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Curriculum as Praxis: Ensuring Quality Technical Education in Singapore for the 21st Century

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Abstract
Singapore, a small island city-state, has achieved notable economic advancement within 40 years since independence. It is fast becoming a global city and a knowledge society. In education and training, the Singapore system has evolved from its British roots. Macro performance indicators of participation rate, literacy rate and mean years of schooling, show that the current education system can be regarded as highly successful. The contributions of general education as well as technical education and training[1] to the overall success of the nation are often cited. Technical education and training, which is globally perceived as having a lower status than "academic" curricula, has largely overcome its "image" problem in Singapore. Singaporeans have seemingly embraced technical education and

[1] *Technical education and training* in Singapore is synonymous with *vocational and technical education* which is more commonly used elsewhere, and they are used interchangeably throughout this paper.

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training as an accessible, attractive mode of education, which therefore enjoys a high participation rate. The success and quality of technical education and training were affirmed when its main provider, the Institute of Technical Education, became the first educational institution in Singapore to win the Singapore Quality Award in October 2005. This paper provides a review of the contemporary education system and curriculum in Singapore with a focus on technical education and training vis-à-vis a vision of education and training in and for postmodern knowledge societies. Suggestions are made on how the technical education and training sector in Singapore can further develop and thrive in the 21st century, while continuing to be accessible and of high quality.

Keywords: curriculum; vocational & technical education; training; globalization; knowledge society; Quality; Performance.

Introduction

Singapore is a small island city-state established 43 years ago with an outstanding history of economic development. According to its Economic Development Board (EDB), in "the 1960s, Singapore was a third world country" (EDB, 2006a). Today it has a resident population (consisting of citizens and permanent residents) of 3.49 million and "ranks among the world's strongest and most vibrant economies" (EDB, 2006b). Its per capita GDP at Current Market Prices rose steadily from US$427 in1960 to US$26,833 in 2005 (Statistics Singapore, 2006a). Several publications have reviewed the successful economic growth of Singapore (Lee, 2000; Chiang, 1998; Huff, 1994), while many articles studying the success of Singapore's economy and education can be readily found on the web (Thatcher, 1993; Schwastz, 2000; Ng, 2001; Cavanagh, 2005; Inkpen & Wang, 2006; Al Jamal, 2006). Singapore's growing status as both a global city and a "knowledge society" is reflected in accolades and achievements cited on the Singapore EDB's homepage: "*Singapore—World's most globalized nation* (A.T. Kearney, 2005), *Singapore—Most competitive Asian economy* (Global Competitiveness Report, 2004–2005), *Singapore—Best place to live and work in Asia* (EIU Quality of Life Index, 2005); *Singapore—Best infrastructure in Asia* (Global Competitiveness Report, 2004–2005); and *Singapore—Best workforce in the world* (BERI, 2005)" (cited in EDB, 2006c). Singapore's contemporary population is broadly grouped into four major ethnic communities: Chinese, Malay, Indian, and Eurasians and others, roughly in the proportion of 76:14:8:2 (EDB, 2006d). Together with more than eight million visitors every year, Singapore is a notably cosmopolitan city where English is the language for business and government as well as for inter-racial communication.

With respect to education and training, Singapore has an established emphasis on multiracialism and meritocracy, with the intention of ensuring that every resident has equal opportunities to schooling and employment. Wong (2000, ¶ 4) credited this "emphasis on multiracialism and meritocracy [as having helped to] build multiracial harmony out of diversity in Singapore, and fuelled our economic development over the past three decades." A close look at "Key Indicators of Education and Literacy" provided by Statistics Singapore (2006b) shows that in 2004, the combined Gross Enrollment Ratio—a proxy to participation rate—reached 87.4% and the Literacy Rate has increased to 94.6% while the Mean Years of Schooling is 8.8 years. These indicators demonstrate the success of Singapore's education system. Yet, both national and international readers may well pose questions of how "success" is portrayed and perceived in Singapore and, more particularly, of what implications the success has for the Singapore society.

This paper presents a critical policy analysis that focuses on Singapore as a knowledge society considering its general education and technical education and training systems. It engages with key policies of these seemingly successful systems in relation to issues and insights provided by two sources of work with a vision of education and training in postmodern knowledge societies; Hargreaves (2003) and Grundy (1987). The first section of the paper develops the framework for critical policy review. The second section of the paper focuses on where contemporary education, and technical education and training curriculum and practices in Singapore appear to be positioned when compared to the vision represented in the framework. The third section presents challenges, measures and changes that are arguably needed for Singapore's technical education and training to transit and thrive in the 21st century. We begin, therefore, by engaging with the notion of Singapore as "a knowledge society."

Singapore as a Knowledge Society

The impact of globalization is visible in the Singapore economy and the day-to-day lives of Singaporeans. For better or for worse, Singapore is fast becoming what may well be termed "a knowledge society." Among the indicators of this development are Singapore's ranking as #1 in World's Top 20 Most Globalized Nations, according to A.T. Kearney/Foreign Policy Magazine Globalization Index 2005, and Singapore's position as one of world's top seven "Intelligent Communities of the Year," according to Intelligent Community Forum 2005 (EDB, 2005e). The question of how ready the general education and technical education and training systems in Singapore are to help prepare its citizens and residents for the knowledge society which is definitely "at our doorsteps if not already here" is therefore very pertinent. Inquiry into that readiness necessarily requires, however, that we firstly acknowledge important characteristics of the contemporary context and its historical and cultural origins.

Education in Singapore

The Singapore education system evolved from an English model. Superficially, the contemporary general education model for primary and secondary school years features tracking (or streaming) and is centrally managed, highly structured, stratified and differentiated with a clear academic/technical divide. Figure 1 depicts the structure of the Singapore education system as presented by the Ministry of Education (2002, Annex). It shows that all students sit for the Primary School Leaving Examination (PSLE) at the end of Year Six when they are 12 years old. Depending on their results, they are tracked into Normal (Technical), Normal (Academic), Special and Express courses. They then follow different academic/technical pathways in the secondary schools and take different examinations (GCE N-level or GCE O-level) at the end of Year 10 when they are 16 years old. The system is thus highly structured and tracked with a clear distinction between academic and technical routes. In an academic route, students follow either the Special or Express course in secondary schools and proceed to junior colleges and then universities. In a technical route, students follow either the Normal (Academic) or Normal (Technical) course in secondary schools and join the Institute of Technical Education (ITE) or polytechnics. The system does, however, provide pathways for students who do well in the ITE and polytechnics to continue their education in the universities.

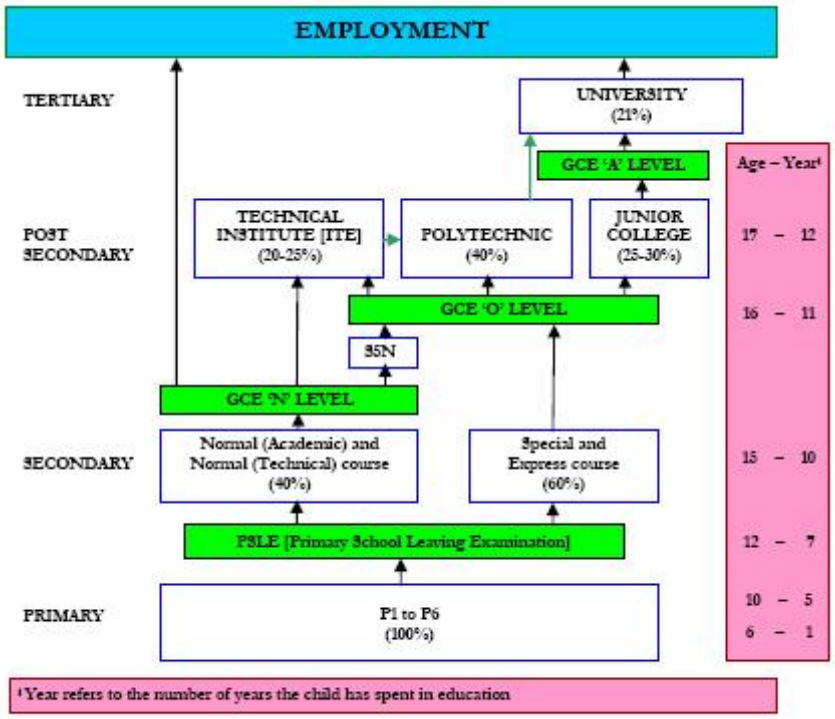

Figure 1
Structure of the Singapore Education System. Source: (MOE, 2002, Annex)

Technical Education and Training in Singapore

Like Singapore as a nation, technical education and training has a relatively short history. A national system of training was adopted primarily to support the manpower needs of industrialization after independence. Since then, the system has undergone several transformations (Law, 1996), from vocational institutes within the school system in the 1960s to the creation of Industrial Training Board outside the school system in 1973 and the formation of Vocational and Industrial Training Board as a Statutory Board in 1979. Finally, the Institute of Technical Education (ITE) was established in 1992 as a post-secondary institution and the national institution responsible for providing technical education and training to school leavers and working adults. As shown in Figure 1, ITE is an integral part of the national system of education and training in Singapore today. The mission of ITE is "To Create Opportunities for School Leavers and Adult Learners to Acquire Skills, Knowledge and Values for Lifelong Learning in a Global Economy" (ITE, 2005a). With this mission, the ITE education and training system essentially caters to between 20–25% of a cohort leaving their secondary education with lower academic achievements. It provides practical hands-on training to equip students with skills for employment and a learning environment that is designed to develop students into confident, independent and thinking practitioners, able to cope with constant changes around them, have passion for what they do and care for the community and society. The ITE space in Singapore's society is important in several respects. It serves to occupy the fresh school leavers (youths) and focus them on learning skills for employment and thus, be positioned to contribute to society in their adult years. Although it is well recognized that vocational and technical training is perceived as having a lower status the world over as compared with its academic counterpart (Metzger et al, 2001), ITE has largely overcome this image problem. Today,

Singaporeans embrace it as an accessible and attractive alternative, enjoying a cohort participation rate of 27% compared with a national target of 25% (ITE, 2005b). In October 2005, in recognition of its status as a world-class institution of excellence in technical education, ITE became the first educational institution in Singapore and one of 22 organizations to win the prestigious Singapore Quality Award (SQA) since it was launched in 1994. Such achievements undoubtedly paint an impressive picture of educational innovation and development. However, critical policy review remains fundamental if such advancements are to be sustained in and aligned with changing national and international economic, political, and social contexts.

A Framework for Critical Policy Review

As a newly developed nation, Singapore represents one notion of a developing knowledge or learning society. The terms *knowledge society* and *learning society* are often used interchangeably in the literature. For example, Hargreaves (2003) states that "a knowledge society is really a learning society" (p. xviii) and Guttman (2003) wrote about "the challenge every country faces in becoming a learning society, and the importance of ensuring that citizens are equipped with the knowledge, skills and qualifications they will need in the twenty-first century" (p. 19) in a chapter entitled "Towards Knowledge Societies." As such, the term *knowledge society* will be the term used in the rest of this paper, taken to simultaneously embrace notions of a *learning society*.

This paper uses two main sources of work with a vision of education and training in postmodern knowledge societies: Hargreaves's (2003) *Teaching in the Knowledge Society* and Grundy's (1987) work exploring curriculum as "product or praxis." Specifically, we draw on concepts from these two sources to critically review contemporary curriculum policies and practices in Singapore, with the aim of illuminating good practices and identifying what may be regarded as gaps or shortcomings in the current general education as well as technical education and training systems. The concepts drawn from Hargreaves (2003) and Grundy (1987) are the theoretical basis for suggestions on how the technical education and training sector can further develop to support the further growth and prosperity of postmodern Singaporean as a knowledge society. Supporting information, arguments and counter-arguments are drawn from journal papers in the *Educational Policy Analysis Archives* (EPAA), speeches and publications from the Ministry of Education in Singapore (MOE), and contemporary academic literature with a focus on education and curriculum aligned with notions of information (Guttman, 2003) and *knowledge* or *learning societies* (Young, 1998).

Teaching in the Singaporean Knowledge Society

As a developing knowledge society, the question of whether the education systems, curriculum and educational professionals in Singapore are ready to provide general education or technical education and training for a knowledge society is an important one. Hargreaves (2003) presented three perspectives of teachers and teaching in a knowledge society—*teaching despite* the knowledge society, *teaching for* the knowledge society and *teaching beyond* the knowledge society. Variously, the three perspectives provide contrasting visions for the role of teachers, the nature of their work, the sort of learning and learners that an education system is concerned (and designed) to develop.

From the perspective of *teaching despite* the knowledge society, teachers are "trapped in an infernal triangle of competing pressures and expectations in the knowledge society" (p. 59) and become its casualties. Teachers as casualties teaching in and despite the knowledge society "find themselves increasingly preoccupied with coaching children for standardized tests" (ibid). They have little or no academic and professional freedom, and more often than not they find themselves "pressured to teach as they are told. Research in best classroom practice is imposed on them rather than being a source of professional reflection and adaptation to teachers' own classroom circumstances" (ibid). Focus on key performance indicators and results reduces essential partnership and relationships with parents for support in pupils' learning to either "market transactions where schools treat parents as consumers, or to defensive reactions which characterize parents as interfering complainers" (p. 60).

From the perspective of *teaching for* the knowledge society, teachers are expected "to be catalysts of the knowledge society, to be the key agents who can bring it into being" (p. 15). As catalysts, teachers teaching in and for the knowledge society are "concerned with sophisticated cognitive learning, an expanding and changing repertoire of research-informed teaching practices" (p. 20). They are mature professionals and avid lifelong learners who practice "continuous professional learning and self monitoring, teamwork, learning partnership with parents, developing and using collective intelligence, and cultivating a profession that values problem-solving, risk-taking, professional trust, coping with change and committing to continuous improvement" (ibid).

From the perspective of *teaching beyond* the knowledge society, teachers must "address other compelling human values and educational purposes in addition to those that make a profit—purposes concerned with character, community, democracy and cosmopolitan identity" (p. 43). Therefore, from this perspective, teaching means serving as a courageous counterpoint for the knowledge society in order to foster the values for society, community, democracy, humanity, and a cosmopolitan identity. It means not just delivering values but being driven by values. Teachers as counterpoints teaching in and beyond the knowledge society are thus "concerned with character as well as performance, with social and emotional as well as cognitive learning, with personal and professional development as well as professional learning, with group life as well as teamwork, with caring as well as cognition, with preserving continuity and security alongside promoting risk and change" (pp. 50–51). The broader concern of *teaching beyond* the knowledge society includes "developing social capital, laying the emotional foundations of democracy and creating the kernels of cosmopolitan identity" (p. 51).

Today, Singaporean educators in schools and in technical education specifically come from varying backgrounds with a wide spectrum of knowledge, skills, values, and experience. Many who started their teaching careers in the 1960s and 70s are still in the system. We might well hypothesize that a good number of them would hang on to the good old days and identify themselves as *teaching despite* the knowledge society. Meanwhile, "up-to-date" lifelong learners and younger educators would be in tune with the fast changing world and might say that they are *teaching for* the knowledge society. Yet few could be expected to have the professional maturity and academic insights to *teach beyond* the knowledge society.

For an official stance on these matters, then-Prime Minister Goh (1997) declared the following vision of Singapore's education system known as *Thinking Schools, Learning Nation* (Goh, 1997):

> It is a vision for a total learning environment, including students, teachers, parents, workers, companies, community organizations, and government.… to develop stronger bonds between pupils and a desire to contribute to something larger than themselves.… Every school must be a model learning organization. Teachers and principals will constantly look out for new ideas and practices, and

> continuously refresh their own knowledge.… to the individual, it offers satisfaction in being able to exercise innovation, demonstrate initiative and enjoy the freedom to participate in improving his own life as well as his community and nation (¶¶ 17–33).

While ministerial pronouncements and official policies arising from government arenas are political and never value-free, elements of *teaching for* and *teaching beyond* the knowledge society are apparent in the declaration. Subsequent sections of this paper will use this vision of education and training in the postmodern knowledge societies as well as concepts and teaching and learning theories as proposed by Hargreaves (2003) to inform the macro-level review of the key developmental stages in Singapore's general education and technical education and training systems to their contemporary forms. Before advancing that discussion, we must necessarily turn our attention to the second key source that informs the framework for our policy analysis.

Curriculum as Praxis

Few would disagree with the statement that education and training in and for knowledge societies must aim to be inclusive and open to develop the human capacity of all to benefit from the development and progress of societies. Yet it is crucial to acknowledge that how curriculum is perceived and organized influences the process of teaching and learning. The concept of curriculum is key in understanding the possibilities and limitations of educational reforms. In postmodern knowledge societies, a key feature is the rejection of meta-narratives, stories which purport to explain the world, history, truth and practices. Thus Lyotard (1984), the person who first coined the term *postmodernism*, defined "postmodern as incredulity toward meta-narratives" (p. xxiv). Postmodernists view knowledge as the product of discourse, not something which is independent of human minds. It is subjective and changes with time according to prevailing environment and situation. Hence for postmodern knowledge societies, viewing curriculum "as praxis" (Grundy, 1987) appears the way forward to develop and maximize the potential of each and every individual. Curriculum as praxis (Grundy, 1987) is a conceptualization of curriculum derived from an orientation towards human well-being and which makes an explicit commitment to emancipation of the human spirit. Hence, it moves the teaching and learning process to critical pedagogy as Grundy describes—"a process which takes the experiences of both the learner and the teacher and, through dialogue and negotiation, recognizes them both as problematic" (p. 103).

Grundy notes that critical pedagogy "places control of knowledge (that is, both the production and application of knowledge) with the learning group rather than elsewhere" (p. 104). Students and teachers are encouraged to confront real problems together. They are encouraged to think and reflect critically and develop these skills further. In working together, they develop an understanding of their respective pedagogical roles and what others expect of them in the learning process. As a learning group, they need to work out an action proposal for essential "content" and for outcomes of the educational encounter. The learning process and outcomes are continually evaluated based on the dynamic interaction of the learning group. Hence, the curriculum itself develops with the learning process. As Grundy puts it, "the curriculum is not simply a set of plans to be implemented, but rather is constituted through an active process in which planning, acting and evaluating are all reciprocally related and integrated into the process" (p. 115). As such, praxis takes place in the real world and at the center of praxis is informed and committed action. The key concern here is for students to make sense of the concepts and theories as well as find meaning and connection to real world applications of knowledge in their learning journey.

Based on one of our (Tiew Ming Yek's) personal experiences, the idea that curriculum is dynamic and develops with the learning process according to the dynamic interaction of the learning group does not fit well into the structured, skills- and standards-driven technical education and training curriculum in Singapore. Indeed, it seems likely to be alien to most of the educators in the technical education and training sector, but nevertheless, it is a potentially important and powerful basis from which to consider the future development of technical education and training in Singapore. Necessarily, any consideration of prospective future developments must be grounded in an understanding of the historical, societal, political and contemporaneous context. Contextual discussion provides the basis from which we will consider the relative readiness of and changes needed for technical education and training in a postmodern knowledge society within Singapore.

Contemporary Curriculum and Practices in Singapore

In terms of a number of measures, the success of Singapore's education system over the past 40 years has been significant. Available data shows that educational attainment indicators compare well with the developed countries, for example: the literacy rate in Singapore reached 93% in 1997 compared with 99% for US and Japan in the same year; mean years of schooling is 7.8 in Singapore in 1997 compared to 12.4 in US and 10.2 in Japan in 1992; and research scientists and engineers per 10,000 labor force is 60.2 in Singapore in 1997 compared to 109.8 in Japan in 1997 and 75.2 in US in 1993 (Teo, 1998, annex). The evolution of Singapore's education system can be looked at in three stages. Before independence, education was for the elite and accessible only to well-connected minority. After independence, mass education existed with an efficiency-driven education paradigm. In the contemporary education system, the official stance is in favor of holistic education with ability-driven education paradigm given the vision of *Thinking Schools, Learning Nation* (Goh, 1997, ¶ 17).

The development of technical education and training in Singapore took a relatively independent path compared to the general education system (with primary, secondary and junior college levels). In the beginning, the discourse for technical education and training was a clear case of national economic direction and the concomitant skilled manpower needs. Law (1990) recorded that the "first vocational institute … was set up within the school system in 1964. With an increasing pace of industrialization, there was a growing concern on how best to expedite and expand the vocational training system to meet the manpower requirements of the emerging industry.… By 1972, there were [nine] vocational institutes. The annual output of graduates increased over [10]-fold from 324 in 1968 to over 4,000" (p. 4). Since then, the system's structure has undergone several evolutions, from a system of vocational institutes within the school system in the 60s to the creation of Industrial Training Board outside the school system in 1973, the formation of Vocational and Industrial Training Board as a Statutory Board in 1979, and the establishment of the Institute of Technical Education (ITE) as a post-secondary institution in 1992 (Law, 1996).

The establishment of ITE as a Statutory Board in 1992 is a key milestone for Technical Education and Training in Singapore. It marked the beginning of an era that saw ITE going through three clear phases of transformation. The first phase was the transition from a lowly vocational training institution with a poor public image towards an established post-secondary institution. The second phase was from an established post-secondary institution towards a world-class technical education institution. Indeed, ITE is today recognized as a world-class institution after becoming one of three Singapore Quality Award (SQA) winners in October 2005. ITE became the first educational institution in Singapore, and one of 22 organizations to win the prestigious SQA since it was launched in 1994 (SPRING Singapore, n.d.). With the Prime Minister as its patron, the SQA is

described as "the most prestigious award conferred on organizations that demonstrate the highest standards of business excellence in Singapore" (SPRING Singapore, n.d.). Essentially, the business excellence model underpinning the SQA is based on universally accepted standards also found in the US Malcolm Baldrige National Quality Award, the European Quality Award, and the Australian Business Excellence Award. The third and current transition is from a world-class institution towards a global leader in technical education. A roadmap defined as the ITE Advantage Plan has been developed to guide ITE—as an educational institution—towards its vision of becoming "A Global Leader in Technical Education" in five years (2005–2009). Major changes relevant to the discussion on the knowledge society through the three phases of transformation include seven components: introduction of a restructured training system, introduction of an Institute Attachment Program, construction of a new curriculum structure, introduction of the ITE pedagogical model, formulation of the ITE information technology master plan, formulation of a global outreach strategy, and formation of an applied research center for vocational and technical education.

Amidst all the changes and developments, both the general education system and the technical education and training systems have emerged as unified national systems, with "multiracialism" and "meritocracy" as policy pillars that aim to provide equal opportunities for each student to learn and achieve their highest potential within the system. In turn, multiracialism ensures that the bilingual policy would become a cornerstone of the education system. While English is the medium of instruction and the first language in schools, every student is also taught their mother-tongue as a second language for the purpose of transmitting moral values and cultural traditions. English, as the common working language, enables inter-racial communication and facilitates the emergence of a common or even universal work and organization culture. In addition, English provides access to the world of knowledge and technology, and others in the world. Meanwhile, meritocracy recognizes and rewards everyone who works hard and excels, gives equal opportunities to everyone, regardless of ethnicity, class or gender. Indeed, under this system, the minority groups have made big strides in social mobility through their own efforts. In essence, meritocracy is highly compatible with the multiracial model of society. It allows all ethnic groups to advance in various fields, solely on the basis of achievement, merit and hard work.

In the following subsections, the changes and developments in general education and technical education and training systems are examined vis-à-vis visions for knowledge society. In Hargreaves' (2003) terminology, are we *teaching for* and *teaching beyond* the knowledge society? Or, are we still *teaching despite* the knowledge society? Are developments informed by and serving to reaffirm Grundy's (1987) articulation for curriculum as praxis?

Teaching despite the Knowledge Society

For general education, the efficiency-driven education paradigm adopted in the 1960s and 70s is akin to Hargreaves' (2003) perspective of *teaching despite* the knowledge society. This is related to the fact that during the early years of nation-building, Singapore's government had to concentrate on providing mass education to equip the young with employable skills including literacy and numeracy skills that were crucial to the nation's earlier phase of industrialization. The view that literacy and numeracy skills are important employable skills for industrialization is shared by Mark, Macmillan, and Ainley (2004) who noted that in Australia today at "the macro-economic level there is [still a] strong case to improve student performance in literacy and numeracy, since the economy is likely to be increasingly reliant on industries based on the manipulation of symbols (words and numbers)" (p. 3). Mass education was achieved through an efficiency-driven education paradigm which provided a single curriculum and common examinations for all students in the

country. At that time the dominant discourses for education were national survival and contribution to the economic well-being of the country.

For a newly independent country with few natural resources, coupled with a poorly educated population, the move to equip the young with employable skills made a lot of sense. Teachers then were pressured by the need for an educated workforce in a hurry. Minimal resources were available. The state of the economy and society was rather backward, and globalization and the knowledge society were unheard of. With a mass education approach using the efficiency-driven education paradigm or *teaching despite* the knowledge society, the country was able to lift its general education profile (especially in equipping the young with employable skills), progress with industrialization, and improve its economy. The strategy clearly worked. Phenix, Siegel, Zaltsman, and Fruchter (2005) also documented the case of "A Forced March for Failing Schools: Lessons from the New York City Chancellor's District" where a centralization and standardization approach akin to some aspects of *teaching despite* the knowledge society has worked well. In their conclusion, Phenix et al. (2005) noted that by "developing, mandating and implementing a comprehensive set of organizational, curricular, instructional and personnel changes, the Chancellor's District significantly improved the reading outcomes of the students in those schools, in three years of focused effort. This is not a small accomplishment" (p. 21).

For technical education and training, the paradigm employed in the early years was also very close to *teaching despite* the knowledge society (Hargreaves, 2003). The initial years were typical of any community or country embarking on industrialization as a means to diversify or grow the economy. There would be shortage of skilled manpower, and by necessity a vocational training system would be adopted to train relevant skilled manpower for the industry. In Singapore, the vocational training system known locally as *technical education and training* was rapidly developed and expanded to meet the needs for trained manpower with technical skills. It was highly structured and centrally regulated and managed. Metzger et al. (2001) reported that to "ensure efficiency, Singapore undertakes centralized manpower planning—a relatively rare practice compared to that of other countries in which, for example, a ministerial level council sets intake targets for each educational institution to support economic growth" (p. 49). The focus was to train the students and equip them with relevant and practical hands-on skills for employment. Standardized curriculum and summative examinations and practical assessments were the normal practice.

Today, ITE has created and articulated a *Hands-on, Minds-on, Hearts-on* technical education and training for ease of understanding and acceptance (ITE, 2005b). *Hands-on* refers to the core skills training that every student receives depending on the course chosen. The focus is to equip students in their chosen course with practical skills required for them to perform in the relevant professional jobs that the course has prepared them for. *Minds-on* refers to the life-skills training that all ITE students will receive regardless of the course chosen. The focus is to equip all students with generic and transferable skills required for them to perform in any professional job in the knowledge-based economy such as information technology skills, teamwork skills and independent-learning skills. *Hearts-on* refers to the development of a civic mindset so that ITE students will contribute to and care for the well-being of society, community, environment and fellow human beings. In relation to perspectives of teaching in the knowledge society as articulated by Hargreaves (2003), *hands-on* is still done through an approach based on *teaching despite* the knowledge society as the focus is on ensuring that students acquire a set of core skills for a specific course and the training methodology or pedagogy is traditional and instructional.

Teaching for the Knowledge Society

The general education system in Singapore today has shifted from the efficiency-driven education paradigm to an ability-driven education paradigm. The move towards the ability-driven paradigm basically started with a declaration by Mr. Goh Chok Tong, then Prime Minister, on the aspiration of Singapore's education system towards a national education vision of *Thinking Schools, Learning Nation* (Goh, 1997). From this declaration by the nation's political leader, the dominant discourse for education seems to have shifted from national survival and economic contribution to maximizing potential and improving lives. Within the vision of *Thinking Schools, Learning Nations*, components of *teaching for* and *teaching beyond* the knowledge society as articulated by Hargreaves (2003) are inherent, and some elements of critical pedagogy are present. Examples of *teaching for* the knowledge society include the exhortation that "every school must be a model learning organizations.… Teachers must be given time to reflect, learn and keep up-to-date" (¶ 23) and for "hands-on experiences and interesting them in real world technologies" (¶ 30).

Following the vision of *Thinking Schools, Learning Nation*, the system for an ability-driven education paradigm was outlined in a speech by Mr. Teo Chee Hean, then Minister for Education at the Annual Workplan Seminar for the Ministry of Education. In the speech, "the system" was to deal with the practical bolts-and-nuts issues in getting the ability-driven education paradigm to work towards the vision (Teo, 2000). It pointed towards *teaching for* the knowledge economy as being the immediate concerns and the dominant direction. He referred to "the Government's commitment to education by … [increasing] spending on education from 3.6% to 4.5% of GDP over the next few years" (¶ 3). He talked about the need to create "a conducive physical environment, improving support for teachers, and recruiting and retaining a quality teaching force… [to provide] good administrative support… [and] to build a quality teaching force for the 21st century" (¶¶ 9–13). The importance of leadership in schools and focus on people in order for ability driven education to happen was stressed. A system of school autonomy with responsibility, freedom to act and accountability was outlined. In the minister's own words "education gives every child a fair shot at achieving his or her hopes and aspirations" (¶ 39). Other politicians have also highlighted components of *teaching for* the knowledge society in the contemporary education system at various times. In a speech by Dr. Aline Wong, then Senior Minister of State for Education, she associated the "system of streaming" (or tracking) (Wong, 2000) with ability-driven education paradigm. According to her, when a system of tracking was introduced in the 80's, for "the very able, there are programs to stretch them to the maximum. For those who are not academically inclined, streaming helps ensure that they acquired the basic literacy and numeracy skills, as well as prepare them for technical and vocational training" (¶ 11). More recently, Mr. Hawazi Daipi, then Senior Parliamentary Secretary, Ministry of Education, spoke about "arts education [playing] an important part in an ability-driven education system. It provides our students with a broad-based educational experience by nurturing their creativity and imagination… arts add depth and dimension to the world we live in and shape our everyday experience" (Daipi, 2005, ¶ 2).

For technical education and training, the emphasis on *minds-on*— in ITE's *Hands-on, Minds-on, Hearts-on* education and training—can be interpreted as *teaching for* the knowledge society as the focus here is on equipping all students with generic and transferable skills required for them to perform in any professional job in a knowledge-based economy. Examining the development of ITE since its establishment in 1992 also points towards *teaching for* the knowledge economy as being the immediate concerns and the dominant direction. Relevant changes that highlight the move towards *teaching for* the knowledge economy include the following: introduction of a restructured training system, introduction of an institute attachment program, construction of a

new curriculum structure, articulation of ITE pedagogical model, formulation of the ITE IT master plan, and formation of an applied research center for vocational and technical education.

The restructured training system has a modular credit-based training system as its key feature. It was the first step towards giving the curriculum more flexibility. Young (1998) described "modularization as a way of organizing a flexible curriculum into small blocks of learning which can be combined together in different ways" (p. 80). With a modular system, the "possibility of student choice and new combinations of study that can relate student purposes to the options a society has for the future" (p. 91) can be achieved. So this is an initiative that moves the curriculum towards *teaching for* the knowledge economy.

The two-day Institute Attachment Program was introduced to all secondary two normal (technical) track students to enable them to appreciate the relevance of technical education to employment and career progression. The importance of linking work and career options to training courses offered by ITE and to academic subjects in secondary schools to promote lifelong learning cannot be over-emphasized. It is a key feature of *teaching for* the knowledge economy. With an understanding of the relevance of knowledge acquired to real-world employment and career progression, students would be more interested and motivated to continue their studies and at the same time, more able to make an informed choice concerning the courses they should embark on once they leave secondary school. This is similar to the strategy used by Scottish Executive (2005) which stated "In our lifelong learning strategy… to encourage locally relevant links between schools, FE [(Further Education)] colleges and local employers to ease school leavers' transitions into further learning, training or employment" (p. 12).

The new curriculum comprises 80% core skills modules, 5% elective modules, and 15% life-skills modules. The aim of the core skills modules—which are specific to each course of study—is to equip graduates of a specific course with the core skills required to contribute to a range of professional works or careers that the course is training them for. To ensure that the list of core skills is relevant and up-to-date, the list and course curriculum are reviewed at least once every three years with teachers needing to continuously self-monitor and upgrade themselves professionally. In some fast changing info-communication technology courses, minor reviews are carried out once every year and major reviews once every three years. The elective/specialist modules aim to cater for students who wish to take up cross-disciplinary studies as well as those who are interested to explore some subject matters in greater depth. Lastly, the life-skills modules cut across all courses and they are meant to be taken by all students. The full range of life-skills modules aims to develop students' ability to be effective and help them acquire life-long learning skills so that they can remain employable as the economy and job availability change. These are all important features of *teaching for* the knowledge society.

In their review of the Northern Ireland Key Stage 3 curriculum (for students aged 11–14 years), the Centre for the Curriculum Examinations and Assessment (CCEA) highlights the importance of these life-skills: "[T]o optimize life-long learning and potential success… young people need to have opportunities to develop effective personal and interpersonal skills and critical and creative thinking skills as part of their all round education" (CCEA, 2003, p. 1). Overall, the introduction of life-skills modules and the elective/specialist modules has the effect of weakening the classification between courses, offering more breadth and flexibility instead. The new curriculum structure addresses some areas of the suggestion, outlined in the Institute of Public Policy Research (IPPR) Report A British Baccalaureate (Finegold et al., 1990, cited in Young, 1998), that a curriculum for the future would need to build on and give specificity to the principles of: breadth and flexibility; connections between both core and specialist studies and general (academic) and applied (vocational) studies; opportunities for progression and credit transfer; and a clear sense of purpose of the curriculum as a whole (p. 79). The intent of the new curriculum structure at ITE is to

prepare graduates for the knowledge society. Together with the ITE pedagogical model which is discussed next, they address many aspects of the perspective of *teaching for* the knowledge society.

The ITE pedagogical model is positioned as a student/learner-centered pedagogy. It adopts a problem or project-based learning paradigm. In a typical learning project, students work in teams. They are facilitated through a Plan–Explore–Practice–Perform (PEPP) cycle. During the Plan stage, a student team and their teacher-facilitator go through a planning exercise together to define the learning plan, activities and objectives. The Explore stage allows the students to practice working together as a team, exploring and sharing their findings, and refining the learning plan, activities and objectives where appropriate. The Practice stage allows the students to try out their solutions and refine them where necessary. Finally, the Perform stage allows the students to implement and present their solution. With this PEPP approach, teachers play the role of a facilitator or coach by the side and enable students as learners to acquire not just technical skills, but also methodological and social skills. This changing role of teachers further weakens the traditional framing of the teacher-student relationship. It is no longer a case of "teachers teach and students learn." Spanning real-life problems, learning plans, explorations, discussions, presentations, and trial implementations built-in for learning activities, the ITE pedagogical model is positioned to ensure that students acquire the necessary skills to be effective in the knowledge society. A teacher acting as a facilitator or coach by the side is to "teach" less but work a lot harder in researching and developing the right real-life problems and context in order to bring about active learning by students. Mapping these activities to Hargreaves' (2003) perspectives, teachers are therefore *teaching for* the knowledge society.

The aim of ITE's IT master plan is to leverage information and communication technology, software applications, and multimedia rich digital content to develop independent life-long learning skills, to enhance and speed up learning, and to facilitate exploration and just-in-time learning as well as to enable asynchronous discussion and communication in a team environment. All students going through the ITE education and training today are required to take an independent learning module equivalent to 200 curriculum hours using the eLearning mode. They can also use the Internet for their research or pick up relevant knowledge and skills for their projects or simply for their own interests. In a knowledge society, the use of technology is an essential part of life-long learning in educational institutions as well as at the workplace. Hargreaves (2003) stated that "aspects of knowledge society depend on having a sophisticated infrastructure of information and communication technology that makes [all this] learning faster and easier" (p. 9). The provision of easy access to sophisticated information and communication technology for learning activities is therefore a critical investment to prepare students for the knowledge society.

As an aspiring global leader in technical education, ITE is in the process of setting up an applied research center for vocational and technical education to conduct applied research as well as encourage the development of new ideas to advance the knowledge frontier. With research-informed teaching practices, continuous professional learning and commitment to continual improvement as key concerns of teachers teaching in and *teaching for* the knowledge society, the applied research center for vocational and technical education would help a long way in moving teachers towards *teaching for* the knowledge society.

Teaching beyond the Knowledge Society

While *teaching for* the knowledge society is the dominant direction of the ability-driven paradigm for the general education system in Singapore today, components of *teaching beyond* the knowledge society can also be found. In the initial declaration by Mr. Goh Chok Tong, then Prime Minster, he talked about giving students and the individual "freedom to participate in improving his own life as well as his community and nation" (Goh, 1997, ¶ 33). Focus on participation and improvement of community as well as the nation is clearly about *teaching beyond* the knowledge society. In recent years, the education system in Singapore has increasingly focused on quality and choice in learning. Mr. Tharman Shanmugaratnam, the current Minister for Education spoke about "Achieving Quality: Bottom Up Initiative, Top Down Support" at the Ministry of Education Singapore Annual Work Plan 2005 Seminar (Tharman, 2005). He highlighted a number of issues that are relevant to *teaching beyond* the knowledge society:

> [T]wo key thrusts… "Teach Less, Learn More" (TLLM) … goes to the core of quality in education. It is about a richer interaction between teacher and student—about *touching hearts and engaging minds*… We will … [reduce] the amount of content in the curriculum … [and] build space into our teachers' weekly timetable to give them the time to reflect and share … have many prototypes, different designs of TLLM, eventually spreading into a mosaic of practices… give schools more ownership and encourage greater emphasis on *character development*. … Teachers and school leaders will have to *touch the hearts of their students*, and *engage their minds*. This is what we all know gives the real quality that shows up many years later (Tharman, 2005, September, ¶¶ 11- 99; added emphasis).

For technical education and training, the *hearts-on* component—in ITE's *Hands-on, Minds-on, Hearts-on* education and training—essentially addresses issues surrounding *teaching beyond* the knowledge society. "Hearts-on," like *teaching beyond* the knowledge society, focuses on contributing to the well-being of society, community, environment and fellow human beings. Programs that are relevant to *teaching beyond* the knowledge society include: articulation of the ITE pedagogical model and formulation of a global outreach strategy. Teachers facilitate by using the ITE pedagogical model—PEPP—and act as counterpoints *teaching beyond* the knowledge society. As they play the role of a facilitator or coach by the side and enable students as learners to acquire social skills, they can design and engage students in learning activities that develop their characters, engage the community, and develop social capital. Hence, they are *teaching beyond* the knowledge society. The global orientation expressed in the ITE Advantage Plan would see ITE participating and playing a more visible role on the international stage (Institute for Technical Education, 2005a). It would see ITE reaching out through international conferences organized with themes that focus on technical education and training at international locations. In terms of teaching and learning activities, a global education program was conceptualized and implemented. Through this program, every year, some 5–10% of ITE staff and students will have the opportunity to visit locations all over the world for community services as well as educational and training purposes. In addition, the aim is to bring the world to ITE staff and students through sharing seminars and cultural awareness workshops, facilitated by international students as well as participants who have had the opportunity to visit an overseas location. This new dimension in global outreach is compatible with Hargreaves' (2003) perspective of *teaching beyond* the knowledge society. The importance of looking at the

global dimension is also supported by Guttman (2003) who pointed out that "education is both a fundamental human right and a key to sustainable development and peace within and among countries…. [and] the reality of growing interdependence between nations" (p. 11).

Critical Pedagogy: Developing a Habit of Inquiry

At the Ministry of Education Singapore Annual Work Plan 2005 Seminar, Mr. Tharman Shanmugaratnam, the current Minister for Education, spoke about "shifting the balance in education, from learning content to developing a habit of inquiry" (Tharman, 2005, ¶ 2). The call for "developing a habit of inquiry" would necessitate a move towards critical pedagogy, a cornerstone of the *curriculum as praxis* model presented by Grundy (1987). From the speech, it is apparent that the political leadership understands the issues that need to be addressed for general education to function well and deliver what is expected of it in a knowledge society. The education system of Singapore is progressing towards one that would exhibit many features of Hargreaves' (2003) perspectives on *teaching for* and *teaching beyond* the knowledge society and Grundy's (1987) *curriculum as praxis* model of curriculum theory. Overall, for the vision of *Thinking Schools, Learning Nations* to be realized, *curriculum as praxis* must be well understood and internalized by those in the teaching profession, and all educators should be involved with praxis.

For technical education and training, there is potential to leverage the ITE pedagogical model and its applied research center for vocational and technical education as catalysts toward *curriculum as praxis*. With PEPP, learning activities can be planned and geared toward active learning and take an orientation towards human well-being and emancipation. As a result of active learning, actions will be both informed and committed. With applied research conducted within a dynamic technical education and training environment, a culture for critical pedagogy can be encouraged and developed. To move towards the actualization of *curriculum as praxis*, it is important that teachers are actively involved in professional development, working together collaboratively and learning from and challenging each other to arrive at informed and committed actions.

Through applied research activities using an action-research method, teachers as professional learners can acquire the skills to engage in active critique and develop a critical consciousness. As Grundy (1987) highlighted, with "praxis in action… learners should be active participants… learning experience should be meaningful to the learner… learning should have a *critical focus*" (p. 101; added emphasis). Also, Hargreaves (2003) argued that teaching "in the knowledge economy requires levels of skills and judgement far beyond those involved in merely delivering someone else's prescribed curriculum and standardized test scores. It requires qualities of personal and *intellectual maturity* that take years to develop" (p. 51; added emphasis). An applied research center that focuses on issues related to technical education and training and simultaneously involves teachers as part of a professional learning community will certainly help equip teachers with the skills to engage in active critique and develop a critical consciousness, leading to even more learning with a critical focus. Personal development and intellectual maturity will come with experience in such a professional learning community.

Readiness of Singapore Society for Critical Pedagogy

The matter of whether the Hargreaves and Grundy models are implementable in Singapore is well worthy of debate. The structural, ideological, political, and economic contexts shape and

inevitably in some respects constrain the development directions that will be conceived as possible and acceptable within the education system, and similarly what can be done within schools and other institutions. The first author (Tiew Ming Yek), who has more than 20 years of academic and administrative experience in Singapore's education system, views the matter as a uniquely Singapore problem. Singapore's democracy, media censorship and the "freedom of expression" that any Singaporean can enjoy have all been a focus for critical comment internationally. For example, a Google web search August 20, 2006, with the exact phrase "freedom of expression in Singapore" returned some 1130 articles, the majority of which implied criticism of a lack in "freedom of expression" in Singapore. Certainly, there are perceived and real curbs in "freedom of expression" when one crosses the boundary of Singapore's laws and engages in expression of libelous nature, racial bigotry, religious intolerance, chauvinism and fanaticism which the laws judge to be irresponsible. Many Singaporeans support the government and view these curbs as necessary to ensure harmony and stability in the small cosmopolitan city/society of Singapore. There is recognition that a stable and harmonious society is a pre-condition for economic growth and educational progress. As indicated above, Singapore's success economically as a city-state as well as its achievement in educating and developing human capitals are notable. That Singapore's government enjoys overwhelming support and trust by a clear majority of the electorate is supported by the results of free general elections conducted within five years for each parliamentary term since the country's independence in 1965. In the last three general elections held in 2006, 2001 and 1997, the governing party (People's Action Party) won 66.6%, 75.3% and 65% of the popular votes respectively (Singapore Elections, n.d.). Arguably, the stability and strength of the government can be seen to have created a situation in which many Singaporeans may have become over-reliant on government for initiatives, leadership and direction, and have a blind faith in the ability of the government to further advance the economic, educational and social development of Singapore. It may well be time to explore how responsible and critical engagement with currently unquestioned discourses can be promoted to further enhance its social fabric and human capital towards a knowledge society. Implementing Hargreaves' and Grundy's models in the schools and educational institutions would certainly support the development of a capacity for critical thinking and new perspectives amongst the next generation of Singapore citizens. The extent of open and easy access to Internet, and hence to a wide range of legitimate (and not-so-legitimate) information and knowledge as well as responsible (and not-so-responsible) expression of alternative views, including views critical of the "Singapore Way," shows there are ready avenues for educationists and students to carry out their research, learning and develop their capacity for critical perspectives. It is also notable that there has been open encouragement from senior government leaders to promote choice, creativity, innovation, and critical thinking in education in their speeches from as early as 1997 (Gan, 2006; Lee, 2006; Teo, 1997; Tharman, 2006; Wong, 1997). Singapore's education including technical education and training can thus be seen as in important respects, being "ready" for the introduction of models such as Hargreaves' and Grundy's. Key challenges in implementation are in developing the education professionals with the relevant skills, knowledge, and perspectives to engage students with issues effectively. The challenges will be discussed further below.

Challenges, Measures, and Changes

Hargreaves (2003) noted that the "Singapore government realizes that its future prosperity depends not on educating its people in the knowledge and skills for a particular kind of economy, but in developing its people's capacity for learning and dealing with change so they can respond quickly and flexibly, adapting and retraining as future economic opportunities or recessions arise" (p. 11). Supported by public funding and leadership among the top-level government, the education system in Singapore is able to respond to the rapidly changing socio-economic environment of the country. The sense of rapid and systemic changes is conveyed by the preceding section. From the changes discussed, there are good reasons to think that the technical education and training system has responded effectively to the economic and societal changes. While not explicitly described in terms of Hargreaves' (2003) perspectives of *teaching for* and *teaching beyond* the knowledge society or Young's (1998) notion of "connective specialization," many of the changes in ITE's curriculum and initiatives are in line with basic principles championed by these authors. The challenges are one of translating theoretical principles into practical reality as well as linking practical initiatives and programs to well-informed and proven theoretical principles and concepts.

The coming subsections look at challenges**,** developing the education professionals, curriculum slippage, new learning environment, and being responsive and staying relevant; measures of continuous professional development, focus on education and training with a constancy of purpose, and commitment and support for publicly funded education; and changes, praxis as a way ahead, needed for Singapore's technical education sector to continue its success into the 21st century.

Developing the Education Professionals

Although good governmental support and adequate public funding are critical, they do not guarantee success. A reality in Singapore's technical education and training sector is that most teachers are trained professionals—engineers, accountants and programmers—from technical fields with minimal exposure to teaching and learning theories and practices, pedagogy, and classroom management. Teachers now in their 40s and 50s would have joined the profession in the 1970s and 1980s. Some have not kept up with their professional development. They would still deliver their lessons in the traditional "teachers teach, students learn" mode despite having access to a well-defined curriculum and pedagogical model with a learner-centered and problem-based orientation. They bemoan the lack of standardized content and clear instructions and many would undoubtedly prefer the role of knowledge transmitters delivering standardized text and carrying out prescribed tests—that is, exemplifying what Hargreaves (2003) termed as *teaching despite* the knowledge economy. Others have kept up with their personal professional development by learning the skills needed to leverage on information and communication technology for teaching and learning and keeping pace with the domain knowledge. However, Singapore is still largely an Asian society within which the dominant expectation or culture in education is for teachers to be center stage with students learning from them unquestioningly. With this historical and cultural backdrop, developing the educational professions to implement the Hargreaves and Grundy models is a major challenge.

Curriculum Slippage

While sound principles and concepts may have been incorporated into a defined curriculum structure and pedagogical model, the final delivery of the curriculum to students in a particular class still depends on the contribution of key participants—the principals, the curriculum text writers, the managers and the department heads. Penney and Evans (1999) identify the process as one of the production of "multiple texts" in "multiple sites." With each "transmission" there is "scope for slippage" (Bowe et al., 1992, cited in Penney & Evans, 1999) in the actual content and the interests and values transmitted or omitted. Dutro and Valencia (2004) sum up their study with the conclusion that

> … all of our participating districts were engaged in important and substantive local conversations about language arts curriculum and instruction, whether around state standards or locally-driven reform efforts.… this study reveals that the link between state and local content standards is a complex one—tighter state control and alignment does not necessarily lead to greater fidelity; nor is greater fidelity necessary to positively impact student success (pp. 39–40).

Curriculum slippage does and will occur. If knowledge societies encourage the notion that "the curriculum is not simply a set of plans [and texts] to be implemented, but rather is constituted through an active process in which planning, acting and evaluating are all reciprocally related and integrated into the process" (Grundy, 1987, p. 115), slippage need not be viewed as inherently problematic. Indeed, slippage can be regarded as a crucial feature if education and instruction is to meet the learning needs of any particular group of students. A key point, however, is that it should be learning and learner needs, as compared to any teacher's personal interests and values, that inform the adaptation of curriculum.

New Learning Environment

Globalization heralds the pervasive use of technology and explosion of knowledge such that youngsters today are exposed to all kinds of information: some pulled from internet portals, databases, movies and digital libraries, while others are pushed to them via e-mails, pop-up web pages and television. Students today do not just learn and acquire knowledge while in school; they are bombarded with information and knowledge in many forms, at many places and times. Some information and knowledge are useful in their personal development. Others, however, can be propaganda, half-truths, and lies. The bombing of London reportedly by "British-born and bred" terrorists (Williams, 2005) illuminates the negative influence of learning outside the school curriculum through experiences in local community and online resources. So, the challenge is for teachers to leverage access to the tremendous amount of information and knowledge anytime, anywhere via technology, integrate learning activities outside the classrooms into curriculum, and facilitate the formation of purposeful learning communities among students to ensure that meaningful learning and overall development take place. Our professional experience in working with students has highlighted that it is a real challenge to arouse students' interest and keep them engaged and motivated to learn what we might regard as "the right things at the right time." Many activities are competing for their attention everywhere—at home and in the community, shopping streets, internet cafés, and gaming arcades. We need to become better skilled in using those activities in productive educational ways.

Being Responsive and Staying Relevant

One characteristic of knowledge societies is the constant, rapid and increasingly complex changes that they face. The nature of education and training is such that the process takes time to bear results. Often, in terms of technical content, what is learnt in schools becomes obsolete right after or even before students step out of school. A key challenge for educational institutions and establishments in such an environment is how to respond effectively to changes as they come? What is the appropriate response to change? From the perspectives of *teaching for* and *teaching beyond* the knowledge society (Hargreaves, 2003) and of *curriculum as praxis* (Grundy, 1987), education and training cannot take a reactive approach by changing content to keep up. So the question is not how to anticipate changes and stay ahead, but rather how to educate the new generation in a manner that informs and shapes them with the right mindset and values and equips them with the requisite knowledge and life skills to face the challenges ahead in order to thrive in knowledge societies—and to keep developing those societies in positive directions. This surely is the meaning of being responsive and staying relevant for technical education and training in a knowledge society.

Continuous Professional Development

The future of Singapore as a knowledge society means change and a commitment to ongoing changes as a way of life. Technology, society, economic drivers, and the nature of education and training will change. Hence, continuous professional development through personal commitment and organizational planning ought to be viewed as a critical strategic tool to ensure that the technical education and training system is highly responsive and relevant to changing needs. As the system evolves, the process of change management includes proper communication and buy-in with effective professional development and support for staff.

To enable *teaching beyond* the knowledge society, Hargreaves (2003) calls for "teachers to work together in long-term collaborative groups, committing to and challenging each other, as a caring, professional community" (p. 49). Hence, it is crucial that teachers are actively pursuing professional development in collaboration with both students and peers, through the application of critical pedagogy. The plan for an applied research center within ITE is indicative of the importance of continuous professional development. Teachers today really need to keep up with their personal professional development by constantly upgrading their skills needed to leverage on technology for teaching and learning. They also need to understand and embrace the impact of globalization and the dynamics of the ensuing knowledge economy and knowledge society, thereby becoming avid lifelong learners themselves.

A Focus on Education and Training with a Constancy of Purpose

During the Winners Sharing Conference at the Business Excellence Awards 2005, Dr. Law Song Seng, Chief Executive Officer of ITE shared that "constancy of purpose in pursuing mission and vision" (Law, 2005, slide #33) is one of the key success factors for ITE to emerge as a winner of the Singapore Quality Award 2005. Moving forward in the knowledge society, an important factor for the success of any technical education and training system will continue to be its determination and ability to focus on education and training with a constancy of purpose for the benefits of students in the system and the national economy. If the focus is shifted to revenue generation or maximization of profits for the shareholders due to privatization, market temptations, economic

conditions, or a combination of these factors, then it is unlikely to deliver effective and relevant training for students to graduate as the skilled manpower needed to drive the nation's economy.

Commitment and Support for Publicly Funded Education

In general, the education and training sector in Singapore is blessed with clear focus from the country's top political leadership. The national vision for education and training—"thinking schools, learning nation" (Goh, 1997)—was articulated and announced in a speech by Mr. Goh Chok Tong, then Prime Minister at an international conference on thinking. In his latest National Day Rally Speech 2005, Lee Hsien Loong, the current Prime Minister devoted a substantial amount of time on education and training. He raised the topic by saying "Next, I want to talk about education because in order to remake the economy, then Singaporeans have to be equipped with the right skills and the right attitudes" (Lee, 2005). This clearly indicates that one of the most prominent discourses for general education and technical education and training in Singapore is still the economy.

Such focus by some of the country's most noted leaders means that the government's commitment and funding support for education is also forthcoming. In his speech at the Ministry of Education Singapore Work Plan 2000, then-Minister for Education Teo Chee Hean spoke about the government's commitment "to increase spending on education from 3.6% to 4.5% of GDP over the next few years. This is equivalent to an extra [S]$1.5 billion every year, on top of the [S]$6 billion we spend now each year for education" (Teo, 2000, ¶ 3). Young (1998) argues that in a knowledge society of the future, the paradigm ought to be "an education-led economy rather than an economy-led education system" (p.155). Inevitably, the education system of a country and its economy are intertwined. Whether publicly or privately funded, education needs adequate funding for the education system to improve and excel. When the education system is working well and feeding the economy with relevant skilled manpower, the economy will improve and perform better, thereby allowing higher funding for the education system. If all goes well, this becomes a self reinforcing cycle that drives the country's education system and economy forward. However, the opposite can also be true: If funding for education is inadequate, then the system will deteriorate and the economy is starved of skilled manpower. The effect is that the economy takes a nose dive, in turn depriving the education system of further funding. This then leads to a vicious cycle that drives the country's education system and economy to eventual oblivion.

In Singapore, the education system is blessed with attention from top leaders, a clear vision and adequate public funding. The education system and the economy are arguably in a self reinforcing cycle and the upswing should continue in the foreseeable future. The commitment and support from government with adequate funding is absolutely necessary for the education and training system to succeed. The importance of publicly funded education is highlighted by Hargreaves (2003) who argued that "a strong system of state education is not only integral to a prosperous knowledge economy but also vital for protecting and strengthening democracy in the way it builds community and develops character" (pp. 39–40), and by Guttman (2003) who "stressed that education is a public good. States have the core responsibility for providing free, compulsory quality primary education, for expanding the provision of secondary and for ensuring that higher education [including technical education and training] is equally accessible to all on the basis of merit" (p. 76). For the technical education and training sector to continue the journey towards excellence, governmental support and adequate pubic funding will be critical. A successful technical education and training system will not only supply the economy with highly skilled manpower but

also ensure that it has the ability to take care of citizens from the lower socio-economic strata of the society. This further enhances social development and strengthens the nation's social fabric.

Praxis as a Way Forward

Singapore's technical education and training system has done exceptionally well on account of its representative institution, ITE, winning the Singapore Quality Award 2005. In the light of the theoretical perspectives of Hargreaves (2003) and Grundy (1987), it can be said that technical education and training in Singapore is well on its way for teachers to be *teaching for* the knowledge society. Moreover, the ITE's *Hands-on, Minds-on, Hearts-on* education and training is a clear alignment towards *teaching beyond* the knowledge society. The ITE pedagogical model and planned applied research center provide a definite path towards a critical pedagogy and the use of *curriculum as praxis*.

Going forward, aspects of *teaching beyond* the knowledge society need to be highlighted and emphasized even more in the curriculum in order to build a sustainable knowledge society. It is also important to break down or reduce the curriculum classification for courses and the framing of roles for teachers and students. More flexibility and choices are needed to cater for individual needs and interests so that meaningful and deep active learning can take place to maximize every student's potential. Professional development of teachers is essential for them to play their roles effectively as facilitators and enablers of a culture of critique, engaging students in meaningful dialogue and active learning. Ultimately, the curriculum develops along the way for each learning group. Curriculum can then be regarded as praxis and "teaching and learning [are to be] seen as a dialogical relationship between teacher and learner, rather than an authoritative one" (Grundy, 1987, p. 115).

Involvement of teachers in applied research—particularly action research projects—as part of their professional development would further foster emancipatory curriculum practice. Grundy (1987) explained that when "action research operates in an emancipatory mode, it is an expression of critical pedagogical practice and so provide us with a framework within which critical consciousness can be developed" (p. 141). With such competent and mature teaching professionals, skilled in the art of critical pedagogy and deeply committed to the purpose of technical education and training, overcoming the challenges of raising the critical consciousness of students and engaging them in meaningful and purposeful learning is really only a matter of time. Students are therefore informed and shaped with the right mindset and values. Moreover, and they are equipped with the necessary knowledge and life skills to thrive in the knowledge society.

Recommendations—a Summary

Table 1 provides a summary of the recommendations (measures and changes needed) for the challenges face by technical education and training as Singapore moves forward as a knowledge society.

Table 1
A Summary of Recommendations

Challenges	Recommendations (measures or changes needed)
Developing the education professionals	• Promote continuous professional development through personal commitment and organizational plan • Change management process to include proper communication and buy-in with professional development and support for staff • Encourage teachers to act as facilitators and enablers of a culture of critique, engaging students in meaningful dialogue and active learning • Involvement of teachers in applied research to develop skills and capacity for critical perspectives
Curriculum slippage	• Encourage the notion that curriculum is dynamic and slippage need not be inherently problematic • Focus on learning and the learner to allow adaptation of curriculum to meet individual learner's need • Regard curriculum as praxis which develops along the way for each learning group
New learning environment	• Break down or reduce the curriculum classification for courses and the framing of roles for teachers and students • More flexibility and choices to cater for individual needs and interests • Leverage on access to information and knowledge (Internet) • Integrate learning activities outside classrooms into the curriculum • Facilitate formation of purposeful learning communities among students to ensure that meaningful independent learning and overall development take place
Being responsive and staying relevant	• Commitment and support from government with adequate funding • Focus on education and training with a constancy of purpose to deliver effective and relevant training • Equip the new generation with the requisite knowledge and life skills to face the challenges of knowledge societies • Align the ITE education and training towards *teaching beyond* the knowledge society • Refine the ITE pedagogical model and promote applied research towards a critical pedagogy and the use of *curriculum as praxis*

Conclusion

The aim of this paper has been to provide a macro-review of the contemporary education system in Singapore with a particular focus on technical education and training vis-à-vis a vision of education and training in postmodern knowledge societies. While superficially, the contemporary education system in Singapore practices tracking, is centrally managed, highly structured, stratified and differentiated, the system has gone through many changes from the original English system it

was modeled after. Today it is highly sophisticated and successful in embracing the national vision of "thinking schools, learning nation." The technical education and training system has gone through two transformations, each guided by a five-year strategic plan. The institution, ITE, which basically represents the technical education and training system in Singapore, is recognized as a world-class education institution for having won the Singapore Quality Award 2005. ITE has also drawn up a third five-year strategic plan to guide it towards becoming a global leader in technical education. On closer examination, all these have enabled the general education system as well as the technical education and training system to progress toward becoming one that exhibits many features of Hargreaves' (2003) perspectives on *teaching for* and *teaching beyond* the knowledge society and Grundy's (1987) *curriculum as praxis* model of curriculum theory.

However, many challenges also remain, including developing the education professionals, dealing with curriculum slippage, adapting to new learning environments and considering how to be responsive and stay relevant. For the technical education and training system to transit into and continue to thrive in the knowledge society of the 21st century, several measures and changes were discussed. These include a firm focus on education and training with a constancy of purpose, continued commitment and support for publicly funded education, continuous professional development of staff and adoption of praxis as a way forward. It is important that teachers are *teaching for* and *teaching beyond* the knowledge society in order to build a sustainable society. It is also crucial that students find meaning in learning, acquire critical thinking skills, learn to think what seemed unthinkable and raise their critical consciousness. Essentially, teachers need to adopt a student-centered learning paradigm, facilitate team learning which allows for dialogue and critical reflection. Teachers also need to provide real world contexts to the curriculum they develop, leading to meaningful and purposeful learning, and praxis: informed and committed action. As such, curriculum as praxis is really one way forward for Singapore's technical education and training system—as an accessible, high quality, responsive and relevant system—to thrive in the knowledge society of the 21st century. Politically and culturally, Singapore is ready to develop genuine dialogic and the critical component in its general education and technical education and training systems to develop and prepare its citizens for the knowledge society. The education professionals must therefore overcome the challenges and practice continuous professional development to acquire the capability and capacity to engage in critical pedagogy.

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