# VOCATIONAL TECHNICAL EDUCATION AND ECONOMIC DEVELOPMENT – THE SINGAPORE EXPERIENCE

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## ABSTRACT

Vocational Technical Education (VTE) systems play a crucial role in the social and economic development of a nation. Owing to their dynamic nature, they are continuously subject to the forces driving change in the schools, industry and society. Often shaped by the needs of the changing economy and local community, the challenges and opportunities are unique. The issue today is not so much about the value and importance of VTE but how to ensure its relevance, responsiveness and value in an increasingly global economy. In this respect, this paper will draw upon and share the Singapore experience. Presented in two parts, the first will trace the various phases of economic development and corresponding strategic VTE responses to meet manpower needs. The second part, which represents the modern history of VTE, highlights the transformation of the Institute of Technical Education (ITE) as a world-class post-secondary institution in Singapore. It is hoped that this Singapore experience will provide some useful insights on the underlying philosophy, policies, choices and rationale for those who are involved in the development of vocational technical education systems.

# INTRODUCTION

As policy makers, administrators and educators in Vocational Technical Education (VTE), we can all agree that VTE plays a crucial role in the social and economic development of a nation. Shaped by the needs of the changing economy and local community, the challenges and opportunities are unique. The target student groups are more diverse. The image, standards and values remain elusive. Often viewed negatively by society, VTE is also the "weakest" link in the total education system in many countries. In contrast, parents today continue to cherish the hope and aspiration that their children will make it to university. This intense desire to pursue a university degree generates unrealistic expectations amongst parents and adds pressure in schools. The consequence is a prejudice against and less than positive image of VTE and all its negative associations with those who are less academically inclined. Yet, the greatest gaps in human resource development are in vocational education and technical skills.

Many of us would have reflected on some of these unique challenges and opportunities. What, for example, makes an effective and responsive VTE system? What are the options available to accommodate the needs of different social, economic and cultural conditions? Is the VTE system responding to the appropriate level and demand of skilled manpower in the economy? How is it positioned within the national education and training system? Is it meeting the training needs of school leavers and working adults? How well is VTE accepted by school leavers, parents, industry and society? What is its public image? What are the policy, funding and educational issues? How can the goals and objectives be translated into reality? How do we measure the results?

These are some of the basic questions we would have asked as we search for the 'best' VTE system to serve our economy, society and the community. The fact is that there is no one "ideal" education and training system, which will suit the needs of all countries. In my view, the so-called 'best' system is one often shaped by the history, social motivation and economic needs of the local community. There should be a clear mission and vision in articulating the role of VTE within the national education and training system. The greatest challenge for VTE today is remaining true to its mission in staying focused in the area of vocational and technical skills. The real tests of success of VTE are the

employability of the graduates, personal development, opportunities for further education and career development, public acceptance and image. Ultimately, the effectiveness and responsiveness of a VTE system would be measured by its impact on the social and economic development of the nation.

In this respect, the Singapore Government believes in and has invested heavily in education and training, not only in the universities and polytechnics but especially, vocational and technical education under the Institute of Technical Education (ITE). The Singapore experience will be presented in two parts. Part I traces the different phases of Singapore's economic development and corresponding VTE strategies since independence in 1965. Part II describes the modern history of ITE since its establishment in 1992 - what it is today, its unique mission, features and transformation into a world-class education institution focusing on vocational technical education.

## OVERVIEW OF SINGAPORE

But first, an overview of Singapore. Founded as a British colony in 1819 and centrally located in South-east Asia, as shown in **Figure 1**, Singapore achieved independence as a nation in 1965. A multi-racial society of 4.35 million people living on a small island of 700 square kilometers, Singapore today is a modern city-state and global centre for industry, business, finance and communications. Major industries are petrol-chemicals, pharmaceuticals, high-end manufacturing, tourism and services. Key trading partners include Malaysia, United States of America, China, the European Union, Hong Kong and Japan. Per capital Gross National Income was US$26,700 in 2005. As a young nation with limited natural resources, one of Singapore's highest priorities has been in education, training and human capital development.

# PART I - ECONOMIC DEVELOPMENT AND VTE STRATEGIES

## Phases of Singapore's Economic Development

In the early years of independence from 1965, it became clear that the traditional trading, commerce and service sectors alone could not provide sufficient jobs for the number of school leavers in a growing population. The overall strategic plan of the Singapore Government then was to diversify and accelerate economic growth through industrialisation. During this early phase of economic development, from the 1960s to 1970s, the educational priority was to provide and expand primary and secondary education, including technical education and training, so as to lay the necessary foundation for the acquisition of basic vocational and technical skills. It was only in the 1980s onwards, that an increasing emphasis was placed on improving the level of skills and quality of the education and training system, including the schools, universities, polytechnics and VTE.

The economic development of Singapore may be characterised in three phases as shown in **Figure 2**. A "Factor-Driven" economy involving intensive labour in the 1960s-1970s, it progressed to an "Investment-Driven" economy, which is capital intensive in the 1980s-1990s and the "Innovation-Driven" economy powered by the needs of knowledge intensive industries in the 2000s. Through these three phases, Singapore has also evolved from an "Early Industrialisation" economy to a "Newly-Industrialised" economy and a "Globalised and Diversified" economy it is today. In tandem with the changing economic landscape, the VTE system evolved in response to the changing manpower needs. The education and training system ensured that graduates from the various educational institutions had the necessary knowledge and skills for the many new jobs, which were created in a rapidly growing economy. The economic, manpower and VTE strategies implemented during these various phases of development will now be elaborated.

## Labour-Intensive Economy (1960s-1970s)

In these early days of industrialisation after Singapore's independence, the main challenge was to create enough jobs. The high unemployment situation was compounded by the sudden decision of the British Government to pull out

its naval bases in Singapore. The economic strategy then shifted in 1968 from one of import substitution to one of rapid industrialisation by attracting foreign investment for export-oriented and labour-intensive manufacturing. From the education and training perspective, the immediate task was to ensure that the workforce has the basic vocational and technical skills to support the labour-intensive manufacturing activities such as ship repairing, turning and fitting, sheet metal working, plumbing and radio and TV maintenance and repair.

The priority in the 1960s was to expand the educational system, especially primary and secondary education. With respect to VTE, the first vocational institute, the Singapore Vocational Institute (SVI), was established within the school system in 1964. With the increasing pace of industrialisation, there was growing concern on how best to expedite and expand VTE to meet the technical and skilled manpower needs of new emerging industries. The mainstream of education remained largely academic. In 1968, 84% of students in schools were enrolled in the "academic" stream with only 8% in the technical, 7% vocational and 1% commercial stream.

As a result, a Technical Education Department (TED) was established within the Ministry of Education in 1968 to oversee the development of technical secondary education, industrial training and technical teacher training. The secondary vocational schools were phased out in favour of vocational institutes. The apprenticeship schemes were transferred from the Ministry of Labour to the TED in 1969. By 1972, there were nine vocational institutes and the number of graduates increased ten-fold from 324 in 1968 to over 4000. By 1973, the TED had developed a training infrastructure of sufficient strength for the next major phase of its development. Thus, the first Industrial Training Board (ITB) was created in 1973 to centralise, coordinate and intensify industrial training. This significant step marked the formalisation of the system of vocational training outside the school system. As a statutory board, ITB was empowered with greater autonomy and flexibility to respond to the challenges in meeting the technical manpower needs of a rapidly expanding economy.

In line with the changing needs of the economy, a new system of skills certification, the National Trade Certificate (NTC), was introduced to meet

the different levels of skills and standards required by industry. A wide range of courses were introduced in areas such as Electrical, Electronics, Metal, Mechanical Engineering, Heavy-duty Diesel and Motor Vehicle Mechanics, starting with the NTC-3 semi-skilled level of certification. The unique feature of this system is that the same competency standards were used for the full-time vocational training courses and the public trade testing system for working adults. In the early 1970s, another government agency, the Economic Development Board (EDB) whose mission is to promote foreign investment into Singapore, also played a significant role in strengthening the industrial training system. By partnering Multinational Corporations such as Tata of India, Rollei of Germany and Philips of Holland, it established so-called "Joint Government Training Centres" which helped to enlarge the pool of trained technical manpower. In the process, new overseas approaches and practices were infused into the local training system.

## Capital-Intensive Economy (1980s-1990s)

In 1979, the Government embarked on a major restructuring of the economy towards higher value-added, high technology and more capital-intensive industries. The restructuring was driven by a decline in domestic labour supply, increasing competition from resource-abundant neighbouring countries and rising trade protectionism from the industrialised countries. The new focus was the development of new industries such as petrochemicals, biotechnology, information technology as well as manufacturing services in testing, financing, warehousing and purchasing. To stay competitive through higher productivity, mechanisation, automation and computerisation of the industry were promoted. Once again, the education and training system was called upon to respond to the manpower needs of more capital-intensive industries.

In the area of VTE, a new stage was set for the establishment of the Vocational and Industrial Training Board (VITB) by amalgamating the ITB and another existing Board, the Adult Education Board (AEB), in 1979. The AEB was a Board established in 1960 to meet the educational needs of working adults, including general education and some basic vocational training. With increasing

educational and training opportunities, it became apparent that the domains of AEB and ITB were complementary components of the same system of training for school leavers and working adults. With the formation of VITB, efforts were directed towards expanding the training system, developing new programmes and improving the quality of vocational training. In particular, the higher NTC-2 skilled level of certification was extended to include Electrical, Electronics, Precision Engineering and Automotive Technology. A new Certificate in Business Studies (CBS) was introduced in 1981. For the first time, a Centre of Vocational Training was set up within VITB to develop professional capability in areas such as curriculum development, training of trainers and instructional media development. These were important areas of functional expertise necessary to develop and support a quality vocational training system.

Economic restructuring had a direct impact on the capability of the existing workforce. What was expected of the workforce in terms of knowledge, education and skills before was no longer adequate. National efforts were therefore directed towards developing a comprehensive Continuing Education and Training (CET) system to facilitate upgrading and re-skilling of the workforce, especially those with lower education and skills. So, between 1983 and 1987, three national CET Programmes were launched, namely, the Basic Education for Skills Training (BEST), Work Improvement Through Secondary Education (WISE) and Modular Skills Training (MOST). Focusing on English Language and Mathematics, BEST and WISE had benefited a quarter million working adults in helping them to acquire a Primary or Secondary level education, respectively. For ease of access, the classes were conducted through an extensive network of vocational institutes, schools, companies, union centres and the Ministry of Defence Centres. Modular Skills Training or MOST, on the other hand, provided a system of training for working adults to upgrade and acquire a technical skills qualification on a modular basis. In 1990, the industrial training system was further strengthened with the introduction of a New Apprentice System, patterned after the well-known Dual System of Apprenticeship in Germany.

In 1991, the Government published a new Economic Plan in charting the next phase of Singapore's development. The goal was to turn Singapore into a first league developed nation within the next 30 to 40 years. The new direction

was focused on building the manufacturing and service sectors as the twin engines of economic growth. Companies were encouraged to diversify, upgrade and develop into strong export-oriented companies and invest in the regional economies. From the educational perspective, the stage was set for a critical review of the post-secondary education system, including the universities, Polytechnics and VITB, to ensure the availability of well-trained and qualified manpower in the high-technology, knowledge-intensive and service industry sectors.

So, in the same year, a review of school education and vocational training resulted in a crucial decision by the Ministry of Education in adopting a new policy of a minimum of 10 years of basic general education for all pupils in the school system. It became clear that to meet the skilled manpower needs of Singapore's future economic development, a primary school education was no longer sufficient for those who wished to pursue vocational technical training. Employers need vocational graduates who have had a secondary education and higher-level NTC-2 skills to respond and adapt to the dynamic changes in the global economy. This review was a turning point for the establishment of the Institute of Technical Education (ITE) as a post-secondary educational institution in 1992. ITE replaced the former VITB. It was an example of the forces driving change in the schools and the rising expectations of industry and society. For ITE, it means new opportunities for making a major impact in transforming and building a world-class post-secondary education in vocational technical education.

Among the post-secondary education in Singapore are the Polytechnics. Patterned after the earlier British model, they are better known for their career and practice-oriented education in preparing graduates for middle-level professions and management. But, unlike the Polytechnics, which were phased out and upgraded into universities in other countries, the Singapore Government has chosen to retain the Polytechnics as valuable institutions playing a critical role in the economy and educational system. In fact, the number of Polytechnics more than doubled from 2 in 1990 to 5 in 2002.

## Knowledge-Intensive Economy (2000s)

Moving forward into the 2000s, Singapore saw the need to increasingly develop into a globalised, entrepreneurial and diversified economy. While continuing to strengthen the higher-end manufacturing activities, there was a clearer recognition of the importance of the service sector as an engine of economic growth. Concerted plans were formulated to attract and nurture new growth sectors such as the Biomedical Sciences, Info-Communications, Creativity Technology, Integrated Resorts and High-Value Engineering. The response in the educational sphere is to position Singapore as an Education Hub by attracting foreign students and internationally-renowned institutions to Singapore. Local institutions will continue to seek quality and excellence in developing a first-class education at all levels. This will also indirectly help to enlarge the talent pool to sustain Singapore's continuing growth and development.

Meanwhile, the ITE in Singapore was well on its journey in transforming itself into a world-class educational institution by 2005. Its mission focus and consistent use of five-year strategic plans has created a unique brand of an ITE College Education for a quarter of the school cohort in Singapore. Two such plans were successfully completed over a ten-year period from 1995 to 2005. The first, *"ITE 2000 Plan"* (1995-1999), was aimed at positioning ITE as an established post-secondary education institution. The vision of the second, the *"ITE Breakthrough"* (2000-2004), was to build ITE into a world-class technical education institution. Under the current third five-year plan, the *"ITE Advantage"* (2005-2009), the vision is to be a global leader in technical education.

## PART II - THE JOURNEY OF TRANSFORMATION

What I have presented so far represents the earlier years of evolution in VTE in parallel with Singapore's economic development. Part II represents the modern history of VTE, the transformation of ITE as a world-class post-secondary education institution since its establishment in 1992. The first educational institution to win the prestigious Singapore Quality Award in 2005, it has achieved organisational excellence in an academic environment. Many innovative and pioneering initiatives have been implemented in the journey of transformation. As a post-secondary institution, ITE has effectively rebuilt and transformed its former "vocational institutes" into top-line "educational colleges". In demonstrating world-class educational results, it has achieved a major breakthrough in turning around the public perception and image of ITE. Today, its unique brand of an ITE College Education is widely recognised locally and internationally for its relevance, quality and values in a global economy.

So, what is ITE and what is so unique about its mission and challenges? ITE is a government-funded post-secondary institution focusing on vocational technical education. It is not a University, nor a Polytechnic. Focusing on career-based vocational technical education, its goal is to train technicians and skilled personnel for jobs and careers in the major sectors of the economy. Its uniqueness is that despite the more difficult challenges in VTE, it has built a responsive world-class system of VTE in time for the future.

ITE today is well positioned amongst the post-secondary education institutions in Singapore as shown in **Figure 3**. An integral part of the total national education system, its mission is "To create opportunities for school leavers and adult learners to acquire skills, knowledge and values for lifelong learning". There are clear demarcations with respect to the missions of the university, Polytechnic and ITE. ITE's mandate is to provide an attractive pathway for those who do not progress to the Junior Colleges or Polytechnics. As a matter of policy, all students receive at least ten years of general education in schools, comprising 6 years' primary and 4/5 years' secondary. Depending on their academic achievements, aptitude and interests, about 90% of a student cohort would progress to the Junior Colleges, Polytechnics or Colleges of ITE. Today, the Junior Colleges provide an academic high school education for the top 25% of a school cohort for a university education. The next 40% of school

leavers would enter the Polytechnics for a wide range of practical-oriented three-year Diploma courses in preparation for middle-level professions and management.

The lower 25% of a school cohort, in terms of academic abilities, are oriented towards vocational technical education in ITE Colleges. The courses are essentially full-time, institutional-based and conducted under the "One ITE, Three Colleges" system of governance. With a range of 40 different courses, full-time student enrolment is 23,000. Another 30,000 working adults do part-time Continuing Education and Training courses every year. There are two basic levels of qualifications under the National ITE Certificate (*Nitec*) system of certification. Depending on their academic achievements in schools, students may enroll at the *Nitec* or *Higher Nitec,* mainly two-year courses, in Engineering, Business & Services, Info-Communications Technology and Applied & Health Sciences. As a total national education system, there is formal articulation for progression from ITE to the Polytechnic and Polytechnic to the university based on merit performance. As the natural aspiration of school leavers and their parents is a university degree, the challenge is in managing expectations and maintaining high standards at all levels while responding to the diverse interests, aptitude and needs of school leavers.

## Unique Features of ITE

So, what are the unique features of ITE's system of vocational technical education? These will now be highlighted. One unique feature as shown in **Figure 4** is the "One ITE, Three Colleges" system of governance. Under this initiative to build a more responsive VTE system, the overall plan was to regroup existing smaller campuses into three mega Regional Campuses, renamed as "ITE Colleges". Under this system, the ITE Headquarters continues to oversee the policy formulation and common functional areas of interest such as curriculum development, student intake, examinations, quality assurance and consistency of standards throughout the Colleges. The economy of scale has helped to achieve synergy and resource savings through greater collaborations and yet promote competition among the Colleges. At the same time, each College

built for a full-time student enrolment of 7000 and headed by a Principal, has more autonomy to grow and specialise in niche areas, thus adding choices and diversity to the programmes. The first Regional Campus, the ITE College East, was built in 2005. The remaining two, ITE College West and ITE College Central, will be completed by 2009 and 2011, respectively.

Another feature is the unique brand an ITE College Education called "*Hands-on, Minds-on and Hearts-on*" illustrated in **Figure 5**. This is a holistic College education that has provided the motivation, assisted student learning and nurtured all-rounded graduates who are ready to take on the challenges of the global economy. The "*Hands-on*" training ensures that the students acquire a strong foundation in technical skills. "*Minds-on*" learning develops independent thinking and flexible practitioners who are able to cope with changes. And "*Hearts-on*" learning develops the "complete person" with the passion for what they do, with confidence and care for the community and society. These attributes underpin a comprehensive education where students integrate theory with practice through coursework, projects, industry partnership, community service and global education. The intent is to produce graduates who are market-relevant, enterprising and adaptable as lifelong learners in a global economy.

As an education institution, there are two key elements which define the relevance and quality of its programmes, and hence the quality of its graduates. The first is the curriculum model representing the contents, the "what to be delivered", as shown in **Figure 6**. ITE's courses are built on skills competencies and standards. Being "hands-on", typically, 70% of curriculum time is practical and 30% theory. To ensure a strong foundation in technical skills and high employability, 80% of the curriculum time would be taken up by core modules, which define the occupational areas where the graduates will seek employment. In view of its importance, the "life skills" module is compulsory for all students. Taking up 15% of the total curriculum time, it ensures that students also acquire the skills of communications, teamwork, thinking and problem-solving, sports and wellness, career development and planning and customer service. In this way, students will be better equipped as lifelong learners and remain adaptable in the global job market.

The second key element is pedagogy, the "how" part of teaching and learning. The underlying objective in ITE's pedagogic model as shown in **Figure 7** is to develop "thinking doers", graduates who can apply what they have learned into practice. Called the "Plan, Explore, Practise and Perform" or "PEPP" Model, the approach is interactive and process-based. Under the guidance of a teacher, the student plans the work to be done, explores the information required, practises what he has learned and finally performs with competence, the knowledge, skills and values he has mastered. Through this approach, the student acquires three key competencies, namely, technical, methodological and social.

Another unique feature of ITE is the creative and innovative teaching and learning environment as illustrated in **Figure 8**. In particular, with the pervasive use of Information Technology (IT) in the society and knowledge economy, it is important that students learn in a rich IT-based environment that better prepares them for the real working world. The *eTutor* and *eStudent* were pioneering systems when launched in 2002. Leveraged on the advances in IT and e-learning technologies, the web-based *eTutor* system has transformed ITE into a community of connected on-line learning campuses. It provides flexibility, convenience and easy access to e-learning for students and staff in a personalised, interactive, multimedia and collaborative learning environment. As ITE's courses are heavily practice-oriented, e-learning is presently focused on the knowledge and theoretical component of the curriculum. Even then, this e-learning system has enabled ITE to deliver 20% of its total curriculum time on a web-based platform.

The *eStudent*, on the other hand, is a web-based fully integrated student services administration system. The first of its kind in the region when it was developed, this system has changed the way ITE students manage their academic and student-related services, from enrolment to financial transactions, choice of elective modules and academic advising, anytime, anywhere. In the process, they take responsibility for planning their studies and initiatives in doing things independently. This seamless one-stop centre on the web replaces the many otherwise manual and unproductive systems of student enrolment and administration. It has helped ITE to redefine its academic structure,

streamline processes and improve student services. Significantly, the eTutor and eStudent systems have created a new way of teaching, learning and living in ITE campuses. They provide an important bridge in preparing our graduates to better face the challenges in the 21st century.

Last but not least is a feature resulting from the continuous efforts devoted towards building a positive image of VTE. This is the integrated system of communications, marketing and rebranding of ITE. Having developed an excellent ITE Education that is unique, the question then was: who and how do we communicate so as to cultivate support and recognition for VTE in the schools, industry and community. There are two aspects to this. The first is communications and marketing as illustrated in **Figure 9**. Over the years, we have put in place, a comprehensive marketing programme, focusing on reaching out to students, teachers, parents and the community. Annually, promotional talks are conducted for potential ITE students in secondary schools. Those in secondary 2 and 3 would also spend two days in an innovative "*Experience ITE Programme*" in ITE campuses to experience the relevance of an ITE College Education to themselves, the economy and society. The highlight of this experience is the exposure to a range of hands-on manufacturing, office and service skills required in the real world, through an integrated simulated learning system. Other regular marketing activities include open houses, road shows and media publicity. This comprehensive approach reaches out to some 50,000 individuals and receives 300 to 400 positive media mentions every year.

The second important aspect of image building is creative rebranding as illustrated in **Figure 10**. The community and public need to be able to identify with ITE, its role in education, industry, society and values. Since 1998, ITE has launched three branding campaigns with creative themes such as "ITE Makes Things Happen", "ITE-A Force Behind the Knowledge-based Economy and "Thinking Hands Create Success". Professionally commissioned and executed through advertising media such as newspapers, posters, buses and trains, the underlying messages have helped the public to associate the success of ITE students with the dynamic transformation of ITE as a world-class education institution. A brand-equity tracking model has shown that the image and public

perception of ITE has significantly improved by 76% over an nine-year period from 1997 to 2006.

## Lessons From Singapore's Experience

As reviewed earlier, Singapore's system of VTE may have transformed into a world-class model today, but it was certainly not a journey without its share of obstacles and challenges. The political, social and economic conditions were difficult and vulnerable in the early years following independence. Politically, the birth of Singapore as an independent nation in 1965, through its separation from Malaysia, was sudden and traumatic. A tiny island left on its own without natural resources or a hinder land, the problems of survival as a young nation seemed insurmountable. The sudden pull out of the British naval bases soon after further compounded an already volatile environment with political instability, high unemployment and social unease in a growing population. Many in fact believed at the time that Singapore would not make it. Indeed, the nation's survival was at stake.

However, through the sheer political will of the people, hard work and a strong and effective government, Singapore eventually succeeded in transforming itself from a "third world" to the "first world". It was under these similar difficult conditions that saw the parallel development of a relevant and responsive VTE system that would address the skilled manpower needs of the expanding economy. In this respect, it took a government that not only believed in, but had invested heavily in education at all levels to make a difference. In particular, there was special attention paid to the lower 25% of a school cohort who needed and could benefit from vocational technical education.

So, in Singapore's experience, what are some of the key learning lessons in the development of VTE? How did it respond to the dynamic forces driving change in the school system, the skilled manpower demand of a rapidly changing economy and the expectations and aspirations of the people? How did it promote the importance of technical skills and gradually change the image and public perception of VTE? What were some of the obstacles and difficulties?

The following would reflect the early experience and key lessons:

- **Policy Shift Towards VTE and Economic Development**
  There was very little VTE prior to Singapore's independence. The limited primary and educational places available were geared towards preparing "white-collar" workers for the clerical and administrative jobs in the colonial civil service. This posed a major obstacle when priority shifted towards the process of industrialisation. There was limited education and training infrastructure, dearth of trained manpower and a workforce without the relevant skills. It was therefore a farsighted government that began to pursue a policy of a relentless and systematic development of education and training in keeping with each phase of economic development. The role of the Singapore Polytechnic and vocational schools in the school system were realigned with the manpower needs of industrialisation. It was a painful and slow process in the beginning. With limited resources, the expansion of the technical education educational system had to make do with basic school building, shared centralised workshop facilities and even crash programmes for the training of technical teachers. Then came the urgency in establishing the first Industrial Training Board (ITB) in 1973. This was a clear policy shift to expand VTE and a milestone in doing this through the formalisation of a system of pre-employment VTE for young school leavers outside the school system. This then became the model of VTE in Singapore, a system subject to constant review and restructuring as it responded to changing economic, social and manpower needs. Another milestone policy decision was the repositioning of VTE from a post-primary to a post-secondary system, with the formation of ITE in 1992.

- **Changing Public Perception and Image**
  As a former British colony, Singapore started industrialisation without the benefit of tradition or experience in production and manufacturing. Culturally, there was a steep preference for an academic education. Parents harbour the aspiration that their children will make it to university. The desire for a university degree is pervasive in society.

The respect for the "scholar" and disdain for the "mechanic" and all the negative associations with those who do poorly in schools and manual work only helped to perpetuate the poor image of VTE. To overcome this barrier and change people's mindset, public campaigns on "using the hand" were organised and basic workshop subjects such as metal work, woodwork, technical drawing and basic electricity were made compulsory for all secondary students. "Top of the Trade" television competitions and "Apprenticeship of the Year" awards were used to create interest and promote the importance of technical skills among the young. Eventually, as the economy grew and VTE graduates were recognised with high employability and successful careers, the acceptance of VTE and its image gradually improved. Even then, as was shown in the experience of ITE, extensive efforts in communications, marketing and branding continue even today towards building a positive image of VTE in Singapore. The provision of modern and conducive teaching and learning campuses, strong support of political leaders and success of graduates have all helped to achieve a significant turnaround in the public perception and image of ITE.

- **Leveraging on Industry Partners**
  The main approach in VTE in Singapore is full-time system of institutional training for school leavers with 10 years of general education. The availability of such technical manpower was an important strategic tool used by the Economic Development Board in attracting foreign direct investment into Singapore. However, this system alone was not enough to ensure the sufficiency and range of skills required by the industry. To do so, it was necessary, especially in the early days of industrialisation, to leverage on the experience, skills and technology that resided in the private sector companies. Many of these were foreign Multinational Corporations (MNCs) who needed specialised skills and had in-house training capability not available or too costly to develop in the formal VTE system. To meet these skills gaps, several major MNCs (Tata, Rollei-Werke and Phillips) were offered total investment packages by EDB, including incentives for the establishment of Government Training Centres, in the late 1960s. This strategic promotional tool

for the government to assure the availability of specialised technical manpower was later extended to the setting up of Government-to-Government Technical Institutes with Japan, Germany and France in the 1970s. These Joint Technical Institutes and Training Centres were eventually absorbed into the Nanyang Polytechnic and ITE. This experience demonstrated an important phase of economic development when it was necessary to leverage on foreign government assistance and private sector industry partners in complementing the formal VTE system.

- **Transformation of ITE- It Can Be Done**
  ITE is not a University or a Polytechnic. It is a government-funded post-secondary institution focusing on vocational technical education. Today, it is widely recognised for its transformation as a world-class institution. The first educational institution to win the Singapore Quality Award in 2005, it has created a unique brand of an ITE College Education for the lower quarter of every school cohort and many working adults in Singapore. It has achieved a breakthrough in enhancing its public image. So, what are the important lessons? In ITE, there is constancy of purpose in pursuing its mission, vision and goals. The consistent use of five-year strategic plans has helped to provide a clear focus and successful platform for implementing many of the initiatives and programmes. It has built a strong team of leaders and staff who are professionally qualified and dedicated to the cause of vocational technical education. Their commitment and enthusiasm to achieve the mission and goals are reflected in the "ITE Care" culture, especially the care and concerns of the staff for the students. Embedded in this culture is also the relentless pursuit of organisational excellence and pro-active approach in always asking how they can better serve, add value and meet the needs of students. There is a open willingness to learn from and adopt the best relevant practices from other educational systems in building the ITE system, as is evident in using the pedagogic concept of "key Competencies" from Germany, the "DACUM" curriculum methodology from United States and "On-the-Job-Training" practices from Japan. The goals and concerns in VTE may be the same but the

systems are unique and often shaped by the schools, industry and needs of the local community. And so with a new vision and strategic plan, the journey of transformation in ITE continues.

## Concluding Remarks

In conclusion, vocational technical education systems are dynamic in nature. The challenges and opportunities are unique. The key issue today is how to build a responsive VTE system in time for the future. While there are more differences than similarities, the overall educational goals, concerns and issues are the same. However, from the international perspective, there is no one ideal system that will suit the needs or aspirations of all countries. The systems are often shaped by the economic, social and cultural conditions of the local community. VTE provides an important pathway in the total education system. A fundamental question is whether sufficient attention has been paid to those who need and can benefit from VTE. There are policy decisions and choices to be made.

Each VTE system is unique in its history and development. In the case of Singapore, VTE has evolved in response to the various phases of economic development since independence in 1965. As the economy restructured and moved from labour-intensive to capital-intensive and then knowledge-intensive, the VTE system responded to ensure that the workforce has the relevant knowledge, skills and values. The educational and training systems were reviewed, upgraded and remodeled to stay relevant and responsive to the needs of school leavers, industry and community. In particular, the experience of Singapore has shown how the Institute of Technical Education (ITE) has successfully transformed into a world-class post-secondary educational institution focusing on vocational technical education. Staying focused in its missions and vision, it has created a unique brand of an ITE College Education that is widely recognised locally and internationally for its relevance, quality and values in a global economy.

**Figure 1: Location of Singapore**

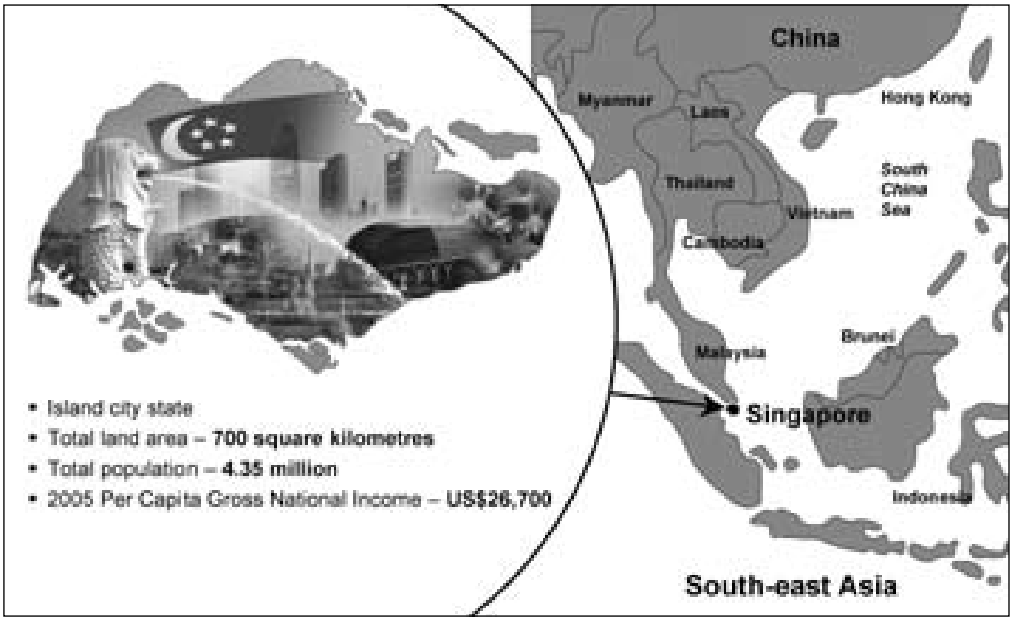
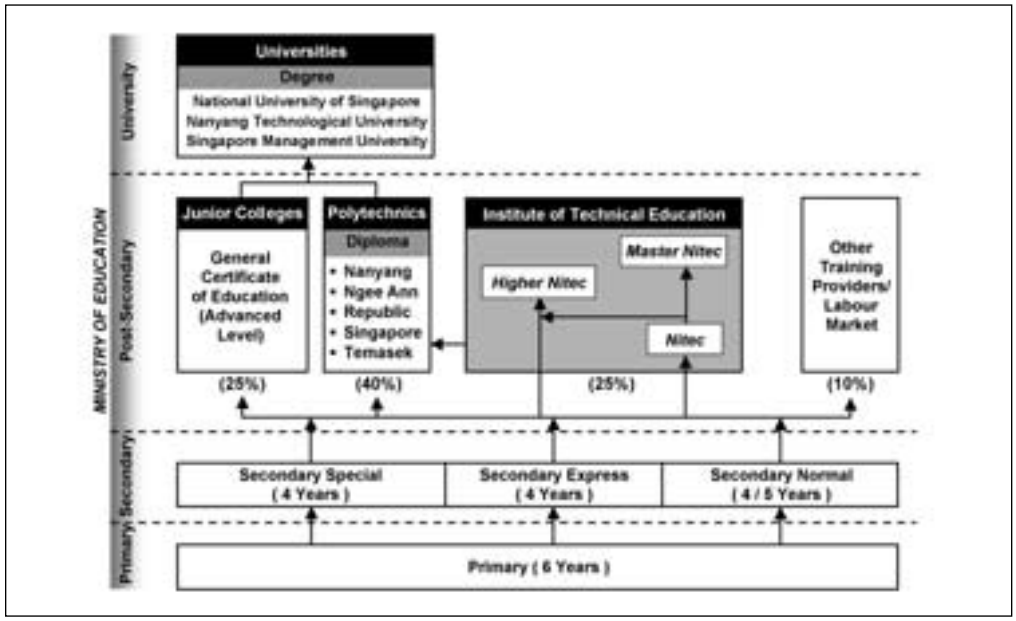



**Figure 2: Phases of Singapore's Development**

## Figure 3: ITE as a Post-Secondary Institution




## Figure 4: "One ITE, Three Colleges" System

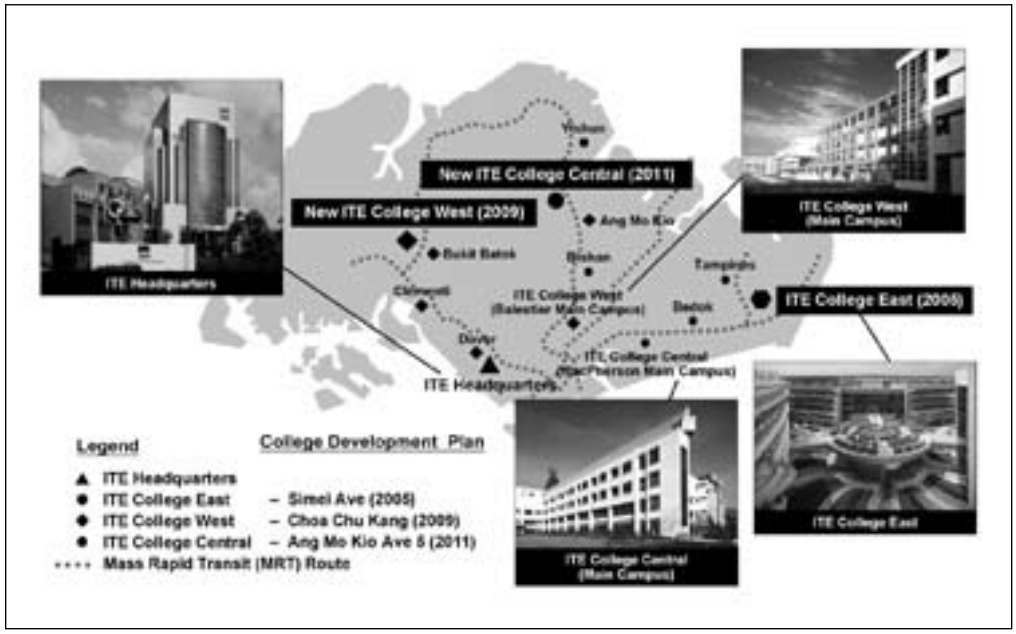


**Figure 5:** "Hands-On, Minds-On and Hearts-On" **Education**

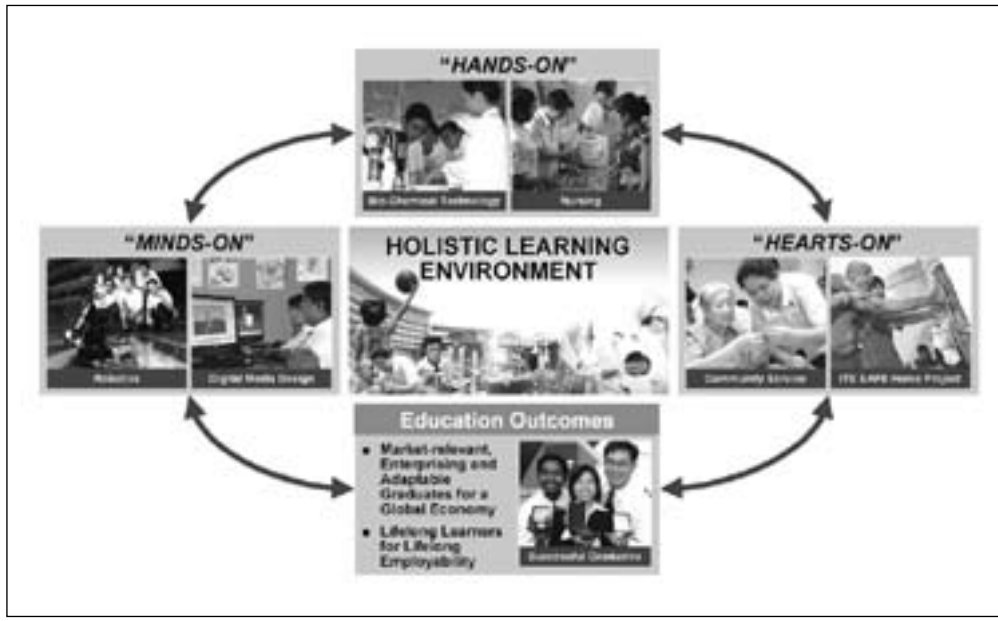



**Figure 6: Practice-Oriented Curriculum Model**

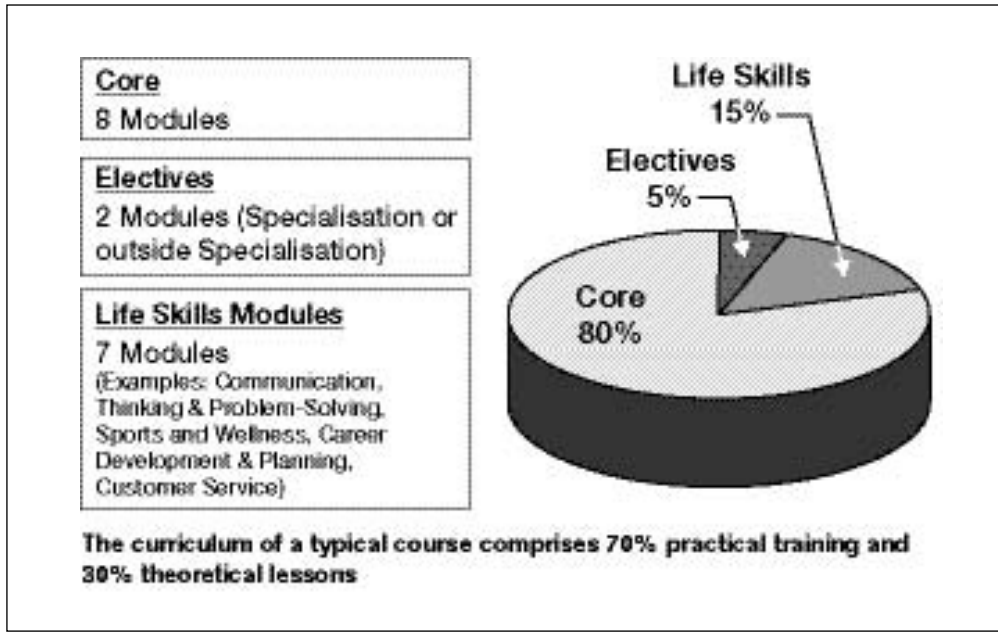


**Figure 7: Process-Oriented Pedagogic Model**

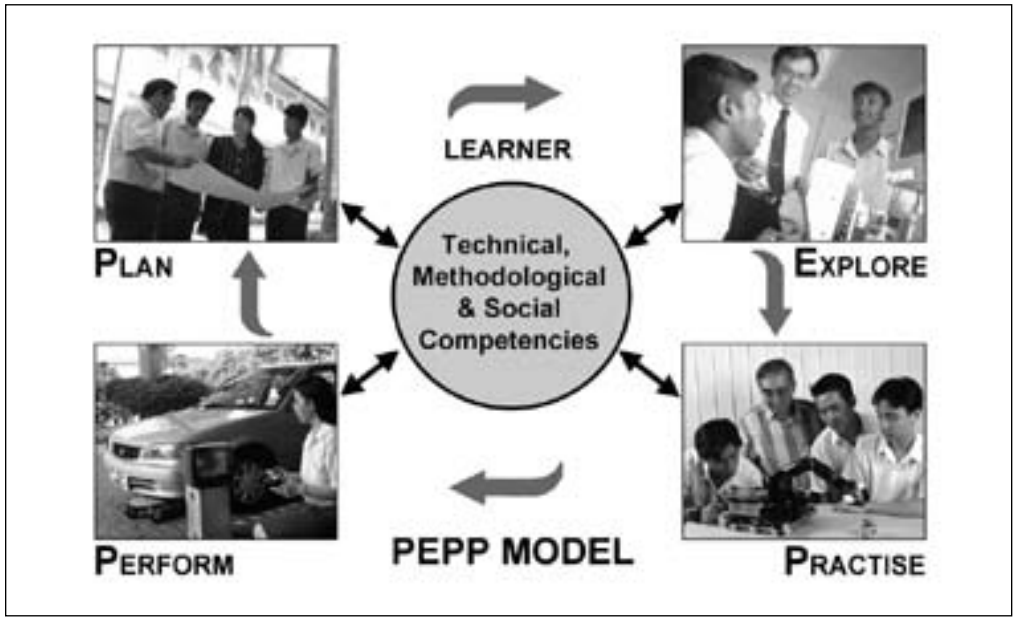
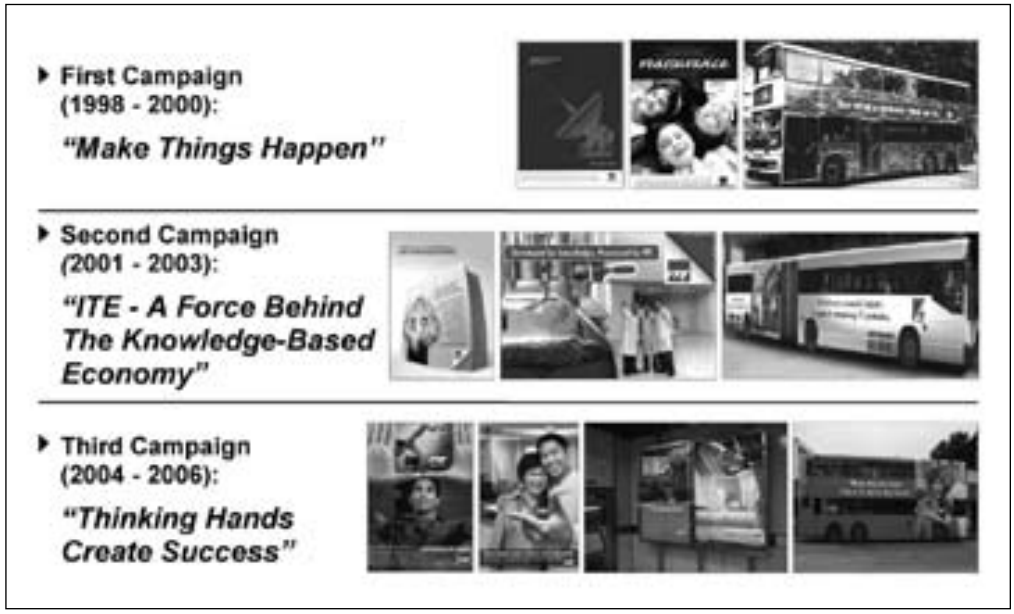



**Figure 8: Innovative Teaching and Learning Environment**

**Figure 9: Communications and Marketing of VTE**


**Figure 10: Creative Rebranding of ITE**



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