REVIEW

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15th Anniversary Issue

Finger-Printing Changes in Education

The ASCD (Singapore) REVIEW Committee seeks original articles on teaching and learning...

Manuscripts should be between 2000-2500 words, typewritten (Microsoft Word document) and submitted in the form of a hard copy together with a 3½" inch diskette or CD. Submissions may also be done via e-mail. Photographs would be appreciated. These visuals may also be e-mailed as jpg files. Contributions by regular mail may be addressed to:

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The theme for the forthcoming issue is:

Vol. 12 No.3: **Singapore: A Regional Educational Hub**
Deadline for articles: 15 May 2005

ASSOCIATION FOR SUPERVISION AND CURRICULUM DEVELOPMENT (SINGAPORE)

Finger-Printing Changes in Education

Finger-Printing Changes in Education

15th ASCD Anniversary Issue Vol. 12 No.2

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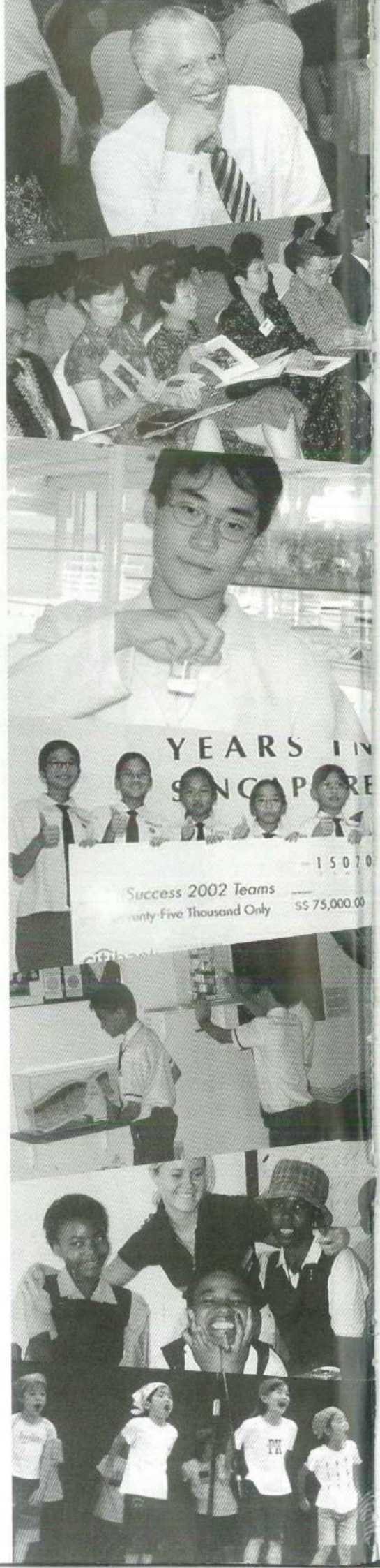

Editorial

In identifying the concept for our Anniversary issue, we wanted to review and reflect on what our schools and educators in schools had gone through with past practises. We also wanted to chart the new plans in the pipeline for the near future, hence the theme ***'Finger-printing Changes in Education'****.*

The recent slew of reports in the press about changes in the education system may have also left many teachers and parents with information overload. These changes have affected the primary, secondary and post-secondary levels. The most significant changes have to do with our bilingual language policy. We hope that with our modest collection of articles here, we would have captured in one handy publication, some of the key changes in recent years. We also have some articles which share how these changes translate into actual practice in the schools. The education system in Singapore is recognised as one of the best worldwide, thanks to our pupils coming out tops again in an international Science and Mathematics examination. This recognition was earned by having educators who are highly committed to nurturing an education system that is very dynamic and constantly being fine-tuned to meet the needs of a rapidly changing island population living in an equally rapidly changing world.

We have also started a new section ***'Voices from abroad'*** *featuring two articles, one from South Africa and another from Japan. We have found to our delight that educators from overseas have heard of ASCD Singapore and would like to share their ideas and news with fellow educators in Singapore. We hope that our new friends will continue to write in and enable this section to be a regular feature.*

Our next issue will consider the issues faced by Singapore as an international education hub and the area of language teaching and learning. Do keep your articles coming and happy writing!

Soo Kim Bee

The ASCD (Singapore) Review is published twice a year. The views expressed in this journal do not necessarily reflect the official position of ASCD (Singapore).

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Changes over

1960s

SURVIVAL-DRIVEN EDUCATION SYSTEM

Singapore undergoes a period of decolonisation; faces the difficult task of building its education system from scratch.

AIM: To help its people survive the new economic realities.

PROGRAMMES: Schools are built, the basic curriculum is developed and teachers are trained to raise the literacy levels of its largely uneducated population. It succeeds in developing a modern and robust education system and boasts of a significant increase in the basic literacy levels of its people.

1970s

TOWARDS FURTHER REFINEMENTS

While the skeleton is already put in place, refinements in curriculum and languages are made to fatten up the existing system.

AIMS: To equip students with sound technical and industrial training and to stress the importance of bilingualism for the purpose of making students more relevant to the job market.

PROGRAMMES: Formation of industrial and technical training institutes. Language exposure programmes are intensified. A further stress is made on building awareness on national cohesion.

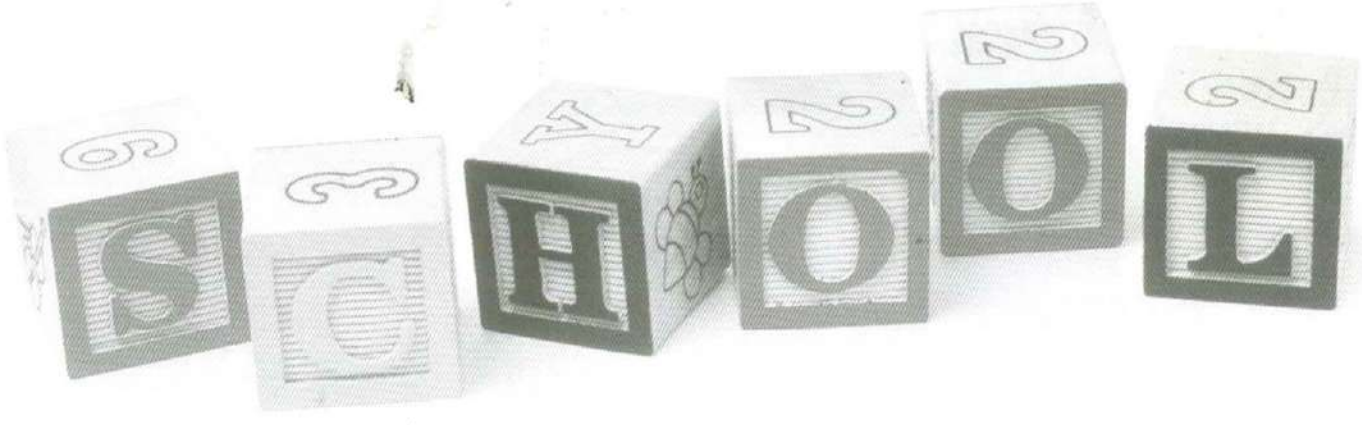
1980s

ABILITY-DRIVEN EDUCATION SYSTEM

Singapore puts in place a sound education system for its people but the system is thought to be too standardised and uniform – no leeway given to the different learning abilities of students.

AIM: Fine-tune system to cater to different learning capacities of students.

PROGRAMMES: Major policy change called "Towards Excellence in Schools" implemented. Autonomous and independent schools are established. Education is decentralised, and teachers given more flexibility to respond to varying learning pace of students.



the Years

1990s

THINKING SCHOOLS, LEARNING NATION

With the economic climate changing again, there is a need to tweak the system again.

AIM: Re-jig policies and focus on training students to become more entrepreneurial and innovative.

PROGRAMMES: A push towards using technology more effectively in assisting education. Structural changes such as loosening the rigid 6-4-2 arrangement (6 years in primary school, 4 years in secondary school and 2 years in JC) to a more fluid structure of combining upper secondary and JC education. Niche schools, focusing on subjects such as Math and Science are formed. Private schools gain more credibility as Singapore moves away from a state-controlled system

2004 and beyond

TEACH LESS, LEARN MORE >

Although there seems to be another spate of changes with the changeover to a new government, it is just the tweaking of current policies.

AIM: Need to foster a change-friendly environment, where educationists are allowed to make policy changes more easily.

PROGRAMMES: Efforts to cut curriculum intensifies. There is greater emphasis to move away from text-book learning to the method of learning the content. There is also a move towards a more open and flexible teaching-learning environment. There is more attention paid to student-teacher relationships.

Extracted from The New Paper on Sunday Sep 5, 2004

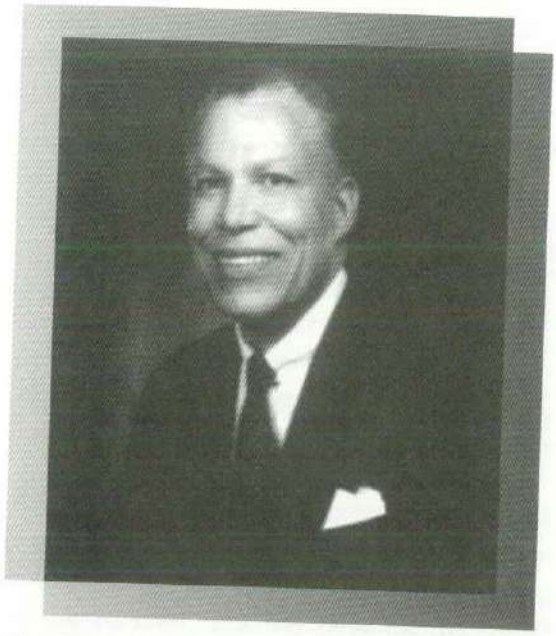
Teach Less, Learn More
What's in store

Announcement	Details	Levels affected	Implementation date
More teachers	At the primary school level, 1,000 more teachers will be deployed while at secondary schools, there will be 1,400 more teachers. Junior colleges and the centralised institute will have 550 more teachers.	All	Starts this year and done over a six-year period (to 2010)
Adjunct Teachers programme	Former trained teachers will be employed to teach in schools with more flexible working hours.	All	October
Counselling services	At secondary schools, junior colleges and the centralised institute, there will be two more trained teacher counsellors. Every school will also have at least one full-time school counsellor.	All	Next year, and done over a three-year period (to 2008)
Children with special needs	Schools will have staff trained in special education to support students with special needs like dyslexia and autism.	Primary and Secondary	Next year
More choice for Normal (Technical) students	Normal (Technical) students can offer up to two Normal (Academic) subjects after Secondary 1.	Secondary	2006 but schools which are ready can start next year
Revised Normal (Technical) curriculum	The curriculum will provide Normal (Technical) students with a firmer foundation and better alignment to continue their education at the Institute of Technical Education (ITE).	Secondary	2007
Elective modules for Normal (Technical) students	Schools may develop elective modules to introduce students to ITE courses.	Secondary	Next year
Transfer system for Normal (Technical) students	Normal (Technical) students can transfer to Normal (Academic) stream if they perform well even after Secondary 1.	Secondary	Next year
Greater choice for Normal (Academic) students	Schools can offer their Normal (Academic) students a wider range of O-level subjects beyond mathematics and mother tongue language which are now offered. The cap on two O-level subjects which they can sit for in Secondary 4 however still remains.	Secondary	2006 but schools can begin next year if they are ready
Third language	Exiting criteria for students who want to take a non-native mother tongue language, like Chinese and Malay, as a third language will be lifted.	Secondary	2007 but schools can begin next year if they are ready
Grants for niche areas	Primary schools which want to build strengths in areas such as character development, aesthetics and teaching approaches will be given funding of up to $100,000 a year to help fund these programmes.	Primary	Next year
School graduation certificate	Students will receive a complete record of their academic and non-academic achievements provided by the school.	All except Primary	2008

Source: MINISTRY OF EDUCATION

Finger-Printing Change

Dr. Gene R. Carter



Thank you for inviting me back to be with you here in Singapore and to be part of your Annual General Meeting and its theme of "Finger-printing Change." It is hard to believe that it has been over three years since my last visit. I know that during my time here, I will learn much from you — my esteemed colleagues and friends.

First and foremost, I offer congratulations to ASCD Singapore on your 15th Anniversary. I know that your affiliate, through the hard work and commitment of many great educators and leaders, is regarded and respected as one of the leading professional associations in your country. I know that you offer quality professional development programs that meet the needs of your teachers and principals as well as parents. Please know that your "voice," the voice of educators in Singapore, contributes an important international perspective to guide ASCD in our global endeavors. We at ASCD admire the efforts all of you make to move an education system that is held in high esteem worldwide, to even greater heights.

For those of you who are not familiar with ASCD, perhaps a little background information may prove helpful. The Association for Supervision and Curriculum Development (ASCD) is an international, nonprofit, non–partisan organization that represents 160,000 educators from more than 135 countries and 66 affiliates. Our members span the entire profession — superintendents, principals, teachers, professors of education, parents, and university students.

We address all aspects of effective teaching and learning — such as **professional development**, **educational leadership**, and **capacity building**. Because we represent all educators, we are able to focus solely on professional practice within the context of "what is good for the children," rather than what is reflective of a specific educator role. We value highly the contributions of ASCD Singapore to the larger ASCD Community and look forward to our continued work together.

At events like this AGM and celebration, I am always reminded that, as educational leaders, it is our responsibility to unleash the **power**, **passion**, and **promise** of teaching and learning for all learners.

Today, we are living at a defining moment in history when the world in which we live and do our work is changing profoundly. But these are also days when all of us involved in education must look anew and with renewed rigor at how our schools and other centers of teaching and learning work, at the kind of learning they foster, and at ways in which students achieve.

While our organizations and nations are dealing with the crush of important day-to-day issues, startling trends or seismic shifts are changing the social and educational landscape. Trends such as the emphasis on an economy based on social and intellectual

capital, the forces pushing standardization toward personalization, the move from information acquisition to knowledge creation and breakthrough thinking, the coming change from a majority-minority to a minority-minority society, and the impact of existing and emerging technologies on the pace of change. The terrain will never be the same. These changing times portend the transformation of our educational structures, practices, and academic programs.

I submit to you that the vast changes around the world also call for reexamination of our personal, institutional, and community lifestyles, values, and indeed priorities. It is clear that we have to create entirely new learning systems. Taking risks is a prerequisite. "Imagineering" is crucial for all educators. Educators must be encouraged to imagine, invent, and implement learning systems for the new global society.

This implies helping all students to reach and exceed educational standards. After all, education must shift from averages to individuals. The world is moving quickly toward mass **customization** — almost the direct opposite of standardization.

The emerging global economy, ongoing demographic shifts, changes in both what counts as knowledge and who determines what knowledge is valued, and advances in technology as well as the skills and abilities demanded by the businesses and industries of the future all combine to challenge us to provide greater diversity in educational pathways.

The knowledge economy and society in which we live are stimulated and driven by creativity and ingenuity. We know that the knowledge society is a learning society. The knowledge economy is fueled by the power to think, learn, and innovate. Furthermore, knowledge societies use information and knowledge in ways that maximize learning, stimulate invention, and develop the capacity to initiate and cope with change.

It is worth mentioning that a recent report on "Knowledge Management in the Learning Society" links knowledge management to the challenges created by the acceleration of change. This link is further affirmation that social and intellectual capital will become the primary economic value in society.

Every day when I walk into the ASCD headquarters building, I pause to read the Amish proverb inscribed on the grandfather's clock in the lobby:

"Children are the messages we send to a future we will not see."

This proverb reaffirms our calling. Together we enact the future.

As Marilyn Ferguson, an ASCD consultant, reminds us, "We can talk or dream about the glorious schools of the future or we can create them." I'm confident the keen thinkers at this gathering of educators will together continue to create those glorious schools of the future by applying what we know from research to today's — and tomorrow's — opportunities.

The future "what" of schooling isn't about specific content but about the skills of seeking, acquiring, judging, and integrating new knowledge, of drawing implications and solving problems. It's about the skills needed to create social and intellectual capital.

Therefore, schools will increasingly focus on information literacy, ethical decision-making, and problem solving. And because this shift will occur in a context that is more diverse and thus risks being more fragmented, schools will focus on developing values education, civic responsibility and demonstrating holistic engagement. But this doesn't mean we'll be ignoring today's content. It means we'll be enriching every student's curriculum.

In addressing this proposition, the Partnership for 21st Century Skills report suggests, "Today's education systems face irrelevance unless we bridge the gap between how students live and how they learn."

The focus on wise decision-making leads to three behaviors that I view as positive signs for the future:

First, educators are becoming consumers of research at the very time when we have over thirty years' worth to inform our work. We have solid research on the key instructional strategies that belong in every teacher's repertoire, on the leadership behaviors that correlate with improved student learning, and on the structures that contribute to improved student learning. Relying on research is a key attribute of the true professional.

Second, educators are becoming more data-driven, and that focus on data leads to customized solutions.

Third, technology has already redefined the space, place, and time dimensions of learning. But technology isn't just convenient (24/7), it's more transparent. We must bring technology integration and use in teaching and learning to a higher level impacting classroom practices. Singapore's National Blueprint is experiencing major breakthroughs in this arena.

Margaret Mead said, "We are now at a point where we must educate our children in what no one knew yesterday, and prepare our schools for what no one knows yet."

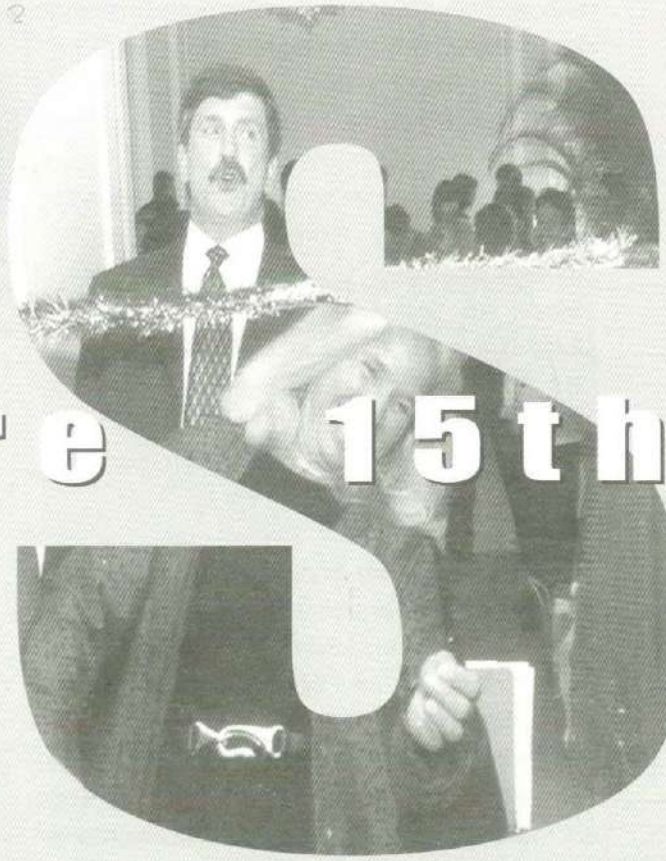
In conclusion, educational reform is truly an international phenomenon. The following are

some guiding principles for our efforts to recognize similarities, bridge differences, and work together for our children's future:

- We must focus on innovation, enterprise, values education, and holistic education.
- We need to foster school communities that celebrate diversity in all its forms.
- We need to balance the drive for accountability with the need to educate the whole child and to close gaps in achievement.
- We must leverage our strengths through collaborative efforts.
- We need to prepare children for challenges that are based on our interconnected world.
- We need to set our sights on building a more diverse community and influencing policies and priorities to support quality teachers, principals, parents, learning, and leadership.
- We need to think globally and to continue to touch one another's lives in unexpected ways.

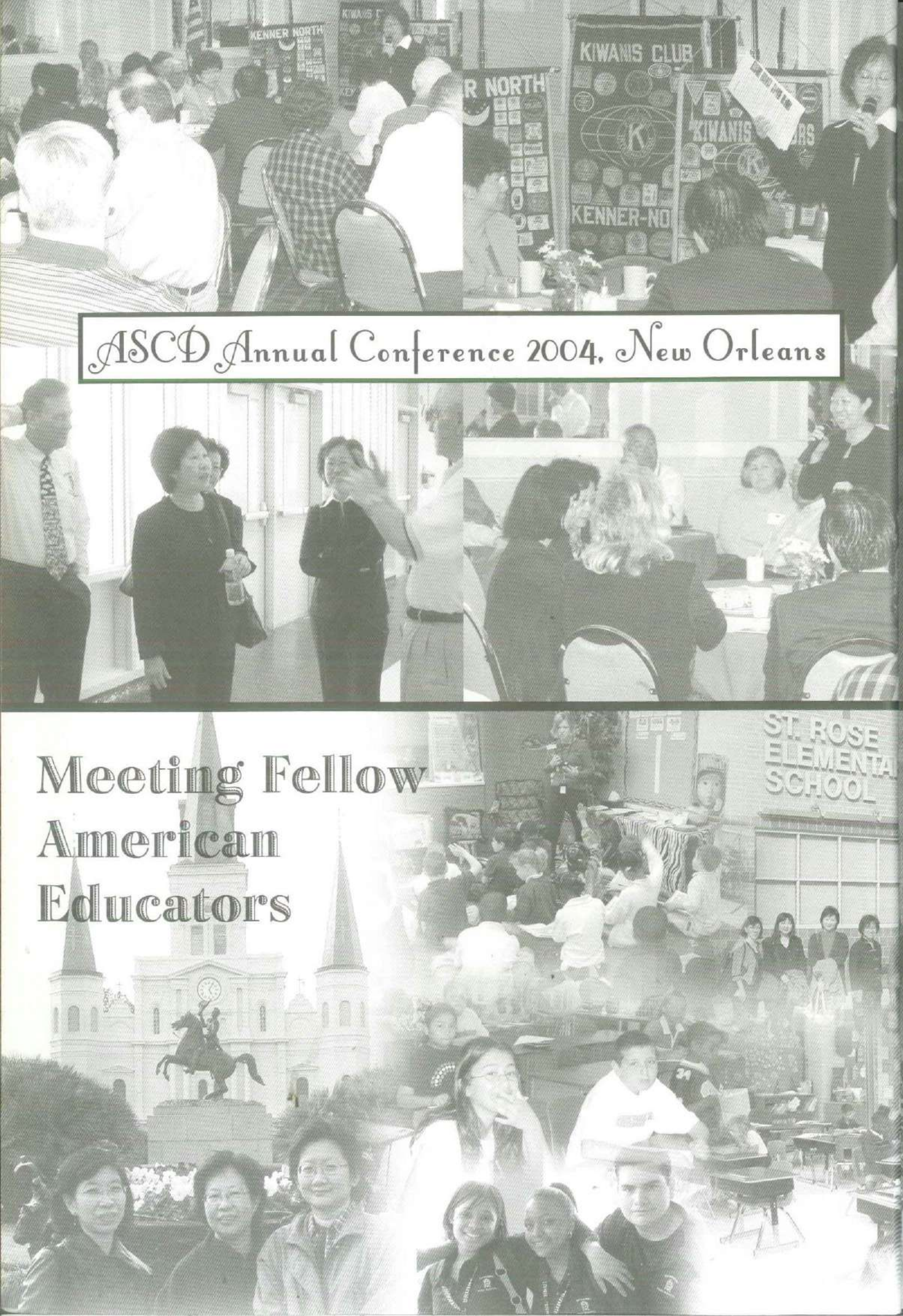
I'm confident that we are up to the challenge. I foresee that we will indeed change the fundamental assumptions, practices, and relationships within ASCD, ASCD Singapore, and between our organizations and the outside world, in ways that will lead to improved learning outcomes for all children – in short, "finger printing change."

Dr. Gene R. Carter *is the Executive Director of the Association for Supervision and Curriculum Development (ASCD) International, USA.*



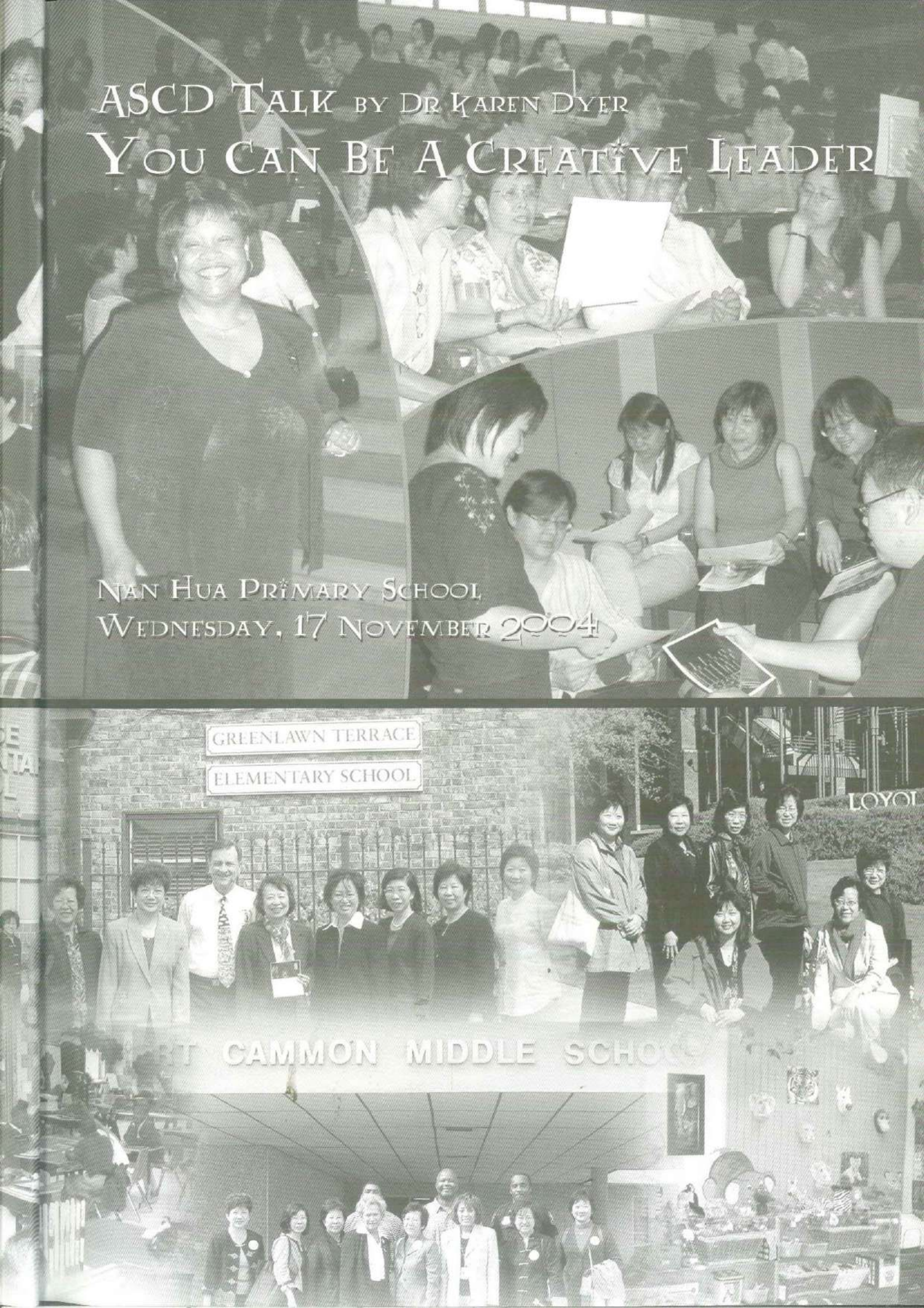
Singapore 15th


Anniversary AGM
ASCD Singapore
15th Anniversary Gala Dinner



ASCD Annual Conference 2004, New Orleans

Meeting Fellow American Educators



ASCD Talk by Dr Karen Dyer

You Can Be A Creative Leader

Nan Hua Primary School
Wednesday, 17 November 2004

Language Planning in Education in Singapore: History, Transitions, Futures

S. Gopinathan

Context

Any accounting of language planning in education – and any assessment of how successful it has been – must be judged by the challenges such an enterprise faced, the quality of the policy responses, quality of implementation, and how school leavers use language and what they believe about the language skills they were taught, possess and can use. Thus, Singapore's unique historical, social, political and linguistic ecology must be the starting point. Language Planning according to Paulston "is a deliberative attempt, at social change in language behaviour by a decision-making administrative structure" (1973). Perspectives used to study LP range from technico-rational models to critical ones that analyse language relationship issues in terms of contestation over power and privilege.

The best way to understand the role of languages in Singapore society is to recognize that the state in Singapore used language to build human and social capital – and one might argue continues to do so. It sought, through language, to address two issues, first, of transforming the economy, from entrepot to industrial and now, a knowledge-based economy, and second, to build unity and cohesion in a fragile, divided society. The great triumph of language planning in Singapore is that it was successful in building a strong economy and society via its deft handling of language issues. But the terms of survival have changed and globalization processes are posing new challenges. How well Singapore meets them will be crucial to how well it masters the challenges of the next four to five decades.

Medium of instruction issues had been a problem for the colonial state since the 1920s. An education policy of benign neglect had spawned a four-medium of instruction school system. English medium education was largely church and state- supported but Chinese medium schools were supported by either clan or individual philanthropists. Chinese school students, teachers and the community felt discriminated and became receptive to anti-colonial, republican and later, communist

influences. The colonial state's response was to promise more aid if these schools came under supervision and taught more English (Gopinathan, 1974). By the end of World War II the Chinese majority felt that colonial education and language policies were discriminatory, and that English was a colonial language which privileged a small number of collaborators. Thus what the post-colonial state inherited in the mid fifties was a school system segmented along medium of instruction lines and divisions within ethnic groups, especially the Chinese, and between groups. Policies related to language in education were contested. Coupled with post war economic hardships the potential for inter-ethnic conflict was large and real. It has taken the state almost five decades to defuse this threat.

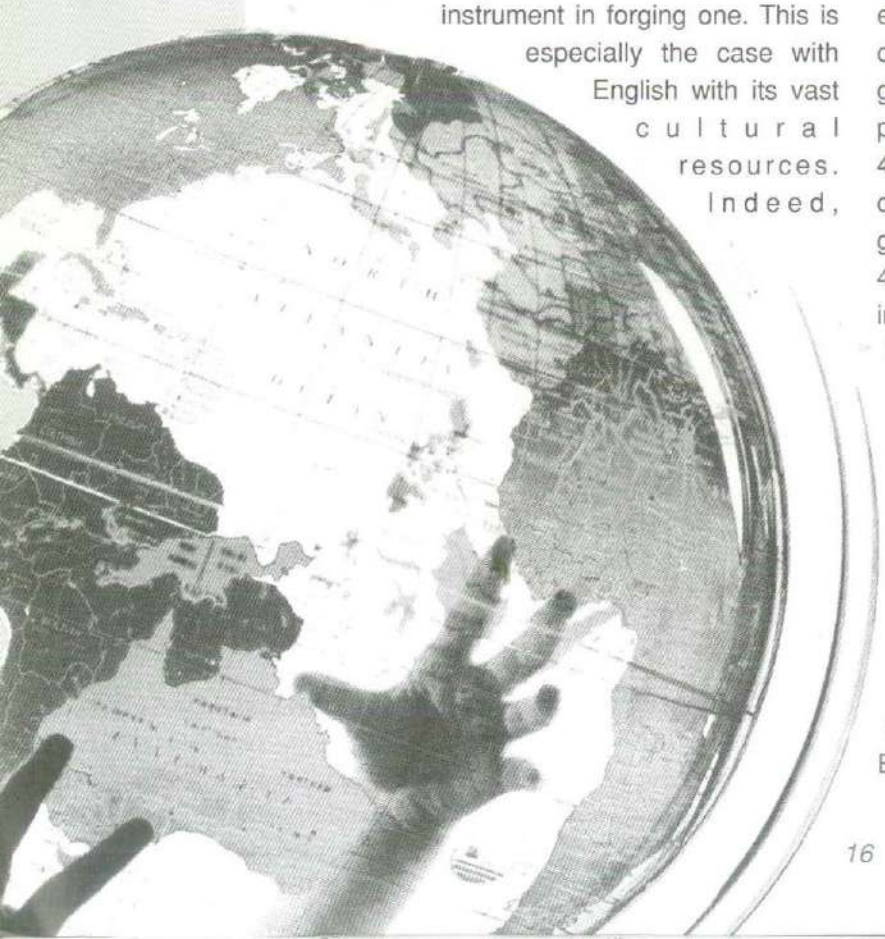
There are 2 major reports of the post-war period to keep in mind. The 1956 *All Party Report on Chinese Education* is a political document as the committee was inter-party and the report was presented to the Legislative Assembly. It addressed the political problem of mobilizing large numbers of the non-English educated to support the emergent post-colonial state. The Report enshrined the principle of 'equality of treatment' for all official languages and committed the post-colonial state to removing discrimination and taking steps like building schools, developing curriculum and training teachers so that this principle could be realised in substance as well as in form. In 1960 the learning of the second language became compulsory at the primary level, and in 1966 at the secondary level. Continual refinements to curriculum time led, in 1987, to English becoming the dominant medium of instruction. Through this report the state sought to enhance the economic and symbolic power of language, to see them as assets not liabilities, and to use language for economic and social cohesion purposes. Language planning in education was intended to grow both human and social capital. English was assigned a modernization role, to assist in Singapore's industrialization strategy, and the mother tongue were to serve as links to culture and tradition and to strengthen ethnic identity. This view of language as asset is vindicated by globalization which has given a boost to English and the economic dynamism of China which is making Mandarin an increasingly important language. The principle of equality of treatment underpins language planning for education to this day.

The Report on the Ministry of Education (1978), by contrast, is an educational document and can be seen as the first major evaluation of the consequences of the bilingual education policy implemented in schools since the 1960s. It signaled the acceptance that policy and practice had produced "an unworkable bilingualism" that was having disastrous consequences for student achievement and for the language and cognitive skills needed for Singapore's economic modernisation. The policy had assumed a capacity amongst a majority of students to master both languages equally well, what Macnamara (1966) termed "balanced bilingualism". I think it fair to say that what troubled Dr Goh and his review team was faltering mastery of English, and the consequences of that for economic growth. It is a view echoed by Minister Mentor Lee Kuan Yew a quarter century later when he acknowledged that the policy had been articulated in the belief that 'nearly everyone could be effectively bilingual'. It is important to remember that the type of economic modernization Singapore opted for, export-led industrialization, relied on a mastery of English language skills. In retrospect, it is clear that the authors did not examine assumptions about capacity for bilingualism or the standards expected but chose a curriculum device, streaming as the solution. The problem was seen to lie with students, not the system. Policy changed after the Report and language-based streaming was introduced to ensure functional mastery in English by all students. This was accompanied in 1979 with the launch of the Speak Mandarin campaign which sought to decrease the use of dialects and to enhance communication in Mandarin among the Chinese.

An understanding of this context is vital to recognizing what has been achieved, and what remains as challenges. The major achievement has been linguistic peace,

achieved not just by sensible polices but also because economic growth provided opportunities for use of language skills learnt in school. The utilitarian value of English and the state's commitment to providing the widest possible access to English has led to what Pakir (1992) has termed 'English-knowing' bilingualism, and possibly the highest levels of English language competence in Asia, at least for a broad swathe of the population. The state has also remained faithful to its commitment to provide to mother tongue education; the paradox is that many Singaporeans wish the state was not so insistent on the mastery of the mother tongue!

The other goal of education policy since the '50s, that of strengthening social cohesion has also been facilitated by widespread access to English and the broadening acceptance and its increased use as a lingua franca. Indeed, while the state continues to link identity formation with mother tongue learning and use, the ever increasing use of English, and its indigenization as in Standard Singapore English points to it becoming a strong marker of a Singaporean identity. It cannot be the case that a language that is supposed to help Singaporeans breach ethnic and linguistic divisions can do so without it also being, if not a carrier of, common culture, at least an instrument in forging one. This is especially the case with English with its vast cultural resources. Indeed, anecdotal evidence suggests that the mother tongue has been less successful as a carrier of heritage and values primarily because mother tongue examinations were high stakes examinations and teachers chose to spend a lot of time on examination preparation.



Language Shifts among Singaporeans

There has been, in line with the broad policy objective, "massive language shifts and phenomenal sociolinguistic realignments" (T'sou, 2002). Literacy rates have arisen overall as have biliteracy rates. The proportion for those 15 years and over who were literate in two or more languages has increased from 45 percent in 1990 to 56 percent in 2000. The Chinese ethnic group saw an increase in the use of both English and Mandarin at home, English from 19.6 per cent in 1990 to 23.9 per cent in 2000 and Mandarin from 30 per cent to 45.1 per cent in 2000. The use of dialects dropped from 50.1 per cent in 1990 to 30.7 per cent in 2000. However, when age groups are taken into consideration, it is interesting to note that for the five to fourteen years category, the use of English increased by 9 per cent between 1990-2000, while for Mandarin it appears to have plateaued with a minimal increase of 0.6 per cent over the decade. When level of educational qualifications is taken into consideration, 47.3 per cent of university graduates spoke English at home while 29.5 per cent spoke Mandarin. For diploma holders, 43.3 per cent spoke English while 30.4 per cent spoke Mandarin, while for polytechnic graduates 28.6 per cent spoke English and 41.4 per cent spoke Mandarin. Given the increased opportunities for training available in English and the further internationalisation of Singapore's economy, the dominance of English as the economic language of choice is likely to be further strengthened. While it is probable that the use of Mandarin in a number of domains, including the home, will decline, the shift to the greater use of English and Mandarin is clear. We must however note that the use of English among the different ethnic groups varies, with the Indians using it most. In terms of school success in English, in 2001 at the 'O' levels 87 per cent of

Indian students passed, 80 per cent of Chinese and 70 per cent of Malays.

What of language diversity? While it must be noted that promoting Mandarin as the dominant dialect has led to reduction in dialect use, and an elimination of some dialects, it must also be noted that Singapore's success in plugging into the global economic grid, principally via English, has meant we now hear more Thai, Bengali, Tagalog, Bahasa Indonesia, Japanese, etc.

Globalisation and Its Challenges to Education and Language Policies

The pace and intensity of change under globalisation are such that societal level strains have emerged in many countries. Lo Bianco (2001) points to a general destabilisation affecting all advanced societies, a moment of new kinds of hybridity of language and culture, the emergence of multicultural societies everywhere, vast population mobility, ever more diversifying codes of communication and "micro-cultures" of "Internet mediated identity". These global trends are inevitably changing old relationships between language, knowledge, and identity. The huge amounts of information available in English on the Internet and the changing economic landscape in countries like China have given a boost to both English and Chinese as languages of economic opportunity; it is estimated that some 200 million Chinese are learning English. Thus, while Chinese on the mainland are learning English to participate in the global economy, Singaporean Chinese are urged to master Mandarin to avail themselves of economic opportunities in China. Heller (2002), reviewing the progress of the debate and evidence on bilingualism in Canada, notes that globalisation has weakened the power of the nation state to prescribe, prohibit and privilege access to and use of languages among its citizens. The new economy, she asserts, has created new markets for language and in Canada today there is a greater willingness to learn French amongst the dominant English-speaking population. Younger Canadians, she reports, are more prone to seeing language less as a marker of identity and more as a much needed tool for occupational success. In these changing contexts, international and national, we need to ask what it means to be literate.

As the Government is persistently reminding us, we live in new times and must prepare for a turbulent, uncertain future. Globalisation's economic and cultural imperatives, the emergence of new economic centres such as China and India, the telecommunication and life sciences revolutions, among others, call for new economic, socio-cultural and educational strategies.

The combined effects of globalisation, the technological and life sciences revolution, the large displacements caused by migration, student flows, travel, etc. have created a major upheaval in the social sciences, which is our way of understanding social relations. Globalisation is both a phenomenon to be studied and as a discourse; there is quite clearly a post-modern turn in the social sciences and how we view language, language relationships, what learning a language now must mean, have all to be freshly considered. The way the early Singaporean state boxed up language into discrete domains – English for utilitarian purposes, mother tongues for cultural identity, the aggressive elimination of dialects, periodic campaigns against Singlish, the state's allocation of mother tongues, will all have to be revisited. We have to pay more attention to diversity, to see culture as much more diasporic and deterritorialised, and therefore the process of identify formation as much less linear, and inevitably, more contested. This has obvious implications for language learning in our classrooms.

How has educational policy responded to these trends and pressures? There is clear evidence of a paradigm shift. Though we tend to mark 'big bang' reform in education in Singapore from 1997, it can be located further back, to the *Towards Excellence in Schools* (1987) report which provided a rationale for decentralisation in governance of education and which led to the introduction of independent and, later, autonomous schools. The view gains support if we look at the nature of the 1991 and 2001 syllabus for English

Language. Cheah (2002) traces the evolution of the syllabus, describing the syllabus in the 80s as being more prescriptive and grammar-based, focused on knowing the language but describing the 1991 and 2001 syllabus as emphasising thinking skills, learning how to learn, being able to use the language flexibly and appropriately in a variety of contexts. The 2001 syllabus has literacy development at the heart of the English language instructional programme with the emphasis on language learning, literacy skills and communication skills. Students were to be taught to be aware of different presentation modes, the varieties of discourse, context and purpose. It is certainly a view of language, and of language learning much more in keeping with the 'new times'.

It can therefore be argued that the 1991 English Language syllabus anticipated the thrust of the 1997 Thinking Schools Learning Nation (TSLN) initiative but the latter, as a broad based and system-wide reform initiative, lends crucial support to the goals of the syllabus. The TSLN initiative coupled with the launch of the IT Master Plan indicated a bold reforming vision for Singapore education, to produce school leavers better able to cope with new economic formations, to use technology confidently and to better navigate cultural diversity. The emphasis was to be placed more on learner initiative and autonomy, to encourage innovation, creativity and critical thinking skills, to cut back on the traditional emphasis on content mastery, on searching for the one right answer, a greater emphasis on problem solving and being able to critique, synthesize and use knowledge. Though some progress has been made since 1997 PM Lee's call at the National Day Rally in August 2004 to 'teach less, learn more' shows that the reform process is far from complete.

Changes to Chinese

In tandem with changes to the English language syllabus there have also been changes to the Mother Tongue syllabus and extensive curriculum and syllabus review efforts over the past two decades have sought to meet the challenge posed by the increasing use and utility of English. While it cannot be argued that the mother tongue policy is a failure, serious problems remain, and in response to this, in typical Singapore style there has been a frank admission of the need to change. Lee Kuan Yew has said "we have turned off one generation, which is a great pity for us – they are forced by parents and schools (to learn Chinese) – they hate it, they want nothing more to do with it" (The Straits Times, 12/10/04). Asserting that Singapore's language policies are not cast in stone he stated that the bilingual policy is a 'moving target' that has to be reviewed from time to time as the language climate changes.

华语听讲写读

As presently articulated the goals of the bilingual policy with regard to Chinese are

a) for the majority: to listen, speak, read Chinese. Make learning fun and give them a foundation they can build on
b) for those interested in Chinese: encourage more to study it at a higher level, and help keep Chinese language and culture alive (in Singapore).
c) for top students keen on Chinese: make them effectively bicultural via the Bicultural Studies programme
d) to do business in China: need to speak, understand what is spoken and read. Know how to use dictionaries, computers and software.

The Ministry would be satisfied for the majority to attain an 80 per cent mastery of English and a 60-70 per cent for Chinese. The aim is to make learning Chinese fun and to give parents more options to decide what kind of bilingual education they want for their children. This flexibility is intended to enable parents and schools to take into account students home language backgrounds and aptitude.

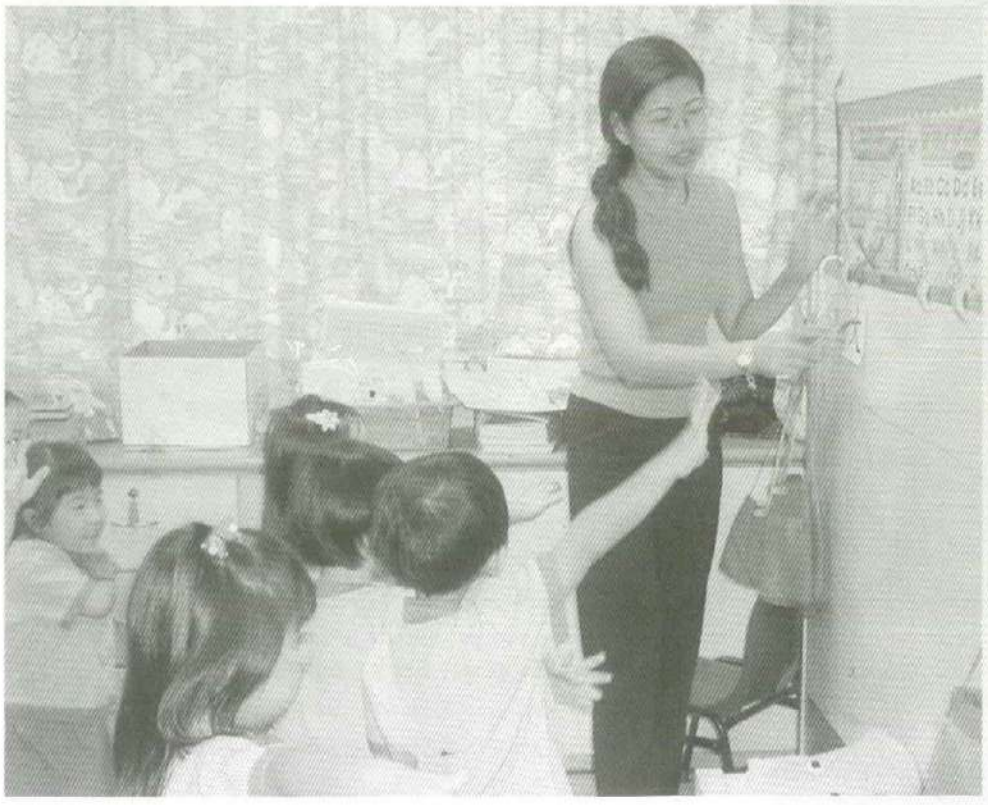
The new syllabus will be modular in nature to allow schools room for customization. A core

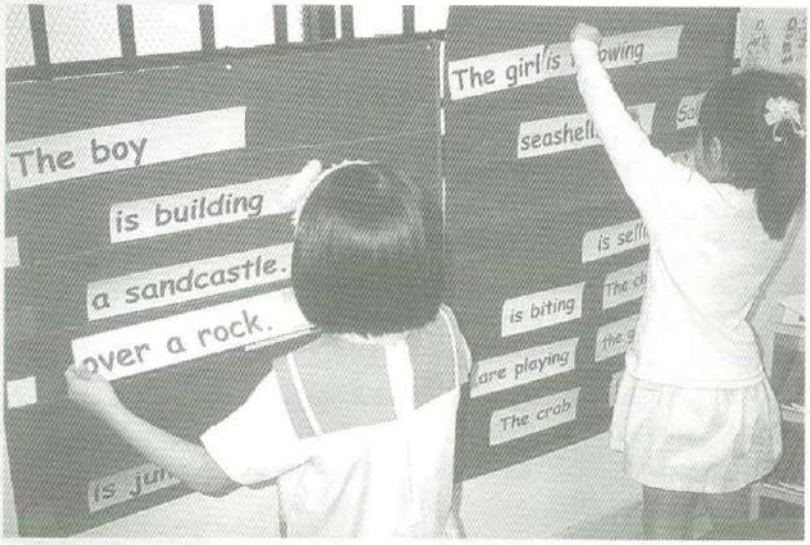
module taking up 70 – 80 per cent of curriculum time, with an emphasis on oral communication, will be taught to all. Those from non-Chinese speaking homes can opt for special modules to strengthen their command of the language while others can take additional modules for extension and enrichment. Another major change will be a focus on reading, speaking and listening instead of the current emphasis on writing and memorizing of characters. At the other end of the continuum, in pursuit of the goal of creating a Chinese cultural elite, competent students will be given the opportunity to study Chinese at university level, to go on attachments to educational institutions in China so that they can become 'bicultural' Singaporeans who will have "an intuitive understanding of China".

These changes to the syllabus will be followed up with changes to assessment. A newly designed Primary School Leaving Examination for Chinese will require less mastery of large numbers of Chinese characters; the current list is 2,500 characters. Criteria for the choice of characters will be words that are relevant and those they can relate to in everyday settings.

We can best evaluate these changes with reference to locally produced research. There is an interesting body of work on the language planning and teaching situation, especially for English from a broad range of perspectives, Tan Su Hwi on language planning (1998), Cheah Yin Mee (2002, 1996, 1997), Maha Sripathy (1998) and Parveen Sandhu (2000) on language teaching from a classroom teacher perspective, Glenn Toh on textbooks (2003), Benedict Lin on syllabus construction (2003) and Kramer Dahl on teacher training (1997); additionally, there has also been collections of research papers on language, education and society (Gopinathan et al, 1998). It is a literature that all language teachers can benefit from. These works raise serious and troubling questions about the purposes of language in our society and teaching in our classrooms. They explore the language learning context in new ways; they explore the implications of policy from the site of instruction, the classroom and they ask if another in-service course on method or a syllabus revision will 'solve' the problem. It provides a useful corrective to the largely functionalist and assessment-driven views that dominate language in education discussions.

What are we to make of these critiques? A fair verdict would be: 'valuable in parts'. They are beneficial in so far as they force us to consider issues in language teaching, especially English Language teaching, from a variety of perspectives. We need to acknowledge that given the importance of English in social and occupational communication, and the fact that a large number of students do not master English to acceptable levels, we must be more critically aware of our pedagogic strategies and what might work better for these students. But the more ideologically motivated critique of Philippson (1998) and Pennycook (1992, 1994) has less relevance to the Singapore situation. English in Singapore is not a minority language spoken by an elite as in Thailand, Indonesia or Vietnam. We need to acknowledge that the





state has invested enormous resources to widening access to English since the mid-50s and given Singapore's need to be economically competitive and the need to have a language to facilitate inter-ethnic communication, the choice of English was inevitable. English is not seen as a privileged language in Singapore, even as we acknowledge that social class, economic opportunity and competence in English are obviously related and that this has implications for both policy and practice. And even though one may have reservations about the policy on dialects, the government cannot be faulted on its commitment to preserve and encourage use of the indigenous languages.

The most recent changes to Chinese raise some interesting issues, at one level about curriculum, syllabus, pedagogy and assessment in Chinese and at another level about how changes in a major mother tongue may impact on language ecology. Lee's frank admission of wrong assumptions about bilingual capacity show a readiness now to confront linguistic realities and to make changes. A pity though that it too so long. The assumption that increased use of English causes 'problems' for mother tongue acquisition and use, while true in a broad sense, masks considerable differences in the extent and nature of use of English at home between different ethnic groups and within ethnic groups. In an environment where English will become even more dominant, the government will need to ensure that appropriate levels of competence are achieved by all.

It will no doubt be the case that the changes proposed for Chinese will be followed up with changes in Malay and Tamil. The even-handed treatment this represents is to be welcomed but here again there is need to avoid knee jerk reactions. The problems faced by pupils learning Tamil and those learning Malay (where the English alphabet is used) are different. This could also mean that while all would need to sit for an examination, examination formats need not be all alike. Ability driven education must mean due regard to difference.

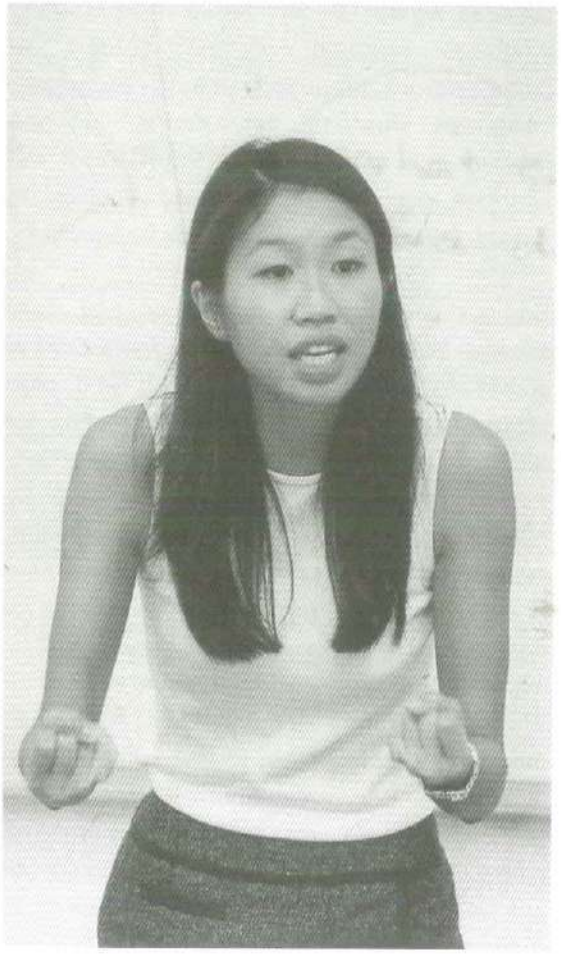
Perhaps the most significant aspect of the changes is the offer by the government to establish, if parents wish it, schools where Chinese would be the main medium of instruction. The rationale offered is that while English would remain the dominant language, Chinese would grow in importance and parents may wish to ensure that their children reach high levels of competence. Lee was aware that this could cause concerns in other language groups and has said that the option would be available as well to the other language groups. Though at this point, a promise it could be argued that if it comes to pass this will be a further extension of the Special Assistance Plan concept and a backward step from the ideal of a unified school system with English as the main medium of instruction.

The Challenge for Pedagogy

What is happening at the level of classroom practice? And though the studies mentioned earlier are to be welcomed, there is need for much more data on what is actually going on in our language classrooms. At the Centre for Research in Pedagogy and Practice at the National Institute of Education an effort at observing, audio and video taping, and analysis of pedagogy across all curricular domains, including English and the mother tongues has begun. It will, when completed offer a detailed picture of Singapore pedagogy. Ingrained practice is hard to change and there are reasons why some practices are hard to change – the influence of assessments, for instance. So, while some innovation is happening it is clear to me that we are far from

achieving in practice the ideals espoused in the syllabus. Cheah (2002) reported with reference to the 1991 syllabus that teachers were upset at the lack of authoritative direction, and anxious about the flexibility they were given. Foley (1998) noted that while the syllabus promoted flexibility and the creative use of language, what he observed was the dominance of textbooks, a lack of genre awareness and the persistence of a narrow range of discourse patterns, both in oral classroom talk as well as in reading and writing. The Minister for Education, Mr. Tharman Shanmugaratnam has echoed the views of many others that Singaporean students need to be much better at communication and persuasion. Anecdotal evidence also suggests that insufficient attention is paid to sustained reading and writing in our language classrooms. Poor implementation then can undermine the good intentions of a progressive syllabus.

As noted earlier there is far less research on pedagogy in mother tongue classrooms. If we follow the logic of domain separation then, in contrast to English language classrooms, which are supposed to be sites for learning and using English for knowledge acquisition and to facilitate inter-ethnic communication, mother tongue classrooms, besides being ethnically segregated classrooms are sites for strong ethnic identity formation via language and emphasis on values. Civics and moral education are expected to be delivered via the mother tongue at the primary level. The earlier judgment of Lee Kuan Yew of a failure to teach mother tongue effectively raises serious questions about how well the goal of identity formation has been met. For a majority of students in Chinese, a misguided pedagogy whose limitations have now been acknowledged, has been in use. Preparing children to pass the all important PSLE examinations has meant that less attention has been paid to familiarizing children with their ethnic cultures.



The fundamental premise of the 2001 English language syllabus is that Singapore's school leavers must become better *learners, creators* and *communicators*. While these attributes must be built upon a fundamental mastery of the English language equally important will be their capacity to use English flexibly, creatively as a tool, and as a means to communicate effectively. To do that pupils must see English as invested with power to alter their lives, to extend and shape their dreams, to think with the language. Though accuracy in the use of language is important, it cannot be allowed to dominate our pedagogy. To do this in a situation where English is not the dominant language of students requires teachers to model appropriate language use and learning behaviours themselves, and to create open and interactive language classrooms. Singapore has introduced streaming to accommodate differences in ability and aptitude but we cannot yet be sure that EM3 and Normal (Technical) students are learning English that is both appropriate and adequate to their needs outside the classroom.

A second major issue is *'cultural literacy'*. It is somewhat paradoxical that we need to stress this in multi-ethnic Singapore, where multiculturalism is proclaimed a pillar of the

state, where the very rationale for bilingual education is stated to be, through the mother tongue, to strengthen and enrich cultural roots. We cannot even be sure, though this is the rationale, that this is being done effectively in mother tongue classrooms. Also, in the implementation of this policy we have wandered into the dead-end, culturally speaking, of ethnically segregated classrooms and schools; even our teachers unions are language based. How are we to square the circle when, with English as the main medium of instruction, we ignore the rich possibilities for cultural learning by insisting that it be learnt as a linguistic tool, for accessing economic not cultural resources? The reality is that English cannot be, and is not being so contained. What we have to do is explicitly acknowledge that in Cheah's (1997) words classrooms are sites for *"cultural border crossings"*, sites for the creating and sharing of culture. A view of curriculum as content has meant that even in history, geography, social studies we have taught cultural information factually and neutrally. The English language teacher must use his/her unique position to access these resources for culturally meaningful language learning. Looking ahead we need to address more urgently the knowledge and skills demands of the new syllabus. We have in place the policy rationales via TSLN and a progressive syllabus. We are all too aware of the limitations of large classes, and the range of linguistic abilities students bring to our classes. We do not yet have a sufficient supply of qualified English graduates coming into teacher education. Many of these limitations will not change in the near future, though the promise of more manpower for schools should allow for more flexible use of curriculum time.

It is too early to say how the proposed changes to the teaching of Chinese, and presumably other mother tongues, will facilitate the emergence of a more flexible and appropriate pedagogy. The positioning of the mother tongues as carriers of traditional culture and values may in part have contributed to a pedagogy that is formal and pedantic. A balance will have to be struck between providing able students with the linguistic resources to access the riches of ethnic cultures while at the same time rooting language learning in the context of contemporary language use in Singapore Language learning in mother tongue classrooms must also acknowledge the changes occurring in language ecology in Singapore and the new demands being made.

So, our pedagogic practices can and must change. Some teachers have responded to the pressures of language teaching and high stakes language examinations by opting for reductive and disempowering practices; many others have taken on much more seriously notions of learner centredness, integration, exposing students to a variety of texts; more attention is being paid to the processes of reading and writing.

We have not done as much as we can to use the language classroom to foster intercultural awareness. We in Singapore have a unique language learning and use environment. The global requires us as teachers to equip our students with the English language skills to manage exciting if uncertain futures. But the

national requires that our students acquire greater inter-cultural awareness. This is the next big challenge for our English language classrooms.

Note

This paper is based in part on ***'Understanding Paradigm Shifts in Language Planning in Education in Singapore: A Teacher Educator's Perspective'*** (2004) and ***Ethnicity Management and Language Education Policy: Towards a Modified Model of Language Education in Singapore Schools*** (2004).

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Overview of Changes to Language Learning

Merging EM1 and EM2 streams

The Old

- Pupils channelled into three streams – EM1, EM2 and EM3 – depending on their performance in the Primary 4 year-end examinations.
- Pupils in EM1 and EM2 streams sit for the same Primary School Leaving Examination in English, mother tongue, mathematics and science, with EM1 students taking an additional subject, higher mother tongue.
  EM3 pupils take a simpler PSLE examination and do papers in just English, mother tongue and mathematics.
- The examination questions which determine a person's stream are by school teachers and drawn from a question bank provided by the Ministry of Education (MOE).

The New

➤ EM1 and EM2 streams are merged, EM3 stream remains a distinct course for weaker pupils.
➤ Schools are given the flexibility to set their own Primary 4 year-end examinations.
➤ Schools decide which pupils are good enough to take the higher mother tongue paper.

The Reasons

✔ Schools can customise lessons to pupils' abilities and needs.
✔ The less academically inclined can continue to benefit from being taught separately.

Non-native mother tongue language as a third language

The Old

- Secondary 1 students can take a non-native mother tongue as a third language under the Malay Special Programme and Chinese Special Programme. This means students taking Chinese as a second language can offer Malay as a third language and students taking Malay as a second language can offer Chinese. Students taking Tamil as a second language can either Chinese or Malay as a third language.
- Only those who are among the top 10 per cent scorers in the Primary School Leaving Examination, or in the top 30 per cent but with an A* in mother tongue or a distinction in higher mother tongue, as well as an A in English can study a non-native mother tongue.

The New

➤ Anyone with the ability and interest can take a non-native language as their third language from 2007.

The Reasons

✔ To help young Singaporeans operate efficiently in the region.
✔ To increase interaction among ethnic communities and encourage interracial understanding.

Changing the way Chinese is taught

The Old

- Most of the emphasis was placed on memorising and less on verbal skills.
- Print dictionaries were allowed in the composition section of examinations for secondary schools.
- All pupils, with the exception of those taking higher mother tongue, learnt Chinese at the same rate.

The New

- ➤ More emphasis will be placed on oral skills and reading for the majority of pupils.
- ➤ If a pilot project works out, schools will from 2008 use the "recognise first, write later" approach. Other teaching methods recommended are using songs, choral reading and recitation.
- ➤ New modular approach will be introduced in primary schools, where all pupils will take a core module of Chinese. Weaker pupils can take reinforcement modules for extra help with the language, while enrichment modules are available for stronger pupils.
- ➤ CL PSLE examinations will be set at the standard of the core modules.
- ➤ Textbook writers to have more flexibility in choosing topics, the length of passages and character lists.
- ➤ Students to be provided with an electronic dictionary by next year. All students will be allowed to use them in examinations from 2006.
- ➤ Assessment will be based more on students' ability to use Chinese in contextualised situations.
- ➤ Government to study the possibility of including oral communication skills as a component of the national examinations.
- ➤ Secondary school students will be able to take literature in Chinese as a combined humanities elective.

The Reasons

- ✔ To make Chinese a "living" language and develop m students a lifelong interest in Chinese language and culture.
- ✔ To let those with the ability and interest study the subject more deeply, while weaker students can catch up.

Bilingual approach to teaching Chinese

The Old

- Teachers were allowed to use English to teach Chinese in a 2002 pilot programme in four schools: Anglo-Chinese School (Junior), Methodist Girls' School (Primary), St Andrew's Junior School and St Michael's School.
- Hanyu pinyin used to teach Chinese.

The New

- ➤ Seven more schools start using the bilingual approach. They are: Fairfield Methodist Primary, Henry Park Primary, Marymount Convent School, Montfort Junior School, St Anthony's Primary, St Gabriel's Primary and St Stephen's School.
- ➤ Pupils are allowed to use some English to express themselves more clearly and clarify their doubts during the initial learning stages.
- ➤ The use of English is gradually reduced. By Primary 3, the children are taught only in Chinese.

The Reasons

- ✔ With a higher proportion of students coming from English- speaking homes, the Ministry of Education is hoping that the bilingual approach will help nurture a love and appreciation of Chinese.
- ✔ Students under the programme are more enthusiastic during Chinese lessons, more eager to learn, and understand their lessons, better.

Some go bicultural

The Old

- Only the Language Elective Programme (Chinese) is available to secondary and junior college students, and it focuses mainly on Chinese language and literature.

The New

- ➤ The four-year Bicultural Studies Programme (Chinese), done from Secondary 3 to JC 2, aims to equip students with a deep understanding of Chinese culture and history through a range of humanities courses.
- ➤ Students of the programme, to be offered at Dunman High, Nanyang Girls' High and The Chinese High next year, will skip the O levels and go on immersion trips to China and another non-Chinese-speaking country as part of the scheme.
- ➤ The youngsters can apply for a Special Assistance Plan scholarshipwhich will pay them $1,000 a year as well as fund the immersion programmes.

The Reason

- ✔ To groom a new Chinese bicultural elite to keep Singapore engaged with China in future.

B syllabus extended to Secondary 1

The Old

- Students who have great difficulty in the subject can take a simpler Mother Tongue course, which focuses more on practical communication skills — but only from Secondary 3 for Express stream students and Secondary 5 for Normal (Academic) students.

The New

- ➤ The simpler B syllabus will be offered from Secondary 1. Schools will be able to allow a student to do the paper if he is unable to cope despite putting in effort.
- ➤ Students with Grade C and below for their Mother Tongue at PSLE can take the B paper. Secondary schools can allow any student they deem suitable to do it. To make this decision, they are expected to assess the ability of the child in Mother Tongue, as well as his PSLE grade in the subject and his performance in his secondary school examinations.
- ➤ Students with learning disabilities such as dyslexia, autism or who have a hearing impairment, can choose the simpler paper and even be exempted from doing Mother Tongue altogether.
- ➤ Requests from Singaporeans who rejoin the education system after living abroad, to be exempted from doing Mother Tongue, will be considered on a case-by-case basis.

More flexible university admission criteria

The Old

- A minimum grade of D7 is required for mother tongue and included in the university score — the total number of points used in applying for a place in a university here. It is made up of candidates' A-level grades and the points he scores for his co-curricular activities.
- The maximum number of points for the University Score is 76.

The New

- ➤ A minimum grade of D7 is still required to qualify for a university place here, but students can choose not to include their grade for mother tongue when calculating the university score, making the maximum number of points they can score 68.
- ➤ A minimum grade of D7 or a pass in the easier "B" mother tongue paper is still required.

The Reason

- ✔ To give universities more flexibility in setting the admission criteria, especially for students who are weak in their mother tongue.

Special Education in Singapore: Celebrating the Past, Envisioning the Future

Marilyn Quah, Levan Lim, & Kim Fong Poon-McBrayer

Introduction

It has been 15 years since the landmark *Report of the Advisory Council on the Disabled: Opportunities for the Disabled* was released to the public in 1988. Since this major report, many changes and achievements have occurred in special education in Singapore. There is much to celebrate in retrospect over the past 15 years, but there is also much to do to further improve conditions and quality-of-life outcomes for people with disabilities. It is with caution that we would like to emphasize in the minds of readers that besides the various developments we have selected to include in this article, there are many successes and milestones achieved at the individual as well as on a collective level in Singaporean society over the past 15 years.

It was in February 1988, the then Minister of Education, Dr. Tony Tan, chaired the Advisory Council for the Disabled which looked into the problems and needs of people with disabilities in Singapore with the purpose of helping them integrate into society. The Council submitted their recommendations in the *Report of the Advisory Council on the Disabled: Opportunities for the Disabled* in November 1988. The recommendations proposed in the report were very well received by the government which took immediate action to begin implementing them (Quah, 1990).

This article looks back at the specific recommendations of this landmark report which has impacted upon the improvement of special education provision during the past 15 years. The past 15 years have witnessed a number of significant developments in supporting the needs of children with disabilities within mainstream education through various preschool and primary school programmes. These programmes and their achievements are described in this article. In addition, key developments in teacher training to prepare teachers to better support students with disabilities in special schools as well as mainstream schools are also discussed. We conclude this article with a number of considerations that are aligned with envisioning a more inclusive future for individuals with disabilities in Singapore.

Report's Recommendations for Special Education

Of the recommendations proposed by the Report of the Advisory Council on the Disabled (1988), three of them pertained to the improvement of special education provisions. These were:

- To coordinate special education schools, the Ministry of Education (MOE) should consider setting up a Coordinating Body for Special Education (this was later called "Coordinating Committee for Special Education" or CCSE).

- The special education programmes should be upgraded. The cost of such upgraded programmes works out to about 4 times that of primary education. This cost of special education should be borne equally by the Government and the voluntary welfare organizations/Community Chest of Singapore.
- The development of special education schools is hampered by short-term leases. Government should urgently consider converting, wherever possible, short-term leases to long-term leases of about 30 years. Where lease conversion is not possible, Government should provide purpose-built special education schools for affected voluntary welfare organizations. (p.11)

Until 1988, special education in Singapore was provided by seven voluntary welfare organizations (VWOs) in 11 special schools (Quah, 1990). There is a strong belief, by the government, that special schools are best run by VWOs, for they have a strong sense of mission and their autonomy allows them greater flexibility to respond quickly to new needs and demands. Prior to 1988, special education was fully funded by the Singapore Council of Social Service (later renamed National Council of Social Service or NCSS). This was viewed by the VWOs as an abdication of responsibility by the Ministry of Education (MOE), as special education should be an 'education' matter.

In the early 1980s, the Ministry of Social Affairs conducted national surveys to gather data to facilitate the planning of services for the disabled. In 1988, the Advisory Council for the Disabled was established by the then Minister for Education, Dr Tony Tan, to bring about better coordination amongst services and agencies. One of the major milestones achieved by this council was that it became an equal partner with NCSS in the funding and management of special education.

Through this partnership, the Singapore Government allowed unused school buildings to be leased out on short three-year leases to special schools. Land was also set aside for the construction of purpose-built special schools. In addition, the Government agreed to provide financial support to special schools of up to a maximum of twice the cost of educating a primary school student in Singapore. This would be matched by a similar contribution from the Community Chest of Singapore. The maximum per capita cost per child being 4,700 Singapore dollars from the MOE and 4,000 dollars from the Community Chest (Quah, 1993). Thus, from 1988, a special child would receive up to four times the amount that would be spent to educate a primary school child.

One of the recommendations from the Report of the Advisory Council for the Disabled (1988) was that the teacher-pupil ratio for special education should be 1:8. It also recognized that for children with more severe disabilities, the teacher-pupil ratio could be as low as 1:2, and that for others it could be up to 1:12. This is consistent with the teacher-pupil ratios in special schools as contained in the Report of the Advisory Council for the Disabled published in 1988. Fifteen years later, statistics available from theNCSS show that these teacher-pupil ratios are still being applied, and within each school, adjustments are made to ensure a good fit in the teacher-pupil ratio depending on the programme and needs of the children served (Quah, 2004a).

Towards Integration

Concerning the integration of children with disabilities, the Report of the Advisory Council for the Disabled: Opportunities for the Disabled (1988) stated, "whenever appropriate and feasible, special education should be provided within the regular education system. A child should only be placed in a special school if he cannot be well educated in a regular school" (pp. 37-38). The report also recommended that "integration should fit the disabled child to the most suitable educational environment" (p. 38).

In reality, however, special education services are generally provided outside the mainstream (Quah, 1993). Special education services are organized along a continuum ranging from total segregation to partial integration to total integration. Placement of a child with a disability at any point of this continuum is dependent on

his or her abilities and needs. Children with moderate, severe, and profound disabilities are taught in special schools, and children with milder learning, emotional, behavioural, sensory, and physical disabilities are found in all levels of the mainstream education system.

During the past 15 years, some progress has been made in integrating and supporting children with disabilities or learning difficulties within regular schools. A pilot project on integrating young preschool children, called Project ASSIST, was conducted by NCSS for 40 preschoolers with mild disabilities aged 3-5 years (Quah, 1998). Its main objective was to ascertain the feasibility of integrating these children into mainstream preschool centres in Singapore. Professional staff including psychologists, occupational-, speech- and physio-therapists intervened through the provision of services and consultations to the teachers and parents of these children. Results of the evaluation conducted after only nine months of implementation found positive effects for the children (with and without disabilities), their parents and teachers. Project ASSIST paved the way for children with disabilities who were previously denied admission into mainstream nurseries and kindergartens, access into quality preschool education programmes.

Later, some of these children joined the TEACH ME (Therapy and Education Assistance for Children in Mainstream Education) Services and were integrated within mainstream primary and secondary schools. This integration demonstrated the feasibility and desirability of mainstreaming children with mild disabilities into general education schools in Singapore. In January 2003, the Ministry of Community Development and Sports (MCDS) implemented a project similar to the ASSIST programme but this time, for preschoolers attending childcare centres. This project, known as the Integrated Childcare Programme (ICP), aims to maximize the potential of children with special needs aged 2-6 years who can benefit from a mainstream education (MCDS, 2003) by providing an inclusion programme with their non-disabled peers in a natural setting. As with Project ASSIST, it also aims at providing a smoother transition for preschoolers with disabilities into general education schools when it is time for their primary schooling. In 2003, the project was implemented in six "pioneer centres", each putting aside 10 places for children with special needs (Quah, 2004a).

In the 1980s, it was also becoming increasingly obvious that a substantial proportion of primary school students were experiencing learning difficulties. One problem faced by primary school teachers was the growing number of students who were underachieving in schools due mainly to their students' poor proficiency in English. To address this problem, the MOE, in 1989, requested the Institute of Education (IE) to conduct short in-service courses of 30 hours duration to help teachers identify and teach underachievers who were experiencing learning difficulties from Primary One (P1) to Primary Three (P3) more effectively. The "Helping Underachievers" course was offered to all teachers teaching in P1 to P3 classes. Meanwhile, the MOE launched the Helping Underachievers Project (HUP) in all primary schools to provide early intervention for students with average and above average abilities to maximize their learning. It focused on helping students improve their English and Mathematics and teaching was carried out in small groups. The programme used a diagnostic-remedial approach and was carried out outside curriculum time. In recent years, the programme was reorganized and is now known as the Encouraging Achievement and Better (ENABLE) programme, catering to students from P2 to P3 (Quah, 2004b).

In 1991, the MOE set up the School Psychological Service (SPS) with the principal objective to:

> "ensure that students with latent problems, be these personal, family, intellectual, behavioural or emotional, that are likely to adversely affect them in their learning are identified early so that the necessary assistance, remediation or treatment can be given to enable them to remain in the mainstream of education and to benefit from their schooling".
>
> [Hogg, 1993, p. 47]

The target population served by the SPS were school-aged students in mainstream schools with special educational needs. The overall framework of the SPS consisted of four zonal teams, each led by a senior educational psychologist and comprising five educational psychologists, four social workers, a reading specialist, counselors and a learning support coordinator in every primary school. The Learning Support Coordinator (LSC) has a very important role within the structure of the service and is expected to be a qualified and experienced teacher with a particular interest in children who experience difficulties in school. Suitably qualified teachers are usually nominated by their school principals as LSCs to be in the Learning Support Programme (LSP). The duties of the LSC include:

- identification and assessment of students with problems
- teaching such students in withdrawal groups and using materials devised in consultation with the SPS
- providing within-class support in negotiation with the class teacher
- assisting the SPS in developing appropriate curriculum and teaching materials.
- assisting the SPS in providing in-service on-the-job training for class teachers.

The setting up of the Learning Support Programme in 1992 was another milestone achieved for serving the needs of children with learning difficulties at the primary mainstream school level.

Teacher Training for Mainstream and Special Schools

A critical aspect of improving special education services, whether within mainstream or special school settings, is teacher training. This section describes key developments in the past 15 years regarding the training of learning support coordinators for mainstream schools and the training of special education teachers for the special schools.

To more effectively launch the Learning Support Programme (LSP) in primary schools, the MOE requested the National Institute of Education (NIE) to conduct a training programme to prepare LSCs to undertake their roles more professionally. The Division of Specialised Education (renamed in 2000 as the Specialised Education Academic Group, and renamed again in June 2004 as the Early Childhood and Special Needs Education Academic Group) in NIE, thus designed and mounted the two-year part-time Inservice Diploma for Learning Support Coordinators programme with a full-day release from teaching duties for LSCs on Fridays to attend classes at NIE. Prior to attending this programme, LSCs were attached to primary schools for about a year to ascertain their suitability for the post of LSC. Since the first intake in 1993, NIE has produced a total of 101 LSCs in four intakes up to 2001. To expand this training to include more primary school teachers (other than LSCs appointed by the MOE), the Inservice Diploma for LSCs was restructured in 2001 into the Advanced Diploma in Teaching Students with Special Needs in Primary Schools. This programme is now offered to all qualified teachers in primary schools who wish to upgrade themselves with an Advanced Diploma, while at the same time, learn to teach students with special learning problems more confidently and effectively. Although the Advanced Diploma would take two years to complete, school teachers are also encouraged to take stand-alone modules within the Advanced Diploma programme for self improvement. In this way, teachers can accumulate credits toward the Advanced Diploma at their own pace.

In addition to the provision of in-service programmes for qualified teachers, the NIE also revamped its pre-service programmes from 1991 to include pedagogy in special needs education in both the Core and Elective Education components of its teacher training programmes. At this initial stage of their teaching career when they have to learn many urgent 'survival' skills to cope with classroom teaching and management, the NIE believes it is important to provide at least an awareness of the needs of students with special educational needs. These courses include, for example, the identification and characteristics of students with a variety of learning and behavioral problems encountered in mainstream education classroom, as well as coping and teaching

strategies which will enable them to deal more effectively with these students. Trainees are also informed of resources in their school and community from where help with more difficult students may be referred (Quah, 2004b).

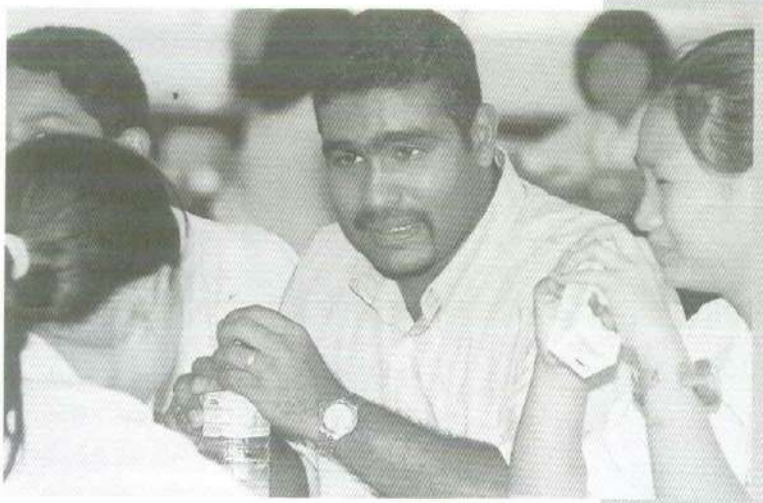
Prior to 1984, before the Institute of Education conducted training for special school teachers, teachers teaching in these schools were either trained overseas, were trained teachers in general mainstream education seconded by the MOE to these schools or were untrained young men and women recruited by the VWOs and given on-the-job training provided by the individual special schools. The IE, the sole teacher training institute in Singapore, launched its first teacher education programme for special teachers in 1984.

This programme, the Certificate in Special Education (CISE), was a three-year inservice programme for special school teachers. Admission requirements were pitched at three credit passes in the Cambridge-Singapore General Certificate in Education Ordinary Level (GCE-O in English) and six months' teaching experience in a special school. Teachers attending this programme taught in their special schools for half a day for five days of the week, and then attended the CISE on three half days (Quah & Chalmers, 1990). The quality of the intake of trainees improved each year, and by 1992, when 169 teachers had already graduated with the CISE, it was observed that at least 60 percent of the trainees had either "A" level passes, were Polytechnic Diploma holders or university graduates.

In 1991, when the IE became the National Institute of Education (NIE) and part of the Nanyang Technological University (NTU), it was decided that those candidates with better entry qualifications could undertake a shortened and upgraded programme of teacher training pitched at the diploma level. So, from 1991, in addition to the CISE, the NIE conducted a two-year, part-time Diploma in Special Education (DISE) programme for candidates with either 'A' levels, Polytechnic diplomas, or degrees from recognized universities. Applicants to this new programme were required to have minimum entry requirements of two 'As', two 'AOs' and a Pass in the General Paper in the Cambridge-Singapore General Certificate in Education – Advanced Level (GCE-A), or for Polytechnic graduates, the requirements were 5 'Os' (including EL1), and at least six months teaching or related experience in a special school setting for both groups.

The first intake in 1991 attracted 61 candidates, of which 35 were successful in gaining admission to the programme. Since then, the DISE programme has been a very popular training programme which is offered each year. For the July 2003 intake, the NIE received a bumper crop of more than 40 eligible applicants. By June 2003, the NIE had graduated 230 DISE trained special teachers. Together with the 308 CISE trained special education teachers since its first intake in 1984, the NIE has produced a total of 538 qualified teachers in special education for the special schools over a 20-year period.

With 4,385 students in 19 special schools, there should be sufficient suitably qualified teachers (not including another 31 who are expected to graduate in June 2004 and another 43 currently undergoing training, making an additional 74 qualified teachers who will be teaching in special schools by June 2005, assuming no attrition) to ensure a good teacher-pupil ratio. However, special schools still report a shortage of teachers. According to several special schools, qualified teachers (especially those with DISE qualifications) leave the profession shortly after graduation. This is a concern in the field of special education because teacher attrition can affect the overall quality of service provision.



In the past, some special schools have blamed attrition rates on the demands of concurrent training and teaching. If that were the case, qualified teachers should not be leaving the profession soon after graduating from training at the NIE, and yet, there are enough resignations to warrant sizeable intakes of trainees into the NIE's training programmes to replace those who leave each year. Whatever may be the reasons for this, these resignations should be viewed as an expensive wastage of resources. To arrest this trend, a concerted effort from all parties involved in special education, especially the employers, is needed to explore ways to improve service conditions to stem the attrition rate and retain good, qualified teachers in the profession. It is the quality of teaching and professional staff that will make an excellent school, not the up-to-date and purpose-built school buildings.

At the request of the Canossian School, the NIE recently mounted the Advanced Diploma in the Natural Oral Approach to the Management and Education of Children with a Hearing Loss for 12 qualified teachers in 2003. Students who can benefit from integration/inclusion receive mainstream education from preschool up to secondary levels and are prepared for the national examinations. This Advanced Diploma programme is aimed at providing qualified primary school teachers who are engaged in working with children with hearing impairments and who use the Natural Auditory Oral Approach. This approach emphasizes the need to maximize the use of children's residual hearing through proper amplification using suitable devices during all waking hours. Through the optimum use of hearing aids including cochlear implants and other supporting hearing devices, the children are enabled to acquire speech and language in the same way as normal hearing children, although often at a slower rate.

To further upgrade the quality of special education through the provision of better qualified staff, the NIE launched a new postgraduate programme at the Master's Degree level in Special Education in January 2003 to help the special schools in their recruitment of suitably qualified teachers who can provide leadership in special schools in the years to come. To enable teachers to attend the programme, it was especially designed as a two-year part-time programme which is partly conducted through coursework and partly through a dissertation. The first intake attracted 14 applicants and 10 of these were selected for admission into the Masters in Special Education Programme (Quah, 2004a).

Envisioning the Future

The developments in special education described above over the past 15 years testify to the progress achieved to better serve individuals with disabilities and their families. The developments described on actions taken to follow up on the recommendations of the advisory council report in 1988, the establishment of integration and support programmes for children in mainstream preschool and school settings, and the expansion of teacher education programmes represents part of the advancement of the field of special education in Singapore, albeit key achievements for greater integration of individuals with disabilities within society over the past 15 years. There is much to celebrate of past efforts contributed by individuals, families and organizations to enhance services, supports and conditions for people with disabilities, but there is still much more to do to achieve an equitable status and greater community membership for persons with disabilities in Singapore.

As more students with various disabilities are enrolled in mainstream schools following international trends and due to a more educated parent populace who are more exposed to and knowledgeable of the global inclusion movement, it is important for mainstream classrooms to be places where these students' learning needs are supported and teachers' concerns are adequately

addressed. The extension of existing support services such as the LSP beyond current primary grade levels appears to be a logical step towards providing more longitudinal support across the school years. Regular evaluation of existing support programmes such as the LSP or TEACHME are important to determining the efficacy of such programmes and improving current models and practices.

The direction of service development for the future is one area which can be contentious in terms of how special education is evolving in Singapore. On one hand, special education as part of the mainstream education is slowly gaining momentum as more children with disabilities are found in mainstream schools and therefore require greater support in terms of various areas such as teacher training (both at the pre-service and in-service levels) and teacher support for managing more diverse classrooms are required. There are already encouraging signs at the teacher training level where there is a concerted effort on the part of the NIE and the MOE to train teachers to be more adequately prepared to handle diverse abilities in the classroom.

On the other hand, special education in Singapore is still heavily associated with a separate system of education consisting of special schools which have grown from 11 in 1988 to 19 at present. Although the building of more special schools truly meets the school needs of a growing population of individuals with disabilities and their families, what has been inadvertently created and further reinforced is a separate system where students with disabilities are seen as belonging to special schools.

If the role of special education services in Singapore is primarily perceived as separate from or outside of mainstream education, resulting in many children with special needs being educated and growing up outside mainstream education and apart from their mainstream peers, their prospects of being accepted and welcomed by mainstream society will be limited. In such an arrangement, efforts to integrate individuals with disabilities to fit in better into the mainstream society will always face resistance from a public that remains alien to them and their needs. In short, the prospects for many people with disabilities in Singapore for inclusion into the mainstream community will be limited because they were never really part of the mainstream school communities (Lim & Quah, 2004). Thus it is very important for key stakeholders in the education of students with disabilities to think and plan very carefully on how present developments in special education will affect inclusion opportunities. Perhaps, it is timely to carry out a review and report of the magnitude and stature similar to the Report of the Advisory Council for the Disabled completed 15 years ago.

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Gender Issues in Leadership Mentoring

Lim Lee Hean and Low Guat Tin

Gender issues in mentoring have been highlighted in numerous literature internationally, though it could be generally perceived as relatively insignificant in Singapore. This article serves to provide some background information pertaining to leadership mentoring locally and overseas, and present the need to explore uncharted territory in leadership mentoring.

Literature surfaces gender issues in leadership mentoring like complexities of cross-gender relationships. This could include collusion in stereotypical roles, limitations of role modelling, intimacy and sexual concerns, public scrutiny, and peer resentment (Kram, 1985). On the other hand, studies on mentoring (Daresh, 1995) did not determine that same-gender matching patterns were necessarily more effective in assisting mentors and protégés than cross-gender matching patterns. Gender differences between mentors and new principals did not appear to pose any widespread problems (Bolam, McMahon, Pocklington, & Weindling, 1995), although there were reported instances of new female principals expressing "unease about difficulties" or "intimidating experience of seeking acceptance in the predominantly male culture" (Bolam et al., p. 40). It would appear that possible drawbacks involving gender issues in mentoring could exist, but these were not overwhelming. There could also be unawareness or non-acknowledgement of such issues. As such, in "the struggle to create a more gender-inclusive profession", Shakeshaft (1999) suggested that there could be a possibility in the future to "understand women's and men's experiences together", and "produce an inclusive vision of human experience based on differences and diversity, rather than on sameness and generalizations" (p. 115).

In the recent past, educators in Singapore had contributed to the generation of knowledge in leadership mentoring. Mentoring was the main feature of a development strategy for aspiring school principals attending the Diploma in Educational Administration (DEA) programme at the National Institute of Education (NIE). It was developed as part of the DEA programme since 1984 (Chong, Low, & Walker, 1989; Marquardt & Engel, 1993). The DEA programme was a full-time one-academic-year programme for the principalship preparation of selected vice-principals (The programme has since 2001 been replaced by the Leaders in Education programme). It incorporated an eight-week school attachment, which was divided into two four-week periods. During the attachment, each participant protégé was paired with a mentor principal. During the attachment the DEA participant learned by "shadowing" the mentor in the mentor's school. The Ministry of Education selected the mentors as worthy role models for would-be school principals. Many of the protégés are now principals of schools. Results of findings (Lim, 2002a) suggest that the formal principalship preparation programme that they attended emerges as a breeding ground for the initiation of informal working relationships at work. Beyond formal mentoring, the principals appear to "lead their own learning in collaboration with their peers in education" (p. 185). Further findings (Lim, 2002b) also reveal that the protégés abandon what they perceive as inappropriate or wrong practices of school management. The concern that mentoring might preserve conservative or traditional practices unthinkingly is questioned. The results also dispute researchers (for example, Bush and Coleman, 1995) who advocate the inclusion of formal assessment of the protégés by their mentors. Recent development in leadership development (for example, the Leaders in Education programme) excludes the component of mentoring, and this appears to surface concerns about the benefits of

mentoring for the future, that mentoring could be a potential hazard to innovative thrusts. However, the implicit assumption that mentoring could not contribute towards the development of future principals as new leaders of innovative organizations has yet to be rigorously challenged (Lim, 2002b, p. 92).

With regard to gender issues in leadership mentoring, statistical records offer some information that could help generate questions in the field. Out of 359 school principals in Singapore, 65% (or 232 principals) are females even though females constitute 73% of the teachers (*Education Statistics Digest*, 2002, p. 5). School cluster superintendents of both genders in Singapore are almost equal in numbers as there are 14 female and 13 male cluster superintendents (*Singapore Government Directory Interactive*, 2002). The figures for Singapore are comparatively very high in comparison to the other countries. For instance, in New York State, only 14.4% of the superintendents, 23% of secondary principals and 46% of elementary principals are females (Shakeshaft, 1999, p. 101). Has the Singapore mentoring system played a part in the generation of a comparatively high female participation in higher positions? Is there a difference in the impact of female/ male mentors on the management practices of female protégés? For those female protégés who become cluster superintendents, what practices of management have been learned through mentoring? In Singapore, the impact of mentoring on the Singapore Education System in generating learning (Lim, 2002a) is pervasive. The nature of learning networks among principals has yet to be examined. Questions like "how well and to what extent do female principals fit into such learning networks?" could be explored.

Sustained over a period of more than one-and-a-half decades, the Singapore mentoring model is one of the longest existing formal mentoring schemes for aspiring principals in the world and the only established formal mentoring scheme in Singapore. As such, it offers a rich setting and background for research on mentoring. Local studies on mentoring have so far excluded the issues of gender. What we need is greater awareness of existing loopholes in research on mentoring in Singapore and to create new knowledge in the understanding of matters pertaining to gender issues. In doing so, we could explore the possibilities, or even probabilities, of further maximizing the potential of women education officers in Singapore.

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Re-making the Learning Experience: Achieving from a Learning Culture

Tan Kok Siang

Introduction

There is a familiar quotation that says "Give a man a fish, he eats for a day. Teach him to fish, he eats for a life time." Having spent a good part of my life as a student, and an equally good part of it as an industrial chemist, then a teacher and now a teacher educator, I have come to a point where I begin to see the subtle meaning this quotation has to me at various stages of my studies and work.

Reflecting on the Years of Studies and Work

In the early years of post-independence Singapore, the learning experience I had was a very endearing teacher-to-student dissemination of knowledge and skills. I would not have done much without having my teacher instructing and providing all the necessities in my learning experience in school. However, those were the survival-driven years of 1960s and 1970s. In the teenage and youthful years of the 1980s, learning became more exciting as we heard about terms and acronyms that sounded rather foreign to the ears – it was an era of Regionalisation and Multi-National Corporations (or MNCs). The mid-1980s were the recession years and being a fresh graduate, we were told, as it is today, that we must not be choosy with jobs, to land ourselves on a job first and then to work ourselves up to a better job later. This advice I took religiously, first getting a sales job and later "selling" myself into a laboratory job as a Chemist in a large foreign MNC. The 1990s put me at the other end of the classroom after I left the laboratory in exchange for a "lower paying" teaching job in a neighbourhood school. I soon discovered teaching was never to be a "lower paying" job in terms of both learning experiences and remunerations. The Education Service began a series of major revamps, including upgrading of the employment terms and benefits, but what won me over were the ample on-the-job learning experiences both inside and outside the school. Teaching has become a "higher paying" job to me in the forms of lifelong learning experiences as a practicing teacher.

As I continue to discover, I began to make sense of the learning experiences I had in my earlier years as a student and as a Chemist. I found that these experiences could be very effectively put to use in my current learning ventures. Thanks to both my teachers and supervisors. However, I also realized that my professional achievement was not the result of my desire to achieve. Rather, it was through a personal effort to distil from the highly competitive learning environments, in the years as a student and as a worker, the values and skill sets I can put to good use later. I believe I have become a lifelong learner.

Going back to that saying, I have to admit that in the beginning I was very fortunate to have been fed fishes as a daily staple. I was indeed

very well fed. Fortunately, or unfortunately, I was thrown into some rough patches in the later years of my studies and in the early years of my work life. It was through the difficulties, like failing to get into a choice course of study, receiving letters of job rejections, weathering the demands of work in the classroom, attending to students' learning needs, parents' expectations and meeting the professional requirements of being a good classroom teacher that I was taught the skills to survive in the various unpredictable work environments. Now, it is a daily ritual to fish for opportunities to learn. I learn from everyone around me, from any situation that arises, and from both good and bad experiences. With so much to learn, what have I achieved then? What do all these learning mean to a mid-career teacher in his mid-forties?

Making Sense of My Learning Experiences

Having come this far, from a student, to a teacher and now a teacher educator, one would have projected this line of progress upwards, expecting me to retire in glory and comfort a decade or so later. It has been three and a half years of partnering hundreds of beginning teachers in their professional training at the National Institute of Education. There is the slightest doubt that all my experiences – be these acquired from years of studies or work – have at one time or another been tapped upon as "fuel" or "ammunition" to propel the training opportunities I provide my trainees. It is still a relatively early stage in my present job as a teacher educator and I still have much to learn from everyone around. However, I do not subscribe to the projection of an upward trend in my professional pursuit. To me, I see it as a full circle in my professional duties to pass on what I have learnt and experienced to the younger teachers, in the hope that they will pick up the tips and traps from my real-life encounters, and use these to mould their own learning opportunities. Achievement has always been important to me, but it has never taken the top spot in my list of priorities in life. I had never work hard hoping for a promotion or an increment in pay. I had never hope to win an award or wish for a reward of any kind. To me, given an opportunity to learn is by itself a very intrinsic reward and by itself, just as valuable an extrinsic reward. I could always use that learning opportunity to generate more meaningful outcomes for my students and myself at a later stage.

One very frequently asked question by beginning teachers is "How do we teach so that students can excel?" We cannot fault the teacher for asking. Excellence, value-addedness and quality are often words that one would hear at school functions and speeches. What I would like to ask the teacher is "Which should come first for a student: Passion to Learn or Desire to Excel?" Although I do not have a track record of an excellent achiever in any area, I do have a very strong passion to learn. In most, if not all, cases, I have been able to achieve some degree of "excellence" at my own pace, but in all cases, I have never failed to be excited about learning from the experience, be it a happy one or a crisis of sorts. As an analogy, one can aspire to reach the top of a mountain, to enjoy the fresh air and the view up there. To reach the top would call for more than just aspiration. One would need determination and willingness to sacrifice the comfort one is so used to. Even with these values, one may succumb to the environment, to unexpected accidents or illness and thus fail to reach the top. Is there no achievement in such cases? Alternatively, one can reach the top by being manually ferried up on horseback or by machines, like being on a helicopter. How much learning takes place in the second scenario and how different are the learning experiences compared to those experienced through someone's pursuit up the mountain's sides and reaching the summit on all fours?

Re-making Students' Learning Experiences

It would of course be too much to ask that students be made to go through crises just to experience the real world order. However, the

learner's culture in society has far been over taken by the achiever's culture. If one learns only for the sake of excelling, of winning an award or gaining recognition or advantages for oneself, society may not have a very good base of endeavouring learners committed to the good of all. It is not about killing competition, it is about encouraging healthy competition by nurturing the love to learn among our students. Students should learn not just in anticipation of success, but also in preparation for the failures, expected or unexpected. So why has the achiever's culture grown so big in size?

The global landscape is changing all the time and competitions hot up every so often. Students can work hard to achieve the tangibles (like results and scholarships) but they may also fail to appreciate the intangibles (like the happiness to see fellow citizens leaving in harmony and in peace). It may sound unrealistic that students may end up having such "cold attitudes", but only if one takes another look at it, this scenario is not so unrealistic after all. The thirst for excellence pushes the able higher up the rungs of the ladder. Having a good view up there means they have more exposure to "greener" pastures not available to those at the lower rungs. If expectations run high in them, some may even jump off and land themselves in the "greener" pastures elsewhere. Those lower down have very slim chances to go up. If they are not given alternatives - not just second chances - to show their worth, they may just give up the ladder altogether and walk or crawl around. Some may end up in the "greener pastures" too, and given their adverse disposition, they may not want to stay on with their original herd. This scenario leaves only the middle group hanging in mid air, not knowing if they can make it to the top and at the same time fearing they may slip to the bottom.

There is nothing wrong with an achiever's culture, but would it not be better if this culture is supported by the real passion to learn and serve others? In a learner's culture, everyone is an achiever. Everyone learns about their own strengths and weaknesses. Their strengths are capitalized to benefit the mass, and weaknesses are also well looked after by the mass. It may sound idealistic or even communalistic. However, if one recalls the story of how in a heavenly place where people can only drink soup from a large bowl by holding the ends of spoons with long handles, one would realize the benefits of feeding each other rather than trying to feed oneself. Can a learner's culture be realized?

There is no fast track to re-making our students' learning experiences. The achiever's culture was built from a hectic and competitive survival-driven environment. This desire to achieve excellence was developed over many years. It may have served us well in those circumstances then, but now, it may be time for a re-think. To remove totally competition and a sense to achieve is naïve. It is important to aspire to achieve but to put it before the passion to learn, that would be difficult. However, it is not impossible. The key lies in how we cultivate the students' learning passion through daily classroom rituals and messages of shared concern. Hopefully, the thirst for knowledge will be created and with wisdom, the students may then be put on a track of committed learning and sharing.

Some Suggestions

There are already many existing avenues which teachers can focus on to help students catch the habit of learning. It is an ability-driven system that all students and teachers are being told about. Let us make some concrete sense from this concept about ability-driven education. It is not just about excellence in what we do best, it is about serving others with what we can do best. It is heartening to read some very good examples of how the ability-driven education system is showing up its true self – like a junior college selecting students for their integrated programme not solely by academic. There was also the flexibility of

allowing Normal Academic stream students to study in the sports school. These are some of the inspiring indications of a maturing learner-centred society.

Some suggestions on the general strategies teachers can use to help students include applications of reflective learning strategies, fostering the entrepreneurial learning spirit and engaging students in learning about real world problems. Reflection is a very established aspect in learning. A reflective learner is able to generate ideas and then to prioritize them. They then relate these ideas to their learning needs and then create the opportunities for themselves. As for the entrepreneurial learning opportunities, these are far more important than the isolated entrepreneurial projects schools do. In entrepreneurial learning, students are consistently exposed to learning opportunities that require them to take calculated risk in everyday learning (not just in some extra-curricular projects). Students are also frequently tasked to generate and seek opportunities and alternative ideas within the curriculum. When these entrepreneurial learning become second nature to students' learning experiences in school, all that is left are the real opportunities out in the world where the students graduate into. Service learning and small-scale problem based learning may also be included in very modest scales to allow students to sample what they may expect to experience when they graduate into society. There would then be a sustainable emergence of true entrepreneurs in our society.

Specifically, I would encourage schools to start building up a life long learning culture by focusing on the ability of the individual student to produce and document something out of her or his passion at school. After six years in primary school, the student should have a collection of work or evidences of performances either in academic or non-academic areas. These should be captured in a school-supported portfolio system. With their respective subject and form teachers, each student can keep one or two of her or his best pieces of work in the portfolio, complete with the student's reflection and the teacher's comments and encouragement. The portfolio will be issued to the students at the end of the year, together with the child's report book. At secondary school, the student can continue with the same portfolio and may even be take it through their junior college, polytechnic or university education. It is a real and valuable collection of the student's sustained interest, passion and talent developed during the school years. It is also an alternative assessment evidence when the students apply to study at some tertiary or professional institutions. In fact, it may even come through as the ultimate piece of evidence of the person's life long passion and ability when she or he enters the work world.

Conclusion

In reflecting upon my own experiences as a student and a worker, I conclude that I have been fortunate to survive happily, like most of my peers, through the past four decades of uncertainties and change. This is no mean feat as many counterparts in my age group residing in other parts of the world may not have shared my fortune. However, this does not mean that the same fortune I had would be shared by the younger generations. Their future is in their own hands now. What we as teachers should do least, is to dictate where they should go and what they should do. What we should do most, is to create an environment conducive to their learning and discovery of their passion, their talent and their commitment. It is only when the thirst of knowledge and skills exist in their mental throat that they will strive to learn and discover. Students should also be taught to humbly contribute to society, which had helped them achieve. Nothing beats the surprises when they discover they actually can achieve much through their passion to learn. Not even the moment when the child achieves excellent examination results through stressful mugging and anxious moments of wondering if they would eventually meet the expectations of society. That is not really a moment of joy, but a moment of relief from an experience in life best forgotten.

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THE CHANGES

The old

- 40 youngsters in a Primary 1 class.
- Most schools have morning and afternoon sessions.

The new

- About 30 children in a Primary 1 class.
- Partial single session: Schools to start shifting their Primary 3 to 6 classes to the morning session to free up space for Primary 1 and 2 classes in the afternoon session.
- All 132 government schools to have partial single sessions by 2014.
- The 46 government-aided schools, including mission schools and those linked to clans do not have to cap the number of children in a class at 30.
- Schools with the smaller classes have to cut their enrolment.

The old

- Primary schools are relatively uniform in the kind of curriculum and activities they offer, compared to the diversity in the secondary school and junior college landscape offered by integrated programmes and specialist schools

The new

- Primary schools will be encouraged to develop niche areas to encourage more diversity with the Programme for School Based Excellence from next year.
- They can apply for up to $100,000 a year from the Ministry of Education to develop their special areas.
- The special area of excellence can be in character development, aesthetics or teaching approaches.
- Schools can use the grant to hire and train staff, buy materials and build facilities.

The old

- Focus on classroom teaching and rote learning. Lessons are mostly delivered by a teacher standing in front of a class talking.
- Emphasis on learning through memorising facts, practising sums and tackling questions in past examination papers and assessment books.
- Not much attention paid to honing thinking, communication and process skills during curriculum time.

The new

- Emphasis on outdoor activities, project work and experiments to promote independent learning.
- More attention given to developing communication and thinking skills while studying academic subjects.

PRIMARY LEVEL

The old

- All pupils were streamed at the end of Primary 4 into three streams, EM1, EM2 and EM3. Where they ended up depended on their performance in the year-end examinations in English, mathematics, and mother tongue. Their score for science was not used.
- The papers had questions from a band provided by the Education Ministry, o top of some the teachers formulated themselves.
- Those who scored a Band 1 – the top grade – in all three subjects made it to EM1, with the rest going to EM2. Children who failed in two subjects or more ended up in EM3.
- Pupils in the EM1 and EM2 streams study English, mathematics, science and mother tongue, with those in EM1 taking higher mother tongue. In EM3, children study basic English, science, mathematics and the mother tongue. They sit for a simpler Primary School Leaning Examination at the end of Primary 6 for all subjects except science.

The new

- Streaming has been modified with the EM1 and EM2 streams merged. The EM3 stream remains for weaker pupils.
- Schools now have the flexibility to set their own Primary 4 year-end examinations.
- The subjects that EM3 pupils and those in the other stream study remain the same, but schools are left to decide which pupils are good enough to take higher-level other tongue. Now a third of schools put EM3 kids into regular classes, with more doing so.

The old

- CO-curricular activities (CCAs), or extra-curricular activities as they used to be called five years ago, used to involcve choosing from a couple of handfuls of activities, like the badminton club, gardening club or Scouts/.Brownies. The activities were aimed mostly at children in Primary 4 and higher levels.

The new

- Primary school pupils are now choosing a weekly after-school activity from a list that ranges from the more cerebral to the arty to the slightly risky. Schools are also allowing pupils in the lower primary classes to join in.

The reasons

- The Education Ministry wants children to have a more well-rounded education, and to give them a chance to discover new interests and learn different skills.
- Schools are also rising to the challenge and including more interesting activities.

Examples of what some schools offer

- Chongzheng Primary: sailing
- East Coast Primary: rock-climbing
- Poi Ching Primary: wushu and Chinese calligraphy
- Tanjong Katong Primary: golf, cricket, bowling and pottery

From Pupil Welfare to Pupil Development: A Review of Guidance and Counselling in Singapore Schools

Esther Tan

Introduction

Guidance and counselling in Singapore schools has a history of more than 30 years. This paper traces the development of guidance and counselling practices in Singapore schools from the remedial orientation of providing welfare services to needy pupils in the 70s to the current developmental approach of focussing on affective education to facilitate the educational, personal, social and emotional development of all pupils, in short, the education of the whole person.

Historical Perspectives

Until the late 1960s, pupil welfare in the schools took the form of financial help for the needy pupils or referral of pupils with social and emotional problems to community welfare agencies staffed by social workers. Examples of such agencies were the Singapore Children's Society and Students Care Services which provided financial help for needy pupils and case work services for those with social and emotional problems.

In 1968 the Ministry of Education set up a Guidance Unit manned by Educational Officers who had received post-graduate training in guidance and counselling overseas. However, the focus of the Unit was more on educational guidance, and the development of resource materials for vocational guidance, not so much on personal counselling.

The first attempt to introduce school counselling was by the late Dr Ruth Wong, the founding Director of the Institute of Education who set up a Guidance Clinic on IE campus in 1974 as a demonstration project to offer school counselling services to a few selected schools. Still adopting a remedial approach, the focus of the Guidance Clinic was on direct service to enhance awareness of the need for school counselling and to spearhead counselling programmes in schools. Staff from the Guidance Clinic visited the schools regularly to receive referrals from the teachers and to conduct school-based guidance activities such as group sessions and individual counselling sessions. Some of these sessions also took place at the Clinic on the IE campus. The progress of the Clinic and some of the cases handled were documented in a monograph published in 1982 (Quah, Lui, Tan & Yip, 1982). From 1976, IE also began introducing in-service courses to equip teachers with basic counselling skills. However, as counselling was given low priority in schools at the time, teachers who had completed the in-service courses were given little opportunity and encouragement to put their skills to good use. A few fortunate ones were appointed Guidance Coordinators and given a lighter teaching load to allow them time to work with students. The rest remained classroom teachers who, on their own accord, doubled up as teacher counsellors.

The Turning Point

The turn of events came in 1986 when the newly appointed Education Minister Dr Tony Tan, after an overseas study tour of schools in the U.K. and the U.S., came to the realization that although most Singapore schools had a strong Instructional Program, the affective aspect of education such as guidance and counselling had thus far been neglected. (The Strait Times, December 1986). In their official report, the study team recommended to the government the formal introduction of guidance and counselling to schools. (Ministry of Education Report, 1987). Immediately a Pastoral Care and Career Guidance Unit was set up in the Ministry to introduce guidance and counselling to schools, first as a pilot project in 14 secondary schools and eventually to phase in all schools (The Strait Times, August 1987). This significant event marked the formal introduction of guidance and counselling to schools and the shift from the remedial approach of pupil welfare to the developmental orientation of pupil development.

Developing the Singapore Brand of Guidance and Counselling in Schools

Since its inception in 1987, guidance and counselling in Singapore schools was given the official name Pastoral Care and Career Guidance (PCCG) and defined as "organised care in the schools involving all the teachers in a developmental programme addressing the needs of all the pupils.". From the beginning a whole-school approach was advocated whereby all teachers in the school were involved in the task of promoting the social, personal and intellectual development of pupils. The Ministry identified six areas of school life for the delivery of pastoral care, namely, the schools' philosophy and mission, relationship building at all levels (teacher-pupil, teacher-teacher, pupil-pupil, teacher-parent etc)., facilitating a caring school ethos, building links with home and community, integrating pastoral care and career guidance (PCCG) into the curriculum and appraisal of pupils, teachers and all school programmes (Ministry of Education, 1994). In an attempt to develop resource materials to facilitate the work of the teachers in delivering pastoral care in schools, the Ministry of Education launched the ACE (Affective and Career Education) programme in 1997 with the aim of "developing individuals who are able to face challenge, manage changes, work productively, live compassionately and contribute to society". (Ministry of Education, 1997).

In 2000 the Pastoral Care and Career Guidance Unit at the Ministry of Education was renamed Psychological and Guidance Services Branch and fresh guidelines were issued to the schools, advocating a framework for pastoral care that has three key features:

1. a whole-school involvement in the delivery of care, resulting in a caring school culture and climate

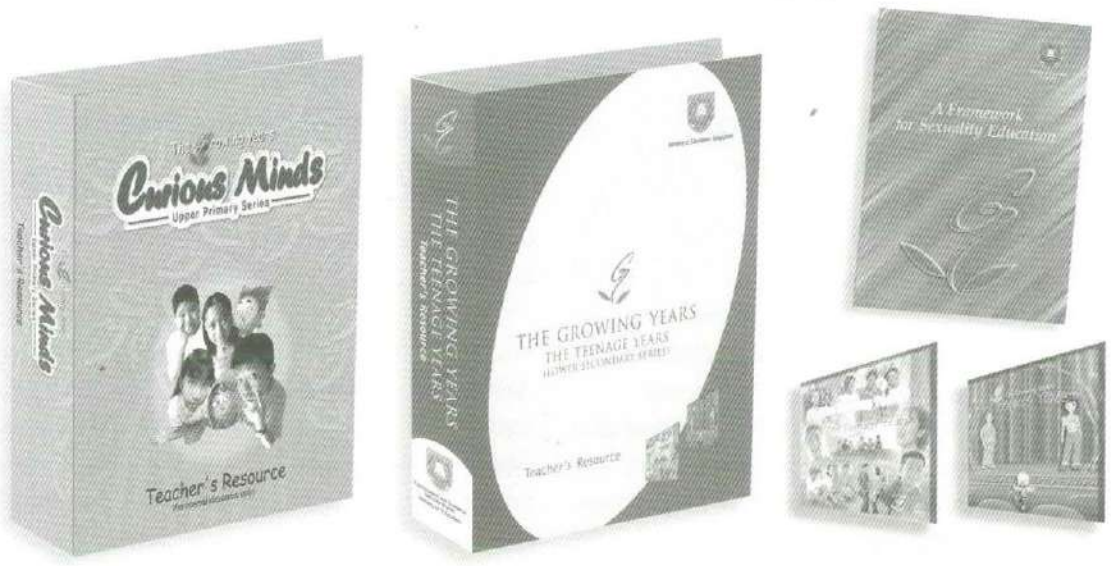
2. structured programmes to promote the well-being and development of all pupils. and

3. special assistance to specific groups of pupils who need extra help.

The ultimate objective is to develop pupils into "Confident, Adaptable, Resilient and Effective individuals." (Ministry of Education, 2001). By 2000 all the schools have in place the official appointment of a Head of Pastoral Care to be in charge of the planning and implementation of guidance and counselling programmes in the school – another milestone to signify the importance given to guidance and counselling in schools.

The Current Scene

Currently Pastoral Care in schools is the systematic and comprehensive provision of care for the total well-being and development of all pupils. It encompasses three domains – affective development, discipline and educational and career development (Ministry of Education 2001). The delivery of Pastoral Care in schools involves a three-fold strategy – the provision of developmental programmes for all pupils, intervention for pupils who need help and support and collaboration with parents and community agencies to enhance the developmental programmes and to facilitate intervention.

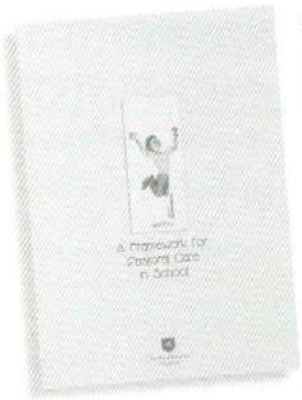


Developmental programmes in pastoral care cover character development, values education, as well as the learning of social, interpersonal and self-management skills. Most schools have structured teaching of life skills as part of the Pastoral Care curriculum. In recent years sexuality education has also been added on to equip pupils with relevant knowledge and skills to make responsible choices on sexuality matters. To facilitate this, the Psychological and Guidance Services Branch at the Ministry has developed "The Growing Years" series comprising multimedia materials and resource files for the lessons. This series includes *The Growing Years: The Teenage Years* (2000) for secondary students, *The Growing Years: Curious Minds* (2001) for upper primary students and *Sense and Sexuality* (2002) for upper secondary students. Other developmental guidance programmes include the training of selected primary pupils as conflict managers to promote the concept and practice of mediation as a way of life among the pupils. In selected secondary schools, a Peer Mediation programme is in place to improve the school climate and to encourage students to resolve conflicts collaboratively.

Since the final goal of discipline is self-discipline, the management of discipline in schools has also taken on a developmental perspective. The underlying assumption is that in order for students to develop their abilities and talents to the fullest, they have to learn to manage their needs and desires, check their impulses and behave in a responsible manner. In almost all the primary schools, discipline of pupils falls under the purview of Pastoral Care or Pupil Development. In secondary schools there is a a separate position for Head Discipline but the Discipline Committee works closely with the Pastoral Care Committee and students who have been disciplined are usually followed up by the Pastoral Care Committee for counselling to facilitate the development of insights and behavioural change.

Alongside the development of pastoral care in schools, career guidance has also gained recognition and importance. All the secondary schools have at least one Career Guidance Coordinator who, as a member of the pastoral care team, is given the responsibility to take charge of career guidance activities in the school. The goal of career guidance aims at equipping pupils with the skills to explore and make informed choices regarding courses of study and career planning that make full use of their abilities and talents. To bridge the gap between the schools and the world of work, work experience programmes are arranged for the students. To sensitise career guidance teachers to the cultures and norms of the world of work, they too, go for short-term attachment to industries during school vacation on a voluntary basis to gain first-hand experiences of work places other than the teaching environment.

While emphasising the developmental aspect of guidance and counselling, educators also recognise that there is a place in pastoral care for intervention to help pupils with learning needs, social and emotional problems.



Currently two schemes are in place in primary schools to cater to the educational needs of pupils. The first is an early intervention programme known as the Learning Support programme to help pupils who do not have the necessary language, literacy or numeracy skills to benefit from the school curriculum. These pupils are taken out of class during English/mathematics lessons for special instruction by specialist teachers called Learning Support Co-ordinators. Complimenting the Learning Support programme is the ENABLE programme (Encouraging Achievement and Better Learning) which is a structured and focused diagnostic remedial programme for English and mathematics. Lessons are conducted outside curriculum time by trained teachers using specially selected remedial materials and strategies provided by the Ministry of Education.

With regard to students with social, emotional or behavioural problems, counselling and intervention is available at three levels, depending on the nature and severity of the problem. Mild behavioural problems such as lateness, truancy or disruptive behaviours in class are handled by the classroom teachers, sometimes with the support of the discipline master. Behavioural problems of a more serious nature such as bullying or petty theft in school are referred to teacher counsellors or the PCCG committee. Serious emotional and psychological problems requiring professional help are taken care of by guidance specialists attached to the Psychological and Guidance Services Branch at the Ministry of Education or professional counsellors from community agencies. In recent years, some schools have started to employ full-time or part-time trained counsellors to ensure that professional help is readily available when needed. Stationed in the schools, these school counsellors receive referrals from the teachers and work with students whose personal and emotional problems have adversely affected their social adjustment and school performance.

Staff Development in Guidance and Counselling

Responding to the change of events and the emerging training needs of guidance teachers in schools, the National Institute of Education launched a part-time, eight-module, in-service programme in Pastoral Care and Career Guidance in 1990. The aim was to train school teachers at two levels - as nurturing, front-line care-givers at the classroom level and as Guidance Specialists at the school level. (Tan, 1994). This very popular part-time, in-service programme was revised in 2000 when the course work was reduced to seven modules but a practicum component was added to provide hands-on training in student counselling. Another milestone in the development of guidance and counselling in Singapore was the introduction of the Master of Applied Psychology programme at the National Institute of Education in 1997 to train educational psychologists for the schools and counselling psychologists for the community. Currently, plans are underway to launch a Master in Education programme in Guidance and Counselling to provide further professional training for teacher counsellors.

Research and Development of Indigenous Resources

In response to the emerging need for indigenous resource materials in guidance and counselling, the National Institute of Education has stepped up research and development activities related to guidance and counselling to inform and enhance practice. Such R & D activities are carried out by academic staff of NIE as well as students in the M.A. in Applied Psychology programme. These efforts have resulted in several research reports on the career development of adolescents and career guidance in schools (Tan & Goh, 2002) and the launching of a comprehensive computer-assisted career guidance program known as JOBS (Jobs Orientation Backup System). Since its launch in 1992, JOBS has become very much part and parcel of career guidance activities in Singapore schools (Tan, 1995). JOBS is being renamed OSCAR (Orientation System for Careers) and is going on line in July

2004. Examples of other research studies look at the self-esteem of pupils with learning problems (Lee, 1999); the coping strategies of at-risk adolescents in schools (Ling, 2000); teachers' and students' perception of school discipline (Foong, 2000), the relationship between emotional intelligence and psychological well-being (Ng, 2001); bullying in school (Chua, 2001) and the effectiveness of using Reality Therapy techniques with at-risk students (Yeo, 2002).

In addition to the resource packages produced by the Psychological and Guidance Services Branch of the Ministry of Education mentioned earlier, counsellor educators have also published indigenous resource materials and reference books for the benefit of teacher counsellors. Some examples are *A Helping Hand* (Yeo, 1981); *Pupil Counselling* (Tan, 1983); *Handbook on Counselling* (Tan, 1984); Living with Stress (Yeo, 1990), *Counselling: a Problem-Solving Approach* (Yeo 1993) and *Counselling in Schools: Theories, Processes and Techniques* (Tan, 2004).

Conclusion

Guidance and counselling in Singapore schools has come a long way since its inception in the 1970s, both in terms of service delivery and the training of school counsellors. Grounded in the belief that nurturing the social and psychological well-being of students is just as important as challenging their minds and maximizing their intellectual potential, guidance and counselling in schools has moved from the remedial approach of pupil welfare in the past to the current developmental approach of pupil development and educating the whole person. This is definitely a move in the right direction in keeping with the philosophy of the ability-driven education which seeks to develop the full spectrum of talents and abilities in every child. In short, guidance and counselling in Singapore schools has finally come of age.

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Differentiated Supervision: Innovating in Supervision

Moo Swee Ngoh

"If teaching is to become more of a profession and teachers are to be empowered, then they must have more options for supervision."

Glatthorn, 1997

In today's changing educational landscape, increased emphasis is being given to teachers' continuous professional development. This is evident in one of MOE's latest initiatives, the Enhanced Performance Management System (EPMS) with its focus on teacher professional growth and improvement. Such an orientation recognizes the sea change taking place in economic and social organizations brought on by the exponential growth of knowledge, and technological advances, and the challenges these pose to all in the education enterprise.

In this state of constant flux, schools continue to have the task of preparing students for an uncertain future, one that defies prediction. It is now clear that the best way schools can enable their students to meet the challenges of tomorrow is equipping them for lifelong learning, not only with skills and attitudes for knowledge acquisition and management but also those for knowledge use, construction and innovation.

The knowledge base in almost every curriculum subject area and discipline is also constantly and rapidly growing. To cope with this and to ensure that their pedagogical content knowledge and skills required in the profession remain relevant, teachers have to be active learners who seek continuously to improve and to construct their own teaching knowledge. In addition, they are also are required to be innovative in their teaching as well as to facilitate innovation in their classrooms.

Schools therefore have to be organized for lifelong learning. They have to become vibrant learning communities with a culture which supports teacher growth and fosters colleagueship among teachers. However, there are many obstacles to achieving this goal, and one such is the annual ritual of evaluative classroom observation of teachers, often regarded by schools as an indispensable means of 'quality control', and one that is supposed to help bring about staff development.

Current practice of evaluative supervision

The current system has been in use with little change in Singapore schools for the last two decades or more. In brief, all teachers are observed in their classroom teaching at least once a year by their supervisor, using the clinical supervision approach. While it is mainly for appraisal and ranking, many will insist that it has a developmental purpose as well. No differentiation is made between competent and

incompetent teachers, and experienced or inexperienced.

Supervision as practiced is evaluative and directive. The main concern of the supervisor (who is often the reporting officer) is to help the teacher improve in his classroom teaching performance. Hence the focus during the lesson observation is on areas that need improving, and on ineffective teaching practices that need to be corrected. In the feedback conference the supervisor from the vantage point of a 'one-up' position in the school organizational hierarchy, and as an 'expert', tells the teacher what the problems are and gives the solutions. The teacher will sit passively while the supervisor exposes him to new ideas or tells him how he should improve.

Why a review is necessary

The annual evaluative supervision is meant to be a form of professional development in classroom instruction for teachers. The way it is implemented in many schools, however, may in fact stifle teacher growth. Some of the reasons why the one-size-fits-all model of evaluative supervision needs to be reviewed are:

- The current mode does not differentiate the teachers. It does not take into account the fact that the teachers are at different stages on a continuum of professional development, and they operate at different levels of thinking, ability, and effectiveness. Teachers also have different levels of commitment. As such their needs for developmental assistance vary. Effective supervision that fosters professional development ought to be differentiated and matched to teachers' developmental stages.

Such a model, which treats all teachers as if they are the same, fails to take into consideration one basic adult learning principle: that "adults bring an expansive reservoir of experience that can and should be tapped in the learning situation" (Glickman et al, 2004:63). The value of the competent veteran teachers has to be recognized, and their wealth of experiential inside knowledge about teaching tapped. These teachers do not need the directive clinical supervision. Instead they would benefit themselves and their colleagues more if they are allowed to engage in collaborative and cooperative development through peer observations and peer coaching. At the same time, this mode also fails to recognize that novices and under-performing teachers may require more intensive guidance than what is currently offered through the once-a-year observation.

- It is a deficit model. To many, the purpose of annual supervision is to 'fix' teachers who have problems in teaching, and this puts the process in a negative light. As Beach (2002) notes, such a deficit model of professional development "perceives teachers as implementers rather than developers and creators, and it contradicts the current view that teaching is a professional endeavor, not just a job".
- It encourages 'privatization' of teaching. Teachers often view the annual classroom observation as a perfunctory inspection exercise, and yet it causes much stress as it is invariably judgmental and evaluative. It is no wonder then that teachers do not welcome being observed when they are teaching since being observed is associated with being judged. The result is the 'privatizing of teaching' which, in the words of Palmer (1988) "not only keeps individuals from growing in their craft but fosters institutional incompetence as well" (pp. 141).
- Teachers are not encouraged to become self-directing, reflective practitioners which should be a focus of the supervision process. The thinking among teachers seems to be that they will be told how they perform, and what they should do to improve during the feedback session. In fact some may even regard this to be the supervisor's job as an evaluator. The 'teaching' and 'telling' mode often adopted by supervisors during the feedback conferences only helps to reinforce this perception.

Teachers today have to role model what they want their students to become –

active and independent learners. They cannot be passive in their own professional development. Instead they ought to be actively engaged and self-directing in constructing their own teaching knowledge, and making sense and giving meaning to their work as teachers.

- It does not encourage collaborative learning among teachers. Research says that professional development should be interactive and ongoing. When teachers teach in isolation their professional growth is impeded. As Palmer (1988) points out, "the growth of any craft depends on shared practice and honest dialogue among the people who do it" (pp. 144). The artificiality of the classroom observation and the dislocated involvement with an appraiser (the supervisor) will not help bring about a collaborative work culture which supports teacher growth.
- It does not encourage innovative teaching. The evaluative emphasis in classroom observation causes teachers to 'teach for appraisal' and to 'play it safe' by keeping to the tried and tested strategies and methods in classroom teaching. Since the appraisal is conducted annually (and even twice a year in some schools) there is neither space nor time for the teachers to try introducing innovative ways of teaching.

By definition innovation involves journeying into the unknown. It also involves experimenting, and the possibilities of failure are real even for the most conscientious and experienced teachers. They will need to be given the chance to learn from the mistakes and to improve. The current restrictive structure of annual evaluation does not allow for this. Innovation is also a group process which thrives on interaction. Without a collaborative culture, teachers teaching in isolation cannot be expected to be very successful as innovative practitioners.

As Beach and Reinhartz (2000) point out, supervision as inspection is a legacy that found justification in the production-oriented, social efficiency era but which is no longer viable in this innovation-driven age when teachers are expected to be change agents as well as

innovators. It is imperative for schools to create a culture that supports innovation and the growth of teachers, and to review the organizational structure to identify the barriers to teacher professional development. In the case of instructional supervision a paradigm shift is overdue. Supervision today ought to be differentiated and developmental, and should focus on encouraging teachers to become reflective practitioners and innovative knowledge workers.

Differentiated Instructional Supervision – a suggested framework

Staff development, for it to gain acceptance among teachers, must be seen not as a deficiency in teachers but rather as a need for people at work to grow and develop on the job.

Darling-Hammond, 1994

Goals:

While the ultimate goal of teacher professional development is always to improve the level of student achievements, the goals to be achieved with teachers through this framework are as follows:

- It is to enable teachers to be engaged in career-long learning and professional development. Teachers will be encouraged to become active, self-directed learners, reflective practitioners and innovative knowledge workers.
- It is to create a learning community with a collaborative work culture which will support teacher growth, collegial cooperation, and innovation in teaching.

Prerequisites:

- Teachers have to realize it is imperative that they learn continuously and grow as professionals in the ever changing environment that schools are having to operate in.
- Teachers will have to see themselves not as a repository of knowledge but a knowledge worker who role models knowledge acquisition, management, use, construction and innovation in their professional practice.
- Teachers need to have a 'good, but growing' perception of their own development: that is, they have to be aware first, of the strengths in their practice, and second, of the areas they need to improve on.

Rationale:

- All teachers ought to take responsibility for their own professional learning and development. It begins with constant reflections on one's own teaching beliefs and practice, and systematic, and objective self-checks and analyses of one's own teaching. Such processes should be encouraged and facilitated by the school.
- When teachers are willing to reflect on and evaluate their own teaching, it encourages professional dialogue and collegial sharing about teaching. This is a step towards the building of a professional learning community, and the creation of a culture that supports teacher growth and innovation.
- Teachers are at different stages on the professional development continuum, and they have varying levels of teaching competencies and commitment. Supervision, to be effective, has to be differentiated and matched to the teachers' developmental needs. It has also to take cognizance of adult learning principles. Chief among these are the adults' psychological need to be self-directing, and honoring the expansive reservoir of experience that adults bring.
- Supervision has to be a learning-centered process (vs teaching-telling-instructing). This is in line with the constructivist view of learning that emerged recently. This new perspective emphasizes the learner as an active 'constructor' or 'maker' of understanding and meaning. Teachers can no longer be a passive party to their own professional development. The supervision process ought to be one that encourages teachers to take an active, inquiring, and constructivist role.
- Teacher growth is enhanced in a learning community with a culture of collegiality, trust, and openness. Differentiated supervision helps to foster collegial cooperation and collaboration through processes such as peer observations and teacher mentoring. Such a positive environment will also be supportive of teacher innovations.

Processes:

1. **Systematic reflective practice and self-assessment for all teachers**

"Quality in an organization can only be achieved if all learn to evaluate their own work and are trusted to do so by management."

Glasser, 1992

- Practices to encourage reflection and self-assessment
  - journal writing
  - student surveys
  - self-checklists
  - video and audio-taping of own lessons for self analysis
  - submitting end-of-week lesson reviews instead of lesson plans
  - teaching portfolio

2. **Differentiated supervision: different strokes for different folks** (adapted from Glatthorn, 1997)

"the long term goal.. is teacher development toward a point which teachers, facilitated by supervisors, can assume full responsibility for instructional improvement"

Glickman et al, 2004:208

- **Directive approach:**
  - for novices and 'underperforming' teachers;
  - evaluative classroom observations at least once a semester;
  - supervisor plays the coaching role

- **Collaborative approach:**
  - for promising beginning teachers (at least 1 years' experience), other positive and performing teachers, and outstanding teachers;
  - peer observation, peer coaching, and teacher mentoring;
  - evaluative classroom observation once in two years;
  - supervisor facilitates and monitors collaboration among teachers

- **Non-directive approach:**
  - for teachers with consistent outstanding performance;
  - self-evaluation, peer observation, mentoring younger colleagues;
  - evaluative classroom observation once in three years;
  - supervisor plays a 'supporting' role

Support from Management:

School leaders play a pivotal role in the success of staff development programs. Some of the steps that school leaders can take to ensure success:

- Provide a supportive culture
- Ensure bottom-up involvement and top-down support
- Keep the program simple
- Provide the needed training (skills in peer observation, teacher mentoring, analyzing teaching etc)
- Arrange for the time needed and allow for flexibility in time use
- Allocate resources
- Give recognition for on-the-job professional development efforts (and not just those gained from external workshops and courses)

(adapted from Glatthorn, 1997:64)

Conclusion

Teacher professional development is fundamental to school improvement. Supervision through annual classroom observations has always been regarded as a way of helping to bring about professional growth in teachers. It is clear, however, that the traditional mode and practice is no longer viable in this age when teachers are to be knowledge producers, change agents, and innovators, while at the same time nurture the young and facilitate innovation in the classroom and school.

A paradigm shift needs to be made that views the supervision process as one which fosters teacher self-directed learning and supports collegial collaboration. All this is in line with the goals of the latest MOE initiative – the Enhanced Performance Management System – with its focus on teacher professional development.

A differentiated approach to supervision – which gives teachers options for growth – is an alternative.

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Reflection for Professionalism, Humanness and Hope

Hairon Salleh

Introduction

The word 'reflection' is not an uncommon word to many teachers and school leaders, but yet its value and potential is in my opinion often underestimated for understandable reasons. On the one hand, schools are such busy organisations providing an increasing gamut of activities for pupils that expecting educators to do quality reflection is considered a mockery or an offence. On the other hand, some educators rightfully observe that they are already practicing reflection on a daily basis in the midst of their professional practice, and thus frown at the suggestion that teachers are not reflecting enough. In this article, I wish to answer three questions. First, what is 'reflection'? Second, why 'reflect'? Third, how to participate in meaningful and powerful reflective practice?

What is Reflection?

Although reflection can simply be associated to thinking, contemplation or rumination, such associations may be over-simplistic and ignore other rich interpretations of the word. Just as teaching is not simply about conveying knowledge and having pupils complete their workbooks and worksheets, reflection goes beyond simply 'to think about something'. At the basic level, reflection is "a mental process which takes place out of the stream of action, looking forward or (usually) back to actions that have taken place" (Louden, 1991, p. 148).

Three key constituents of reflection can be observed from Louden's definition. Reflection has to do with *(1) thinking about (2) actions that (3) have taken place or about to take place*. For example, when a teacher plans for the coming week's lessons, he or she is engaged in reflection. He or she thinks back to the actions that had taken place in the past week, and make meaning from those actions. Both successful and failed, or positive and negative, experiences provide meaningful lessons for the teacher. These meaningful lessons, coupled with what is expected of the curriculum for the

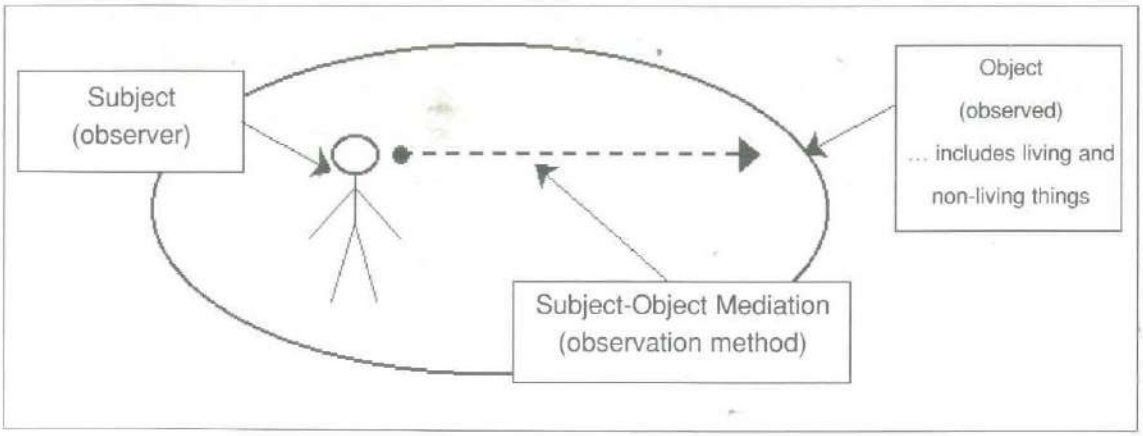

Diagram 1: Domains of Social Reality

coming week, would help him or her make plans for the coming week. Of course, the quality of this reflective routine varies from individual to individual and from one situation to another.

The quality of reflection is however dependent on the degree of 'criticality' within three domains of social reality: being critical of the object of observation; being critical of the method of observation (the subject-object mediation); and being critical of the subject of observation *(Diagram 1)*.

1. Being Critical of the Object of Observation

Being *critical of the object of observation* refers to being inquisitive and skeptical with what I observe – taking on a questioning stance to what I observe. The following case attempts to illustrate this.

During reflection, a teacher recalls an event that had taken place in class:

Teacher : Okay, that's very good Shankar. The boys scored 11 points. (A quiz as a trigger activity)

Pupils (Boys) : Yes! Yes!

Teacher : Right, let's now take out your workbook ...

James (pupil) : (Surprised) Uh? That's it, ah.

The teacher then asks the following questions:

- Why was James surprised?
- Was he surprised because he was expecting a longer quiz time? If so, why?
- Was he more disappointed than surprised that the fun time did not last for a longer time? If so, why?
- Was his unhappiness an expression of his unhappiness that his revenge on the girls was short-lived?
- Perhaps, the turn of event was too sudden, and James was denied time to celebrate their victory.

2. Being Critical of the Method of Observation

Being *critical of the method of observation (subject-object mediation)* refers to being inquisitive and skeptical of the way the observer makes observations. The following questions are examples:

- Is my observation only one interpretation out of a variety of others?
- Did I miss out other cues that James exhibited before and after this incident?
- Did I miss out other pupils in my observation?
- How would an interview with James or other boys help me understand the situation better?
- How different would the opinion of girls be in contrast to boys?

3. Being Critical of the Subject of Observation

Being *critical of the subject of observation* refers to being inquisitive and skeptical with the observer – in other words, being self-critical. The following questions are examples:

- Am I reading too much into the situation?
- What personal assumptions and beliefs have affected my judgement of this situation?
- Do I have any prejudice against or favouritism with James, or the boys in general?
- Do my past experiences with James have any impact in my interpretation of his action?
- Is my assumption that quizzes increase pupils' motivation accurate?

From the above illustration, the quality of reflection is influenced by the extent and depth of criticality of social reality.

Besides attention to quality, the forms of reflection equally provide meaningful insight into the notion of reflection. In this regard, Louden (1991) provides four categories of reflection: introspection, replay and rehearsal, enquiry and spontaneity. The following summarizes these categories along with examples taken from my personal experiences as an educator (Table 1).

Both the quality and forms of reflection are useful tools for educators who are keen on being reflective practitioners. However, they

FORMS OF REFLECTION	DESCRIPTION	EXAMPLES
Introspection	Involves looking inwards and reconsidering one's thoughts and feelings.	At the end of a hectic and tiring week, a teacher reflectively questions, "Why do I feel disheartened and disenchanted about teaching?"
Replay and Rehearsal	Involves teachers' discourse (knowledge, understanding, or meaning) about events (actions) that had occurred or the possibility of future actions. It is close to Schon's reflection-on-action (Schon, 1983).	By end of the week, a teacher reflects on critical incidents of the past week, "Why was the class noisier when Kevin speaks in class?" (replay) or reflects on what will take place in the coming week, "Will the class be quieter if Kevin is denied of speaking freely?" (rehearsal)
Enquiry	Involves a deliberate movement between action and discourse about action – suggesting that reflection on discourse about actions ought to result in future changed actions.	Upon reflecting that the class was noisier when Kevin was given more opportunity to speak in class (discourse about action), the teacher decides to act, "This coming week I will minimise the opportunities for Kevin to speak freely so the class will be quieter." (action)
Spontaneity	Involves a tacit reflection which takes place within the stream of experience. It is close to Schon's reflection-in-action (Schon, 1983).	While teaching pupils on improper fractions, the teacher observes that the faces of half the class were expressionless, and thought, "Why are these faces expressionless? Bored? Too easy? Distracted?"

Note: Modified illustration of Louden's (1991) forms of reflection

Table 1: Forms of Reflection

only pertain to the technological aspect of reflection – in other words, the means to an end. Furthermore, too much emphasis on the means could result in the means becoming the end in itself. The next level of consciousness relating to reflection thus ought to focus on the purposes of reflection.

Why Reflect?

The focus of my presentation is on the purposes of reflection within the scope of the education profession, and thus relating it to the notion of 'professionalism'. Using three related characteristics of professionalism espoused by Bottery (1997) – competence, autonomy and altruism – reflection in my view serves three purposes:

1. To guard our professional knowledge base (competence)
2. To guard our humanness (autonomy)
3. To guard our calling (altruism)

1. Guarding our Professional Knowledge Base (Competence)

Although the word 'competence' or 'competencies' usually relates to educators' behavioural traits, actions or practices, it often neglects theories about teaching and learning or their professional knowledge base which in my view has a very significant influence over educators' practice. In this regard, I challenge the often-quoted phrase that *"structure drives behaviour"* because it under-values the human person and human consciousness. The

neglect of theories residing in the human consciousness or mind is however understandable as theories usually exist at the unconscious and abstract level, thus making their articulation very difficult.

In addition to this, the little emphasis placed on educators' professional knowledge base is also an unintended consequence of the increasing intensification of work in schools. Educators rightly perceive that they do not have the luxury of time to build up their professional knowledge base. In the worse case, educators may perceive that there is little need to establish a rigorous professional knowledge base because it takes place outside school and within the scope of in-service training, and that common sense knowledge is sufficient 'to get the job done'.

Notwithstanding the problems that have been presented, I propose that the importance of rigorous professional knowledge base cannot be emphasised enough. First, the quality of our professional practice depends on the quality of our professional knowledge base. Second, its unconscious existence does not mean its powerlessness. In contrary, our professional knowledge base is silently and powerfully influencing and directing our day-to-day decisions and practices. What follows is an illustration to give flesh to my argument.

Mrs Gow is the form teacher of Primary 5G and Miss Pow the form teacher of Primary 5P. Both classes are comparable in character – 40 pupils per class; mixed ability; EM2 stream; and equal number of boys and girls. However, the seating arrangements of both classes vary significantly. The tables and chairs of 5G are arranged in groups of 4 pupils sitting together and all groups are well spread out across the class, while 5P are arranged in rows of 4 where each row comprises of 5 pairs of pupils sitting back to back.

Mrs Gow prefers the groups of 4 because she believes that cooperative learning helps to boost the self-esteem of pupils through shared learning as opposed to competitive learning. In cooperative learning, pupils learn not only to work together and rely on each other, but also to recognise and respect each other's strengths and differences. In addition, Mrs Gow believes that pupils develop a greater sense of responsibility towards the group as a community. In terms of pedagogy, pupils will engage in a deeper level of thinking as knowledge is constructed through multiple views. Mrs Gow believes that helping pupils to become self-responsible will in the long-term add-value to not only their learning, but also test and examination scores.

Miss Pow preferred the rows of pairs as she believes that pupils will be better behaved; the completion of syllabus will not be slowed down; and the monitoring of pupils' work is easier in contrast to group work. She believes that getting pupils disciplined and engaged in their work would eventually help pupils to be prepared for tests and examinations. Miss Pow believes that pupils need to be closely monitored and controlled so that time spent in learning in the classroom is not wasted.

What I want to raise in the above illustration is that educators' assumptions, beliefs and theories about teaching and learning do have a powerful influence over day-to-day classroom practices. When an educator engages in reflection he or she questions the theories about teaching and learning to see if they match with practical realities. If they do not, refinements will be made to his or her theories. This process ensures that his or her professional knowledge base is continually being developed and refined. However, the rigour of this process is dependent on the quality of reflection.

2. Guarding our Humanness (Autonomy)

Autonomy in the context of professionalism is the educator's ability to make his or her own decision affecting his or her working conditions and outcomes. This privilege has been entrusted to the profession by the community based on the competence or expertise of the profession. The degree of autonomy is therefore dependent on the degree of trust given to the profession. Thus, it is not difficult to see that the degree of autonomy is also dependent on the degree of rigour that

educators uphold regarding their professional knowledge base.

In the context of philosophy, autonomy is closely related to the notion of consciousness. Paulo Freire (1972), a staunch believer in human freedom, maintained that while humans have capacity to be 'in the world' and 'with the world', animals only have the former. To be 'in the world' is to be conjoined with nature or our surroundings, which humans and animals are capable of doing. However, animals cannot be 'with the world' as they are unable to objectify the world. Animals live a life without time and are *"submerged in life with no possibility of emerging from it"* (p. 28).

Humans however can stand at a distance to objectify themselves and the world around. They have the power to be conscious of themselves and their surroundings, and thus to think about and transform their surroundings. The materialisation of this consciousness is however contingent on our ability to reflect upon our assumptions, beliefs and theories in relation to the world around us. Reflection is not only a necessity to be human, but also a way of living that has powerful impact upon the lives of others as well as our own.

3. Guarding our Calling (Altruism)

Altruism is the sense of calling and commitment to serve the community or society to reach a certain ideal that professionals hold on to regarding what a good life is. In the case of education the calling for educators could broadly be summed up as to develop each learner to his or her full potential in all aspects of life. This will inevitably vary from one context to another. Although most educators could vouch allegiance to this calling, it somehow loses its anchoring along the way for reasons that are often not looked at seriously.

One main reason for educators to jettison altruism in our professional practice is due to our coping mechanism in response to work demands which have been increasing in time.

ROUTINES	DESCRIPTION OF REFLECTIVE PRACTICE
Weekly Lesson Planning	Reflect on the experiences of the past one week, and write critical learning moments in a diary or a section in the record book *(10-15 mins)*.
Contact Time	Individually reflect on a particular topic or issue *(5 mins)*, and followed by verbal reflection with another teacher on the same issue or topic *(10 mins)*.
Departmental Meeting	Engage in collaborative reflection relating to the effectiveness of strategies that had been implemented for the past month *(20-30 mins)*, followed by a documentation of learning moments in the minutes of meeting *(15 mins)*.
Marking	At the completion of a marking assignment, immediately reflect key learning points relating to the marking. Record these learning points in a diary or marking notebook so as to help in the monitoring of pupils' progress *(10 mins)*.
Teaching	In the midst of classroom teaching, capture critical learning moments on sticky notes. For example, "Some pupils may not understand model drawings." These notes could be stuck onto the pages of a diary or record book *(1 min)*, and could be used for discussion during level meetings or weekly lesson planning.

Table 2: Examples of Reflection Routines

Our need for efficiency has at times remove time and space to think and talk about issues of equality of opportunities and fairness in our highly competitive education structure, or just the issue of quality per se. Basic survival has become educators' basic instinct.

With this backdrop, I see the excellent use of reflection to not only cope with, but also resolve the problems of ever increasing workload. Within a constantly changing education landscape that demands effective and efficient use of already strained resources, each educator must become strategic thinkers exercising professional judgement regarding how best to use resources in view of micro and macro goals of the organisation. Such professional judgement is however not based on instinct but careful critical reflection. It is within critical reflection that hope for the nurturing of educators' calling is found.

Conclusion

I conclude by challenging the assumption that doing reflection is another method that further demand time on educators – time to think and time to write down thoughts. My first assertion is that reflection is less a method of problem-solving than a way of life – to reflect is only human. This leads on to my second assertion that reflection should flow seamlessly in all our actions. There is a symbiotic relationship between reflecting and acting. The table below illustrates how educators, specifically teachers, could take advantage of current routines to engage in individual and/or collective reflection.

A cautionary note however needs to be made explicit with regard to the potential abuse of reflection. Practitioners cannot be imposed to do reflection as this would unintentionally contradict and clearly violate the purposes of reflection. Although time and space could be allocated for reflection, practitioners themselves need to recognise the value of it and themselves make strategic decisions to engage in reflective practice. Attempts at imposing practitioners to engage in reflection would result in effectively transforming it into a disempowering and dehumanising tool.

Yet another form of abuse is to use reflection in a limited way – that is, to solely solve problems such as "How to help my students pass Mathematics?" In this regard, and in support of Habermas' notion of 'knowledge-constitutive interests' (1972), I propose that reflection adopts the stance of not only to technically control the environment to meet basic needs, but also to gain mutual understanding of people, and to free oneself and others from forces of domination. Hence, asking oneself, "How to help my students pass Mathematics?" also requires asking "What is it I need to know about my students to help them pass Mathematics?" and "What disenabling conditions need to be removed and enabling conditions to be put in place in order to help my students pass Mathematics?"

My third and last assertion is that within reflection resides the imaginary hope for the transformation of a better world. If no one in the past had imagined that humans could fly like birds in the air, we would not have invented airplanes. Likewise, educators cannot collapse to current pressure of demands and give up imagining or envisioning a better society through better education, and learning and working condition.

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Reflections from Teaching Secondary Mathematics Experience

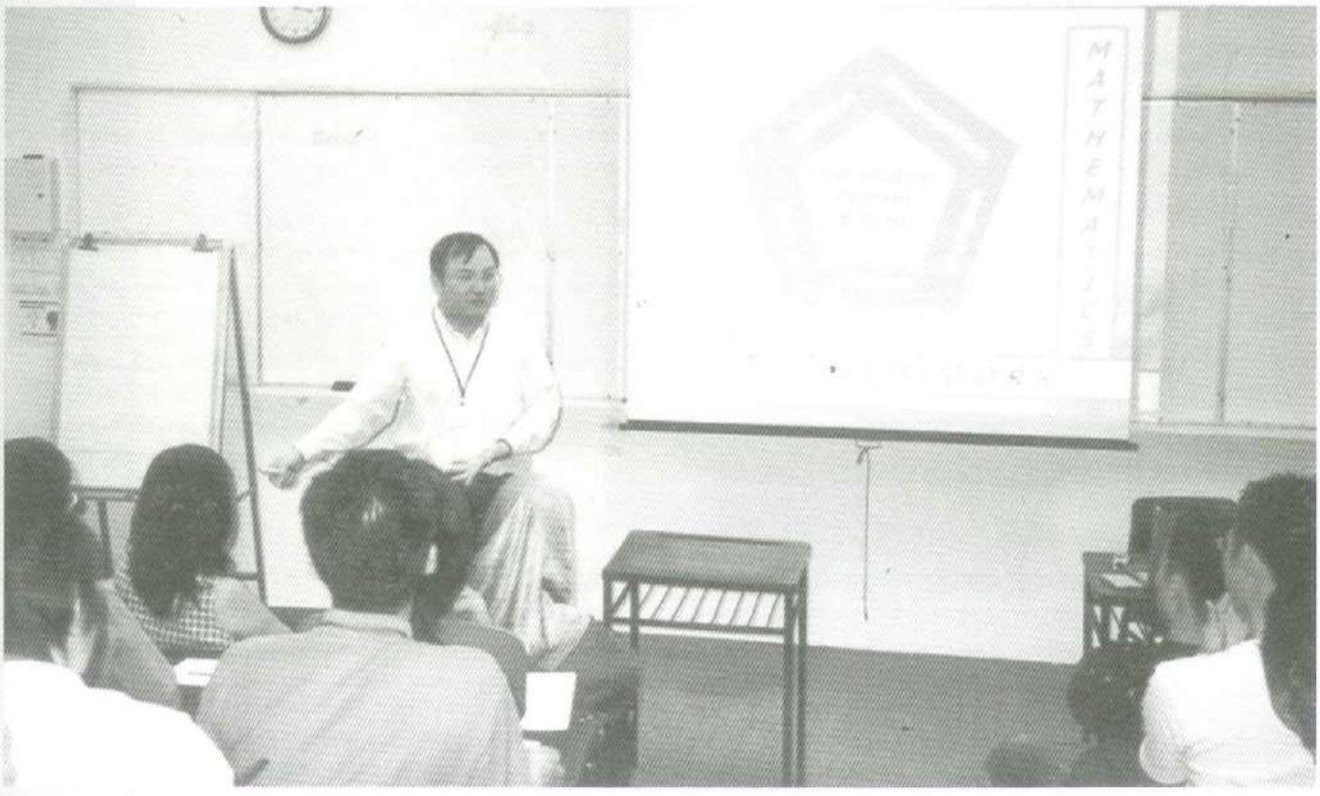
Joseph Yeo Kai Kow

Initial Reflection

Learning occurs when an individual reflects on his or her experiences. As classroom mathematics teacher in the 1990s, I found the experience utterly overwhelming. For many years, I had taught mathematics to secondary school pupils. I reflected the lessons and jotted down any crucial incidents in my notebook. When a day went well, I left the classroom with my heart singing and cheerfully made an effort to remember about all that had happened. On the other hand, when a day was unpleasant, I left feeling lousy, discouraged, perplexed and miserable. Unpleasant days could happen for numerous reasons. At times, a lesson that I thought was well planned, interesting, challenging and proper resulted in confusion, boredom or even worse turmoil. In other occasions, the class was particularly rowdy or out of tune with each other for numerous reasons, including that one pupil was disturbed and everyone was affected. On those days, I mused on events happening in the classroom and wondered if the effort was worth it.

When I write about my thoughts and ideas, I am engaging in an internal dialogue as I try to express in my own words how the experience or ideas is applied to my own reality. Writing as a tool for reflecting helps me to organize my thoughts about issues related to the teaching of mathematics. Writing also creates an opportunity for me to look back at my thoughts and reflect on my growth. I tend to ask the following questions as I reflect:

- What have I done?
- What does this mean to me?
- How do I come to accept these opinions and practices? Are there any reasons?
- How can I do these things differently?
- Are there any theories supported my responses and strategies?



- Do I perceive differences between my practices in the classroom and my opinions?
- How do I reconcile the differences between my opinions, classroom practices and external demands?

Reflections from my Classroom Experience.

Establishing the structure for classroom learning at the beginning of the school year has a real payoff.

I used the first week to assist pupils understand what it means to solve mathematical problems in my lesson. Actually, I spent three weeks assisting them learn and understand my expectations in several areas: (a) the procedures in completing their mathematics homework, including which exercise book to do their homework and when to hand in their homework and a system of filing their handouts; (b) focus on solving problems and explain their thinking in all situations; (c) the significance of solving non standard problems and perverse even if they had great difficulty; (d) how to work individually, with a partner and in small groups; (e) nominated a mathematics representative to perform any administrative duties such as purchasing materials that were required for the lessons.

Examining the scheme of work for planning and provide handouts for productive learning.

Each mathematics topic last from two to four weeks, I was able to teach 10 to 14 topics each year. Preparing 10 to 14 topics meant many big planning times for me. Each of the topic included whole-class lessons; a menus of independent activities, some for pair work and some for individuals, assessments and homework assignments.

Providing different challenges for mathematically competent pupils stretch them to their fullest potiential.

When working on independent activities, high ability pupils can select what they want to explore and the amount of time they spend on each activity. I have always believed that it is crucial to provide choices in and control over their learning. A menu of independent activities allows me to do so. Also when pupils are working independently – individually or cooperatively – I am able to monitor and meet their needs that were related specifically to them and their particular work.

Homework can be a useful vehicle to inform parents about their child's mathematics learning.

With a set of assignments complied for the year, I sent home a "Mathematics Homework" note to inform the parents about the purpose of the assignments and suggested how they might participate. I made approximately one home assignment each week. Feedback from the parents was positive. During the yearly Parent-Teacher meeting, some parents expressed that the problems assigned were challenging and they enjoyed solving the problem together with their children.

It is possible to emphasis pupils'attention on basic facts and formulae. At the same time, maintain an emphasis on problem solving.

Knowing the basic facts and formulae is essential for secondary pupils as it allows them to be more flexible with their mathematics estimates and manipulations. However, I do not want to promote rote learning but rather incorporate appropriate activities which promote the development of conceptual understanding. It is pertinent to teach strategies to enable then to deal with abstract mathematical concepts and to see various possibilities and alternatives in tackling mathematical problems.

Modelling for pupils how to represent their thinking concretely and symbolically in a variety of ways assists pupils to learn how to communicate their thinking mathematically.

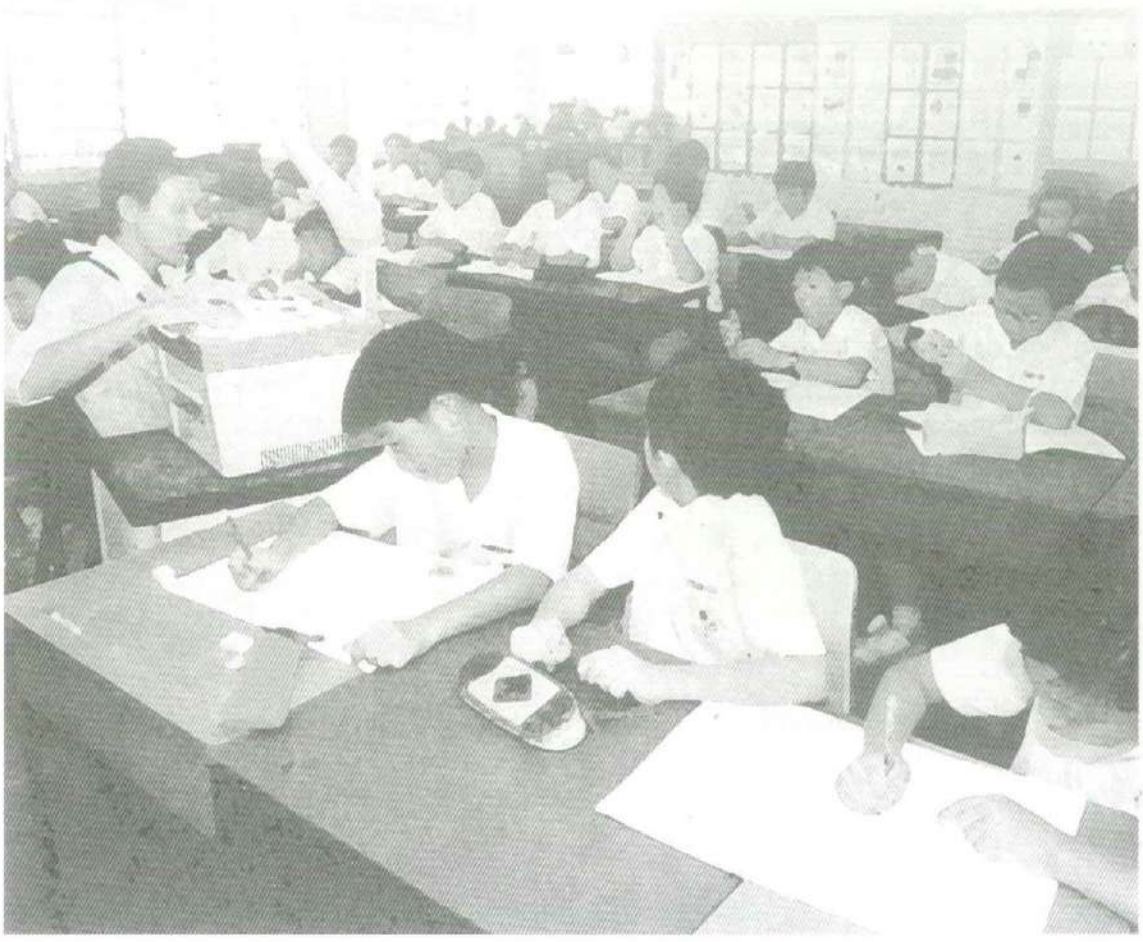
In the discussion of the problem "Find two numbers whose sum is 67 and whose difference is 3", John offered to draw two bar diagrams with first longer bar representing the bigger number and shorter bar representing the smaller number. He further extended the shorter bar to make it the same length as the longer bar. He pointed out that longer bar

represented one part. Two parts will represent 67 + 3 =70 and hence one longer bar will be 35 which was the answer for the bigger number. Peter had a different idea. He said that he could make a guess of the two numbers such that the difference is 3 and then check if the sum of the two numbers is 67. To ensure that the difference between the two numbers is 3, Peter began with the number 0 and 3. In this case, the difference is 3 but the sum is not equal to 67. Peter made another guess of two numbers. Peter repeated the process for three times to get the answer. He called this method trial and error. I then said to the class that Peter's approach of solving the problem was termed as 'guess-and-check' which required it to guess a number and then to check whether the constraint was satisfied and John's approach was using diagrams and using bars to represent number which was a semi concrete representation. Although the standard strategy of solving this type problem is to transform the problem statements into two algebraic equations, pupils should also be encouraged to use varied strategies to solve problems and to seek alternative solutions to problems.

Modelling effective use of worked examples assisted pupils to recognise underlying similarities between problems

When I first began to use worked examples as a teaching tool, many of my pupils had difficulty using them effectively. It was obvious that many perceived mathematics as merely solving a series of problems with little attention for conceptual understanding. Although I instructed the pupils to spend time examining each example until they understood it, pupils often ignored the examples that were given and went straight to the practice problems that were assigned, even when they did not understand how to tackle the problems. If they did not know how to solve a problem instantly, many would skip it or rely on me for guidance.

As one of my aims in using worked examples was to assist pupils to be more independent learners and relied less on me and more on themselves, I found it useful in the beginning of the year to model a strategy for using worked examples. To show such a strategy, a worked example was followed by a similar problem or two were placed on the overhead projector or



the whiteboard. I asked the class to (1) study the example for understanding in a step-by-step manner; (2) make some points about what was shown in the example, for instance, "Now I understand . A linear equation is formulated"; (3) go on to the practice problem when the example was understood, referring back to the example when necessary; and (4) check the final answer in the practice problem, relating it back to the example if necessary. Not all pupils would always use this approach but it provided some steps for the pupils to begin.

Probing for more ideas and further reasoning, learning to allow wait time for pupils to collect their thoughts and giving pupils many opportunities to verbalise their thinking are techniques that support learning.

When asked the pupils to think about one particular fact, like "$(a + b)^2$", each time a pupil offered the result, I would ask if anyone had another idea. Pupils would think of interpreting the expression both algebraically and geometrically. I would provide some prompts if they were any difficulties along the way. Then I would wait. I made a deliberate effort to learn to talk less in the class and have the pupils talk more. The payoff had been great. Pupils soon learned that I would wait for their responses. When pupils gave an answer, I would be sure to ask them for an explanation and then follow with the same question: "Does anyone have another idea?"

Taking the time to encourage pupils to write in mathematics class enable them to construct new knowledge and to clarify their understanding.

I have long been convinced that writing could give pupils an opportunity to clarify their understanding of a concept or topic. I have seen evidence of how writing has pressed pupils to organized and clarify their thoughts. In addition, writing offers an excellent way to assist pupils to create new knowledge by reflecting on previously learned mathematics and linking it to the new information. Writing is a general life skill that all pupils must learn and I believe that writing ought to be integral to all of pupils' learning including their mathematics learning.

Although I had learnt the basic of getting the pupils to write, I found some pupils reluctant to write during mathematics class. They have the belief that mathematics class involves only solving problems. It can be quite discouraging. I decided to create writing prompts to solicit their written response. Though their write up may be brief, it enables me to assess the level of understanding and identify any inaccuracies.

Some Parting Thoughts

No matter how skillful I am as a mathematics educator and how deeply I understand the process of learning, I know that the many variables in teaching make the job extraordinarily difficult. Becoming a better mathematics teacher is not a straightforward endeavour. Collaborating, reflecting and revising programmes can assist teachers to think smarter about teaching and minimize the negative effects of the tension inherent in becoming a better mathematics teacher. From the pupils' perspective, I need to consider the impact I have on the pupils' education. I must passionately believed in the innate and latent qualities of pupils, no matter how unpromising they may have seemed. Look at each pupil as an individual who is capable and willing to learn. Create an atmosphere where the pupils are encouraged to ask questions, not made them feel stupid. Be patient and remind myself that the pupils are not experts. If they were, they would not be in my mathematics class. Becoming a mathematics teacher is more than classroom teaching. In short, I would want to be a mathematics teacher who through my words and actions says, "I care".

In this article, I have tried to make my beliefs accessible and useful to others by identifying what I experienced. I feel more analytical and less emotional but still deeply committed to growing as a mathematics educator and searching for ways to support and improve pupils' learning.

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THE CHANGES

The old

- Lists of the top 50 Express stream schools and top 40 normal stream schools were drawn up. For both lists, the schools where ranked according to how well their students performed in the O levels.
- To get this ranking, say, for the Express Stream schools, where students complete their secondary education in four years, the youngsters' scores for their first language and best five subjects were added up and divided by the total number of students to derive the school's average score, right down to the decimal point.
- The ranking introduced in 1992 lead to rumblings that it made schools even more examination-oriented and led to teachers, students and parents fretting over a school's exact position on the list and whether it moves up or down from year to year.
- The School Excellence Model – under which schools can win awards for developing their students in non-academic areas – was introduced in 1999, but the awards were not included in the ranking tables.

The new

- The ranking tables have been renamed the School Achievement Tables this year. Schools are still ranked according to their students' performance in the O levels, but instead of using the exact academic score, schools are banded according to groups with similar results.
- The new tables also display, just as prominently, how many awards the schools have won in value-added academic areas as well as non-academic fields, such as the arts and sports.
- The schools offering the integrated programmes are left out of the academic ranking list, as their students do not do the O levels and move straight on to the A levels or the equivalent.

The reason

- The new School Achievement Table send the strongest signal yet the academic excellence is no longer the sole measure of success. More importantly, they transform the closely watched annual list into a tool to develop all-round education.

The old

- Only independent schools and autonomous schools could use other criteria besides the PSLE results to admit Secondary 1 students. Independent schools could admit up to 10 per cent of their intake using these criteria and autonomous schools up to 5 per cent.
- Students admitted using such criteria had to have scores no lower than 10 points below the school's PSLE cut-off.
- Students who were admitted based on other criteria were taken in only after most of the places have been given to those students accepted on their PSLE scores.

.The new

- Students taken in on other criteria no longer have to have PSLE scores that are no lower than 10 points below the school's cut-off.
- Independent schools can enrol up to 20 per cent of their Secondary 1 intake using discretionary criteria in 2006; autonomous schools can do so for up to 10 per cent of their intake.
- By 2006, mainstream secondary schools can admit up to 5 per cent of their Secondary 1 intake who do not meet their PSLE cut-off but can help the school develop their niche areas, subject to the Ministry of Education's approval.
- Schools can take in youngsters using discretionary criteria before the PSLE results are released.

The reason

- To give schools more flexibility in admitting students and to recognise children with a range of abilities beyond examination results.

The old

- Students had to do the GCE O levels before going on to the A levels.

The new

- Students in the integrated programme offered in a handful of schools can skip the O levels. They can do a six-year programme starting at Secondary 1 or a four-year scheme starting from Secondary 3. Some schools offer both.

School offering six-year programmes:

- Anglo-Chinese School (Independent) and Dunman High, where students stay all six years in the same school
- Raffles Institution and Raffles Girls', whose students go to Raffles Junior College in the fifth year
- Chinese High and Nanyang Girls' High, whose students join Hwa Chong JC in the fifth year

Schools with four-year programmes:

- Anglo-Chinese School (Independent), Dunman High, Raffles Institution, Raffles Girls', Chinese High and Nanyang Girls' High
- Unlike at other schools, IP students at ACS (I) take the International Baccalaureate diploma which is equivalent to the A levels

The gifted programme:

- The Ministry of Education will still offer its four-year Gifted Education Programme (GEP), leading up to the O levels, in three schools: ACS (I), Dunman High and Victoria School. This programme is an extension of the primary school GEP, from Primary 4 to 6, which was started in 1984 and seeks to stretch the intellect and creativity of the intellectually gifted identified through aptitude tests.
- Integrated programme schools also have their own six-year gifted education programme, not run by the ministry.

The reasons

- Instead of slogging for the O levels, students can have time to develop their " intellectual curiosity" and try things outside the syllabus, like field trips, camps and attachment programmes to universities and companies.
- This allows them to experience a broad-based education, and equips them with the skills to deal with the solve real-world problems.

THE CHANGES

The old

Normal (Technical) students:

- About 15 per cent (7,000) of all students enter Secondary 1 enter this stream.
- Students in this stream are prepared for a technical-vocational education with he Institute of Technical Education.
- Their core subjects are English, mother tongue, mathematics and computer applications. Compared to other streams, they take simpler examinations geared to test their fundamentals.
- At the end of their fourth year, they take the N-level examinations.
- If they do well enough in Secondary 1 or 4, they can transfer to Normal (Academic) stream to do Secondary 2 or 5 respectively.

Normal (Academic) students:

- The Normal (Academic) stream allows students to take O levels in five years. Compared to the Normal (Technical) stream, subjects are done at a higher level but at a slower pace then that of Express stream students.
- There are about 50,000 of these students in secondary schools this year.
- After Secondary 4, students sit for the N-level examinations and then O Levels at the end of their fifth year if they do well enough.
- These students can take either mathematics or mother tongue or both as O-level subjects if they do well and sit for these papers at the end of Secondary 4.

Express and Special stream students:

- Students in these streams take the O-level examinations at the end of four years. They use their score in one language and their five best subjects to enter polytechnic or junior college.

The new

Normal (Technical) students:

- Students can cross over to the Normal (Academic) stream in any year if they perform well. But if they transfer after they have completed Secondary 2, they have to repeat that year in the Normal (Academic) stream. So a student who crosses over at the end of Secondary 3 has to repeat Secondary 3 in the academic stream.
- From 2006, students can offer a maximum of two Normal (Academic) subjects if their teachers believe they will be able to cope with the subjects. They can choose from the full range of subjects tackled in the academic stream, including literature and history, which are not offered at Normal (Technical) level.
- The syllabus for Normal (Technical) students will be revised by 2007 to involve more practice-oriented learning. This includes a choice of electives which schools are developing with the Institute of Technical Education and polytechnics to give them a grounding in their chosen line.

Normal (Academic) students:

- From 2006, students can choose to do subjects at O-level standard from a wider range that includes humanities, music and sciences, provided their school offers these subjects. They can take a maximum of two O-level subjects at the end of Secondary 4.

Express and Special stream students:

- Schools can offer students a choice of new O-level subjects.
- From 2007, Secondary 1 students can take a non-native mother tongue language – Chinese and Malay – as a third language. This means a student taking Chinese as a second language, for example, can now take Malay as a third language.

The reason

- The changes are part of an MOE plan to help students develop their strengths.

The old

- Students could earn up to eight CCA points for representing the school, combined schools or the nation.
- Students with a second co-curricular activity (CCA) received leadership and achievement points but not participation points — CCA points are needed for university admission.

The new

- Students can get up to two CCA points if the activities they suggest get the nod from their school. These suggestions can be a new CCA, an ad hoc activity or a one-off event requiring students to put in at least eight hours.
- Students' involvement in community-based organisations, such as the Residents' Committee Youth Club and Community Club's Youth Executive Committee, are recognised as a second CCA.
- Taking up a sport or game, or joining a uniformed group as a second CCA can earn a student up to two points.
- Up to nine CCA points can be awarded for representing the school, combined schools or the country.
- Adults can now volunteer to lead other CCAs besides uniformed groups.
- Funding for uniformed groups has been increased from $6 per member to $8.
- New uniformed group, the National Civil Defence Corps, to be rolled out in eight schools.

The reasons

- The CCA points system has been refined to encourage more students to take part in sports and rugged activities as there has been a drop in the number of them involved in these activities. The Education Ministry believes these activities help develop qualities like resilience and tenacity.
- By recognising activities started by students, the MOE hopes to get more students to take the initiative.
- The ministry wants to encourage students to work more with the community.

The old

- Students who are good in sports, arts or science and maths had to go to normal schools.

The new

- Setting up of specialist schools such as the Singapore Sports School, the National University of Singapore High School of Mathematics and Science (NUS High) and the Arts School.
- The sports school started this year, specialising in eight sports, such as track and field and badminton. It has about 140 students in Secondary 1 and 2. Students need to pass selection trials and show that they can complete the O levels within four or five years. After the O levels, students can move on to junior college or do a two-year sports science diploma course offered by the Auckland University of Technology.
- Students can also choose to skip the O levels and enter Republic Polytechnic after passing an entrance exam. Those who are national athletes can apply to the Nanyang Technological University (NTU) without O levels. NTU is looking to offer bridging courses for these students.
- NUS High starts next year with 125 Secondary 1 students and 125 Secondary 3 students. Students bypass the O levels and get the new NUS High School diploma, which is recognised by NUS and NTU, at the end of four or six years.
- The Arts School will open in 2007 and will take in 200 students a year from secondary 1. Students must qualify for the Express stream (that is be in the upper 60 per cent in the PSLE) to apply. Others will be admitted on a case-by-case basis. After six years students will take the International Baccalaureate (IB) diploma, equivalent to the A levels.

The reason

- Giving students more options and allowing them to specialise and excel in areas like sports or the arts.

Kindling Students' Interest in Life Sciences

Dr Ng Pak Tee

Introduction

"Life sciences" is the new buzzword in town. Singapore is going after it with the same steely single-mindedness with which it built electronics, engineering and chemicals into the "three pillars" of its manufacturing economy. Now the Singapore government has designated life sciences as the "fourth pillar". Manufacturing output in the biomedical sector grew by 3.2% to S$6.6 billion in 2002, according to the Economic Development Board (EDB), and will rise to S$12 billion by 2005. By 2010, the EDB estimates the industry will contribute at least 10% of Singapore's total manufacturing output (Saywell, 2003).

The pursuit of success in the life sciences is a global trend because this field offers a tremendous economic potential. Even countries like China are entering into the market in a big way. Barely three years old, the Beijing Genomics Institute has already emerged as a world leader - it stunned Western scientists by decoding the rice genome in a matter of months. In 2001, a Beijing team grew dog-bladder tissue on a mouse's back, a prelude to generating human tissue. In Changsha, a city in central China, researchers claimed to have cloned dozens of human embryos as sources of stem cells, which promised to rejuvenate failing organs – an apparent world first. Indeed, U.S. companies and universities may well find themselves in future seeking access to cutting-edge Chinese biotech in drugs, agriculture, and other fields, rather than the other way around (Stipp, 2002). In a cut-throat global economy, the Singapore government reasons that it cannot lag behind if the Singapore economy is to stay competitive.

The Singapore government is committing more than S$3 billion over the next five years to life sciences. It is offering incentives to attract companies to set up R&D centres here, investing in an array of projects, helping local start-ups and funding research institutes devoted to genome research, bio-informatics, bioengineering, nano-technology, molecular and cell biology, and cancer therapeutics. It is building Biopolis, a S$300-million city-within-a-city to house public research institutes, private R&D centres, companies and as many as 4,000 scientists (Saywell, 2003).

The government has brought in foreign talents such as Edison Liu, former director of clinical sciences at the National Cancer Institute in the U.S.; Alan Colman, a member of the team of scientists in Edinburgh who in 1996 created 'Dolly the sheep' and Yoshiaki Ito, former director of the Institute for Virus Research at the University of Kyoto. But one pressing issue is the shortage of home-grown scientists for the next decade at least. But how can schools in Singapore kindle students' interest in life sciences and encourage students to explore the possibilities in this field? This article now describes two case studies of how schools in Singapore have indeed done so.

"Project Scientist@Work" at Radin Mas Primary School

"Project Scientist@Work" was an innovation project undertaken by Mrs Yeow Lee Lin at Radin Mas Primary School as part of her course work for the Leaders in Education Programme (LEP) at the Singapore National Institute of Education from March to September 2002 (The LEP prepares a specially selected group of vice principals and Ministry of Education officers for school leadership, emphasising on knowledge creation and innovation). The aim of the project was to systematically equip Radin Mas pupils with a deeper understanding of the world of work in the area of life sciences and research, in an inquiry-based learning paradigm in a career guidance context, culminating in a website to operationalise the pupils' learning.

A group of 15 Primary 5 pupils attended talks and participated in visits to find out more about the world of work of research scientists. In particular, the pupils attended talks on life sciences by Dr Tham Foong Yee and scientific research by Dr Chia Tet Fatt (both Dr Tham and Dr Chia are professors at the National Institute of Education). The pupils also visited the National Cancer Centre and the West 3 Cluster Centre of Science & Technology. During the talks and the trips, the pupils drew up a list of questions relating to life sciences and research that they would like answered and sourced for answers to their questions. A sample of questions from the pupils:

- What is "Life Sciences"?
- How much time do you spend on research?
- What do you like about your job?
- Can you describe how you feel when your experiments fail?
- I wonder if I have enough knowledge about Life Sciences to become a scientist? If I do not, where and how can I gain more knowledge?
- Do scientists have time for recreation?

The activities created opportunities for pupils to have close encounters and develop a deeper understanding of the world of work in the area of life sciences and research, and thereby nurture an interest in life sciences in them, at a young age. Each pupil kept a journal that contained their reflections on their learning. Tapping on the school's strength in IT, a web site on the school's intranet was constructed to share the pupils' experience and learning with other pupils. Teachers, pupils and parents were able to access the website to learn more about life sciences and the career opportunities available in this area. The pupils also shared their learning during the Life Sciences Sharing Night. Parents of primary 5 pupils gave overwhelming support as 120 of them turned up at the sharing session. Professor Lee Sing Kong from NIE also gave a talk on life sciences to the parents.

Through a variety of activities during the project, the pupils learned how to seek information to better understand the work of research scientists. They learned how to turn the information sought into useful knowledge. They learned more about themselves, their aptitudes, personal qualities, aspirations and values. They also learned the particular parts of the working environment of a life scientist that matched their aptitude. A survey before and after the duration of the project, as well as the feedback and reflections of the pupils, indicated that an interest in life sciences has been kindled in the students.

"Kids Against Cancer" at Crescent Girls School

"Kids Against Cancer" was an innovation project undertaken by Mdm Shirleen Chee Yan Hoon as part of her course work for the Leaders in Education Programme (LEP) at the National Institute of Education from March to September 2002. This project aimed to help students from Crescent Girls School (CGS) to develop an understanding of cancer and thereby provide a source of support for cancer patients, while stimulating the interest of the students to further explore life sciences research and experiments

Anchored in experiential learning in which the students were attached to mentors (doctors) at the National Cancer Centre (NCC), the students created a "Kids Against Cancer" (KAC) Website and hence provided a brand new service to the local and global community. This was probably the first website in the world that was designed for kids, by kids to raise awareness of and support for cancer patients. This website was launched on 15 September 2002.

The collaboration between CGS and NCC involved different groups of CGS students working with different staff members of NCC. CGS students were divided into several groups:

- Specialist Life Sciences Group: participate in laboratory research work on cancer with doctors, surgeons and research scientists at NCC;
- IT Specialist Group: work with the students from the Specialist Life Sciences Group to encapsulate the content learnt through video journalism, cumulating in an interactive website (the KAC).

NCC's role was to provide opportunities for the CGS students to work alongside the staff members of NCC, who played the role of mentors, and vetted the accuracy of the content

that finally appeared in the web pages of the KAC. NCC hosted an Orientation Programme for the students and teachers in which the mission and philosophy of NCC was shared with the students, followed by a tour of the facilities and a meeting with the various mentors (doctors, researchers and IT specialists).

During the June 2002 holidays, these CGS students were attached to their NCC mentors. The students not only observed doctors at work but also participated in certain experiments and wrote experiment reports. This provided immense insights into the busy schedule of the doctors, the work of the nurses, and memorable encounters with different patients. The learning that the students experienced was wide ranging – from knowledge acquisition about cancer and its debilitating effects to empathizing with the patients the discomfort and pains they went through while undergoing tests and the emotional struggles of the patients.

Such authentic learning enabled the student to learn form the real world context. Students attended clinical and diagnostic sessions. The yields for the students extended far beyond what textbook learning could give as they interacted first hand with surgeons, researchers, nurses, patients and their loved ones; witnessed the struggles of patients in a variety of circumstances – from undergoing a scope test to receiving confirmation of their cancer-afflicted condition and others.

To create the website, students made use of a variety of hardware and software (like Dreamweaver, Photoshop and others) to accomplish their work. The website not only served CGS students but also the children who accessed the user-friendly website either because they or their loved ones might have been afflicted by cancer. In addition, anyone who required a simplified but accurate understanding of the disease, its treatments and cures, could do so through this interactive and informative website.

The students also recorded their reflections into journals, which provided insights into the issues that they grapple with and their thought-processes. The students reflected that they really empathised with the medical personnel, patients and their caregivers.

"they (the doctors) are brave people who operate and cure patients, despite the very stressful procedures and long hours they have to put in..."

"...I saw quite a number of patients who are no older than you and me...they can neither work nor study. To think there are students who are not willing to study and wasting their time in school. How much more fortunate can we get?"

Mdm Chee shared that the learning model in this project emphasised authentic learning and reflection on the part of the students instead of a prescription of learning points. The same learning model could be adopted for many areas in life sciences and research. The students got interested in life sciences not because they have read chapters from a textbook in a classroom but because they have experienced it. The school has indicated that it would continue to collaborate with NCC to enhance the KAC website and keep it updated. The school also had plans to continue such projects where students get a chance to participate in life sciences research and experiments in a real life context.

Conclusion

"Project Scientist@Work" engaged pupils in a primary school in career guidance activities relating to life sciences and research. "Kids Against Cancer" engaged students in a secondary school in authentic experiential learning in life sciences and research. In both projects, the students' interest in the field has been aroused. Both models of learning provide good references to other schools interested in getting their students enthusiastic about life sciences.

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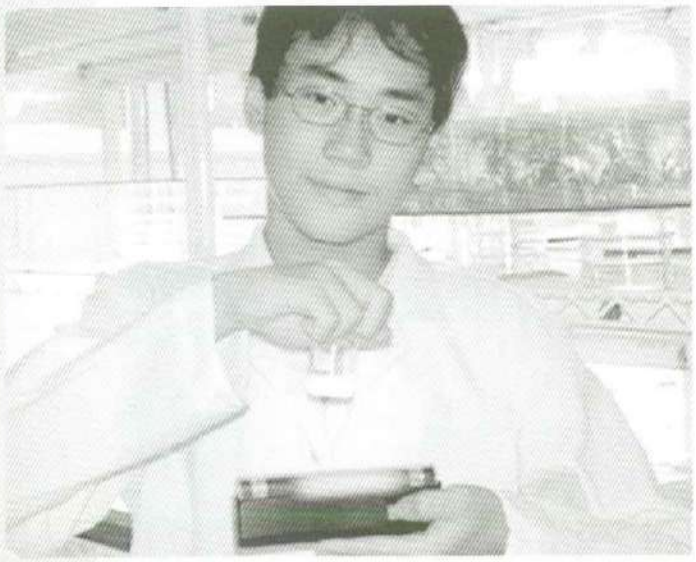
Life Sciences @ Dunman Secondary

Edelweis Neo

In 1999, the life-sciences cluster was selected by the Singapore government as the 4th pillar of Singapore's manufacturing sector.[1] Since then, much emphasis has been placed in promoting the life-sciences in Singapore. Singapore's $300 million biomedical hub in North Buona Vista, Biopolis, will provide at least 4,000 jobs in the industry.[2] The Genome Institute of Singapore (GIS) is recruiting up to 250 scientists to conduct genomic research in a highly collaborative environment.[3] The Temasek Life Sciences Laboratory (TLL), (a joint project by Temasek Holdings, NUS and NTU) is launching a global recruitment drive for world-class research scientists to build up its R&D capabilities.[4] It is acknowledged that generating and sustaining a strong interest in science, technology and biomedicine is crucial to building up the manpower resources Singapore acutely needs in the area.

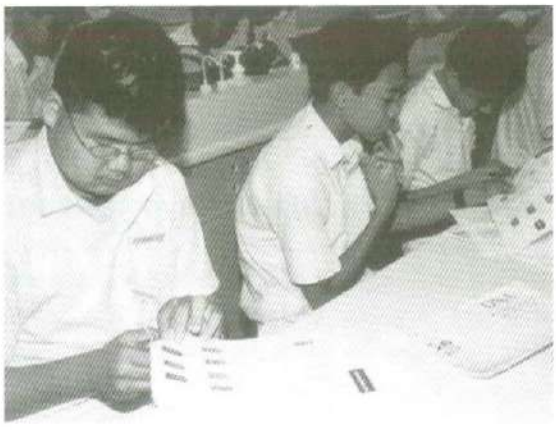
The Life Sciences Training and Research Centre at Dunman Secondary school was officially launched by Mr Mah Bow Tan, Minister for National Development on 6 April 2002. The centre is supported by the North East CDC. The mission of the Research centre is to play a supporting role in developing budding scientists to meet the manpower resources Singapore needs in the area of the life-sciences. Heading the programmes at the life-sciences research centre is Dr Dennis Yeo, a molecular geneticist with vast experience in US and Japan. He is assisted by the Dunman Life-Sciences Committee chaired by Ms Lim Guat Hong (Botany Hons, MSc). The centre focuses on molecular genetics and branches into pharmacology, microbiology and the biomedical field.

Since the set up of the centre, teachers and pupils from Dunman and many other schools have been engaged in a variety of training and research projects. All Secondary 2 Dunmanites undergo a 10 week training programme introducing them to the basics of molecular



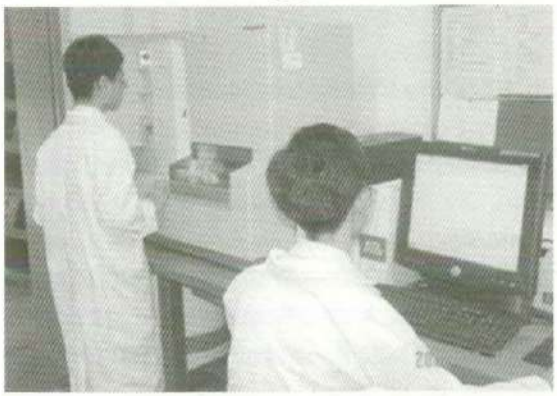
genetics. Pupils learn about the structure of DNA, extract DNA from fruits, prepare culture media and test for antibiotic resistant bacteria. They also learn to use the electrophoresis and micro-pipettes. Those with an interest in research and the life-sciences are provided with more advanced training including plasmid extraction, bacterial transformation and restriction digest. They are also exposed to polymerase chain reaction and the cloning of genes.

Active participation in specific research projects allow students to experience first hand the wonders of genetic engineering. In working on real DNA experiments, students and teachers encounter genuine research obstacles requiring both theory and practical skills. Learning is enhanced as pupils work in teams brainstorming and reflecting on skills and processes. Apart from engaging in research projects, these students facilitate in the exposure programmes for primary and secondary students from other schools.



In the short space of its existence, students at the centre have made two major achievements. A team of students comprising Dunman students and students on attachment from the Singapore Polytechnic have come up with a DNA extraction kit that is 20 to 30 times cheaper than that in the market. The centre holds monthly workshops at a small cost for teachers, parents and students on Human DNA Fingerprinting using the PCR technique and Thermal Cycler for DNA Analysis. Students from Dunman Secondary facilitate during these workshops.

Dunman pupils have come up with a Green Fluorescent Protein (GFP) that glows more than 10 times brighter than commercial ones. The GFP is a protein that glows under light blue/UV light stimulation. It has been used to transform rabbits, mice, bacteria and plants to make them glow under specific conditions. GFP plants of commercial interest are now being studied for the world floriculture market. Apart from producing transgenic fluorescent plants, we are modifying the GFP gene further to promote its use among schools as a low cost alternative for screening genes.



Our achievements have shown that students between the ages of 14 - 18 are eager to learn and cultivate their interest and expertise in molecular genetics. Through research work, students develop an enquiring mind as well as the tenacity and determination to persevere before a breakthrough is achieved.

The centre reaches out to other schools through its main training programme, the Genesis of the Life-Sciences Modules for teachers and students. Although the modules are copyrighted to Dunman Secondary School,

with permission all schools are allowed to duplicate materials produced by the centre for the purpose of teaching and learning.

The Genesis of Life Sciences Modules for teachers and students consist of five major modules. Modules 1, 2, and 3 run in order of sequence while Modules 4 and 5 are optional.

Programme Genesis Module 1
12 hours

Plasmids and Restriction Enzymes

- Plasmid DNA extraction and purification, quantification and detection, electrophoresis of plasmid DNA on agarose gels.
- Restriction enzymes of DNA based on recognition sequences, Sticky and Blunt Ends and Modifying Enzymes and RE Mapping.
- Bacterial culture and Media and Solution Preparations.

Module 1 equips teachers and students with the concepts of molecular biology from theory to practise based on plasmid DNA manipulations. These basic concepts and skills are applicable to all areas of life sciences research.

Programme Genesis Module 2
15 hours

Principles and Applications of polymerase chain reaction

- Components of PCR, cycling Reactions, Bacterial Transformation, Competent Cells, Heat Shock Treatment and determining Transformation Efficiency.
- Subcloning of Gene of Interests, Primer Designs and Calculating Annealing Temperature.

PCR is used in Human DNA fingerprinting, Forensic Science, Paternity Test Detection of certain Diseases and GM plants and animals.

Programme Genesis Module 3
10 hours

Principles of Protein Expressions

- Basic introduction to proteins as the driving force of the diverse range of biological functions in a cell. Induction, extraction and quantification of proteins, electrophoresis of proteins on SDS-PAGE and Native PAGE, and staining with coomasie blue.

Teachers can transmit to students knowledge on protein extractions and detection as they relate to food, medicines and other pharmaceutical applications.

Programme Genesis Module 4
12 hours

DNA sequencing and Bioinformatics

- Teachers and students learn to analyze the composition of DNA using high-end Capillary DNA sequencer, Detect mutations and analyze recombinant DNA.

Programme Genesis Module 5
18 hours

Southern and Western Blot

- Copy number and qualitative and genome mapping of DNA
- Principles of antibody and antigen, and the qualitative expressions of RNA and proteins

Participants learn about genomics and proteonomics as they relate to expressions, qualitative and quantitative detection commonly practised in the life sciences. DNA sequencing is the prerequisite to determining DNA mutations in diseases or any recombinant DNA and Proteins.

Teachers from Siglap, East Spring, Telok Kurau and Dunman attending Genesis Module 3

Research Projects

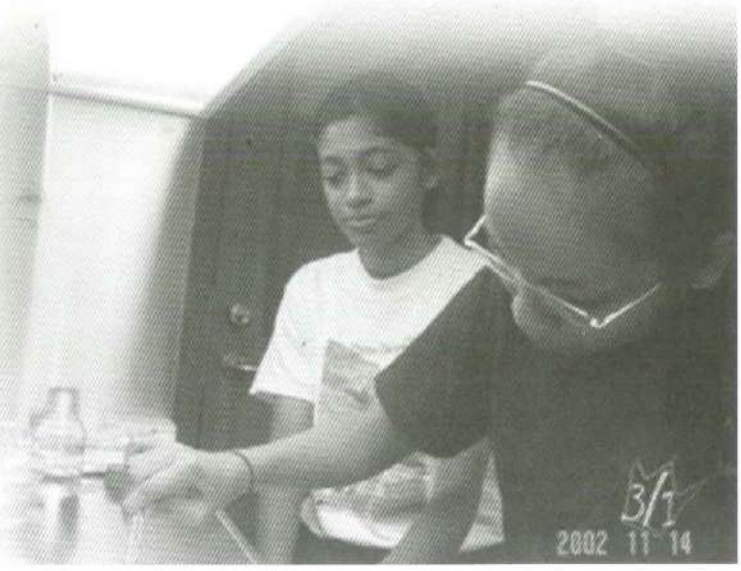
There are several ongoing research projects at the life sciences research center. A longer term project currently worked on by students is Project Petunia where pupils work on the regeneration and propagation of plants using hormones. Students from Dunman and Chai Chee Secondary are working together to clone transcriptional genes (eg Chalcone R gene) to make transgenic plants in any forms. Students are also working on recombinant GFP for transgenic petunia that glows.

Two very familiar faces at the centre are Lilah Bte Rahmat and Sameera Begum, students from Chai Chee Secondary who are studying the pure sciences. "We consider it an honour and a privilege to work at the centre under Dr Dennis Yeo. Our teacher has told us that we are to teach next year's batch of Secondary 3 students all that we have learnt. We hope to come up with a discovery that will bring pride to our school."

Students from Anglican High, Ping Yi Secondary, East Spring Secondary and Telok Kurau secondary are working on several projects such as the cloning and characterisation of terpenoids, analysis of Carotenoid Gene expression and the isolation and characterization of an aromatic gene for use in pharmaceutical and food industries. Several terpenoid genes are responsible for steroids, anti-inflammation, oils and wax, fish foods and anti-bacterial/anti-viral and antifungal pharmaceutical values while Carotenoid genes are responsible for color, anti-cancer and anti-oxidant and anti-aging properties, aromatic fragrance for cosmetic and food industry. An example of this sort of gene is the Chalcone R gene.

Students from Tampines Junior College working on the Heat Shock Protein Gene

Pupils from Tampines Junior College are Cloning the Heat Shock Protein Gene. Heat shock proteins are induced under stress response. Applications of HSPs in the medical sciences include myocardial and cytoprotection and molecular indicators prior to the onset of certain diseases. In the floriculture sciences, heat tolerant plants that are grown at high temperature create novel cutflowers from the temperate to the tropical conditions. Temasek Junior College students are looking into the metabolic Engineering of Squalene for use in building blocks of hormones and cholesterol and active suppression of tumour growths and lowering cholesterol.

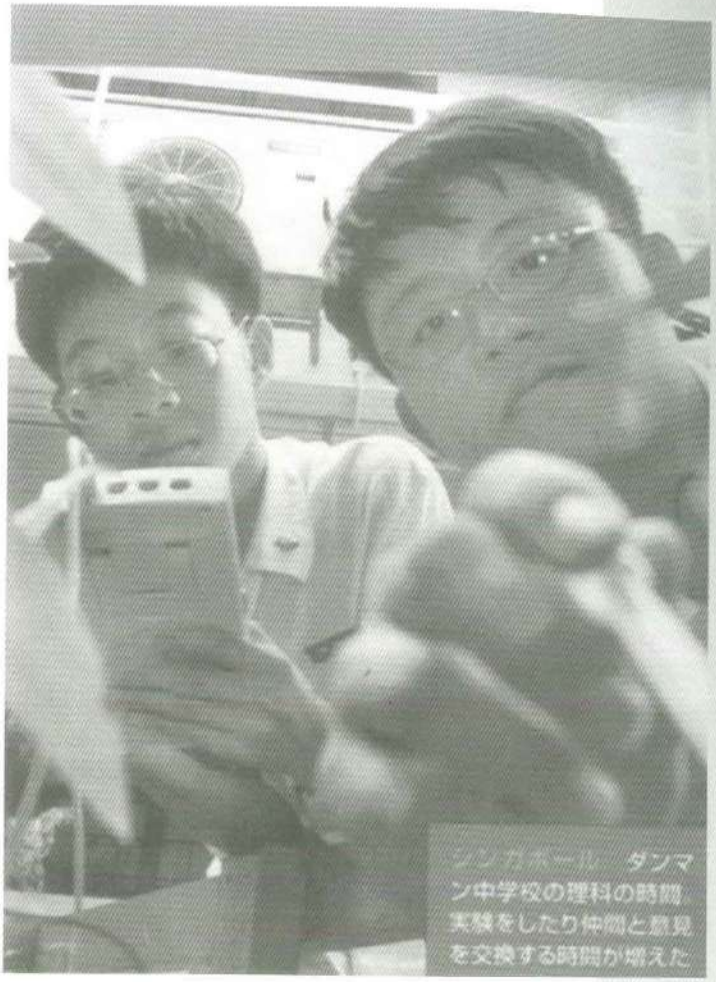


Chia Yihui from Singapore Polytechnic on attachment at the Centre

Dunman Secondary has an ongoing attachment programme with the Singapore Polytechnic. These students assist the Secondary and Junior College students with their research projects. Singapore Polytechnic has kindly waved the stipend due to these students. Dunman Secondary is currently working towards collaborating with Kandang Kerbau Hospital and Alexandra Hospital on projects related to areas such as diabetes. Pupils will have the opportunity to work on collaborative research projects on areas directly relevant to areas of need in Singapore.

Visitors from Chiba Prefecture, Japan

In the short space of its existence, the Centre has attracted much attention hosting visitors from many countries including Hong Kong, Japan, Thailand and Abu Dhabi. The school was recently featured in the October edition of Newsweek in Japan.



Dunman students in the Oct issue of Japan Newsweek

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Edelweis Neo *is Principal of Dunman Secondary School, Singapore*

Life Sciences in Junyuan Primary School

Shawn Goh

Nurturing young entrepreneurs

The pod turned brown and was snipped off. Relentlessly, the six Primary 5 pupils of Science Exploria Club from Junyuan Primary School started work on the next batch of the Vandas and Dendrobiums. "They had to learn new skills to overcome the challenges. They also had to refine their plans and make changes along the way to bring their innovation to fruition…. "Minister for Education Teo Chee Hean said during his speech at the "Citisuccess: Ideas in action' culmination event 18 Nov 2002 at Suntec City.

These young entrepreneurs were granted the Citisuccess grant to work on this orchid hybridisation project, hoping to create a new species of orchid and name it after their school; dreaming of the day the floral imprints of the hybrid they have created would appear on their files, bags, exercise books, pencil cases etc.

The ripe pods that are still intact on the parent plant are taken to the Clean Room of the Life Sciences Laboratory at the Science Exploria situated in East Spring Primary School. Here, the pupils would culture the seeds under aseptic conditions. The plantlets are grown under controlled light and temperature conditions. It would take the plants two years to flower and the characteristics to be identified and declared a breed of its own.

Life Sciences in Schools

One of the first steps the Ministry of Education took to enhance the learning of Life Sciences in schools from 2001 was the introduction of more life Sciences topics in the revised primary science syllabus.

CitiSuccess Grant of $4000 for the Orchid Hybridisation Project

Pollination.

This encompasses the study of cells; that a cell is a single unit of life. Examples of single cell organisms are the bacteria, yeasts and paramecium; pupils learn to identify the different parts of a plant and animal cell and to relate it to their parts.

The primary pupils would also for the first time examine cells under the microscope and to mount plant epidermal cells.

Pupils are also given the awareness that off springs take the characteristics of their parents, thus adult living things closely resemble their parents.

Physical support comes in the form of a Second Science Room for the schools to carry out Life Sciences activities and the provision of life Sciences equipment and materials. Schools are also made aware of Safety Laboratory Management and more Life Sciences training courses are made available to the teachers.

To further facilitate the implementation of the Life Sciences in the primary schools, the CPDD has produced one Life Sciences Guidebook comprising hands-on activities for the schools.

The Life Sciences programme at the Cluster Science Exploria

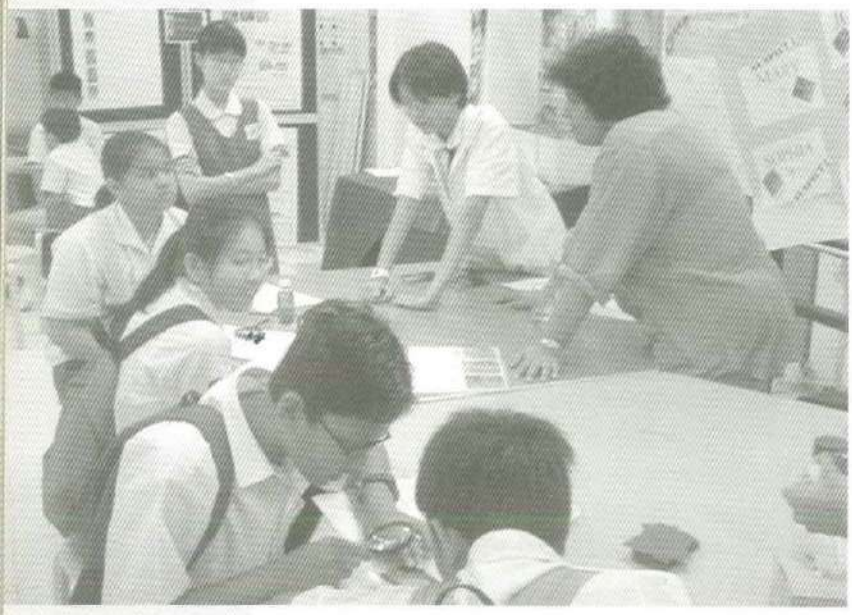
The Life Sciences programmes at the Science Exploria are aligned with the Life Sciences initiative established in 2000 by MOE to respond to the changing needs of sustaining global competitiveness and economic development in Singapore. Life Sciences is the fourth pillar of the Singapore economy.

The mission of the Cluster Science Exploria is to kindle a passion for Science and it leverages on the good rapport it has built with higher Institutions of learning and industry partners.

Life Sciences programmes at the Exploria provides the chance for the teachers to develop in students a new appreciation for Science and Learning. It provides cutting edge scientific frontiers presented in a meaningful and accessible way to many of the primary pupils of the 12 schools in School Cluster East 2 when is started end 2001 and into the year 2002.

The Guest-of-Honour at the Science Exploria Official Opening Ceremony – Mr Tharman Shanmugaratnam, Minister for Education.

Pupils have been provided with opportunities to learn the Plant Tissue Culture techniques. This technology has enabled scientists to understand how plant cells and tissues are able to regenerate into whole plants under controlled conditions. It forms the basis of plant genetic engineering where genetically modified plants with unique traits Eg virus and insect resistant traits, improved nutritional quality and new hybrids. These are important considerations in agriculture as there is rapid population increase, loss of arable land for cultivation, environmental pollution and severe weather changes.



Activity on lifting of finger-prints

The introduction of Plant Tissue Culture gives pupils the opportunity to learn more about plants and its applications to improve the quality of living for mankind; which is what life Sciences is about – for the betterment of mankind.

The plants cloned in the laboratory were the African Violet, Kalanchole, Boston Ferns, Sunflowers and some Orchids.

The application of technology in Science in everyday living is becoming a reality for the many of the primary pupils; and the art lies in the ability for the teachers to simplify the content to a level suitable for pupils to grasp.

Kalanchoe Culture

Pupils were able to do a profile of themselves based on genetically controlled traits such as tongue-rolling, curly hair, brown eyes etc. Pupils are introduced that chromosomes are strands of DNA with the ability to pass on vital information to the new generation of organisms.

The Exploria, in collaboration with the Health Sciences Authority, Criminalistic Laboratory Department, Changi Police Neighbourhood Post and the NTU/NIE, organised a CheMystery Trail for Primary 6 pupils to investigate a crime case that involved basic forensic Science concepts and investigations. Pupils lifted finger prints, identified fibres and carried out simple chemical analysis to solve the crime.

In the primary curriculum, pupils learn about micro-organisms such as the bacteria and yeasts. The Exploria provides hands-on activities for pupils to learn that micro-organisms are not all harmful; some are useful and are used in the food technology Eg How yeast cells ferment sugars to develop processes of bread making and wine. Pupils

Teacher Attachment Programme where teachers planned hands-on Life Science and other lessons

Camp Ole – Study of the light and temperature conditions at Lower Pierce

have a hands-on at bread baking and yoghurt in the laboratory.

Activities have been developed to show the different shapes of bacteria, compare the effect of different antibiotics on E-Coli, know about bacterial resistance to some antibiotics, and to give pupils an awareness of the correct usage of antibiotics, and the use and danger of genetic engineering.

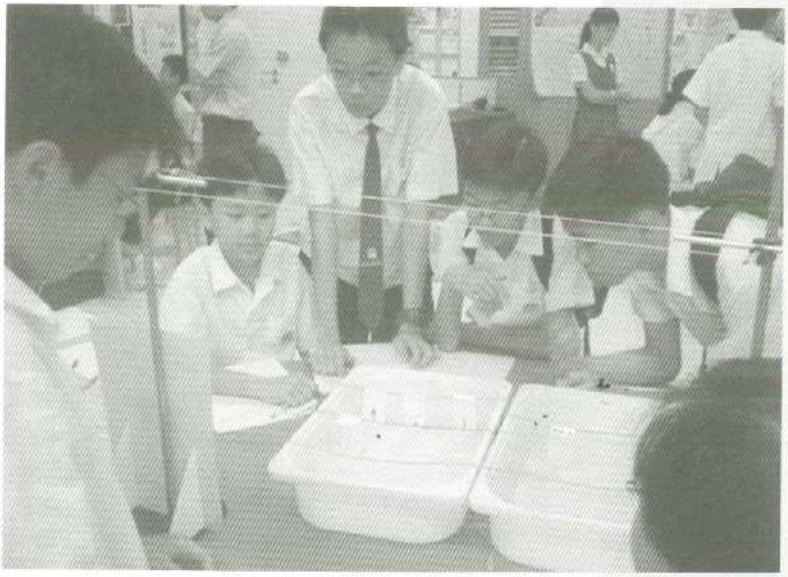
The introduction of the study of bacteria and antibiotics would enable our pupils to develop an appreciation for the Medical Sciences. Thus, they would be provided with a foundational understanding and appreciation of the breadth of biomedical sciences knowledge.

The Life Sciences programmes in the primary schools aim to support the long-term development of a highly-skilled talent pool by instilling interest at a very young age.

It aims to prepare our pupils, to spark their passion in this field as early as their formative years.

Pupils who are interested to specialise in the Life Sciences will be equipped with the skills and in-depth knowledge in the Life Sciences, and to apply their knowledge for the welfare of humanity and the environment.

The Ministry of Education has taken major steps to enhance the learning of the Life Sciences in the schools from year 2001, with the mission to equip the general student population with an appropriate level of the knowledge and skills to enable them to have an interest in and understanding so as to make decision with respect to themselves, country and environment.



'CheMystery' Trail

Mrs Shawn Goh *is Head of Department Science in Junyuan Primary School, Singapore.*

Budding Life Sciencers in Woodlands Ring Primary School

Tan Chuan Lim, Elaine Quek, Koor Siew Hwa

School Background

"Walking into Woodlands Ring Primary School (WRPS) is like entering a mini Science Centre ..." as commented by many visitors to the school. As the life sciences industry has become an important part of Singapore's economic landscape, the school believes that it is important to equip our pupils with the basic concepts and applications of the life sciences. The many innovative and interesting Life Sciences projects and activities introduced in the school serve to show that young primary school pupils are capable of taking on meaningful and challenging tasks as part of their learning journey. Through experiential learning in the school, our pupils are equipped with more in-depth knowledge and higher-order investigative skills in the Life Sciences. Through the many innovative programmes, we aim to deliver a holistic education to our pupils with emphasis on building intellectual capacity and fostering I & E spirit.

Innovative Projects

ALOHA (Active Learning through Orchid Hybridisation in Action) Project

Giving the students an early headstart of knowledge in Pollination Biology, Genetics of Breeding and Plant Tissue Culture is what the school envisages as she was the first primary school in Singapore to implement the innovative Orchid Hybridization Project in January 2000.

Our pupils had the privilege of starting this meaningful biological project which involves plant identification, taxonomy, pollination, genetics of breeding and simple techniques of aseptic tissue culture to create new orchid hybrids. The new hybrids created by our pupils can be named after them, the school, or any distinguished guests to the school.

The teachers and the committed pupils work together as a team in a cooperative learning environment to foster a strong team spirit to reach a common goal in the hybridization project. As such, pupils realise that learning can be fun, challenging and exciting. Participation in ALOHA project not only allows pupils to become more knowledgeable and creative, it also allows the cultivation of a greater strength of character and an aesthetic appreciation of nature as a new learning environment is provided to widen the pupils' experiences and maximize their potential. There is also a a strong focus on Singapore's history and the role and significance of orchids in our nation-building as ALOHA is integrated into National Education. Furthermore with the exposure gained through participation in exhibitions and interactions with the media like Channel Newsasia, Mediacorp, Newsteach unit from MOE, Lianhe Zaobao and The Straits Times, our pupils have also gained confidence and experience in public speaking.

An interactive CD-ROM was also designed by the teacher-in-charge to allow more pupils in the school to be exposed to orchid hybridization whereby pupils learn through e-

lessons which are complemented with teacher-designed worksheets. The ALOHA project is also incorporated in the curriculum for all the levels from Primary One to Six by teachers using these resources.

Our pupils and the teacher mentor were further challenged as they attained an award and fund of $2500.00 in May 2003 from the Citi-Ideas in Action, Citigroup Singapore to carry out an investigative research on the "Use of novel lipids for cross pollination and fertilisation in the creation of unusual orchid hybrids that cannot be achieved through normal means".

The project was a success as our pupils yielded their first blooms of new hybrids in November 2003.

Amaizing Project

Corns can be used to demonstrate simple Mendelian Genetics. Learning of difficult genetic concepts is thus made easy and meaningful. Growing of the corns by pupils themselves is one of the important processes in this project as they learn how to take care of plants and to harvest their own products.

The corn plant makes a very suitable study of common genetics theory. The multi-coloured corn ears harvested are used to demonstrate both genotypic and phenotypic ratio. By counting the phenotypes of corn grains resulting from various (monohybrid or dihybrid) crosses and comparing results to predict values, it gives the students a close approximation of the theoretical ratio, giving the students a convincing demonstration of Mendelian Genetics. At an advanced stage, the pupils will also learn about Population Genetics whereby the Hardy-Weinberg Law states that in any population, the gene frequencies from the F2 generation will remain constant on certain stated conditions.

In general, the pupils are able to map the genetic make-up of organisms by learning Mendelian Genetics through corns. The immense varieties of multi-coloured corn ears they harvest serves to show that each individual in any population is different and has its own unique characteristics. This introduces the topic of 'Diversity of Life' to our pupils which is an important component in Life Sciences. In addition, this colourful spectrum helps to attract the pupils, which will no doubt help to arouse interest and maintain motivation.

Life Sciences Package

This learning package comprises of a folder with the school's life sciences postcards, stickers, brochures, ALOHA CD-ROM and teacher-designed worksheets meant for the various learning niches. On top of these, there is also the Life Sciences Survivor Card which comprises of questions from all the Science learning niches. Pupils from Primary One to Six are thus able to carry out the various learning activities using the knowledge acquired at the various life sciences learning niches in the school. This is to encourage all pupils to visit the various interesting life sciences learning corners so as to arouse their interest in Science learning as well as to encourage self-exploratory study. Completing the survivor card thus helps them to consolidate the knowledge acquired and earn awards for themselves.

Creating a Learner-Centred Environment

Life Sciences Gallery

The Life Sciences Gallery was officially launched recently by Mrs Yu Sing Tong, Deputy Director/ Schools North. The gallery is lined with vivid murals, informative posters, comprehensive notes, realistic models and interactive activities to engage pupils in an environment that is conducive to learning in an interesting and fun manner. The Life Sciences Gallery is easily accessed by teachers and pupils. Teachers can make use of the murals, models and notes to conduct a lesson outside of class with pupils. Pupils have the opportunity to learn at their own pace and discover concepts in a meaningful and engaged manner. Pupils also have the opportunity to carry out hands-on activities. They are provided with worksheets to consolidate their learning. In addition, pupils can complete the Life Sciences Survivor card through the knowledge acquired.

Project WIN (Walk In Nature)

Pupils are able to embark on a learning journey of self-discovery as they take a walk through Project WIN and learn about the names and characteristics of the plants around them. Pupils encounter delightful experiences as their ramble takes them to the Avenue of Flowering Plants, Herbs and Spices Garden, Grove of Poisonous Plants, Cactus Garden and Trove of Medicinal Plants.

Life Sciences Koi Fantasy Pond

The Koi Fantasy Pond is an unique feature in the school as it incorporates both the waterfall and the aquarium concept. Pupils learn about the delicate balance in nature and the interdependent relationships between fauna and flora which need to co-exist harmoniously together. At the same time, pupils also derive pleasure from nature, simply by visiting the oasis and observing the graceful way kois swim.

Eco Haven and Eco Garden

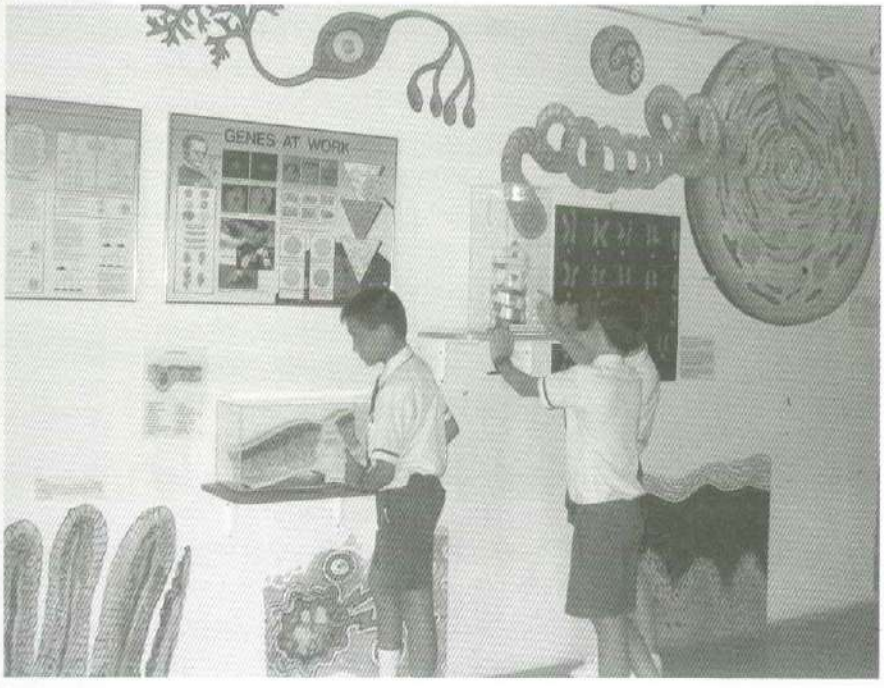
Pupils get transported into the world of nature as they spend their time here. Pupils learn to identify the different species of plants and animals as well as their inter-relationships within the community.

Tropical Rainforest Walkway

Pupils enjoy taking a walk through their very own tropical rainforest. The fascinating animals on the murals seem to come alive as they go on their nature ramble, enticed by the lush foliage and the sounds of birds and frogs. Indeed, a feast for the senses.

Life Sciences Laboratory and Tissue Culture Room

A state-of-the-art Life Sciences Laboratory and Tissue Culture Room were set up to stimulate and motivate pupils to develop an intrinsic interest in the area of Life Sciences. Pupils carry out Science research work and techniques here while teachers conduct interesting Science activities with them through experimentation. With this valuable hands-on laboratory experience and action research studies, pupils will be able to further their interest and expertise in life sciences research and investigative skills.



Science Spiral

The Science Spiral is the place where pupils visit to learn and enjoy themselves at the same

time. A good variety of Science learning aids are available to help them understand Science concepts effectively. A growing collection of videos from acclaimed stations like Discovery Channel and National Geographic are screened regularly for pupils' viewing pleasure. Even the steps are used to convey a myriad of Science concepts to our pupils.

Fern Paradise

Budding botanists develop a feel for nature as they spend many languid hours here, observing the various species of ferns and spores. The epiphytes planted on the rain trees to stimulate the natural system help pupils to appreciate the natural world around them.

Nurturing a spirit of I&E

Hybrids of ALOHA project can be promoted and sold both locally and overseas through the internet. The seedlings of hybrids can be placed in ornamental bottles with agar medium and then sold to interested parties to raise these seedlings. The flowers of hybrids can be preserved in acrylic and used as decorative ornaments and paper weights or they can also be gold or silver plated into accessories like brooches, collar pins, tie studs for sale.

Pupils can be trained in marketing and sales to promote and sell these products to fellow pupils, parents and the community. Proceeds from the sales can be channelled back into the ALOHA project or even help needy pupils or to start other new programmes.

Pupils' Reflections

"I love dealing with the unusual. It's fun putting two breeds together and coming up with something new and exotic."

– Khen Ting Wei

"The cross-pollinating of the corns is fun. We hold our breath before we peel open the leaves. You never know what you are going to get."

– Mandy Chan

"I'm sure the harvested corns will taste good and we can even sell them to supermarkets once we get a steady harvest."

– Muhd Shah

Teachers' Views

"The school is poised to take its niche area to greater height by establishing the Centre of Excellence for Life Sciences."

– Mrs Yeong-Tan Chuan Lim

"Both teachers and pupils are actively engaged in a culture dedicated to effective teaching and learning. Together, they are able to stay at the forefront of Life Sciences."

– Mrs Elaine Quek

Conclusion

At Woodlands Ring Primary School, we seek to further develop our pupils' interest in Life Sciences in line with emphasis on Life Sciences in Singapore, thereby providing our pupils with a platform to excel in Life Sciences. We believe that by laying a good foundation for our pupils, they will be able to soar to greater heights like an eagle in their pursuit for excellence and life long learning.

Tan Chuan Lim, Elaine Quek, Koor Siew Hwa *are teachers at Woodlands Ring Primary School, Singapore.*

THE CHANGES

Changes in JC Curriculum

The old

- Students are either in the arts or science stream.
- Some junior college science students take an arts subject, though the number is low.
- Subjects are studied at AO level (between A and O levels), A level, and S level (for exceptional students).

The new

- Students must take subjects outside their stream.
- Subjects are offered at three levels: H2 level is equivalent to A level; H1 to half the content of the H2 level, and H3, the most advanced level.
- H3 work can be in the form of independent research, undergraduate modules in university, or new Ministry of Education (MOE) modules.
- A new interdisciplinary subject will be introduced: Knowledge And Inquiry. It aims to stretch students' thinking, and may be taken in lieu of the General Paper.
- The new curriculum requirements are:
  1. Compulsory subjects:
     - Project Work and mother tongue at H1 level.
     - General Paper at H1 level or Knowledge And Inquiry at H2 level.
  2. Students must take at least four content-based subjects:
     - Three must be at H2 level.
     - At least one must be Knowledge And Inquiry or a subject from outside their stream and taken at H1 or H2 level.
  3. Better students can do five content-based subjects, three at H2 level and two at H1 level.
  4. Students with exceptional abilities in a subject may take it at H3 level.

The reason

- To provide a broader and more flexible education, with students getting a good grounding in both the sciences and the arts.

Changes in JC calendar

The old

- Two intakes at first-year junior college. The first, in January, uses students' O level preliminary exam results. The second, in April, uses the actual O-level results released in March.

The new

- Only one intake, in mid-March, from 2006
- A-level exams in the second year will begin about two weeks later than under the current calendar. This will ensure the total number of curriculum and school holiday weeks over the entire two-year JC calendar remains unchanged.

Why

- To remove the "churning" of students in April when many students switch JCs. This churning means that subjects have to be re-taught and students have to undergo school orientation again.

The old

- Students do GCE 0 levels at Secondary 4 and go on to spend two years in junior college to do A levels.

The new

- Under one model of the integrated programme, students can join a junior college at Secondary 3, skip 0 levels and go straight to A levels.
- Some schools also offer a six-year programme in which students do not sit for O level exams and go straight to A levels, starting at Secondary 1.
- Schools that offer only the four-year programme are National Junior College, Victoria Junior College and Temasek Junior College.
- NJC started its programme this year, while Victoria and Temasek will do so next year.
- Secondary 3 students get to interact with junior college students during co-curricular activities and other mass school events.

The reason

- So students can have time to develop their "intellectual curiosity" and try things outside the syllabus.

The old

- Assessment by examinations only.

The new

- Project Work introduced as an A-level subject last year.
- Students work together to tackle an issue, such as identifying a trend and predicting how it will evolve. They are graded on an oral presentation, a written report of up to 2,500 words and how they attack the problem.
- The subject accounts for 10 per cent of admission criteria for entry to local universities.
- The subject will be fine-tuned next year. Students will need to hand in less paperwork so they can focus on research and discussion. Assessment criteria will also be cut down from 16 to 10 to give teachers more flexibility in grading. Students will also have more choice of topics.

The reason

- To prepare students to work in teams, communicate effectively and evaluate their own performances. It is also aimed at allowing students to link ideas across different disciplines.

The old

- The A level-based admission criteria for the National University of Singapore (NUS) and Nanyang Technological University (NTU) includes the Scholastic Assessment Test I (SAT), which made up 25 per cent of the entry points, and co-curricular activities (CCA), which contributed a bonus five per cent.
- A student's mother-tongue grade was counted for the admission entry points.
- The Singapore Management University, which has a separate admission criteria, used the A-level results, SAT, CCAs, as well as interviews and writing essays on the spot.

The new

- This year, grades for mother tongue and SAT are not counted for entry into NUS and NTU, though students must still score at least a D7 in mother tongue or a pass if they are doing the easier B paper.
- SAT will no longer be a requirement for NUS and NTU. At SMU, it is optional.
- Both NUS and NTU can apply their own criteria to select up to 10 per cent of students. For example, an average student who has set up his own business, indicating entrepreneurial flair, could be admitted on that basis.
- A-level Project Work will count from next year. It will make up 10 per cent of the entry score.

The reasons

- The mother-tongue requirement is changed so that a student's choice of university, course and eventual career should not be determined by his scores for this subject. Having requirements that are too strict would hamper NUS and NTU in attracting the best students from here and abroad.
- SAT was ditched because the new SAT would overlap with the new A-level exam, which has been changed to also test reasoning skills.
- The changes allow for a broader, more flexible measure of merit so students can develop more all-round abilities.

Changes in other institutions

Polytechnics

- The five polytechnics will gradually bring forward their start dates over the next two years, so that in 2006 their new academic year will start in mid-April instead of early July.

  The change will allow diploma holders to enter a local university in the same year that they finish poly.

  Currently, they have to wait until the following year, as their results are released only after university admission deadlines.

  Under the new scheme, they will be able to put in their application for a university here in February, together with A-level students. The change will also allow them to start work earlier.

Institute of Technical Education

- The ITE is regrouping its 10 schools into three new mega-campuses, each with its own principal and specialising in specific areas.

  ITE College Central will focus on wafer fabrication and digital media technology; ITE College East on nursing the life sciences and logistics management; and ITE College West on precision engineering and automotive and chemical process technology.

  ITE College East in Simei Avenue will open in January, ITE College West in Choa Chu Kang by 2010 and ITE College Central in Ang Mo Kio Avenue 5 by 2015.

Exploring Authentic Assessment in the National Junior College Integrated Programme

Tan Wan Yu, Brian Ang and Goh Hock Leong

Abstract

As part of the nation's effort to reposition the education system and offer a diversity of educational options to young Singaporeans, the National Junior College Integrated Programme (NJC IP) has implemented an inter-disciplinary curriculum that presents content, skills and thinking processes, and assessments through exploring connections among the disciplines (Hayes Jacobs 1989). This curriculum is designed for the pioneering batch of Secondary Three students who will by-pass the 'O' Level Examinations entirely in a seamless upper secondary and junior college education system. An interdisciplinary curriculum involving real world problem solving can meet the learning needs of students with diverse learning and thinking styles, motivational characteristics and creativity. It can also develop the range of essential skills that will enable them to thrive in an increasingly complex, uncertain and rapidly changing world. However, the assessment of student learning in such a curriculum requires new tools and a new mindset among teachers. This paper explores some issues in developing and implementing the assessment component of the NJC IP curriculum.

Introduction

College Mission

"College of the Nation: home of scholars and leaders who serve with honour"

Started in 1969 as the first junior college in Singapore, National Junior College (NJC) is also the first to offer a 4-year Integrated Programme (IP) from Secondary 3, bypassing the GCE 'O' Level Examinations. By integrating common areas in the Upper Secondary-Junior College curriculum as well as within and across subject areas, the NJC IP provides a seamless learning experience eliminating redundancy and overlap. To achieve the College Vision of developing students whose "passion for knowledge is nurtured in a vibrant learning environment which fosters academic excellence, critical and creative thought and an enterprising spirit", the structure of the IP is customised for ability-driven, broad-based, inter-disciplinary application learning (Hayes Jacob 1989) with a strong emphasis on independence, character development, and national education.

The desired outcomes of the NJC IP are for the typical IP graduate to be:

a an academically excellent person who reads widely, communicates clearly and effectively and appreciates critically the ways in which knowledge is gained and applied;
b a person who is a critical, creative and a mature problem-solver;
c a person who has a deep sense of responsibility to society, understands what it takes to lead and is able to provide strong and committed leadership;
d a person who is not only passionate about his or her interests but also appreciates and explores other intellectual, social, cultural and aesthetic domains;
e a person who is a risk taker and embodies the entrepreneurial spirit.

To achieve these desired outcomes, the NJC IP curriculum is organised on a semester-based modular framework leading to the GCE 'A' Levels with the following focuses:

1 **Integrated Curriculum:** The curriculum offers a wide range of "integrated" core and elective modules that presents a radical

departure from the mainstream subject-based curriculum. To avoid the "potpourri effect" (Hayes Jacobs 1989) of cognitive dissonance from selecting weak links or random inclusion of topics and activities, the integrated cross-disciplinary modules were designed with natural and meaningful connections to capitalise on the synergy of different intellectual domains, while honouring the spirit of each discipline. This has resulted in about 50% integration, with the rest of the content still being taught in traditional subject silos. Examples of such modules are

a Integrated Humanities (IH) – Human Geography, History and Economics. e.g. IH1101 – *Salt, Spices and Slaves*, IH1102 – *Travel, Exploration & Discovery*
b Integrated Sciences (IS) – Physics, Chemistry, Biology and Physical Geography. e.g. IS1101 – *Nothing to Something*, IS1102 – *Atoms to Matter*, IS1103 – *Light to Life*
c Writing Programme (Language and Literature)

2 **Special Programmes:** Academic and non-academic programmes aimed at nurturing and developing the student in a holistic way:
a Man and Ideas
b Arts Appreciation Programme
c Special Programme in Inquiry and Research (SPIRE)
d Community, Adventure, Achievements & Leadership (CAAL)
e Governance and Society
f Personal Mentorship
g Art Elective Programme
h Language Elective Programme (German)

Assessment in NJC IP

An integrated curriculum involving real world tasks and application based learning can meet the learning needs of students with diverse learning and thinking styles, motivational characteristics and creativity (Clark 1986, Kaplan 1979, Van Tassel-Baska 1992, Maker & Nielson 1995, Treffinger 1994). It can also develop the range of essential skills that will enable them to thrive in an increasingly complex, uncertain and rapidly changing world. However, the assessment of learning in such a curriculum requires new tools and a new mindset among students, teachers and parents. The underlying principle with regard to assessment in NJC IP is that the traditional examination-centred assessment alone is not a complete measure of the students' diverse abilities. While end of year examinations do have their place, NJC IP has consciously adopted a continuous assessment framework that not only emphasizes both process and product but also takes into account alternative modes of assessment such as:

a Class participation
b Presentations
c Term papers
d Take home tests
e Help-sheet tests
f Individual & group projects
g Authentic tasks
h Oral defence
i Quizzes etc.

Such an approach not only provides a better and more complete measure of the students' abilities but also, more importantly, helps to develop crucial faculties and domains in our students that will give them the edge in the real world (Wiggins 1989, Treffinger 1994, McTighe 1996, McTighe & Wiggins 1999).

In addition, grades for core and elective modules as well as special programmes are combined to give a criterion-referenced **Grade Point Average (GPA) system**. Calculated as a moving average, a student's GPA defines his or her standing relative to the expected standards of the IP. To graduate from NJC IP, a student will be required to meet a minimum number of credits, which will be earned upon completion of each module. Most of these modules are obtained through the broad-based Core Modules covering the breadth and depth of at least the 'O' and 'A' Levels. A minor proportion may be obtained through the Elective Modules that serve as an avenue for broadening and enriching students' horizons. In order for every module to have standardized grading, general specifications for every grade were discussed by the tutors and communicate explicitly to the students as shown in table.

General Specifications for Every Grade

Score	Grade	Grade Value	Specifications
% ≥ 84.5	A+	4.3	Earned by work whose excellent quality indicates a full mastery of the subject and, in the case of the grade A+, is of extraordinary distinction.
69.5 ≤ % < 84.5	A	4.0	
64.5 ≤ % < 69.5	B+	3.5	Earned by work that indicates a good comprehension of the course material, a good command of the skills needed to work with the course material, and the student's full engagement with the course requirements and activities.
59.5 ≤ % < 64.5	B	3.0	
54.5 ≤ % < 59.5	C+	2.5	Earned by work that indicates an adequate an satisfactory comprehension of the course material and that indicates the student has met the basic requirements for completing assigned work and participating in class activities.
49.5 ≤ % < 54.5	C	2.0	
44.5 ≤ % < 49.5	D	1.0	Earned by work that is unsatisfactory but that indicates some minimal command of the course materials and some minimal participation in class activities.
% < 44.5	U	0	Earned by work that is unsatisfactory and unworthy of course credit.

Each module is weighted and the grade point for every module is included in the computation of the GPA. Students should earn a GPA of at least 2.0 (grade C) to be promoted to the next level.

NJC IP Survey 2004

As part of the NJC IP overall evaluation study, an IP survey was conducted in May 2004. Three sets of surveys were designed and carried out for the three main stakeholders of IP students' education, namely, students, parents and tutors. At the point of administering the survey, the students have been in NJC IP for about 18 weeks.

This preliminary study aims to identify key leverage points to improve the integrated programme by triangulating the results of the three sets of surveys. The key performance indicators for the NJC IP are items that have been determined, through a regression analysis, to directly affect the achievement of the programme's desired outcomes. This is a valuable tool for the College to decide what aspects of the programme to improve and where to allocate resources.

Method

A four-point agreement scale is used for all 3 surveys (Refer to Annex A1, A2 and A3 for the three sets of survey), with 'Strongly Agree' coded as 1 and 'Strongly Disagree' coded as 4. Even-numbered scales can more effectively discriminate between satisfied or unsatisfied stakeholders because there is no neutral option. However, this clear division may cause hesitation for respondents who are neutral in regard to a survey item. Without a midpoint option, respondents often choose a positive response, creating positively skewed data.

Results and Findings

All results are calculated based on 95% confidence interval.

Table 1. Actual and Sample Populations

Stake-holders	Actual Population	Sampled Population	Ratio sampled
Students	127	116	92%
Parents	127	34	27%
Tutors	17	15	88%

Self-Directed Learning

All 3 stakeholders do not agree that IP trains students to determine what needs to be learned. The mean for this survey item is the highest of all the items for parents and tutors and second highest item for students.

Table 2. Results on Self-directed Learning of Students

Stakeholders	Results
Students	2.14 ± 0.10
Parents	2.38 ± 0.12
Tutors	2.27 ± 0.18

Range of Assessment Modes

All 3 stakeholders agreed that compared to mainstream secondary school subjects, IP modules have a wider range of assessment modes. The mean for this survey item is the lowest of all the items for all 3 stakeholders.

Table 3. Results on Range of Assessment Modes

Stakeholders	Results
Students	1.65 ± 0.11
Parents	1.47 ± 0.11
Tutors	1.33 ± 0.13

Continuous Assessment vs. Examination

All 3 stakeholders agreed that continuous assessments in IP are better indicators of students' skills and understanding of concepts than having a major examination.

Table 4. Results on Continuous Assessment

Stakeholders	Results
Students	1.90 ± 0.11
Parents	1.71 ± 0.11
Tutors	1.67 ± 0.27

Stress of Continuous Assessment

Surprisingly, parents and tutors agree more than students that continuous assessments in IP are more stressful than having a major examination.

Table 5. Results on Stress of Continuous Assessment

Stakeholders	Results
Students	2.02 ± 0.13
Parents	1.85 ± 0.25
Tutors	1.60 ± 0.41

Overall Satisfaction of IP

The survey showed that students, parents and tutors were generally satisfied with IP.

Table 6. Results on Overall Satisfaction of IP

Stakeholders	Results
Students	1.95 ± 0.06
Parents	1.97 ± 0.11
Tutors	1.87 ± 0.06

Regression Analysis

From the regression analysis of the items in the three surveys using SPSS, it was found that the overall satisfaction with IP (dependent variable) was statistically related with different variables for the 3 stakeholders:

A Parents:

1 IP fosters critical thinking in my child.
2 IP trains my child to seek and gain new and relevant knowledge.
3 IP trains my child to work collaboratively with the other members during group work.

B Students:

1 Compared to Secondary Two General Science, IS is well integrated.
2 Overall, my learning experience is stimulating.
3 The Continuous Assessments in IP are better indicators of students' skills and understanding of concepts than a major examination.

C Tutors:

1 IP fosters creative thinking.
2 IP trains the student to give constructive comments and receive criticism.

The results show that the impact of Continuous Assessment and the integrated curriculum on overall satisfaction with IP is statistically significant only for students, but not for other stakeholders. While parents are concerned with the acquisition of new knowledge and critical thinking, tutors are more concerned with creative thinking and the students' ability to give constructive comments and receive criticism.

However, as the sample size for the parents' survey was only 27% of the total population, and the programme was still very new, so that several features of the IP has yet to be experienced by the students and seen by the parents at the point of the survey (e.g. enrichment elective week in Semester 2, the College believes that the various stakeholders' views will most likely shift and evolve with time. As part of the overall evaluation study, longitudinal studies would have to be carried out to monitor the shift in the views of the stakeholders.

Table 7. Regression Analysis (Stepwise)

	t	Significance	Correlations	
Parents			**Partial**	**Part**
3 Critical Thinking	3.487	.002	.550	.453
11 New knowledge	3.443	.002	.545	.447
6 Collaboration	-2.165	.039	-.379	-.281
Students			**Partial**	**Part**
1 Integrated Curriculum	3.291	.001	.325	.256
23 Stimulating learning experience	3.890	.000	.376	.302
20 CA better than Exam	3.854	.000	.373	.299
Tutors			**Partial**	**Part**
6 Creative thinking	3.641	.005	.772	.743
8 Criticism	-2.271	.049	-.604	-.463

Dependent Variable: Overall Satisfaction of IP

Implications for Further Inquiry

This preliminary survey has shed some light on the students, parents and tutors' perceptions of the Integrated Programme, including many aspects of continuous assessments, and helped the tutors to reflect on and improve their current practices.

It is heartening to know that the students appreciate the curriculum integration and the multiple mode of continuous assessment, as these are two of the factors that significantly affect their overall satisfaction of IP.

In the spirit of action research, the researchers have tried to enlarge their "circle of inquiry" (Stringer 2004:10) by doing the following:

1 analyse the data to identify key features of the issues investigated;
2 communicate the outcomes of the study to the College Management, IP tutors, students, parents;
3 use the outcomes of the study to work toward resolution of the issue investigated.

Some of the issues investigated and actions taken are as follows:

1 **Self-directed learning.** Being in the IP does not automatically make the students self-directed and reflective learners who can improve on their own learning. One student wrote in the open-ended feedback, *"I think the greatest thing I've learnt is independent learning. However, I feel that this 'sudden' independence is a bit overwhelming..."*

Based on feedback from all stakeholders, IP tutors have planned some new courses to equip students with essential learning skills, for example, time management and basic research skills. Tutors have found that while research skills are taught formally in the Special Programme in Inquiry and Research (SPIRE), the timing of this unit is structured specifically for the students to carry out research project across 2 semesters but unfortunately is out of synch with the Integrated Humanities (IH) module, which requires such skills much earlier in the year. The scope and sequence of SPIRE has to be realigned with other subjects like IH so that the skills can be taught in a timely manner. Alternatively, tutors can structure some of the skills that are essential and useful for many modules to be covered during the induction programme before the students start their formal curriculum.

2 **Stress Level.** Parents and tutors agreed more than students that Continuous Assessments in IP are more stressful than having a major examination. This suggests that the IP students' resilience and ability to cope with the perceived stress of CA could have been underestimated. Students could also have been more honest about the stress levels in talking to their parents than when they were doing the survey.

More dialogue among the stakeholders is needed to ensure that the objective of stretching the capacities of the students is not undermined by unnecessary concern about perceived stress. This was carried out through a early term Parent-Teacher

Meeting where personal mentors and subject tutors met up with parents to discuss their child's progress in the IP, using an interim progress report and managing parent's expectations.

3 **Communication.** This survey showed up perception gaps between the tutors and parents in various items. For example, in the open-ended feedback on the GPA, some candid comments from certain parents and students prompted active responses from the tutors:

Parent A: *"...although the GPA is a fair indicator of how well a student is doing, there should not be too much weightage (sic) on group projects."*

Parent B: *"Usually a couple of students are actually working and hence learning through the project. The grade obtained, therefore, is not an accurate reflection of the ability and contribution of the individual student. There is a real need for closer monitoring and fairer assessment in group project work."*

Student C: *"How about bonus points? To help to improve GPA."*

Some overachievers have pleaded for extra assignments in order to improve their GPA because of unrealistic expectations. Therefore, tutors need to communicate in parent-friendly terms what the IP is trying to achieve in order to solicit buy in and parental support in managing the students' expectations and optimal learning pace. To do so, personal mentors have worked out Individual Education Plans, in Term 1, with students, setting individual learning goals with realistic projection of attainable grades for each subject. Personal mentors have also met up with patents to communicate the interpretation of GPA and percentile in engaging students in their studies. Mentors are also constantly updating parents through e-mails and through PAACT (PArents-in-ACTion), the NJC parent support group. Score rubrics for group presentations have also been crafted to take into account individual contribution. Tutors have also made a conscious effort to place an equal weighting on individual assignments, in the midst of striving for collaborative excellence in IP students.

Conclusion

Evaluation of the IP curriculum and its new approach to assessment is an ongoing process. More studies will have to be done on the various issues surfaced in this survey to further broaden the circle of inquiry and ensure continuous improvement in the NJC IP.

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IP Survey

With the aim of giving you the proper context for your learning, we have weaved together various subjects in our lessons to deliver an integrated curriculum. Lessons are also conducted differently in order for you to learn many process skills such as team skills and self-directed learning.

We would like to seek your frank feedback and comments on modules in Semester 1. Please circle the view that best reflect your actual view.

SA : Strongly Agree **A** : Agree **D** : Disagree **SD** : Strongly Disagree

A. CURRICULUM INTEGRATION	**Your View**			
Integrated Sciences (IS)				
1. Compared to Secondary Two General Science, IS is well integrated.	**SA**	**A**	**D**	**SD**
2. There is meaningful integration of content and skills in IS modules.	**SA**	**A**	**D**	**SD**
3. IS modules foster independent learning.	**SA**	**A**	**D**	**SD**
4. IS modules foster creative thinking.	**SA**	**A**	**D**	**SD**
5. IS modules foster critical thinking.	**SA**	**A**	**D**	**SD**
Integrated Humanities (IH)				
6. Compared to Secondary Two Humanity subjects, IH is well integrated.	**SA**	**A**	**D**	**SD**
7. There is meaningful integration of content and skills in IH modules.	**SA**	**A**	**D**	**SD**
8. IH modules foster independent learning.	**SA**	**A**	**D**	**SD**
9. IH modules foster creative thinking.	**SA**	**A**	**D**	**SD**
10. IH modules foster critical thinking.	**SA**	**A**	**D**	**SD**
B. PROCESS SKILLS				
Team skills				
11. IP trains me to give constructive comments and receive criticism.	**SA**	**A**	**D**	**SD**
12. IP trains me to communicate effectively.	**SA**	**A**	**D**	**SD**
13. IP trains me to work collaboratively with the other members during group work.	**SA**	**A**	**D**	**SD**
14. IP trains me to be responsible for roles and tasks assigned.	**SA**	**A**	**D**	**SD**
Self-Directed Learning				
15. IP trains me to determine what needs to be learned.	**SA**	**A**	**D**	**SD**
16. IP trains me to carry out my own learning.	**SA**	**A**	**D**	**SD**
17. IP trains me to reflect and improve on my own learning.	**SA**	**A**	**D**	**SD**
18. IP trains me to seek and gain new and relevant knowledge.	**SA**	**A**	**D**	**SD**
C. ASSESSMENT				
19. Compared to secondary school's subjects, IP modules have a wider of range of assessment modes.	**SA**	**A**	**D**	**SD**
20. The continuous assessments in IP are better indicators of students' skills and understanding of concepts than a major examination.	**SA**	**A**	**D**	**SD**
21. The continuous assessments in IP are more stressful than having a major examination.	**SA**	**A**	**D**	**SD**
22. The Grade Point Average (GPA) is a fair indicator of how well a student is doing in IP's modules.	**SA**	**A**	**D**	**SD**
D. GENERAL				
23. Overall, my learning experience is stimulating.	**SA**	**A**	**D**	**SD**
24. Overall, I am satisfied with the Programme.	**SA**	**A**	**D**	**SD**

Other comments:

Thank you for your feedback!

njc
Integrated Programme

IP Survey (Parents)

With the aim of giving your child the proper context for their learning, we have weaved together various subjects in our lessons to deliver an integrated curriculum. Lessons are also conducted differently in order for your child to learn many process skills such as team skills and self-directed learning.

We would like to seek your frank feedback and comments on your observation of your child after 2 terms in NJC IP. Please circle the view that best reflect your actual view.

SA : Strongly Agree **A** : Agree **D** : Disagree **SD** : Strongly Disagree

A. PROCESS SKILLS	**Your View**			
Thinking skills				
25. IP fosters independent learning in my child.	**SA**	**A**	**D**	**SD**
26. IP fosters creative thinking in my child.	**SA**	**A**	**D**	**SD**
27. IP fosters critical thinking in my child.	**SA**	**A**	**D**	**SD**
Team Skills				
28. IP trains my child to give constructive comments and receive criticism.	**SA**	**A**	**D**	**SD**
29. IP trains my child to communicate effectively.	**SA**	**A**	**D**	**SD**
30. IP trains my child to work collaboratively with the other members during group work.	**SA**	**A**	**D**	**SD**
31. IP trains my child to be responsible for roles and tasks assigned.	**SA**	**A**	**D**	**SD**
Self-Directed Learning				
32. IP trains my child to determine what needs to be learned.	**SA**	**A**	**D**	**SD**
33. IP trains my child to carry out his/her own learning.	**SA**	**A**	**D**	**SD**
34. IP trains my child to reflect and improve on his/her own learning.	**SA**	**A**	**D**	**SD**
35. IP trains my child to seek and gain new and relevant knowledge.	**SA**	**A**	**D**	**SD**
B. ASSESSMENT				
36. Compared to secondary school's subjects, IP modules have a wider of range of assessment modes.	**SA**	**A**	**D**	**SD**
37. The continuous assessments in IP are better indicators of students' skills and understanding of concepts than a major examination.	**SA**	**A**	**D**	**SD**
38. The continuous assessments in IP are more stressful than having a major examination.	**SA**	**A**	**D**	**SD**
39. The Grade Point Average (GPA) is a fair indicator of how well a student is doing in IP's modules.	**SA**	**A**	**D**	**SD**
D. GENERAL				
40. Overall, my child's learning experience is stimulating.	**SA**	**A**	**D**	**SD**
41. Overall, as a parent of a IP student, I am satisfied with the Programme.	**SA**	**A**	**D**	**SD**

Other comments:

Thank you for your feedback!

njc
Integrated Programme

IP Survey (IP Tutors)

With the aim of giving the student the proper context for their learning, we have weaved together various subjects in our lessons to deliver an integrated curriculum. Lessons are also conducted differently in order for them to learn many process skills such as team skills and self-directed learning.

We would like to seek your frank feedback and comments on modules in Semester 1. Please circle the view that best reflect your actual view.

SA : Strongly Agree **A** : Agree **D** : Disagree **SD** : Strongly Disagree

A. CURRICULUM INTEGRATION	**You View**			
42. Compared to Secondary Two syllabus, IP, as a whole, is well integrated.	**SA**	**A**	**D**	**SD**
43. There is meaningful integration of content and skills in IP (as a whole).	**SA**	**A**	**D**	**SD**
44. Compared to Secondary Two syllabus, my module is well integrated.	**SA**	**A**	**D**	**SD**
45. There is meaningful integration of content and skills in my module.	**SA**	**A**	**D**	**SD**
B. PROCESS SKILLS				
Thinking skills				
46. IP fosters independent learning.	**SA**	**A**	**D**	**SD**
47. IP fosters creative thinking.	**SA**	**A**	**D**	**SD**
48. IS fosters critical thinking.	**SA**	**A**	**D**	**SD**
Team Skills				
49. IP trains the student to give constructive comments and receive criticism.	**SA**	**A**	**D**	**SD**
50. IP trains the student to communicate effectively.	**SA**	**A**	**D**	**SD**
51. IP trains the student to work collaboratively with the other members during group work.	**SA**	**A**	**D**	**SD**
52. IP trains the student to be responsible for roles and tasks assigned.	**SA**	**A**	**D**	**SD**
Self-Directed Learning				
53. IP trains the student to determine what needs to be learned.	**SA**	**A**	**D**	**SD**
54. IP trains the student to carry out their own learning.	**SA**	**A**	**D**	**SD**
55. IP trains the student to reflect and improve on their own learning.	**SA**	**A**	**D**	**SD**
56. IP trains the student to seek and gain new and relevant knowledge.	**SA**	**A**	**D**	**SD**
C. ASSESSMENT				
57. Compared to secondary school's subjects, IP modules have a wider of range of assessment modes.	**SA**	**A**	**D**	**SD**
58. The continuous assessments in IP are better indicators of students' skills and understanding of concepts than a major examination.	**SA**	**A**	**D**	**SD**
59. The continuous assessments in IP are more stressful than having a major examination.	**SA**	**A**	**D**	**SD**
60. The Grade Point Average (GPA) is a fair indicator of how well a student is doing in IP's modules.	**SA**	**A**	**D**	**SD**
D. GENERAL				
61. Overall, my teaching experience is stimulating.	**SA**	**A**	**D**	**SD**
62. Overall, I am satisfied with the Programme.	**SA**	**A**	**D**	**SD**

Other comments:

Thank you for your feedback!

Designing Problem-Based Learning Environments: What Science Students Value, Enjoy and Learn

Annemarie Hattingh

Abstract

Problem-based learning (PBL) is a teaching strategy that has the potential to put students at the centre of activity and to make them accountable for their own learning. The aim of this research was to uncover 1) Science students' perceptions of the value of learning through problem-solving 2) the enjoyment experienced by below- and above-average performers in a PBL environment and 3) what Science students have learnt through PBL. Insights provided by this investigation can assist Science teachers to refine their pedagogical knowledge regarding the design of the various elements that comprise problem-based learning. It also informs teachers about more effective facilitation of the needs of above- and below-average students, so that all students' performance and enjoyment of Science can be heightened.

Introduction

Student-centred, hands-on and inquiry-based learning strategies all feature in literature on constructivist-orientated Science education (Black & Atkin, 1998; National Research Council, 1996; Windschitl, 1999). One of many teaching strategies that has the potential to increase student involvement and also make them more accountable for their own learning, is problem-based learning (PBL) (Savoie & Hughes, 1994; Schmidt, 1993). West (1992) contends that the information humans gain from their daily confrontation with problems influence their thinking much more than information read or spoken. In addition, problem-based learning also strikes a natural and resonant cord with the problem-orientated nature of Science.

Despite this fact Yerrick, Park and Nugent (1997) report that traditional secondary Science curricula are still dominated by teacher-centred pedagogy where transmitting a body of knowledge to students through intelligible explanation is the main vehicle, especially in high schools, for delivering instruction. Various reasons may exist for Science teachers not using PBL. It may be that they feel more confident and in control when using direct instruction and demonstration. Also, when having to cover a content-loaded curriculum, it takes time to use PBL as it requires an in-depth involvement of students.

The aim of this research was to uncover

1 students' perceptions of the value of learning through problem-solving,

2 the enjoyment experienced by below- and above-average performers in a PBL environment and

3 what Science students have learnt through PBL.

Relating student-centredness to problem-based learning

On a continuum representing various teaching strategies, two main approaches can be discerned, a teacher-centred and a student-centred approach. Killen (2000, p. xi) contends that it may be seen as an unfortunate set of labels, because learning, and therefore students, should always be at the centre of learning. Nevertheless "these labels certainly convey the idea that in some approaches to teaching the teacher plays a more direct role than in other approaches" (Killen, 2000, p. v). He also reminds us that in a student-centred approach the teacher still sets the agenda, but has much less direct control over what and how students learn in this less structured, less predictable learning environment. Although a multitude of meanings may be associated with the term student-centredness, this research embraced John Dewey's observation that "true learning is based on discovery guided by mentoring rather than the transmission of knowledge" (Boyer, 1998, p.15). This interpretation of student-centredness is consistent with a constructivist view of learning. The constructivist view of learning promotes the active exploration of physical phenomena as the trigger for personal meaning-making (Von Glaserfeld, 1993 and Yip, 2001).

Several interpretations are associated with the term PBL. PBL is broadly defined as a curriculum design approach where the entire curriculum content (knowledge, skills, attitudes and values) is organised around authentic, 'burning' problems that motivate students to identify and research concepts and resources necessary to solve the problems. Students work mostly in collaborative learning teams, "bringing collective skills in acquiring, communicating and integrating information" (Duch, Groh & Allen, 2000, p. 6). The fundamental assumption behind PBL curriculum design is that a carefully structured set of problem-solving experiences will lead students to a deeper understanding of the subject matter than they would obtain through traditional teaching approaches.

It is extremely unlikely that PBL of the type defined above would ever be implemented on a large scale in any public school system—it would require far too many resources and far too much retraining of teachers. However, school teachers can adapt their teaching to incorporate some of the principles of PBL. The essential point is that problems can be carefully designed as triggers of learning experiences through which students can gain knowledge, rather than being straightforward applications of prior learning. When teachers use problems as the focal point for a section of the curriculum they engage in what Killen (2000, p. 129) refers to as "using problem-solving as a teaching strategy". This approach to teaching retains the emphasis on learning about the subject through solving problems, rather than simply learning how to solve problems by applying algorithms.

When teachers decide to use problem-solving as a teaching strategy the most effective problems are likely to be those that adhere to the rigorous criteria for PBL problems. The problems should be authentic and credible; be relatively unstructured and open-ended;

require seeking and accessing information from various sources; and be complex enough to require considerable individual and collaborative effort (Claxton, 1999). Carefully chosen problems of this type will be interesting, challenging and engaging and have the potential to encourage and facilitate high levels of comprehension and higher-order thinking skills development (Darling-Hammond, 1996; McAllister, 1997).

An implementation framework for PBL

202 Grade 10 Science students were exposed to PBL by teachers who had had intensive six months pedagogical training on how to facilitate learning in a PBL environment. The Science teachers, together with the researcher, designed the PBL projects that students engaged in. Two typical examples will briefly be discussed.

The Biogas Environment Friendly Energy Project: Typically, one Chemistry-orientated problem required Science students to solve an energy provision problem in remote geographical areas where the National Electricity Grid cannot provide energy for household needs. Since creative ways of presenting the problems are extremely important to capture students' interests, an 'official' from an energy corporation delivered a 'message' to the Science class which contextualised the problem. The learning outcomes and criteria that students had to adhere to were interweaved throughout the 'message', making it appear less like a typical teacher centred top-down assignment. After researching alternative forms of energy, the solution of producing biogas was proposed, as the production process addresses the sewerage problem of a typical rural community and is therefore environmentally friendly. As part of the problem-solving process the Science students then used their energy-related knowledge to plan and build biogas-producing plants and a household device (e.g. a methane gas lamp) that they had to demonstrate working effectively.

Solar-Powered Boat Project: This particular PBL task had a Physics orientation and was adapted from a project described by Rennie (2003). Teachers wanted to use this PBL task as they said that students had done many experiments and textbook exercises on the following electricity concepts: Series and parallel circuits, Ohm's Law, the relationship between $V=IR$, $P=VI$, $P=W/t$ and $W=Fs$. However, teachers felt that the students could not use their book knowledge to do something that is meaningful. Therefore, since the local

town is situated in a sunny area and approximately 55% of household energy needs are provided for by solar cells installed on the roofs of houses in which students live, a solar energy task would be relevant to students' daily lives. A local company sponsored small solar cells that students had to use to build a solar powered boat. Essentially, each boat comprised a hull on which was mounted solar cells and a small electric motor to propel the boat. Students, in cooperative groups, had to construct and test their circuits using a multimeter on both cloudy and sunny days. From what appeared to be a straightforward solution to the problem, students learnt about tough decisions and trade-offs. From the science principle P=VI students could see that they needed high voltage (favoured by a series circuit), as well as high current (favoured by a parallel circuit). So, there was a trade-off at the very beginning of planning the circuit – a real life encounter that resembled the decisions that real scientists have to make. The same situation occurred when students realised that the resistance of the motor varied according to the load and the nature of the hull. In short, a great deal of trial and error testing had to be done to get a circuit that worked. The efficiency of the groups' boats was finally tested in the school's swimming pool during the Science Awareness Week.

Table 1 gives an overview of a framework that Science teachers in this project used to implement the PBL tasks.

Students speak out on PBL in the Science class: Insights for teachers

Students' general impressions of the PBL experience: 75% of the students "enjoyed this new method in the teaching of Science" very much, while 25% did not enjoy it. The next level of analysis uncovered how below- and above-average performers differed in their enjoyment of PBL. Students who scored below the group average in both the pre- and post-tests that were written, were categorized as below-average. The same criterion was used to categorize the above-average performers. Fisher's Exact Two Tail Test (Fisher, 1935) was used to do the comparison which indicated that the above-average performers had a significant preference for learning in a PBL environment. This was not the case for the below-average performers. Of the below-average performers, 23% enjoyed PBL very much, while 25% did not like it. One below-average student (30% score) commented that "I do not like it. Just give us our books and let us learn". This was one of the lowest performers who begged for direct guidance. He felt very lost in the less-structured PBL environment and consequently did not like the PBL experience. In contrast, another below-

Table 1 An implementation framework showing various design elements for PBL learning tasks

Creation of a productive learning environment: Present the problem scenario in the most realistic way to create an authentic learning context. (Show video; television clip; photos; let students visit the real problem area, e.g. pollution site, coal mine, solar energy plant; use a case study, computer simulation, role play)
Learning materials: Provide a resource kit with basic information; relevant materials; a research corner in the laboratory with a variety of books; internet-addresses; additional references to resources to use in own searches. Include a self-discovery checklist to guide students through the many dimensions of the problem-solving process.
Learning facilitator's role: Give feedback and emotional support to cooperative groups and individual students when and where necessary; monitor progress towards outcomes; "guide-on-the-side" not "sage-on-the-stage".
Student roles: In heterogeneous cooperative groups students brainstorm ideas, hypo-thesize, draft action plans, decide on individual responsibilities while facilitator monitors individual accountability, group functionality, overall progress. Initiate the research. Use minimum resources provided in the resource kit as a point of departure. Identify, access and use additional resources. Students actively discover, research materials, construct meaning from the resources. Scheduled meetings for cooperative groups to map progress (During or after class). Share and debate new perceptions, knowledge, skills, values. 45-minute presentation of problem-solution (process and product which, for example, was the working prototype device) to other class members and teachers in the school; 15 minutes question time and inter-group discussion.
Feedback: Formative feedback: Students receive continuous feedback from cooperative group members, facilitator and a self-discovery checklist that they completed individually. Summative feedback: Facilitator does PBL task debriefing and quality assurance of outcomes demonstrated.

average student (52% score) seemed to be empowered by her learning experience, according to the following comments: "I enjoy it to do things on my own every now and then. One do not only sit on your chair and write frantically like a zombie."

Value of PBL to students: 65% felt that they learnt something valuable from the PBL task. One student (73% score) related her valuable experience to the cultivation of her creativity when she commented that "at the beginning of the year I could not think creatively at all, because it was never necessary to be creative". Another student (69% score) valued what he perceived as the hands-on nature of PBL: "I really enjoy these hands-on ..... projects. It places Science in a new, different light". What a pity that this was not the case much earlier in his school Science exposure.

Working cooperatively as part of the PBL experience: *74% of the students indicated that it was very valuable to work cooperatively.* However, although they value collaboration, 50% actually prefer to work on their own. One student remarked "that I am glad that you divided us into groups. We brainstorm – the more ideas, the better. We share the research work". Another student highlights what frustrated her in the cooperative setup: "People do not work together in a group. Students who were supposed to gather particular information did not bring it to all group members". One student experienced the group debates as "senseless". The fact that group debates took place, is a positive indication of the fact that students were sometimes at loggerheads with one another which were the trigger for meta-cognitive reasoning. These are important processes to help students make sense of their learning. One student encapsulated the value and theory of cooperative learning when she said that *"it was interesting to hear how my friends think".*

Resources used in a PBL environment: 90% of the students used the minimum resource kit that came with each problem extensively, while 83% of them also accessed other kinds of resources. One student went beyond the school library when she "landed up in the Department of Bio-chemistry [at the university]. I had some valuable discussions with lecturers there which broadened my horizons". This kind of connectivity to the outside expert Science community is one spin off initiated by PBL and which is desperately needed to breathe life into the schools' Science curriculum.

Time and effort required for PBL: 79% of the students reported that they had to put much *more effort* into this task, than they normally have to with 'regular' Science tasks – "it kept me very busy". Both above- and below-average students made it clear that they needed more time in future to do this type of task. Students would not have been willing to put much extra effort into work if they did not derive some form of intrinsic motivation and pride in what they were doing.

What have the Science students' learnt through PBL?

The six teachers who taught through PBL kept reflective notes in their action-research diaries describing the most significant accomplishments of their Science students. The teachers' reflections that resonate with research findings in the PBL field will be highlighted here:

- The most frequent comment by teachers was that, apart from the regular content knowledge that students have constructed, they have taken the first steps towards 'learning-how-to-learn' that is paramount for surviving in the 21st century. Skills that learners practised included how to access and especially evaluate the reliability of information from multiple sources. Students realised that "a teacher is one of many resources" one teacher wrote.
- The natural curiosity of most students was triggered which in turn sustained the commitment to the learning process, which unfortunately usually seems to get lost by the time most students get to high school Science.
- Students started realising that the world is a set of interrelated systems. They identified the natural links that exist between science, technology, the environment, and local and

global societies which have to be taken into account when thinking about solutions.

- While engaged in group debates, students realised that they had to give evidence for the arguments or solutions that they suggested, as PBL tasks do not only have one process of arriving at a solution. Students also learnt to handle the benefits, but sometimes the frustration of working with cooperative and non-cooperative team members, which is a small scale simulation of real workplaces.
- They have realised that, in the quick-fix and instant-everything age, problem-solving can be frustrating, time consuming and emotionally draining, and that they need tenacity to bounce back.

In conclusion it can be said that apart from learning subject content in a PBL environment, students were being equipped with skills that are necessary to be flexible life-long learners.

Conclusion: Implications for teaching on "Monday morning"

The students' experiences of PBL reflect varying attitudes, some negative, but the majority (75%) mostly positive. A significant number of above-average performers enjoyed PBL. A possible explanation for this result may be found in the assertion by Ornstein and Hunkins (1993, p. 8) that above-average performers "exhibit high independence in learning and are better off in low-structured situations in which they can exercise their own initiative", while some low performing students often lack "the inner controls necessary for self-discipline and the cognitive skills necessary for independent learning". These students need and are more comfortable in highly structured environments.

As far as low-performing students are concerned, Ross and Kyle (1987) claim that direct instruction is one of the most effective strategies for teaching explicit concepts and skills to these students, and in the present study, several low performers actually did express their preference for direct instruction over PBL. However, one below-average performer did make it clear that it was empowering not to be treated like a "zombie".

These findings raise the important question whether the fact that significantly more above-average performers enjoyed learning through PBL than low performers means that low performers should not be challenged in the same way as high performers. Or should all students be empowered to develop the necessary skills for functioning responsibly and independently in a less structured learning environment?

The answer is provided by the reality that faces all of us: life outside the classroom is complex and often threatening, whether students prefer to accept it or not. Real-life demands will not provide paint-by-number instructions for solving it. Mentors will not always be there to provide direct instruction or a structured, safe environment, even though students might prefer it that way. Tomlinson (2000) reminds us that students will learn best when supportive adults push them slightly beyond the place where they can work without assistance. The purpose of Science education should be geared towards preparing students, also those not taking up careers in the Sciences, to perform complex real-life roles and make responsible decisions regarding Science related issues that may impact their daily lives.

There are, however, mechanisms that a teacher can use to support low-performing students to have maximum benefits of a PBL experience:

- The teacher who knows her students' abilities and personalities very well can subtly compile groups that are comprised of students who can support a particular student on both cognitive and emotional level.
- The facilitator should also enact the monitoring role regarding a low-performer's progress very closely and intervene with direct instruction *only* when a student is *really* in need of it.
- The facilitator must make sure that a low-performer is directed towards the most appropriate resources and monitor the successful access to these resources, as

well as the meaningful interpretation of information.

- When using the cooperative learning method of Jigsaw, the teacher can allocate sub-tasks to individual members in which each member has to become a specialist. This approach ensures that every student, including the low-performing student and students with less self-confidence, have a valuable contribution to take back to their own base-group. Self-worth and pride will contribute towards a more positive experience of a less-structured PBL environment.

In conclusion it can be said that, with the thrust towards greater student-centred pedagogy, PBL should at the very least be considered a useful addition to the variety of teaching strategies which attempt to involve students more in their own learning, in peer collaboration, and in inquiry.

It should, however, be kept in mind that the journey towards self-directed learning takes time, since students have to be pushed purposefully out of their comfort zones in order to set in motion a self-sustainable process of growth towards life-long learning. Some students will find this approach very different from what they have become used to, especially in Science classes during their previous years at school. For some, the challenge of taking responsibility for their own learning is threatening. Teachers who wish to introduce change in some way or another, should take cognisance of the fact that students need to practice new strategies, such as cooperative learning in PBL, before it can render them the maximum benefits of meaningful learning.

Insights provided by this research can assist Science teachers in refining their pedagogical knowledge regarding the design of the various elements that comprise problem-based learning. If Science teachers do not intentionally plan and implement such student-centred strategies more often and more effectively in Science classes, Science runs the risk of becoming, as one student claimed, a "dead" subject.

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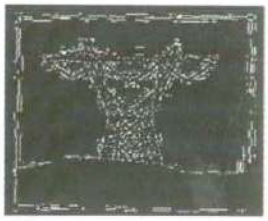
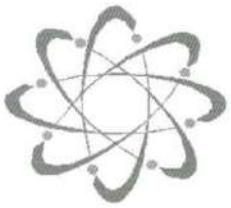
Example of a problem presentation:The Biogas Environment Friendly Energy Project

DEPARTMENT OF MINERALS AND ENERGY

Research and Development Division
The Managing Director
Energy Consultancy Company
Al Cajun
0001-443-767

Dear Sir or Madam

ENERGY RESEARCH: ALTERNATIVE RESOURCES FOR HOUSEHOLD DEVICES

A problem which is of global concern has to be researched and solutions need to be found as soon as possible.

The problem is the following:
As you might be aware, our state, as the rest of the world, has only enough traditional energy resources left for approximately the next 20 years. Our company cannot postpone intensive, focused research in this future crisis area any longer. 196 locally and 992 companies world wide are competing in the race for alternative energy resources and associated energy devices.
The alternative energy resource researched by our company will have to adhere to the following demands:

- It must minimally provide for the domestic energy needs for a household of 4 people.
- It must be one of the cheapest resources of energy. All types of households, whether low or high income, should be able to utilise this energy resource and its associated household devices.
- The National Electricity Grid cannot be expanded to every remote town and rural village everywhere in the country. It implies that the alternative energy resource should be available in remote rural areas.
- The alternative energy resource has to be environmentally friendly and safe. Also it should conserve the natural surroundings.

Knowledge about a suitable alternative energy resource must be put to use in a particular household device(s). Design a household device(s) which will be able to store, transform and/or distribute the energy for human needs. You also need to build a working prototype of your design. A detailed research and design portfolio will have to be compiled and presented to delegates from the Department of Minerals and Energy and other interested role players who might want to contribute towards further development financing.

Each team member will be responsible for a section of the presentation. All prototypes have to be demonstrated to role players. Prepare yourselves for a press conference directly after the presentation and demonstration to the Department's delegates. You have approximately 20 man-hours to complete this project.

We, as the board of directors trust that we can rely on high quality, professional work which will contribute towards the creation of an energy sustainable future for all the global citizens.

Sincerely,

.....
A Hattingh
Central Executive Officer (CEO)

MEXT into Context: K-6 English Language Reform in Japan

Samuel Andrew Meyerhoff

What is an AET?

First, a distinction must be made between traditional AETs, hired through the Ministry of Foreign Affairs (MOFA), and contemporary AETs, hired through the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Traditional AETs are T2s, or follow teachers, who model key language points, provide native pronunciation, and explain about one's native culture. In the traditional scenario, the JTE (Japanese Teacher of English) is T1, or lead teacher, and is correspondingly responsible for lesson planning, curricular development, and filling out assessment reports. AETs on MEXT's pilot study program, on the other hand, are T1s, and it is their duty to train Homeroom Teachers (HRTs). Presently, HRTs assume the role of T2s. MEXT is hoping that HRTs will become adequately trained to assume T1 roles within the next few years.

Although there are advantages to HRTs assuming greater classroom leadership in English classes, MEXT should be cautious not to implement change too quickly. In this context, Mr. Meyerhoff will look at present English language reform in Japan.

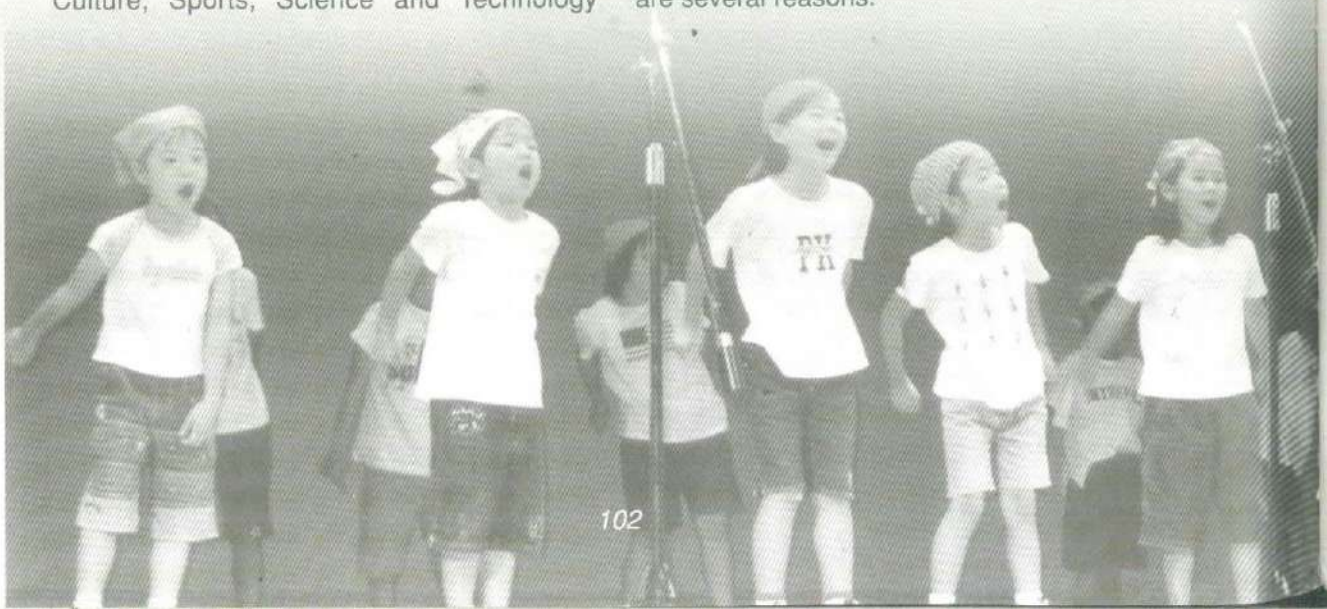
Period for Integrated Study: An Interdisciplinary Approach

Beginning 2001, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) introduced the "Period for Integrated Study" from the third grade of elementary school onwards. This period has been allocated to use an interdisciplinary approach based on students' interests and needs, as well as the appropriateness for the individual school and its surrounding community. In MEXT's words: "individu5al schools (are allowed) to pursue their own unique initiatives" (*Practical Handbook for Elementary School Activities*, p. 121) – again, presumably based on needs.

Indeed, an interdisciplinary approach is laudable. Yet, exactly what does it imply? For MEXT, it includes basic core subjects, with increased emphasis placed on technology and computer skills, as well as the introduction of oral English skills and a moral education component. Further, MEXT's mandate expresses a desire for students to raise their awareness of self and Japanese culture, within the context of internationalization, and to further develop students' problem-solving and critical thinking skills. In short, MEXT's proposal is all encompassing. Only time will tell whether change will be lasting, or fleeting. I, for one, believe the answer does not lie in the hands of MEXT, but on the local level.

Impetus for Change

Next, what has caused the ministry to institute such drastic change in policy? Clearly, there are several reasons.



Children from Matsugawa performing in the "We Love Okinawa" English performing arts festival. (19 Sep 2004)

Mr Higa of the Naha Board of Education presents Matsugawa students with the award for "Best Team Work" in the English performing arts festival (19 Sep 2004)

First, the ministry itself went through a process of reform. Prior to 2001, the ministry was called Monbusho (the Ministry of Education, Culture, Sports and Science). Then, in 2001, the Japanese government decided to reduce the number of governmental agencies through mergers, including the amalgamation of Monbusho and the Ministry of Science and Technology, resulting in the combined agency: MEXT (Hicks, 2002). Along with the name change, policy change was implemented, too.

Second, English language education in Japan has endured harsh criticism over the years. In a report dating back to 1995, one critic purported learning English in Japan as nothing more than a mere "intellectual exercise" with no positive transfer (Clark, 1995).

More recently, it has become apparent how poorly Japanese students perform on international standard achievement tests such as TOEIC and TOEFL. The Mainichi Daily News indicated: Among 23 Asian countries, Japan's (TOEFL) score rank(ed) a pitiful 22nd (Mainichi Shimbun, 2002). Such results have obviously been a wake up call for MEXT.

Fourth, there is a growing trend through out Asia to start similar initiatives. Korea, Thailand, Taiwan, and China have all initiated almost identical programs.

Fifth, there is the growing awareness that language learning must be meaningful, learned in context, and started at an early age.

Lastly, there is an increasing awareness of Japan's role in the international community, and the need for communication skills to function in that community.

How has language education changed?

Until recently, English was taught in junior high schools through an ineffective grammar-translation method, along with the memorization of specified word lists for Eiken, a series of standardized tests administered only in Japan, with little emphasis placed on real-life communication or authentic English.

MEXT, realizing the inappropriateness of these tests, is now de-emphasizing standardized testing, and is requesting that teachers focus on oral communicative skills to be learned in a non-intimidating way, so as to decrease the phobia many students develop towards English.

Local Boards versus Individual Schools

Each Board of Education (BOE) has been broken into patterns, with one school per pattern designated as lead school.

For brevity, Matsugawa Elementary School is lead school for D-pattern in Naha city. D-pattern has been asked to teach sixty-six 45 minute English lessons over the span of a year for grades 3-6, and thirty-three 45 minute lessons for grades 1-2. Out of the sixty-six lessons to be taught for grades 3-6, thirty-three lessons have had their content predetermined by the Naha BOE based on needs assessments, qualitative data, and suggestions made by individual teachers. The remaining thirty-three lessons are to be devised by each school's AET and JTE in consultation with HRTs. Thus, the role of AETs and JTEs is crucial in determining an adequate English program for schools.

How are AETs adjusting to the Programme

Frankly, it has been difficult for the local BOEs to find competent AETs, and there has been

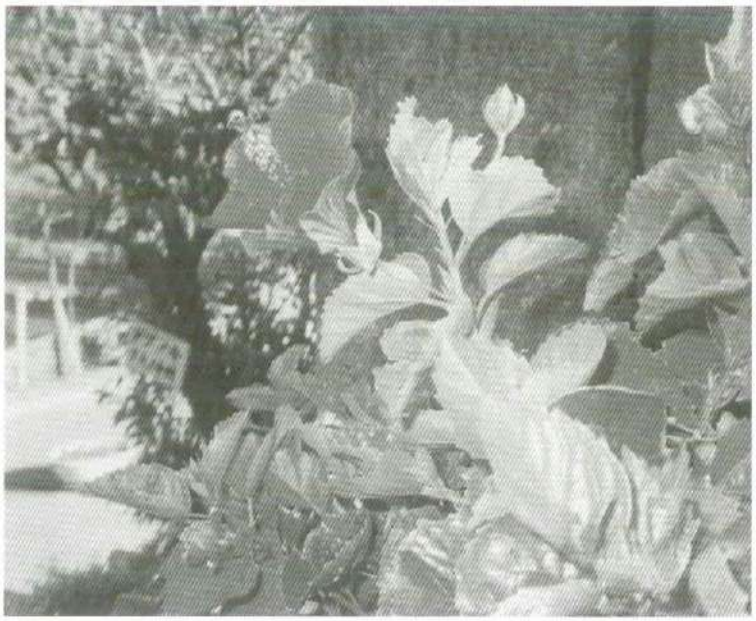
frustration on both sides. MEXT relies on recruiting foreign teachers who already live in Japan. Unfortunately, many of these AETs are not professional. To further exasperate matters, many of these AETs were either previously employed as more traditional AETs, or compare their conditions to their more traditional counterparts.

Many AETs on the MEXT program cannot understand why they are given more duties, paid less, and denied many of the perks availed to those on the JET program. Further, both sets of AETs are hired on only limited term contracts. Thus, they tend to lack any sense of long-term commitment to the job.

Moreover, many AETs who do try simply burn out. Without sufficient training, the classroom can be a most ominous place.

Even some professional teachers struggle as they run up against a language barrier as they are expected to write lesson plans every week in Japanese, not to mention hold team-teaching meetings with their colleagues who usually cannot speak English.

Finally, it is difficult for BOEs to recruit good foreign teachers from abroad when the pay is far less than one would make in one's native country, and the conditions are far more tenuous.



Beautificatiaon is an integral part of their Matsugawa Project. Students tend to the gardens daily (19 Nov 2004)

On a more positive note, BOEs have been extremely successful at hiring excellent teachers from within Asia. In particular, AETs from the Philippines have proven themselves most worthy of the MEXT program.

Interdisciplinary Approach

Until now, there have been two major impediments: lack of coordination time with other subject teachers, and apprehension on part of some non-English speaking teachers to use English in the classroom. In fact, reluctance on part of some HRTs has been a major stumbling block for MEXT. Amidst teacher trepidation, MEXT is placing high expectations on HRTs. MEXT's justification is as follows:

For HRTs, who have no experience in English instruction, to be in charge of the English activities at elementary schools is a situation greatly different from junior high and high schools. However, it cannot be said that this is strictly negative... It is also possible to relate the English activities to other contents and allow students to incorporate the knowledge and skills gained in these subjects into the English activities (*Practical Handbook for Elementary School Activities,* p. 136).

Having one teacher teach across the curriculum increases relevance. As HRTs know exactly what is being taught in other subjects, they would be much better equipped to ascertain needs. Yet, these teachers would first need time to acquire new skills and broaden their knowledge base.

Personally, I find the timeframe given by MEXT too short. Many HRTs are presently in state of panic as they have suddenly been requested to take on new responsibilities. Therefore, I would suggest that change be implemented more gradually to better acclimatize HRTs.

Focus on Matsugawa

Ayumi Tanahara, Matsugawa's JTE, and I have taken various measures to remedy the anxiousness felt by many of our school's HRTs. For one, we hold after school English lessons and training sessions for HRTs.

We are also encouraging other subject teachers to implement English into their classes. Further, we are reinforcing English skills by using as much English as possible outside the classroom: rooms have English placards on doors indicating room names, and public address announcements are given by students in both English and Japanese.

In addition, I have integrated math, social studies, and science skills into my English classes. Lastly, we hold supplementary Canadian cooking lessons in English for all students from grades 3-6. These lessons are based on experiential learning.

Constructing the Curriculum

The onus is on AETs and JTEs to find the means to build continuity into the curriculum. The basic guidelines given by the BOEs are self-contained lesson units. Personally, I enjoy the challenge of looking for innovative ways to link lessons together to form a stream-like continuum.

Games, Songs & Chants

MEXT mentions the importance of both rhythmic activities and gestures in the class:

For children, exposure to English…is exposure to a new world, including not just words but also gestures and ways of thinking (*Practical Handbook for Elementary School Activities,* p. 127).

A few songs and chants that I have found that work well are:

- The Finger Family
- The Hokey Pokey
- If You're Happy And You Know It
- Who Stole the Cookies from the Cookie Jar?
- Did you ever see a Lassie?

On September 19, 2004, 20 students from our school participated in a municipal stage performance competition, and won an award for singing a traditional Ryukyu folk song in English. I translated the song into English, and along with a few of my colleagues, we gave up lunch hours for nearly two weeks to coach the children. The whole process was very empowering for our students, both in terms of language and culture.

Evaluation and Assessment

Simply, there is no formal evaluation for English classes at public elementary schools in Japan. Schools have formative listening tests at the beginning of the school year, and summative listening tests at the end of each term. However, students are not disclosed scores. These tests are designed merely to assess students' needs, and to inform teachers whether the planned curriculum and taught curriculum were actually learned, so they can revise accordingly.

Further, report cards only include comments on the students observed behavior, and all comments are good. MEXT believes that grading students would only cause some students to "dislike" English. Yet, teachers still need to know what has been achieved so they know where to take the curriculum.

Internationalization

MEXT strongly encourages classes that promote internationalization. In these regards, Matsugawa has initiated a video letter project for our fourth grade students. Further, we have invited guests to our school from Paraguay,

Bolivia, Argentina, Benin, Vietnam, Guinea, Mauritania, and the Solomon Islands.

Unique Initiatives

Our school's principal, Kenjirou Futori, has recently initiated the Matsugawa Project: a three year development plan which proposes to improve students' English ability, and to beautify our school's surroundings.

In the words of Mr. Futori: "Over the next three years, I hope to decrease class sizes, and to encourage teachers to individualize the curriculum based on students' needs." I certainly hope his plan comes to fruition. Yet, teachers need more than encouragement; they need training, too.

In Summary

Over all, I am hopeful for elementary education reform in Japan. Further, I believe MEXT has taken unprecedented steps to implement change. I would only caution that change be implemented slowly, yet constantly. If change is implemented too quickly, it may place unnecessary burden on HRTs who are not yet adequately trained nor psychologically prepared to assume the role as T1 English teachers.

Indeed, eventually having HRTs become T1 English teachers could lead to more effective teaching across the curriculum. Yet, I believe that AETs have a vital role to play in the internationalization of schools. With increased exposure to other cultures, the need for AETs may diminish. At present, I believe the need for AETs is still very real. However, the BOEs should hire competent AETs. Likewise, AETs should not take their charge lightly.

Also, I question the effectiveness of having two separate ministries running competing programmes. To prevent further ambiguity, the JET program should be gradually phased out. Also, MEXT could benefit greatly by hiring more qualified AETs from non-traditional countries such as the Philippines.

To end, perhaps the two greatest changes proposed by MEXT are its recognition that formal language learning must start at an early age, and that it must be taught through experiential, integrative means. These shifts in policy alone will help put English language education in Japan into better context. Surely, success will depend on careful implementation at the local level. MEXT has given the mandate. Now, local BOEs, schools, and teachers must deliver.

Keywords
Language reform, integrated study, interdisciplinary approach, local initiatives

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Name (as in NRIC): _____

Mailing Address: _____

_____ Postcode: _____

Contact No: (Home): _____ (Handphone): _____ (Office): _____

(Fax): _____ Email: _____

Organisation/School: _____

Occupation: _____ Sex: _____ Nationality: _____

Areas of Interest *(please tick all which apply)*

- ❒ Motivation
- ❒ Coaching Subordinates
- ❒ Habits of the Mind
- ❒ Curriculum Design
- ❒ Early Childhood Education
- ❒ Leadership Related Talks
- ❒ Others *(please specify)* _____
- ❒ Curriculum Differentiation Workshops
- ❒ Handling Difficult Colleagues / Students
- ❒ Pedagogical Practice
- ❒ School Assessment / Appraisal
- ❒ Organisational Behaviour
- ❒ Special Needs Education

What length and type of programme do you prefer? (please tick all which apply)

- ❒ Full day
- ❒ Half Day
- ❒ 2 hours
- ❒ 2 Days Conference
- ❒ Saturday Morning
- ❒ Lunch Time Talks
- ❒ Seminars
- ❒ Workshops

Membership Category (membership is not transferable)**:** *(please tick against type of membership selected*

Types of Membership	Fees Payable	Please tick
ORDINARY: *For those interested in supervision, curriculum & instruction*	S$30.00 per year	
INSTITUTIONAL: *For schools, institutions, libraries & educational societies*	S$300.00 per year	
LIFE: *For individuals*	S$500.00	

My payment for ASCD (Singapore) membership of S$ _____ is enclosed.

Payments by CHEQUE: Please cross and make payable to ASCD (Singapore).
Payments by IFAAS (no invoice will be issued): please process the payment immediately.
Ensure that either the Principal or Vice-Principal signs and rubber-stamps the application form, indicating that payment is through IFAAS before forwarding it to us. Our MOE Vendor ID is: MOE0100648.

Please post to:

The Secretariat
ASCD (Singapore)
c/o Tele-Temps Pte Ltd
1002 Toa Payoh Ind'l Park #06-1475
Singapore 319074

For official use only	
Date Received:	
Data Update:	
Card Issued:	
O/Receipt No:	
Membership No:	

Photocopies of this page are acceptable.

ASCD Courses

Available for Teachers and MOE Officers

The Ministry of Education (MOE) has acquired some ASCD courses for its officers. These are accessible through VITAL, the e-learning portal that provides teachers and MOE officers an alternative mode of training for their professional development and personal growth. MOE officers can access the courses on the Internet @ www.vital.moe.edu.sg.

➢ The ASCD courses on VITAL are

Title	VITAL Course Code
The Reflective Educator	G0114
Classroom Management: Building Relationships for Better Learning	G0115
Multiple Intelligences	G0116
Surviving & Thriving in Your First Year of Teaching	G0117
Memory and Learning Strategies	G0118
Student Portfolios: Getting Started in Your Classroom	G0119
Differentiating Instruction	G0120
Teacher Behaviour That Promote Assessment for Learning	G0121
Effective Leadership	G0122

➢ MOE officers can access and register for the above ASCD courses directly through VITAL by clicking on the register button under the General Courses in the Course Catalogue. Certifications of completion will be issued upon successful completion of these courses.

➢ As VITAL is linked by an interface to ASCD in the U.S., officers who register for these courses are able to interact with the ASCD trainers there as well as participate with other international participants in discussion on the ASCD portal.

➢ MOE has initially purchased 500 keys from ASCD for the 9 courses. Each key costs $146 and allows the officer a place in one of the above courses. The key is valid for one year from 1 Apr 2003 – 31 Mar 2004 allowing officers a year to complete the course.

➢ Officers have to register for a course before they can browse through the course on VITAL. Should a decision be made not to start on the course, they should de-register from the course or they will be classified as "not completing the course".

➢ Officers can use the online feedback system to evaluate the courses completed. This will help STB determine whether these courses would be offered again the following year.

➢ Should officers wish to discuss with our local experts any issue related to any of the above ASCD courses, they can e-mail the following ASCD Executive Council members, Dr Ang Wai Hoong whang@nie.edu.sg, Dr Cheah Yin Mee learning@pacific.net.sg or Mrs Soo Kim Bee kbee@gmt.com.sg.