials to the use of information technology as a tool for nurturing creativity and self-expression in children. Until then, the officials had believed that bringing IT into the classroom meant teaching children how to click on a mouse and to master the Internet.

'It was a great shock to me,' confessed Mr YOKICHI YOKOYAMA, chief of Tokyo's education bureau who toured the schools in Singapore earlier this month. 'In Japan, we see IT as something we have to teach.'

He was astonished to hear from Singapore teachers that they viewed IT as a means for getting children to think and to express themselves.

Japanese schools, which have long stressed rote learning, this year introduced a new comprehensive-studies subject designed to equip children with skills to help them solve problems encountered in everyday life. 'We think that is something you in Singapore have already achieved using IT,' said Mr YOKOYAMA.

His visit was a follow-up to an earlier trip to the Republic in late April by Tokyo governor SHINTARO ISHIHARA, who wanted to see Singapore's IT achievements.

Mr ISHIHARA was so impressed with the use of IT by teachers at Raffles Girls School and Queensway Secondary School that, upon returning to Tokyo, he insisted that his education officials take a look for themselves. Mr YOKOYAMA's team added Princess Elizabeth Primary School to their itinerary.

He said he was 'very moved' when he saw Singapore teachers conducting classes using CD-ROMs or other computer-based material which they had produced almost entirely by themselves.

'I was surprised that Singapore was so different from us. The biggest problem in Japan is that we have little of such teaching material that exploits IT,' he said.

So far the Japanese have been concerned mainly with hardware. In line with a government directive, each public school is equipped with an Internet-wired computer lab.

By 2005, each classroom will also have two personal computers, a projector and Internet access. 'In terms of how to use IT in schools, Japan is behind many countries, including South Korea and Singapore,' said Mr WATARU SEKI, who was until recently in charge of IT education.

Within the next year, as a pilot project, the Tokyo authorities will pick three schools and provide their teachers with the resources to use IT in their teaching. Planners for the project are likely to draw on the experience of Singapore schools.

The delegation, which included two members of the Board of Education, was also interested in Singapore's concept of independent schools.

To counter long standing criticisms that public schools in Japan are all cast in the same mould, the authorities hope to promote competition among schools and to let principals have more say in running their own schools.

'In Japan, we are also trying to establish different kinds of schools so that parents will have more choice,' Mr YOKOYAMA explained.

From the Straits Times Interactive [Singapore], Monday, July 29, 2002.
See http://straitstimes.asia1.com.sg/

US, Malaysia, Thailand, Vietnam, India, Pakistan, Bangladesh, Finland ...
Now, Israel uses Singapore maths textbooks too

Tracy Quek

Primary 1 and 2 children in over 100 Israeli schools will study basic mathematics the way it is taught here

Starting this month, Primary 1 and 2 children in over 100 Israeli schools will start the new school year using Singapore maths textbooks and workbooks to learn basic concepts, such as fractions and the decimal system.

Israel joins a growing list of countries where Singapore mathematics textbooks are popular. They have already found their way into classrooms in the United States, and are also a hit with schools and parents elsewhere, from neighbouring Malaysia, Thailand and Vietnam to countries further away like India, Pakistan, Bangladesh and even Finland.

In Israel, two private charitable organisations, *The Israel Foundation for Maths Excellence* and the US-based *Rosenbaum Foundation*, have bought the rights to translate 10,000 copies of 'Primary Mathematics 1 and 2' textbooks and workbooks into Hebrew and to distribute them to schools there.

The organisations signed the contract with the Education Ministry, whose staff wrote the textbooks, and the publisher of the maths series, Times Publishing. They declined to reveal the cost of the project. Singapore's strengths in mathematics and science achieved worldwide recognition after the Republic came in tops among 38 countries in the 1995 and 1999 International Maths and Science Study. Piqued by Singapore's success, Israeli-born entrepreneur and philanthropist DAVID GARBASZ, the man behind the Israel Foundation, started to 'research' Singapore textbooks.

Mr GARBASZ, who has a post-graduate degree in maths, said: 'I found the books to be well-written, logical and methodical and used them to coach my daughter. I felt that they would help other children in Israel.'

Educators and academics in Israel agreed. Professor RON AHARONI from Technion-Israel Institute of Technology's maths department has only high praise for the Singapore approach to teaching maths.

The maths textbooks emphasise mental calculation and use colourful pictures of everyday objects such as whistles, keys and local fruits to catch a child's eye. Concepts are revisited but at a higher level each time, allowing pupils to draw on what they have learnt before to help them understand more complex ideas. He said in an e-mail reply: 'The books will change the way students learn maths in Israel. There is a lot of wisdom and thought invested in them.'

Elsewhere in the world, the Singapore influence has been felt for some time now. In the US, a pilot programme using the maths textbooks is entering its second year in 140 schools. Earlier this month, the US and Singapore signed an agreement to study how maths is taught here, which could see even more US schools using the books later. Malaysia, Pakistan and Thailand have been buying the books for over a decade, said Ms JUNE OEI, publisher and managing director of Times' curriculum division.

Orders from foreign countries can range from fewer than 100 copies to more than 10,000. Pakistani publishing firm, Publishers Marketing Associates, for example, has been ordering about 1,000 copies of the books every year for the last four years.

Its chief executive officer, Mr ZIA HUSAIN, said the books were used in eight private schools in major cities like Islamabad. Miss LIM JUAT FONG, 54, a teacher at Radin Mas Primary, said: 'It's wonderful to hear that other countries like the books. It reaffirms that we've got a good system of teaching our children maths.'

From the Straits Times [Singapore], Monday, September 23, 2002.
See http://straitstimes.asia1.com.sg/

Realistic Math Makes Sense for Student

Eve Torrence[1]

I am a mathematician. I am a college professor. I am a mother. From all three perspectives I have been following with interest the controversy over the current mathematics education reform. Last year I had an experience that finally brought clarity.

My husband, who is also a mathematician, and I had a sabbatical at the University of Utrecht in the Netherlands. We enrolled our eight year-old son, Robert, in a local Dutch school. In doing so we were unconsciously starting a very interesting experiment. At home Robert had been experiencing a traditional mathematics curriculum where a great deal of time and effort is spent on learning the carrying and borrowing algorithms for addition and subtraction. The mathematics curriculum at his Dutch school was very different. The students were working on problems at the same level, but they were encouraged to develop their own techniques for doing the problems. They were not taught the carrying and borrowing algorithms. This approach has been used successfully in Holland for almost thirty years.

At the same time Robert was adapting to a new curriculum, I was studying at the Freudenthal Institute at the University of Utrecht-a world-renowned center for research on mathematics education. I was learning that the curriculum he was experiencing is called *Realistic Mathematics Education* (RME). In RME, the mathematics is introduced in the context of a carefully chosen problem. In the process of trying to solve the problem the child develops mathematics. The teacher uses the method of guided reinvention, by which students are encouraged to develop their own informal methods for doing mathematics. Students exchange strategies in the classroom and learn from and adopt each other's methods. I also learned that much research has been done on this approach, that it is based on what we know about child development and the development of numeracy, and that it is this body of research that is driving the math education reform in our country.

When we first arrived in the Netherlands and I began to learn about RME, I spent a little time quizzing Robert on how he would solve a few addition and subtraction problems. I was shocked by the rigid attitude he had developed at his school in the U.S. When asked to do any addition problem with summands larger than 20 he would always invoke the addition algorithm. He would sometimes make mistakes and then report an answer that made no sense. He was putting all his confidence in the procedure and little in his own ability to reason about what might be a sensible answer. When I suggested there was a simpler way he could think about the problem he became upset and told me, "You can't do that!"

[1] EVE TORRENCE currently teaches at Randolph-Macon College, USA.

After a few months in Holland, I began to see an amazing difference in Robert's number sense. He was able to do the same problems more quickly, more accurately, and with much more confidence. For example, I asked him to solve 702 minus 635. He explained, "700 minus 600 is 100. The difference between 2 and 35 is 33, and 100 minus 33 is 67." When he tried using the algorithm he made a borrowing error and became very frustrated. I asked him to compute 23 times 12. He explained, "23 times 10 is 230, 23 times 2 is 46, 230 plus 46 is 276." This multiplication problem was much harder than anything in the curriculum at home. I was very impressed with the flexibility and range of methods he had developed in only a few months.

What happened to Robert in those few months has had a profound effect on my perception of learning and on Robert's understanding of mathematics. My child learned to think. He learned he could think. He was encouraged to think. He learned to see mathematics as creative and pleasurable. This independent attitude towards mathematics will remain with him forever and serve him well. It is this fact that has convinced me of the value of de-emphasizing algorithms in the elementary years.

Unfortunately, Robert is once again back in a school that focuses on the teaching of algorithms. The other day as we were driving to soccer, out of the blue Robert asked from the back seat, "Mommy, wouldn't it be crazy to do 5000 minus 637 using borrowing?" I smiled proudly at him and said, "Yes, honey, it would."

From Education Update [Online]. New York City, December, 2002.
See http://educationupdate.com/archives/2002/dec02/issue/spot_mathtorrence.html
Homepage is at http://educationupdate.com/index.html

Show them how to learn

Our role should not be to lecture but to guide students on journeys of discovery, says Steven Schwartz

Steven Schwartz

HAMILTON HOLT, an American college president, ridiculed lectures as "that mysterious process by means of which the contents of the professor's notebooks are transferred by means of the pen to the pages of the student's notebook without passing through the minds of either". That was 60 years ago, and little has changed. University students are still expected to sit passively through lectures or their hi-tech equivalent, the PowerPoint presentation. This would be fine if lectures or presentations actually produced learning. Unfortunately, they don't. Psychological research shows that students

taught passively remember little of the material presented to them, and understand even less.

Teaching and learning were once very different. Classical scholars, Socrates particularly, eschewed didacticism, preferring instead to teach by interaction. Socratic dialogues, in which propositions and ideas were subject to close scrutiny and debate, were widely considered the best way to instill knowledge and creative thinking.

Over the centuries, however, practice changed. By the middle ages, active debate between teachers and students virtually disappeared. Students were expected to learn church-approved wisdom; teachers were priests whose job was to transmit religious teachings, not question them.

Interest in new forms of teaching and learning revived during the Enlightenment. Philosophers such as JEAN JACQUES ROUSSEAU argued that students learn best when they are allowed to discover knowledge for themselves: "Put questions within [the student's] reach and let him solve them himself. Let him know nothing because you have told him, but because he has learned it for himself."

ROUSSEAU's ideas exerted a profound influence on JEAN PIAGET, the Swiss psychologist who studied the development of the intellect in children, and also on the American educator JOHN DEWEY. DEWEY advocated what he called discovery learning, in which learners uncover facts, theories and relationships for themselves in the course of solving meaningful problems. The teacher's role was to guide students and facilitate discussion.

ROUSSEAU, PIAGET and DEWEY are the forebears of problem-based learning, which has now been developed into a complete medical curriculum used to train doctors around the world. In contrast to the traditional curriculum, which begins with lectures on basic science and works upwards to organs, systems, and finally to clinical syndromes and treatments, problem-based learning begins by posing students a realistic clinical problem and letting them discover the solution, with the professor as guide. As more problems are presented, students learn to ask increasingly deeper questions. They "discover" the answers by their own library, internet and laboratory research. Unlike students in traditional lecture-based courses, students studying in problem-based mode are able to relate everything they learn directly to the clinical context.

As DEWEY and others asserted, problem-based (discovery) learning leads to a deeper and more meaningful understanding than mere memorisation of facts. Because of the emphasis on discovery, students who graduate from problem-based courses may actually know fewer facts than those who studied more traditional lecture-based programs. But in a fast-moving field such as medicine, "factual" knowledge is soon obsolete. Graduates from problem-based medical courses who learn how to solve problems are far better prepared for a lifetime of learning and discovery than those taught in lecture formats.

I predict that within the next decade all university learning will become discovery learning. Problem-based learning is already spreading to fields other than medicine - engineering and architecture, for example.

This trend will accelerate as academics and students continue to harness the enormous power of the internet. Not only does it provide students seeking solutions with access to databases around the world, but it can also provide access to sets of "problems". Lecturers around the world can post problem-based exercises on the web; these can be accessed and perfected by other academics, eventually providing a globally accepted curriculum for problem-based learning in many different fields.

Internet chat groups also provide an excellent way for students to explore problems with their instructors guiding the way. In this way, lectures will give way to assisted problem solving, and passive learning will be replaced with deeper understanding.

The first step is a change in mindset. Students are not empty vessels to be filled with facts, but active, enquiring human beings whose natural curiosity we must harvest. Most important, we need to redefine our jobs. We academics are not here to teach students, but to show them how to learn.

From The Guardian [Education.Guardian.co.uk], Tuesday, October 29, 2002. See http://education.guardian.co.uk/egweekly/story/0,5500,820786,00.html

Self Testing in Maths

Bob Kansky

Visit the NCESKIDS website: http://nces.ed.gov/nceskids/eyk/

That site has 20 middle school mathematics items and 20 middle school science items for students to use in self-testing their knowledge and comparing it with international peers.

There is a similar (but more extensive website) that was started two years ago by the Council on Competitiveness. Now covering both mathematics and science at both the middle and high school levels, that site is up and running at: http://www.getsmarter.org

The Council created a website to use TIMSS-like items to challenge those who needed to refine their skills in mathematics and science. The Council itself, based in Washington, D.C., was founded in 1986 by JOHN YOUNG, then-president of Hewlett Packard. It is a nonprofit association of leaders from business, universities and labor that works to set a national action agenda for U.S. leadership in the global marketplace, technological innovation and education. [...]

Tagungen

Tagungsberichte

Mediatoren für Mathematik gesucht

Gute Trefferquote auf der 4. Tagung des Vereins Begabtenförderung Mathematik e.V.

Paul Jainta[1]

"Mathematik braucht man immer". Der das sagt, ist kein Mathematiklehrer und auch kein Mathematiker. Prof. Dr. WOLFGANG GRÜNBEIN leitet die Clariant AG (vormals Hoechst AG) in Frankfurt/Main und weiß deshalb, wovon er redet: "Wir leben in einer hochtechnisierten Arbeitswelt, in der viel Mathematik steckt".

Gleich zu Beginn der 4. Tagung "Begabtenförderung in Mathematik", die vom 21. bis 23. März in Frankfurt/Main stattgefunden hatte, war damit die Stoßrichtung vorgegeben. *Mathematik braucht Mediatoren* lautete der Weckruf an die bundesdeutsche Bildungsszene. Übersetzungshilfe sollen dabei Ingenieure, Informatiker, Techniker, Naturwissenschaftler und Mathematiker aller Schattierungen leisten. Und die Hochschulen und Schulen sowieso. "Denn das Wissenschaftsfach Mathematik benötigt dringend Vermittler oder auf Neudeutsch Mediatoren", so Prof. GRÜNBEIN in seinem Grundsatzreferat, "damit die Mathematik hinter den Alltagsdingen sichtbar gemacht wird".

Die Grundlagen für eine erfolgreiche spätere Berufstätigkeit müssten bereits in der Grundschule gelegt werden, forderten viele der fast dreißig Vortragenden. "Der Schlüssel zur Zukunft", so der Untertitel der Tagung, liege vor allem darin, in den Schulen "lehren zu lernen" und auch ständiges Gedächtnistraining zu betreiben. Dass wir in der Bundesrepublik inzwischen auf dem falschen Weg sind, zeigen die blamablen Ergebnisse deutscher Schüler bei der TIMMS bzw. PISA-Studie. In den Schulen würden eben Diskussionsfächer stärker gefördert als Fächer, die Fakten vermitteln. Dementsprechend schlecht seien die Grundfertigkeiten von Jugendlichen im Lesen, Schreiben und Rechnen ausgebildet.

Der Verein *Begabtenförderung Mathematik e.V.* hat sich zur Aufgabe gemacht, mathematisch begabte und interessierte Schülerinnen und Schüler möglichst früh schon zu

[1] Stellvertretender Vorsitzender von *Begabtenförderung Mathematik e.V.*