2

The teaching profession and teacher education in Singapore (1950 to present): from surviving to thriving

La profesión docente y la formación de docentes en Singapur (1950 al presente): de sobrevivir a prosperar

Woon Chia Liu*

*WOON CHIA LIU: National Institute of Education, Nanyang Technological University. **Datos de contacto**:
E-mail: woonchia.liu@nie.edu.sg. ORCID:https://orcid.org/0000-0002-6607-9351

Woon Chia Liu

Abstract

Teaching is a highly regarded profession in Singapore. Achieving such a status was a result of a series of strategic polices passed by the government to improve public education in Singapore. In tandem with Singapore's priority in developing human capital, improving the quality of teachers is considered essential to achieving the goal of providing quality education to every child. To develop a better understanding of Singapore's journey in teachers being viewed as professionals today, it is necessary to examine key developments in both Singapore's education system and teacher education programmes. Based on these two overarching themes, the author will discuss some of the key policies that were incepted to guide Singapore's success towards providing quality education for its learners (students and teachers). For a small nation with no natural resources, a concerted effort by the Ministry of Education, Academy of Singapore Teachers, and National Institute of Education is deemed necessary to achieve her educational goals. Looking beyond the 21st century, the article will also share some of the current strategies that aim to equip Singapore teachers with the attitudes, skills, and knowledge to help their students tackle the challenges of living in a volatile, uncertain, complex, and ambiguous world. To realise this vision, the National Institute of Education adopts the Model of Teacher Education for the 21st Century (TE21) that aims to prepare autonomous thinking teachers for the 21st century through a new paradigm of teacher education that is supported by a robust partnership with education stakeholders, and a strong theory-practice link in teacher education programmes. Through these insights, we hope to provoke reflection, stimulate discussion, and encourage educational stakeholders across the globe to draw out promising strategies for improving teacher education worldwide.

Keywords: teaching profession; teacher education; professionalism; future-focused; teacher policy; education system

Resumen

La enseñanza es una profesión muy apreciada en Singapur. Alcanzar tal estatus fue el resultado de una serie de políticas estratégicas aprobadas por el gobierno para mejorar la educación pública en Singapur. Junto con la prioridad de Singapur en el desarrollo del capital humano, mejorar la calidad de los docentes se considera esencial para lograr el objetivo de brindar una educación de calidad a todos los niños. Para desarrollar una mejor comprensión del viaje de Singapur en los maestros que son vistos como profesionales hoy en día, es necesario examinar los desarrollos clave tanto en el sistema educativo de Singapur como en los programas de formación docente. Sobre la base de estos dos temas generales, el autor analizará algunas de las políticas clave que se introdujeron para guiar el éxito de Singapur hacia la provisión de una educación de calidad para sus alumnos (estudiantes y docentes). Para una nación pequeña sin recursos naturales, se considera necesario un esfuerzo concertado del Ministerio de Educación, la Academia de Maestros de Singapur y el Instituto Nacional de Educación para lograr sus objetivos educativos. Mirando más allá del siglo XXI, el artículo también compartirá algunas de las estrategias actuales que apuntan a equipar a los maestros de Singapur con las actitudes, habilidades y conocimientos para ayudar a sus estudiantes a enfrentar los desafíos de vivir en un mundo volátil, incierto, complejo y ambiguo. Para hacer realidad esta visión, el Instituto Nacional de Educación adopta el Modelo de Formación Docente para el Siglo XXI (TE21) que tiene como objetivo preparar docentes con pensamiento autónomo para el siglo XXI a través de un nuevo paradigma de formación docente respaldado por una asociación sólida con las partes interesadas en la educación y un vínculo sólido entre la teoría y la práctica en los programas de formación docente. A través de estas ideas, esperamos provocar la reflexión, estimular el debate y alentar a las partes interesadas en la educación de todo el mundo a diseñar estrategias prometedoras para mejorar la formación docente en todo el mundo.

Palabras clave: profesión docente; formación docente; profesionalismo; visión de futuro; política docente; sistema educativo

1. Introduction

Singapore is a very small nation-state spanning 733 square kilometres in Southeast Asia (Department of Statistics, Singapore, 2022a). With a population of 5.63 million people, Singapore is one of the most densely populated countries in the world (Department of Statistics, Singapore, 2022b). With no natural resources except her people, Singapore comprises a diverse profile of languages, cultures, ethnicities, and religions since its colonial beginnings and her context continues to evolve (Gopinathan, 2012). The early years of Singapore's history in the mid-1950s was a tumultuous period when she was plagued with political unrest, high unemployment, and rising population (Goh & Gopinathan, 2008).

Despite a challenging past, Singapore's education has received much global attention over recent decades. Singapore students have consistently performed well in the international education arena such as the Programme for International Student Assessment (PISA), Progress in International Reading and Literacy Study (PIRLS), and Trends in International Math and Science Study (TIMSS). Some of Singapore's recent accolades include: sweeping the top spot for all three domains (reading, mathematics, science) at the 2015 PISA survey (Organisation for Economic Co-operation and Development (OECD), 2016); at the 2016 PIRLS, Singapore was the runner-up country in English language and had the largest percentage of students attaining the PIRLS Advanced International Benchmark (Mullis *et al.*, 2017); and was ranked first in all four categories (mathematics: fourth and eighth grades; science: fourth and eighth grades) of the 2019 TIMSS (TIMSS, 2019). According to the then-Deputy Director-General of Education, Ms. Low Khah Gek, these acclaimed educational achievements should be attributed to the work of the Singapore teachers (Ministry of Education (MOE), 2016, December 6). Likewise, in OECD's (2016) report on Singapore's educational success, it was noted that "teachers are the pillars of Singapore's education system" (p. 3). Furthermore, Singapore's educational success testifies to what the Holmes Group (1986) report argues – that the training of teachers is "a highly significant part of the making of the nation" (p. 24). In view of this, it is worthwhile to understand the developments of teacher preparation in Singapore from the beginning when it was then conducted at the Teachers' Training College (TTC). Today, the TTC has transformed into the National Institute of Education (NIE), Nanyang Technological University (NTU), which is the sole teacher education institute in Singapore.

This article will examine the roots of how Singapore teachers are currently recognised as professionals who are the drivers of Singapore's educational excellence (Barber & Mourshed, 2007; Hargreaves & Shirley, 2012; OECD, 2016). Unique to Singapore, Gopinathan (2012) noted that the developments in public education has been synonymous with the evolution of modern Singapore. Specifically, in each era of Singapore's growth from a swamp land to a cosmopolitan city, educational developments followed suit (Gopinathan, 2012; Gopinathan & Mardiana, 2013). This article will discuss some of the key policies that have shaped Singapore's educational landscape under four key periods: *industrialisation and survival-driven years* (1950 to 1978); *skills-intensive economy and efficiency-driven education* (1979 to 1996); *knowledge-based economy and ability-driven education* (1997 to 2011); and *innovation-driven economy and student-centric, values-driven education* (2012 to present).

It is worth noting that in modern day Singapore, 'teaching as a profession' means that teachers are governed by professional ethos and have a moral and ethical commitment

to the child, society, and nation. They need to acquire a scientific knowledge base that is a pre-requisite for practice. In addition, teachers need to have the technical skills to enact what they know in the classroom, the judgement in applying the knowledge, and the autonomy to make decisions in the best interest of the child. Finally, teachers are expected to continue to sharpen their expertise throughout their career to maintain relevance (Liu, 2017; Liu & Lim, 2018).

2.   1950 to 1978: Industrialisation and Survival-Driven Education

The Singapore today is quite different from its colonial beginnings. After World War II, Singapore was beleaguered with economic and social issues. There was high unemployment, recurrent industrial strikes, and racial and religious tensions. In 1959, Singapore was granted full self-governance as a British colony and years later in 1965, after separation from Malaysia, Singapore became a sovereign state. Arguably, it was during this tumultuous period that reinforced the idea to the residents of Singapore that political reform was crucial to ensure the state's survival (Chia *et al.*, 2022; Goh & Gopinathan, 2008). Specifically, these policies focussed on improvement of public education, manpower development, and military capability development (Goh & Gopinathan, 2008).

Providing public education was a national priority in pre- and early independence Singapore to ensure her survival, the strategy to developing education was influenced by the founding Prime Minister, Mr. Lee Kuan Yew's vision to develop Singapore's human capital (Liu, 2017). Mr. Lee believed education was a key pillar in nation building and was instrumental in addressing the social and economic woes. He was also clear that teachers were the decisive force in the classroom, and that teachers had a duty of care and responsibility to develop the impressionable minds of young people, and hence influence the future of the young nation (Lee, 1959, 1966).

Although Mr. Lee's views became the cornerstone on which Singapore built the teaching profession, and the foundation for Singapore's approach to teacher preparation, it would be many years later that teachers were given adequate support to be developed and respected as professionals.

The TTC, the predecessor of NIE, was formed on 1 March 1950 to meet the demand for teachers after World War II. Shortly after, the MOE was established in 1955. At the TTC, non-graduate trainee teachers attended a 2-year programme that would earn them a Certificate in Education (Chen & Koay, 2010). In tandem with teacher training, schools were built to meet the demands of the rapid increase in student enrolment particularly in English-medium and Chinese-medium schools following World War II (Goh & Lee, 2008; Gopinathan & Ho, 2000). According to C. B. Goh and S. K. Lee (2008), teacher education and training in the 1960s was "more of a bane than a boon" (p. 97). The teacher training curriculum then had little emphasis on liberal education but instead, focused on the craftsmanship of teaching and student management (Gopinathan & Ho, 2000). In the early years of initial teacher preparation (ITP), primary school teachers were trained at the TTC, and secondary school teachers were trained at the School of Education of the National University of Singapore. It was only from 1969, that the TTC was involved in the training of secondary school teachers (Gwee & Chang, 2010). The early years of the TTC was a challenging period in terms of the resources available to train teachers.

After Singapore attained self-governance from the British in 1959, between the years of 1959 to 1965, an average of one school was built per month (Goh & Gopinathan, 2008). With this increase in infrastructure, student enrolment rose rapidly between the late 1950s to early 1970s (Gwee & Chang, 2010). Due to the severe shortage of teachers, the TTC initially ran on a dual system of full-time and part-time training but eventually switched to a single system of in-service training so that teachers who were training at the TTC were able to assume teaching responsibilities concurrently in schools (Gwee & Chang, 2010). In the early years of nation building, teachers struggled to cope with the various demands in the education system such as the rise in student enrolment and changes in the education programmes (Goh & Gopinathan, 2008). The quality of teaching was low and teachers had "little time for reflection, innovation and self-improvement" (Goh & Lee, 2008, p. 97). Considering the circumstances in a 'survival' era that required enough teachers to sustain the growing education system, compromising on the quality of teaching was "accepted as a necessary evil" (Lun & Chan, 1983, p. 10). By 1962, the student population rose to 400,000 out of a population of 1.7 million, which meant that a significant portion of the population could receive an education (Goh & Gopinathan, 2008). The educational policies then focused on increasing the supply of teachers while meeting the high demand for basic public education for her residents.

The early political leaders of Singapore saw education as a driver in uniting the demographically diverse city-state while increasing literacy and employability of her residents. Moreover, due to the multilingual profile of Singapore residents and the existence of various ethnic education streams at that time (e.g., Malay education, Chinese education, Tamil education), the role of education was viewed by the Singapore government as an important factor to promote socialisation and developing a national identity through emphasising on bilingualism (Ong, 1965). Therefore, learning a second language was made compulsory for primary schools in 1960 and subsequently, compulsory for secondary schools in 1966 (Goh & Gopinathan, 2008). Between 1961 to 1965, a Five-Year Plan was implemented to improve education standards and in "providing universal free primary education to its residents" (Goh & Gopinathan, 2008, p. 84). The main features of the Five-Year Plan articulated that there had to be four streams of education (Malay, Chinese, Tamil, and English), Malay was the national language, and the public education curriculum focused on the study of mathematics, science and technical subjects (Goh & Gopinathan, 2008). It was during this period that saw the introduction of a common syllabus for all subjects in all four language streams, a Government Scheme for Loan of Free Textbooks was made available, and common examinations at various levels (primary, secondary, high school) (Yip & Sim, 1994). Through such policies, the Singapore government demonstrated that the education system should function based on the principle of meritocracy where each child, regardless of race, language or religion, is given full opportunity to succeed (Goodwin *et al.*, 2017). This philosophy in ensuring equal opportunities for all Singaporeans largely continues today.

In tandem with early education curriculum initiatives, the Singapore government took steps to ride the wave of industrialisation by attracting foreign-owned industries to operate in Singapore and grew her economy. Hence, providing sufficient vocational and technical training and subsequently, skilled labour (e.g., welders and machinists) was important to meet the demands of the foreign industries (e.g., shipping, electro-mechanical, precision engineering) that established themselves in Singapore (Gwee & Chang, 2010). Concomitant to this strategy, increasing vocational and technical schools

addressed concerns related to an over-emphasis on the academic aspect of education in Singapore and catered to the less-academically inclined students (Goh & Gopinathan, 2008). MOE set up the Technical Education Department in 1968 and in 1969. All male lower-secondary students were required to have two years of education in technical subject while female students could choose between home economics or technical subject.

Teaching as a profession was lowly regarded during the survival-driven era. There was a sentiment of low morale and status amongst Singapore teachers, evident in the high resignation rates in the early 1970s of both teachers and principals (Goh & Gopinathan, 2008). Liu (2017) noted that this perception was in part due to a "top-down approach in planning, disseminating, and enforcing educational changes in Singapore" (p. 32). Teachers' practice in schools was "highly prescriptive, textbook-bound and examination-driven" (Liu, 2017, p. 32), and teachers had little autonomy in making educational decisions. However, the centrality of education was considered a crucial element for promoting social cohesion and for establishing a national identity. It was deemed a "well-tested" strategy (Sharpe & Gopinathan, 2002, p. 164) that allowed Singapore to survive during its tumultuous early-independence years and was seen as pivotal for her to achieving a credible education system.

3. 1979 to 1996: Skills-Intensive Economy and Efficiency-Driven Education

In the late 1970s, after laying the foundation in providing standardised education for the masses, the Singapore government saw the need to transit towards improving the skilled capabilities of its residents. Motivated by economic growth of staying globally competitive, policies steered towards further improving the skills of Singaporeans. Steadfast to the belief that education should drive this economic objective, the then Deputy Prime Minister and Minister for Education, Dr. Goh Keng Swee was tasked with the responsibility to conduct a review of public education in 1978. To enact this, Dr. Goh assembled a team of systems engineers to rigorously examine the progress of the local education system (Chia *et al.*, 2022). Commonly coined as the 'Goh Report' by Singaporeans, the report unveiled three key areas for improvement in education*: the need to reduce 'education wastage'*; *low literacy levels*; and the *ineffective bilingual policy* (K. S. Goh, 1979). Following the report, MOE incepted a series of polices that would encourage differentiation in education for the next two decades.

In 1979, the New Education System (NES) was introduced to address the concern of 'education wastage' (Goh & Gopinathan, 2008). The implementation of the NES saw the introduction of three educational streams for students in primary and secondary schools to enable them to progress at a pace more suited to their abilities. The NES was designed to allow students to progress as far as possible in schools to maximise their employability in the workforce. The national curriculum at that stage focused on bilingualism, moral education, and civics, and emphasis was given to science, mathematics, and technical education.

To challenge the more academically inclined students, the Gifted Education Programme was rolled out in 1984 (Goh & Gopinathan, 2008). And, to cater to students with different interests and aptitudes, the Music Elective Programme, Art Elective Programme, Language Elective Programme were rolled out between the 1980s and 1990s. Another key educational policy happened in 1987 when English was officially instated as

a first language and mother tongue as a second language in public education. The key rationale for this language policy was to establish a common working language amongst a culturally and linguistically diverse Singapore while improving the competitiveness of its residents in the global marketplace.

Alongside the differentiation of school curriculum, schools also differentiated themselves. Between the 1980s to 1990s, schools were labelled as 'independent', 'government' or 'autonomous' as each of these terms suggests, various levels of autonomy were given to schools in terms of staff resourcing, curriculum delivery and text books adoption (Chia *et al.*, 2022). The impetus for such a change was largely motivated by the need to provide individualised education for diverse student profiles and allowing schools to preserve their unique identity (Chia *et al.*, 2022). In contrast with the survival-driven phase, which was characterised by curricula uniformity and little autonomy in schools, schools in the efficiency-driven phase experienced a period of decentralisation of education decisions.

3.1. Teachers' Training College to National Institute of Education

To support policies that allowed for the maximisation of capabilities of Singaporeans, there was a need to improve the quality in teachers. In 1970, the Parliament passed the Institute of Education Act that spearheaded the conversion of TTC to become the Institute of Education (IE) in 1973. As a result, IE became the sole teacher education provider taking over the functions of the TTC, the former School of Education of the National University of Singapore, and the Research Unit of MOE (Sharpe & Gopinathan, 1993; Sim & Ho, 1990). The establishment of IE provided necessary facilities for running of teacher education programmes and promoted research in education (Taylor, 1980). The IE Act also established IE as an independent institute that could confer education degrees and institute professorships. This development was accompanied by the launch of the full-time Diploma in Education programme with practicum (Chen & Koay, 2010). With the aim of promoting the teaching service as a worthwhile profession for better candidates, the Teacher-In-Training Scheme was introduced in 1979, replacing the part-time Teaching Cadetship Scheme, where student teachers were paid a salary whilst undergoing training (Loh & Hu, 2019). In 1981, the Further Professional Certificate in Education was introduced to upgrade all nongraduate primary school teachers which resulted in a salary increment for these teachers. Another key development to the IE curricula was the support given to train school leaders in the 1980s. This was in part a response to the feedback that the quality of management in schools was lacking (Goh, 1979). By 1984, a 1-year Diploma in Educational Administration was introduced for school leaders such as school principals and vice-principals (Loh & Hu, 2019). 1984 also saw the establishment of the College of Physical Education (CPE) as an autonomous college at the IE, and a 2-year Diploma in Physical Education programme was provided to improve the quality of Physical Education teacher training (Chia *et al.*, 2022).

Together with the programmatic improvements in teacher education, there were efforts to improve the quality of academic faculty through encouraging postgraduate work and establishing a research culture. Particularly, during the period of 1973 to 1991, the IE leadership spearheaded many reviews and subsequent changes to professional and training programmes which resulted in increased training grants and opportunities for faculty to pursue higher degrees (Goh & S. K. Lee, 2008). To recognise and promote a research culture amongst academic faculty, there was a "formal recognition of research as a crucial criterion for staff recruitment, promotion and development" and the use of

"explicit statements pertaining to research and publications" in the recruitment advertisement and promotion guidelines (Sim & Ho, 1990, p. 57). The profile of academic faculty at IE changed significantly over time (Sim & Ho, 1990). For example, in terms of the proportion of faculty holding a master's or doctoral degree, the percentage rose from 37.5% in 1975 to 67.3% in 1982 (Lun & Chan, 1983). These developments were considered significant in IE's strive towards improving the quality of teacher education programmes and for teaching to be recognised as a profession.

A milestone development for teacher education in Singapore happened in July 1991 when IE merged with CPE to form NIE (Gopinathan & Ho, 2000). On the same day of the merger, NIE became an autonomous institution within the NTU and subsequently offered 4-year bachelor's degree programmes. Although teacher education has always been a priority to the Singapore's government, the merger catalysed the goal of providing immersive full-time university-based preparation for teachers. Being a constituent of NTU catalysed cross-disciplinary research and collaboration between education and other faculties (e.g., engineering, applied sciences), which would boost the impact of both education and teacher education research (Tan *et al.*, 2017). It also allowed pre- and in-service teachers to have access to the research resources of the parent university (Liu, 2022). Next, by association with other newer professions (e.g., engineering, accountancy) which NTU educated its students according to an American model of university education, it placed NIE in a better position to engender teaching as a profession, where the development of teachers is underscored by evidence-based learning (NIE, 2009). Finally, unlike many other teacher education institutes around the world that were absorbed by universities, NIE was given the autonomy in financial and curriculum matters, which facilitated the design of teacher education programmes to meet the practical needs of the education system (Gopinathan & Ho, 2000). As a result of this partnership, NIE grew tremendously – offering an extensive range of undergraduate and postgraduate degrees, as well as short-term PD courses and milestone programmes for the education sector.

3.2. Recruiting the Best and Brightest

The call to raise the quality of teachers at recruitment was made in a report by Taylor (1980), where he recommended for IE to emphasise on the "quality of student [teacher] intake" (p. 97). To grow the profession, substantial resources and various policies were put in place to attract, develop and retain the best talent in the teaching service (Goodwin *et al.*, 2017; P. T. Ng, 2015). To this day, to attract talent, MOE offers a substantial remuneration package for newly recruited teachers and accepts the best graduates into teaching each year (Goh & Gopinathan, 2008; Loh & Hu, 2019; Ng, 2015). During their teacher preparation years, student teachers are paid a full monthly salary (with employment benefits) that is provided by MOE (P. T. Ng, 2015). The remuneration package for student teachers is "comparable with (or even better than)" other beginning professions such as lawyers and medical doctors (Goh & Gopinathan, 2008, p. 101). Over the decades, the criteria for entry was raised to the extent of accepting aspiring teachers from the top one-third of the graduating cohort each year (Ng, 2015).

4. 1997 to 2011: Knowledge-Based Economy and Ability-Based Aspiration-Driven Education

Considering the wave of globalisation, the Singapore government took the view that Singapore should be developed as a knowledge-based economy (Gopinathan & Mardiana, 2013). Therefore, the previous era in developing a skilled labour force was deemed obsolete for Singapore to remain competitive in a globalised world. Hence, educational policies shifted towards an ability-driven phase which entailed nurturing the unique strengths and talents of its students (Gopinathan & Mardiana, 2013).

4.1. Thinking Schools, Learning Nation and Teach Less, Learn More

A notable curricular transformation for Singapore's public education was when the Thinking Schools, Learning Nation (TSLN) and Teach Less, Learn More (TLLM) initiatives were introduced in 1997 and 2005 respectively (C. B. Goh & Gopinathan, 2008). Significant developments during the few years were the outlining of the '*Desired Outcomes of Education'* (DOE) in 1997 (MOE, 2023) and the further enhancement in 2010 with the development of the '*Framework for 21st Century Competencies and Student Outcomes*' (21CC in short) in 2009 (MOE, 2022a). The 21CC is seen as a set of key competencies that learners need to thrive in the 21st century that is meant to produce the DOE, that is, a confident person, a self-directed learner, an active contributor, and a concerned citizen.

The implementation of TSLN and TLLM underlined the importance of education to focus on developing students' 21st century competencies, to provide customised education for students with differing passions and interests, and the need to allow teachers to exercise professional judgement in deciding the pedagogies to engage their students (Deng, 2004). It set forth various milestone developments such as the establishment of specialist schools (e.g., Sports School and School of the Arts), and the introduction of the Integrated Programme (IP) (Gopinathan *et al.*, 2008). During the period, MOE adopted a more 'bottom-up' approach that allowed the voices from the 'bottom' (teachers, school leaders) to be heard, albeit curriculum decisions still followed a 'top-down' model (Ng, 2017). In other words, all public schools followed a prescribed curriculum that detailed 'what' (e.g., syllabus) students should be learning from the MOE but 'how' (e.g., pedagogy) it was enacted in the classroom was decided at the school level. Teachers were given greater freedom to make pedagogical decisions to better engage their students, and principals were given more autonomy to make decisions on school management matters (Gopinathan & Mardiana, 2013). This unique paradoxical combination of a 'centralisation' and 'decentralisation' education model allowed for a system that was "top-down, competitive and accountability-driven" but also "bottom-up, collaborative and responsibility-driven" (Ng, 2017, p. 86). Underpinning the successful implementation of TSLN and TLLM was the realisation that teacher preparation had progressed to a level that teachers were sufficiently competent to exercise good judgement in bringing out the best in their students while following a prescribed curriculum.

On a systemic level, the TSLN redefined teaching as a learning profession and schools as learning organisations. The new positioning moved away from the traditional view of the 'teacher as a technician' to that of 'teacher as a reflective professional' (Deng *et al.*, 2013), and established continuous PD as a cornerstone of the Singapore's teaching profession (Bautista *et al.*, 2015).

4.2. Beginning of Education Research

Although NIE was in a better position to conduct research when she became a constituent of NTU in 1991, research at NIE did not really take off. In 1999, in part a response to the TSLN, dedicated funding for education research was made available by the MOE to the NIE in the form of the Education Research Fund, with an annual budget of SGD $1 million (Chen & Koay, 2010). A few years later, the MOE awarded a five-year tranche funding of approximately SGD $50 million to NIE that saw the establishment of the Centre for Research in Pedagogy and Practice (CRPP) in 2003 (Tan *et al.*, 2017) and the establishment of the Learning Sciences Lab (LSL) in 2005. In 2008, following an examination of the impact of education research on policy and practice that followed the initial funding, a second instalment of the Education Research Funding Programme (ERFP) totalling approximately SGD $ 100 million was granted to NIE. This period marked the establishment of a new Office of Education Research responsible for managing the grant from the MOE, guiding the course of education research at NIE, fostering collaboration and communication within the NIE faculty, and facilitating external partnerships between NIE researchers, MOE policymakers, school practitioners, and other universities (Tan *et al.*, 2017).

Since then, NIE has played a crucial role in offering evidence based on empirical research in shaping policies in Singapore. Examples include the policy review on mother tongue languages in 2011 and the introduction of the Integrated Programme and Direct School Admission scheme in 2004 (Poon, 2012). The development of education research also facilitated the development of locally based evidence-informed ITP, PD, and leadership programmes.

4.3. A Focus on Values in Teacher Education

As MOE was engaged in developing the 21CC, NIE, with input from MOE and the schools, conducted a comprehensive review of its teacher education programmes (Lee & Low, 2014). Based on extensive analysis of international literature, careful evaluation of current and emerging global trends, and a deep understanding of evolving policies, local context, and stakeholders' viewpoints, NIE launched the *Model of Teacher Education for the 21st Century* (TE21) (NIE, 2009). TE21 emphasises the learner at the heart of her educational goals and is Singapore's response to develop 21st century teachers for 21st century learners (NIE, 2009). It is premised on the fundamental belief that teachers must possess essential 21st century skills, knowledge, and values to excel in their practice.

However, instead of a single values paradigm, a *V3SK framework* was introduced where values form the central pillar, surrounded by the necessary skills and knowledge of a 21st century teacher. The pillar of 'values' was distilled into 'three values paradigms' (NIE, 2009). The first values paradigm, known as *learner-centred values*, places the learner as the focal point of the teacher's efforts. The second values paradigm, *teacher identity*, pertains to the core beliefs held by teachers regarding their roles and responsibilities. Lastly, the third values paradigm, *service to the profession and community*, focuses on promoting stewardship, encouraging collaborative learning, and cultivating social engagement. The V3SK, the new underpinning philosophy, encapsulates NIE's distinctive approach of values-based teacher education.

4.4. Professional Voice and Professional Development

A shared characteristics found across all professions is the presence of an advocate who represents the interests and concerns of the profession (Shulman, 1998). Hence the year 2010 was a milestone year for the Singapore's teaching profession when the MOE established the Academy for Singapore Teachers (AST). Launched at the 2010 Teachers' Conference by the then Minister for Education and Second Minister for Defence, Mr. Ng Eng Hen, the AST represents the 'professional voice' of Singapore teachers (MOE, 2010, September 6). It is tasked to spearhead a teacher-led culture of professional excellence and gave teachers the ownership of their own PD (MOE, 2010, September 6).

The significance of PD is of utmost importance to establish teachers as respected professionals (Sachs, 2016). By prioritising PD and coaching, teachers are recognised as valuable sources of skills and intelligence that require support (Adler & Borys, 1996, p. 68). Singapore's policymakers not only recognise the significance of PD, but also emphasise the crucial role of teacher-led learning. This commitment is evident in the deliberate use of phrases such as 'teachers individually and collectively steering the course to enhance professional development', 'top-down support for ground-up initiatives', 'teachers driving professionalism', and 'teachers leading their own professional development' (Ho, 2009; Ng, 2008, 2009; Salleh & Dimmock, 2012). This reinforces the belief that teachers as professions should have the agency and autonomy to shape their own professional growth and development within the education system.

Under the Professional Development Continuum Model (PDCM), teachers are entitled to fully subsidised PD of up to 100 hours per year and are allowed to pursue a higher degree either locally or overseas. To cater to the various strengths and career aspirations of teachers, MOE also incepted three career tracks for all its education officers (i.e., Teacher Track, Leadership Track, Senior Specialist Track) which allows teachers, regardless of their aspirations and strengths to excel and grow to the best of their abilities in the different tracks (Goodwin *et al.*, 2015; Liu, 2017, 2022).

5. 2012 to present: Innovation-Driven Economy and Student-Centric, Values-Driven Education

In recent years, international leaders have become more aware and concerned with new and complex issues (e.g., climate change) that would inadvertently affect their country's economy. Educationalists argue that education systems have an important role in addressing these prescient concerns (Green, 2020). Similar to Singapore's focus on 21CC, the OECD recommended that education should nurture students with 21st century competencies (i.e., creating new value, taking responsibility, reconciling tensions and dilemmas) (OECD, 2018) and underpinning those competencies should be a set of skills, knowledge, attitudes and values (OECD, 2019a).

Against this backdrop, the Singapore education system underwent a notable transformation with the introduction of the vision of being '*student-centric, values-driven*' (Heng, 2012). This vision represented a significant change, placing greater importance on values, socio-emotional competencies, character development, and holistic growth as central elements of students' educational journeys (Lee *et al.*, 2022). Concomitant to

the 'student-centric, values-driven' launch, the then Minister for Education Mr. Heng Swee Keat, also announced four visions for Singapore's education: 'every school, a good school'; 'every student, an engaged learner'; 'every teacher, a 'caring educator' and; 'every parent, a supportive partner' (Heng, 2012). The four 'every' mantras symbolise the "four dreams" for all stakeholders in Singapore's education to collectively embrace the "enduring spirit of education" instead of being focussed on results (Ng, 2017, p. 18).

Shortly after in 2016, MOE conducted a review of its CCE curriculum and at the Committee of Supply 2020 debate in parliament, the then Minister for Education, Mr. Ong Ye Kung shared the findings from the review (Y. K. Ong, 2020). Concerned with the VUCA environment and the pervasiveness of technology in daily lives of students, Mr. Ong raised the question of "How do we ensure that our young make the right choices, and survive well in an online world?" To address such emerging issues, he outlined five changes to the CCE curriculum: building on and strengthen the current CCE curriculum; emphasis on cyber wellness education; focus on mental wellness through a peer support system; promote critical discussion of contemporary issues; and further integration of CCE learning in other school activities. Essentially, these policies drove the rhetoric that inculcating a strong foundation of desirable values in students should be prioritised in a VUCA world.

More recently, to provide students with greater flexibility to customise their educational experiences, MOE launched the full subject-based banding (FSBB) initiative (MOE, 2019, September 3). Specifically, the 'One Secondary Education, Many Subject Bands' thrust was to address the trade-off between customisation in education and the downside of stigmatisation. There have been changes over the years but the move towards FSBB is the most radical. It means that by 2024 secondary students will be in mixed form classes and can study different subjects at different levels without the label of stream. The move encourages students to find their strengths, whilst getting additional support for their areas of weakness without negatively affecting their self-confidence.

5.1 A National Priority and Teacher Status

While teachers are recognised as professionals, they may not receive the same level of respect, rewards and recognitions as certain other professionals, such as doctors and lawyers (e.g., Tichenor & Tichenor, 2005). To a large extent, the status of teaching in a country is tied to the respect the society accord teachers, the value they ascribe to the teaching profession, and the way in which teachers are selected and trained as professionals, and are empowered within the education system (Liu, 2017; Liu & Tan, 2015).

In modern Singapore, teachers are considered a national priority. Their role in fostering national progress and nurturing the younger generation is frequently praised in political speeches and mainstream media. For example, Mr. Heng Swee Keat, then Minister for Education, acknowledged teachers' contribution when he declared that '… You teach to make Singapore possible, you teach to make our future possible' (Heng, 2014). This high regard did not happen by chance. It is Singapore's commitment to deliberately celebrate teachers and treat teaching as an important profession. As noted by foreign academics, it is developed and sustained politically, (e.g., Darling-Hammond, 2017; Goodwin, 2012; Goodwin *et al.*, 2017) which is in stark contrast the wave of teacher bashing or teacher-shaming in some countries.

In addition, teachers in Singapore enjoy a relatively high status (Dolton & Marcenaro-Gutierrez, 2013; Dolton *et al.*, 2018a). Of the 21 countries ranked in the 2013 and 2018

Global Teacher Status Index reports, Singapore was 7th in 2013 and 5th in 2018 (Dolton *et al.*, 2018b). Teacher status in Singapore had increased over the last five years.

Furthermore, teaching is seen as a career of choice for young people in Singapore (Low, 2012; A. Sim, 2012). In the Teaching and Learning International Survey (TALIS) 2018, 71% of Singapore teachers reported that teaching was their first-choice career (OECD average of 67%, OECD 2019b). Most teachers also had no regrets joining teaching (OECD, 2014, 2020b).

5.2 From Quantity to Quality

In 2012, teacher education in Singapore arrived at a crossroad when the then Minister for Education, Mr. Heng Swee Keat, announced that the target of 33,000 teachers was met (Heng, 2012). There were thoughts about whether the emphasis of ITP should be placed on enhancing the 1-year PGDE programmes and discontinuing the more resource-intensive 4-year degree programmes. NIE was, however, fervently advocating for a more comprehensive approach to ITP that would be comparable to the rigorous preparation of other professional fields such as medicine, law, or engineering (Tan & Liu, 2017). Ultimately a decision was reached to shift the focus from quantity to an even greater focus on quality in teacher preparation.

To this end, the 4-year Bachelor of Arts / Science (Education) programmes underwent structural changes to integrate the best of academic degrees with a good foundation in the field of education. Launched in 2014, the enhanced undergraduate programmes have a strong research focus which expose student teachers to both research in their academic discipline and education. This development supports the idea that developing teachers as professionals requires them to think and act independently and rationally, and that presupposes that they have the ability to engage in research-based thinking and to conduct research (Kansanen, 2007).

NIE also pushed the frontier of teacher education in Singapore by developing a new NTU-NIE Teaching Scholars Programme (TSP) that is aimed at preparing future leaders of education who possess the passion and aspiration to inspire, nurture, and lead the next generation of learners (NIE, 2014). Together, the enhanced degree programmes and the TSP provide student teachers with opportunities to nurture their competencies, delve into local and global issues, gain valuable insights, and crystallise their teacher identity through experiences such as service learning, industry internship, semester exchange, and international student teaching in other high-performing education systems.

Singapore believes that having both the degree and PGDE pathways is a strength of her system as the teachers bring with them different experiences and perspectives. As such, the 1-year PGDE programme was also reviewed and extended to become a 16-month programme to provide more 'time and space' for PGDE student teachers to deepen their sense of professional ethos, strengthen their pedagogical content knowledge, and improve their practice (Liu, 2022). The programmes were also designed to give greater emphasis on inquiring into practice.

At a time where teacher preparation was being scrutinised globally and teacher education institutions faced the need to justify their existence, the endorsement and support of the TSP and the 4-year undergraduate programmes by the MOE went a long way in solidifying the standing of the teaching profession in Singapore. Such an approach is in line with the view that having stringent criteria for selection and having quality preparation helps in making teaching the preferred career choice (Barber & Mourshed, 2007) and raises the status of the teaching profession (Sahlberg, 2013).

5.3 Growth of Research and Research Literacy

Since the establishment of the Office of Education Research in 2008, NIE has continued to grow in strength in education research. A third tranche ERFP funding of SGD$ 130 million was awarded to NIE in 2013 to focus on addressing educational needs and issues in Singapore, and researching on education reforms and innovations for 21st century teaching and learning (O. S. Tan *et al.*, 2017). Thereafter, a fourth tranche ERFP funding of SGD $108 million was awarded in 2017 to build on the work that had been done in the previous three cycles (NIE, n.d.). The development of the ERFP 2018-2022 was based on the recommendations put forth by the Singapore's Committee of the Future Economy and built on the policy initiatives of TSLN and TLLM. The objective was to contribute to policy formulation and support Singapore's education system in providing 'Research-Informed Education for Future-ready Learners' (NIE, n.d.). The 'future-ready learners' agenda' was closely aligned with key policy imperatives such as 'Learn for Life' (Ong, 2018).

Sahlberg (2013) noted that one of the reasons that enable Finnish teachers to be highly respected as professionals and leaders in their profession is the fact that their academic graduate degree is based on research, which allows Finnish teachers to acquire important knowledge and skills to make decisions in the classroom. Singapore does not have a research-based ITP, and most of our teachers do not have a master's degree. However, the growth in education research in the last decade provided opportunities for Singapore teachers to be involved in research. Just between 2013 to 2017, a total of 312 (out of 360) schools were involved in intervention projects, and 2925 teachers were involved in intervention and scale-up projects (Office of Education Research, 2017). Involvement in research allows teachers to gain valuable research skills to interpret, evaluate, and even collect their own research evidence while teaching. The levelling up of research literacy of Singapore's teaching profession also enables teachers as professionals to be at the heart of system change (Office of Education Research, 2017).

5.4 The Singapore Teaching Practice

As professionals, teachers need to commit to ongoing learning to sharpen their expertise throughout their career (Liu, 2017; Liu & Lim, 2018; Sachs, 2016). Professionalism also involves teachers engaging in professional inquiry that underpins decision-making (Elmore *et al.*, 1996; Fullan, 2003) and co-creating knowledge through shared practice and reflection on practice (Mockler & Sachs, 2011; Pickering *et al.*, 2007). To accomplish the aforementioned, teachers (and teacher educators) must have a shared vocabulary and a common vision of professional practice.

One of the key success factors of Singapore's education success is the strong tripartite relationships between the key stakeholders of education, that is, MOE, AST and NIE (e.g., S. K. Lee & Low, 2014; Liu, 2022). The strength of the partnership was exemplified when the three key stakeholders worked together to develop the *Singapore Teaching Practice* (STP) (MOE, 2022d). Launched in 2017, The STP articulates Singapore educators' core beliefs about teaching and learning and makes explicit what it means to be 'student-centric'. It is Singapore's collective effort to frame, codify and document the good practices of the teaching profession, and to unpack the perspectives and practices that support the teachers in facilitating learning within the Singapore classroom (see Liu & Lim, 2018, for details). It provides teacher educators and educators in Singapore with

an agreed knowledge base and curriculum philosophy, shared beliefs and vocabulary about practice, and a common vision of profession practice. There are people who argue that teaching is not a true profession because the craft of teaching is an individual matter, and there is no shared standard of practice — a hallmark of true profession (OECD, 2011). With the STP, Singapore consolidated the status of teachers as professionals with the crystallisation of a common vision of professional practice. She also has a shared vocabulary that facilitates teachers' learning and development.

5.5 Embracing Innovation and Technology

In addressing concerns related to technological developments, the Smart Nation initiative was launched in 2014 by Singapore's Prime Minister, Mr. Lee Hsien Loong (Lee, 2014). Acknowledging the need for Singaporeans to effectively ride the wave of technology in their daily work and living, the Smart Nation initiative was targeted at improving liveability and sustainability through encouraging the adoption of digital technologies and promoting digital innovation (Lee, 2014). To achieve the vision, education was identified as one of the most crucial pillars in the quest.

A month prior to the announcement of the Smart Nation initiative in November 2014, NIE established a Steering Committee with the objective of creating a Teaching and Learning framework as part of a key initiative in the NIE strategic roadmap (Liu, 2022). Recognising the global trend among prominent educational institutions and thinktanks, NIE understood the necessity to envision education anew in an era dominated by technological advancements and the rise of machine learning. This new EMIC (Experiential, Multimodal, Inquiry-based and Connectedness/Connectivity) framework was a move to address the overall change in the 21st century world that called for education to innovate and harness the power of technology to enhance teaching and learning (NIE, 2018).

It was during this period that two more nation-wide education technology plans were implemented since the previous three ICT-in-Education Masterplans. The key distinctive feature of the 2015 ICT-in-Education Masterplan 4 was in aligning the use of learning technologies in schools with MOE's 21CC (MOE, 2022a; MOE, 2022b). This deliberate alignment was in part a response to the VUCA environment that requires students to be responsible digital citizens (OECD, 2018). The current Educational Technology (EdTech) Plan is aimed at establishing a 'responsive, agile approach and structure to help MOE react quickly to technological and contextual changes to ensure the effective use of EdTech for quality teaching and learning' (MOE, 2022c). Importantly, this educational reform established a firm foundation with the necessary infrastructure for Singapore to embrace digital learning and set forth new waves of innovations in teaching and learning (e.g., Koh *et al.*, 2010; Lim *et al.*, 2022) and thrive in an innovation-driven economy.

5.6 Future-ready Teachers for a Post-pandemic World

Singapore has come a long way from the days of survival. Her education system is considered one of the strong performers in the world (OECD, 2011) and she is recognised for her rigorous approach in preparing teachers (Darling-Hammond & Rothman, 2015; Goodwin & Low, 2021). Her ITP programmes have also been cited as exemplars of programmes with a strong theory-practice nexus, high-quality clinical practice, the use of professional teaching standards to emphasise learning and evaluation of critical knowledge, skills and dispositions, and the creation of teacher performance assessments, based on professional standards, that are connected to student learning in the classroom

(Darling-Hammond, 2017). Despite the accolades, Singapore knows that more can be done to develop teachers as professionals for a VUCA world. Singapore strives to develop teachers to be *shapers of character, creators of knowledge, facilitators of learning, architects of learning environments,* and *agents of educational change* (NIE, in press).

In 2023, building on the previous TE²¹ model (NIE, 2009), NIE launched the *TE21: Empowering Teachers for the Future* model with a greater focus on developing teachers to be self-directed and lifelong learners (NIE, in press). Correspondingly, there is an *Enhanced V3SK* that crystallises Singapore's paradigm of values-based ITP programmes. The key values, skills and knowledge articulated in the *Enhanced V3SK* are competencies 21st century teachers need if they are to help their learners develop 21st century skills (OECD, 2018). Of the 21st century skills identified by NIE, critical and metacognitive skills, creative and innovation skills, digital and data literacy, reflective skills, and research literacy deserve special mention. Since the launch of the enhanced degree programmes and the 16-month PGDE programmes, NIE's teacher education has a strong emphasis on reflection and inquiry. Student teachers are required to be familiar with the knowledge bases of teaching and learning (Liu & Lim, 2018), which is a pre-requisite for practice. They are also required to reflect on their experience, construct their own conceptual map of learning, and inquire into practice during their final practicum. As mentioned earlier, student teachers from the 4-year undergraduate programmes have the opportunities to be involved in research projects.

To bring teacher education to a higher level, Singapore's current model of ITP is built on four pillars of *deepening professionalism*, *strengthening practice, broadening pedagogies, and developing perspectives* (Liu, 2023).

To *deepen professionalism*, apart from the focus on understanding the learners, mastery of educational and subject-matter knowledge, and competence in content-specific pedagogical approaches, Singapore's ITP programmes are designed with an emphasis on *values development*, *ownership of learning*, and *inquiry*. The programmes provide opportunities for student teachers to examine their values and challenge their assumptions as they develop their teaching philosophy and teacher identity (Liu, 2022; Liu & Lim, 2018). The emphasis on teaching philosophy also encourages the student teachers to bear in mind that the learners should be at the centre of what they do. Since no ITP programme can provide all the knowledge teachers need, it is crucial to develop student teachers' ability to reflect and inquire into their practice and take ownership of their learning. A sense of ownership fosters autonomy and is essential for teachers to feel competent and professional (e.g., Paradis *et al.*, 2018). The ability to reflect and inquire into their practice helps teachers gain new competencies, develop judgement, and assume new roles throughout their career (Liu, 2022). Singapore's teacher education programmes are structured to support this development with opportunities such as the Professional Practice and Inquiry portfolio and research (see Liu, 2023; Liu, Koh, *et al.*, 2017, for elaborations).

A good scholarly knowledge base is not enough to make teachers good at what they do. Teachers who are professionals must be able to enact knowledge into practice (Darling-Hammond & Bransford, 2005; Liu & Lim, 2018; Shulman, 1998). To *strengthen practice*, the NIE enhanced practicum model is built on five key tenets (refer to Liu *et al.*, 2014; Liu, Tan, *et al.*, 2017; Png & Liu, 2017). Most notably, practicum is positioned as the spine of NIE's teacher education programmes with intentional interweaving of coursework and school stints so that student teachers can 'learn for teaching' and 'learn

from teaching' (Liu *et al.*, 2014; Liu, Tan, *et al.*, 2017). NIE sees teaching as a complex *professional thinking activity*, and the process of practicum is designed to be *purposefully analytic* (Liu *et al.*, 2014; Liu, G. C. I. Tan, *et al.*, 2017). Hence instead of focusing on micro-teaching skills, student teachers are mentored by university-based and school-based mentors to theorise their accounts of practice and reflect on their experience to better their practice through structured reflections and professional focused conversation. The mentors act as coaches, counsellors, co-learners, challengers, and co-enquirers and evaluators (Liu, 2023, May).

*Broadening pedagogies, reinforce the view that teachers need to be equipped with a range of pedagogies to effectively engage a classroom of diverse 21*st century learners (Chua & Chye, 2017). As mentioned earlier, NIE adopted the EMIC framework so that student teachers are placed in learning environments that provide opportunities for them to be active in their learning, and utilise educational technology to integrate pedagogies across various disciplines (NIE, 2018). More recently, NIE established AI@ NIE to lead and exemplify the use of AI to transform teaching and learning in the 21st century and to support MOE initiatives in harnessing the affordances of technology to enhance student learning (NIE, 2022, May 25).

During the Covid-19 pandemic in 2020, Singapore government carried out a stringent set of lockdown measures from April 7 to May 4, officially known as the "circuit breaker", where all schools were closed. MOE responded to the circuit breaker by implementing full home-based learning (HBL) via the pre-existing national online learning portal, Student Learning Space (SLS) (MOE, 2020). The SLS allowed teachers to curate and share lesson resources and students to access these resources in a self-directed manner. It also provided a common platform for teachers to collaborate across schools and for students to collaborate in their learning projects. In addition, there was ground up effort by teacher educators and teachers to share their experiences of designing and implementing technology-enabled pedagogies during HBL on social media (e.g., Home-based Learning Support Group on Facebook). Several other measures (e.g., provision online access and loaning of digital devices to the disadvantaged students) were put in place to facilitate remote learning. In the end, Singapore students only missed about a month of physical lessons at school, and learning was maintained through home-based and online means during this month (O. S. Tan & Chua, 2022).

The effects of the recent COVID-19 pandemic bear strong testament that for a nation to succeed in education, technology must be an integral part of the education masterplan and learning must be part of the teachers' DNA (Liu, 2022). The pandemic has also brought to the fore the importance of teacher education curriculum to prepare teachers to have the competencies and judgement to make good pedagogical decisions in an unpredictable world (Towers *et al.*, 2023). Singapore was able to reap the benefits of years of investing in teacher education and the teaching profession. Singapore teachers demonstrated the competencies, commitment, and judgement to support their students learning during the 'circuit breaker' and beyond.

Finally, the *developing perspectives* pillar takes into consideration the VUCA environment requires student teachers to make good educational decisions that are in the best interest of their learners. To do that, teachers must have a deep knowledge of the learners and education system, an understanding of the needs of the society and nation, and an appreciation of the opportunities and challenges of the disruptive economy (Liu, 2022). Developing such professionals necessitates that teacher education programmes

be grounded in the present reality while being multi-perspective and future oriented. Singapore utilises a three-pronged approach of 'community as coach', 'industry as partner', and the 'world as our classroom' to help broaden student teachers' perspectives. For instance, the building university interns for leadership development (BUILD) and international practicum (IP) programmes provide opportunities for student teachers to move beyond their comfort zone and experience working in a different organisation (i.e., BUILD) and teaching in a school beyond Singapore (i.e., IP). For NIE, each of these components work in tandem to holistically develop each student teacher so that he or she is future-ready to take on the challenges of 21st century teaching.

6. Conclusion

Teachers are at the forefront of any education system. Singapore's educational achievements must be attributed to the work of teachers and the support provided to develop them as future-ready professionals. Seven decades ago, the vision to prioritise the preparation and development of teachers has arguably been a crucial contributing factor to the current view that teaching is a highly respected profession in Singapore. Achieving such a status did not happen by chance. It was a result of a series of strategic polices passed by the government. Today, Singapore teachers are recognised as professionals who are prepared under a future-focused teacher education curriculum, given the autonomy to make classroom decisions, and are provided opportunities to continually develop their practice. In hindsight, it should be appreciated that attaining professional status for Singapore teachers was an outcome of a stable and supportive political leadership that strove to closely align economic with education objectives in each phase of her development.

In the aspect of developing quality teachers through ITP, there was a need to transform a curriculum which focussed on the training of teachers at the TTC, to a curriculum which focuses on educating its teachers to be future-ready professionals at the current NIE. Moreover, the concerted efforts of key educational stakeholders (i.e., MOE, AST, NIE) that work in unison to ensure that educational resources are optimised to align educational policies, PD, and ITP of teachers continue to facilitate the appropriate growth of the teaching profession in Singapore. Indeed, according to Tan (2012), a good education system is defined as one that "builds trust and connectivity, stays responsive to cultural and contextual diversity, creates teacher empowerment and builds bridges for all partners to contribute" (p. 40). In essence, Singapore has a strong education system because all her educational stakeholders share a common vision and align their efforts to achieving the various educational goals. A testament of the tripartite partnership was the development of the STP that articulates what the teaching profession in Singapore stands for. To this end, improving the quality of teachers has always been a national priority to ensure that the various educational goals can come to fruition (Goodwin *et al.*, 2015).

As the only teacher education institute in Singapore, a heavy responsibility rests on the shoulders of NIE to ensure that its programmes are transformational and relevant to meet the needs of the 21st century era and its learners. Recent programme developments such as the NTU-NIE TSP and 16-month PGDE programmes, show that NIE is ready to take on the challenges posed by a VUCA world. In response, NIE believes that its ITP programmes must be underpinned by a philosophy (i.e., TE21) that articulates key attributes (values, skills, and knowledge) that would put our student teachers in a

good position to take on the challenges of the next generation of teaching and learning. Indeed, for education systems to be relevant and flexible in the 21st century, the quality of teachers "make all the difference" (Hung *et al.*, 2018, p. 231) and it is therefore pivotal that they must be developed as professionals who are empowered with the autonomy to make the best decisions for their students. Clearly, cementing the status of teachers as professionals is a view that Singapore continues to take very seriously.

To conclude, although contexts differ, the Singapore's story affirmed that the quality of an education system depended on the quality of teachers, and that making teaching the preferred career choice necessitates (a) a long-term vision of political leaders who saw education as an important economic and social driver, (b) a national commitment of developing teachers as professionals, (c) policy decisions involving selection and training of teachers, paying good starting compensations, and managing the status of the teaching profession, and (d) educational stakeholders who share a common vision and align their efforts to achieving the educational goals.

7.   References

Adler, P. S., & Borys, B. (1996). Two types of bureaucracy: Enabling and coercive. *Administrative Quarterly, 41*, 61-89. https://doi.org/10.2307/2393986

Barber, M., & Mourshed, M. (2007). *How the world's best-performing schools systems come out on top*: McKinsey & Company. https://www.mckinsey.com/industries/education/our-insights/how-the-worlds-best-performing-school-systems-come-out-on-top

Chen, A. Y., & Koay, S. L. (2010). *Transforming teaching, inspiring learning: 60 years of teacher education in Singapore, 1950-2010*. National Institute of Education.

Chia, Y. T., Chew, A., & Tan, J. (2022). *Teacher preparation in Singapore: A concise critical history*. Emerald Group Publishing.

Chua, B. L., & Chye, S. (2017). Nurturing 21st century educators: An EPIIC perspective. In O. S. Tan, W. C. Liu, & E. L. Low (Eds.), *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 59-76). Springer. https://doi.org/10.1007/978-981-10-3386-5_5

Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education, 40*(3), 291–309. https://doi.org/210.1080/02619768.02612017.01315399.

Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. Jossey-Bass.

Darling-Hammond, L., & Rothman, R. (2015). Developing effective teaching: Why search globally. In L. Darling-Hammond & R. Rothman (Eds.), *Teaching in the flat world: Learning from high-performing systems* (pp. 1-5). Hawker Brownlow Education.

Deng, Z. (2004). Beyond teacher training: Singaporean teacher preparation in the era of new educational initiatives. *Teaching Education, 15*(2), 159-173. https://doi.org/110.1080/1047621042000213593

Department of Statistics Singapore. (2022a). Environment. https://www.singstat.gov.sg/find-data/search-by-theme/society/environment/latest-data

Department of Statistics Singapore. (2022b). Population. https://www.singstat.gov.sg/publications/reference/ebook/population/population

Dolton, P., & Marcenaro-Gutierrez, O. (2013). *Global teacher status index 2013*. Varkey GEMS Foundation. https://www.varkeyfoundation.org/media/2787/2013globalteacherstatusindex.pdf

Dolton, P., Marcenaro-Gutierrez, O., Vries, R., & She, P. W. (2018a). *Global teacher status index 2018*. Varkey Foundation. https://www.varkeyfoundation.org/media/4867/gts-index-13-11-2018.pdf

Dolton, P., Marcenaro-Gutierrez, O., Vries, R., & She, P. W. (2018b). *Singapore GTSI Statistics*. Varkey Foundation. https://www.varkeyfoundation.org/media/4856/gtsi-singapore-chart-findings.pdf

Elmore, R. F., Peterson, P. L., & McCarthey, S. J. (1996). *Restructuring in the classroom: Teaching, learning, and school organization*. Jossey-Bass Inc.

Fullan, M. (2003). *The moral imperative of school leadership*. Corwin Press.

Goh, C. B., & Gopinathan, S. (2008). The development of education in Singapore since 1965. In S. K. Lee, C. B. Goh, B. Fredriksen, & J. P. Tan (Eds.), *Toward a better future: Education and training for economic development in Singapore since 1965* (pp. 12–38). The World Bank.

Goh, C. B., & Lee, S. K. (2008). Making teacher education responsive and relevant. In S. K. Lee, C. B. Goh, B. Fredriksen, & J. P. Tan (Eds.), *Toward a better future: Education and training for economic development in Singapore since 1965* (pp. 96-113). The World Bank.

Goh, K. S. (1979). *Report on the Ministry of Education 1978*. Ministry of Education. https://www.nas.gov.sg/archivesonline/data/pdfdoc/956--1979-02-10.pdf

Goodwin, A. L. (2012). Quality teachers, Singapore style. In L. Darling-Hammond & A. Lieberman (Eds.), *Teacher education around the world: Changing policies and practices* (pp. 22-43). Taylor & Francis.

Goodwin, A. L., & Low, E. L. (2021). Rethinking conceptualisations of teacher quality in Singapore and Hong Kong: A comparative analysis. *European Journal of Teacher Education, 44*(3), 365-382.

Goodwin, A. L., Low, E. L., & Darling-Hammond, L. (2017). *Empowered educators in Singapore: How high-performing systems shape teaching quality*. Jossey-Bass.

Goodwin, A. L., Low, E. L., & Ng, P. T. (2015). Developing teacher leadership in Singapore: Multiple pathways for differentiated journeys *The New Educator, 11*(2), 107-120. https://doi.org/110.1080/1547688X.1542015.1026782

Gopinathan, S. (2012). Fourth Way in action? The evolution of Singapore's education system. *Educational Research for Policy and Practice, 11*(1), 65-70. https://doi.org/10.1007/s10671-10011-19117-10676

Gopinathan, S., & Ho, W. K. (2000). Teacher education in Singapore. In P. Morris & J. Williamson (Eds.), *Teacher education in the Asia-Pacific region: A comparative study* (pp. 199-225). Routledge.

Gopinathan, S., & Mardiana, A. B. (2013). Globalization, the state and curriculum reform. In Z. Deng, S. Gopinathan, & C. K. E. Lee (Eds.), *Globalization and the Singapore curriculum. Education Innovation Series*. (pp. 15-32). Springer. https://doi.org/10.1007/978-981-4451-57-4_2

Gopinathan, S., Wong, B., & Tang, N. (2008). The evolution of school leadership policy and practice in Singapore: responses to changing socio□economic and political contexts (insurgents, implementers, innovators). *Journal of Educational Administration and History, 40*(3), 235-249. https://doi.org/210.1080/00220620802507250

Green, A. (2020). *Staff of 2030: Future-ready teaching*: The Economist: Intelligence Unit Limited. https://edudownloads.azureedge.net/msdownloads/microsoft-edu-staff-of-2030.pdf

Gwee, Y. H., & Chang, A. S. C. (2010). Training of university graduate teachers before 1972. In A. Y. Chen & K. S. Luan (Eds.), *Transforming teaching, inspiring learning: 60 years of teacher education in Singapore*. National Institute of Education.

Hargreaves, A., & Shirley, D. L. (2012). *The global fourth way: The quest for educational excellence*. Corwin Press.

Heng, S. K. (2012). Keynote Address by Mr Heng Swee Keat, Minister for Education, at the Ministry of Education Work Plan Seminar, on Wednesday, 12 September 2012 at 9.20 am at Ngee Ann Polytechnic Convention Centre. https://www.moe.gov.sg/news/speeches/keynote-address-by-mr-heng-swee-keat--minister-for-education--at-the-ministry-of-education-work-plan-seminar--on-wednesday--12-september-2012-at-920-am-at-ngee-ann-polytechnic-convention-centre

Heng, S. K. (2014). Growing our teachers, building our nation. Keynote Address by Mr Heng Swee Keat, Minister for Education, at the Ministry of Education Work Plan Seminar 2014, on 23 September 2014 at Ngee Ann Polytechnic Convention Centre. https://www.moe.gov.sg/news/speeches/20140923-keynote-address-by-mr-heng-swee-keat-minister-for-education-at-the-ministry-of-education-work-plan-seminar-2014-on-tuesday-23-september-2014-at-9-15am-at-ngee-ann-polytechnic-convention-centre

Ho, P. (2009). Address by Ms Ho Peng, Director-General of Education, at the Teachers' Mass Lecture, Singapore Expo Hall 2, Wednesday 26 August. http://www.moe.gov.sg/media/speeches/2009/08/26/address-by-ms-ho-peng-at-the-t.php

Hung, D. W. L., Koh, T. S., & Jamaludin, A. (2018). Teachers at the heart of system change: Principles of educational change for school leaders. In T. S. Koh & D. Hung (Eds.), *Leadership for change: The Singapore schools' experience* (pp. 231-247). World Scientific. https://doi.org/10.1142/9789813227323_0009

Kansanen, P. (2007). Research-based teacher education. http://pdc.ceu.hu/archive/00001720/01/changes-5-01-0th-svn-enl-t07.pdf

Koh, J. H. L., Chai, C. S., & Tsai, C. C. (2010). Examining the technological pedagogical content knowledge of Singapore pre-service teachers with a large-scale survey. *Journal of Computer Assisted Learning, 26*(6), 563-573. https://doi.org/510.1111/j.1365-2729.2010.00372.x

Lee, H. L. (2014). Speech by Prime Minister Lee Hsien Loong at Smart Nation Launch on 24 November 2014. https://www.smartnation.gov.sg/whats-new/speeches/smart-nation-launch

Lee, K. Y. (1959). Responsibilities of teachers. Speech at the Education Ministry's Rally of Teachers at the Happy World Stadium (8 December 1959). In *The papers of Lee Kuan Yew: Speeches, interviews and dialogues* (Vol. 1: 1950-1962, pp. 146-149). Gale Asia, 2012.

Lee, K. Y. (1966). A literate but uneducated population? Speech at the Opening of the Third Asian Teacher's Seminar at the Singapore Conference Hall and Trade Union House, Shenton Way (20 November 1966). In *The papers of Lee Kuan Yew: Speeches, interviews and dialogues* (Vol. 3: 1965-1966, pp. 548-555). Gale Asia, 2012.

Lee, S.-S., Chia, A., Pereira, A., & Tay, L. Y. (2022). Singapore's student-centred, values-driven education system. In J. Lee & K. K. Wong (Eds.), *Centering whole-child development in global education reform: International perspectives on agendas for educational equity and quality* (pp. 102-122). Routledge. https://doi.org/10.4324/9781003202714-9

Lee, S. K., & Low, E. L. (2014). Balancing between theory and practice: Singapore's teacher education partnership model. *InTuition, 16, Spring 2014. https://www.ifl.ac.uk/publications/in-tuition/intuition-16-spring-2014/opinion-balancing-between-theory-and-practice-singapore%E2%80%99s-teacher-education-partnership-mode*

Lim, F. V., Toh, W., & Nguyen, T. T. H. (2022). Multimodality in the English language classroom: A systematic review of literature. *Linguistics and Education, 69*, 101048. https://doi.org/101010.101016/j.linged.102022.101048

Liu, W. C. (2017). The teaching profession and teacher education. In O. S. Tan, E. L. Low, & D. Hung (Eds.), *Lee Kuan Yew's educational legacy: The challenges of success* (pp. 29 - 42). Springer.

Liu, W. C. (2022). *Singapore's approach to developing teachers: Hindsight, insight, and foresight.* Routledge. https://doi.org/10.4324/9780429433641

Liu, W. C. (2023). Preparing teachers for the changing future (2014–2018). *Educational Research for Policy and Practice.* https://doi.org/10.1007/s10671-023-09328-5

Liu, W. C. (2023, May). *The role of practicum in Initial Teacher Preparation: The Singapore's perspective* [Paper presentation]. Re-thinking and Re-searching the Practicum for the Future Teacher Education: Issues, Challenges, and Possibilities Conference, South Korea.

Liu, W. C., Koh, C., & Chua, B. L. (2017). Developing thinking teachers through learning portfolios. In O. S. Tan, W. C. Liu, & E. L. Low (Eds.), *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 173-192). Springer.

Liu, W. C., & Lim, Y. C. (2018). Understanding teaching, learning and learners: The Singapore teaching practice. In W. C. Liu, C. Koh, D. Choy, & J. Tay-Lim (Eds.), *Understanding teaching, learning and learners: A guide for Singapore teachers* (pp. 1-23). Cengage Learning Asia.

Liu, W. C., Tan, G. C. I., & Salleh, H. (2014). Developing teacher competency through practice in Singapore. In J. Calvo de Mora & K. Wood (Eds.), *Practical knowledge in teacher education: Approaches to teacher internship programs* (pp. 109-126). Routledge.

Liu, W. C., Tan, G. C. I., & Wong, A. F. L. (2017). Redesigning and reconceptualising of field experience for teacher accreditation. In O. S. Tan, W. C. Liu, & E. L. Low (Eds.), *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 193-215). Springer. https://doi.org/10.1007/978-981-10-3386-5_11

Liu, W. C., & Tan, O. S. (2015). Teacher effectiveness: Beyond results and accountability. In O. S. Tan & W. C. Liu (Eds.), *Teacher effectiveness: Capacity building in a complex learning era* (pp. 335-345). Cengage Learning Asia.

Loh, J., & Hu, G. (2019). Teacher education in Singapore. In *Oxford research encyclopedia of education*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190264093.013.293

Low, E. L. (Ed.) (2012). *Portraits of top-performing education systems (CJ Koh professional series)*. National Institute of Education.

Lun, C. Y., & Chan, W. C. (1983). A brief survey of teacher education in Singapore. *IEXperience: the first ten years*, 3-17

Ministry of Education (MOE). (2010, September 6). Academy of Singapore Teachers. [Press release]. http://www.moe.gov.sg/media/press/2010/09/academy-of-singapore-teachers.php

Ministry of Education (MOE). (2016, December 6). Equipped, primed and future-ready: Singapore students have what it takes to thrive in the 21st century workplace. [Press release]. https://www.moe.gov.sg/news/press-releases/20161206-equipped-primed-and-future-ready-singapore-students-have-what-it-takes-to-thrive-in-the-21st-century-workplace

Ministry of Education (MOE). (2019, September 3). One secondary education, many subject bands: 28 secondary schools to pilot full subject-based banding. [Press release]. https://www.moe.gov.sg/news/press-releases/20190903-one-secondary-education-many-subject-bands-28-secondary-schools-to-pilot-full-subject-based-banding#:~:text=1.,of%20Full%20SBB%20from%202020

Ministry of Education (MOE). (2020). Schools and institutes of higher learning to shift to full home-based learning; preschools and student care centres to suspend general services. [Press release]. https://www.moe.gov.sg/news/press-releases/20200403-schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services

Ministry of Education (MOE). (2022a). 21st century competencies and student outcomes framework. https://www.moe.gov.sg/education-in-sg/21st-century-competencies/

Ministry of Education (MOE). (2022b). Educational technology journey. https://www.moe.gov.sg/education-in-sg/educational-technology-journey

Ministry of Education (MOE). (2022c). Educational technology plan. https://www.moe.gov.sg/education-in-sg/educational-technology-journey/edtech-plan

Ministry of Education (MOE). (2022d). Our teachers. https://www.moe.gov.sg/education-in-sg/our-teachers

Ministry of Education (MOE). (2023). Desired outcomes of education. https://www.moe.gov.sg/education-in-sg/desired-outcomes

Mockler, N., & Sachs, J. (2011). Rethinking educational practice through reflexive inquiry: An introduction. In N. Mockler & J. Sachs (Eds.), *Rethinking educational practice through reflexive inquiry. Professional learning and development in schools and higher education, vol 7* (pp. 1-8). Springer. https://doi.org/10.1007/978-94-007-0805-1_1.

Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2017). *PIRLS 2016 international results in reading*: International Association for the Evaluation of Educational Achievement. https://timssandpirls.bc.edu/pirls2016/international-results/pirls/student-achievement/pirls-achievement-results/index.html

National Institute of Education (NIE). (2009). *TE21: A teacher education model for the 21st century*. National Institute of Education. https://www.nie.edu.sg/docs/default-source/te21_docs/te21-online-version---updated.pdf?sfvrsn=2

National Institute of Education (NIE). (2014). NIE moving forward towards 2017 strategic roadmap. https://nie.edu.sg/docs/default-source/nie-files/office-of-strategic-planning-academic-quality/strategicreport-150119.pdf?sfvrsn=2

National Institute of Education (NIE). (2018). Learning and teaching @ NIE: Principles for educating teachers for the 21st century. https://www.nie.edu.sg/docs/default-source/IN-Learning/learning-and-teaching@nie-version-1.pdf?sfvrsn=cbb065a7_0

National Institute of Education (NIE). (2022, May 25). The NIE NTU, Singapore launches AI@NIE to transform teaching and learning for 21st century education. https://www.nie.edu.sg/about-us/news-events/news/news-detail/the-nie-ntu-singapore-launches-ai@nie-to-transform-teaching-and-learning-for-21st-century-education

National Institute of Education (NIE). (in press). *TE21: Empowering teachers for the future*. National Institute of Education.

National Institute of Education (NIE). (n.d.). *Office of Education Research*. https://www.nie.edu.sg/research/research-offices/office-of-education-research

Ng, E. H. (2008). Opening Address by Dr Ng Eng Hen, Minister for Education and Second Minister for Defence, at the Teachers' Conference 2008, Suntec City Ballroom, Wednesday 28 May. https://www.nas.gov.sg/archivesonline/data/pdfdoc/20080528983.pdf

Ng, E. H. (2009). Speech by Dr Ng Eng Hen, Minister for Education and Second Minister for Defence, at the MOE Work Plan Seminar 2009, Ngee Ann Polytechnic Convention Centre, 17 September, 2009. https://www.nas.gov.sg/archivesonline/data/pdfdoc/20090924002/moe_wps_2009.pdf

Ng, P. T. (2015). Whole-systems approach: Professional capital in Singapore. In J. Evers & R. Kneyber (Eds.), *Flip the system: Changing education from the ground up* (pp. 151-161). Routledge. https://doi.org/10.4324/9781315678573-17

Ng, P. T. (2017). *Learning from Singapore: The power of paradoxes*. Routledge.

Office of Education Research. (2017). *Teachers at the heart of system change: A consolidation of OER research*. National Institute of Education. https://www.nie.edu.sg/docs/default-source/oer/oer_rcr_final_for_web_v2.pdf?sfvrsn=0

Ong, P. B. (1965). Speech at the Teachers Training College graduation ceremony at Victoria Theatre on 12 November 1965. https://www.nas.gov.sg/archivesonline/data/pdfdoc/PressR19651112b.pdf

Ong, Y. K. (2018). Learn for Life. Opening Address by Mr Ong Ye Kung, Minister for Education, at the Schools Work Plan Seminar on September 28, 2018. https://www.moe.gov.sg/news/speeches/20180928-opening-address-by-mr-ong-ye-kung-minister-for-education-at-the-schools-work-plan-seminar

Ong, Y. K. (2020). MOE FY2020 Committee of Supply Debate Response by Minister for Education Ong Ye Kung. [Press release]. https://www.moe.gov.sg/news/speeches/20200304-moe-fy2020-committee-of-supply-debate-response-by-minister-for-education-ong-ye-kung.

Organisation for Economic Co-operation and Development (OECD). (2011). *Lessons from PISA for the United States: Strong performers and successful reformers in education*. OECD Publishing. https://www.oecd.org/pisa/46623978.pdf

Organisation for Economic Co-operation and Development (OECD). (2014). *A teachers' guide to TALIS 2013: Teaching and Learning International Survey*. TALIS, OECD Publishing. http://www.oecd.org/education/school/TALIS-Teachers-Guide.pdf

Organisation for Economic Co-operation and Development (OECD). (2016). *Singapore tops latest OECD PISA global education survey*. TALIS, OECD Publishing. https://www.oecd.org/education/singapore-tops-latest-oecd-pisa-global-education-survey.htm

Organisation for Economic Co-operation and Development (OECD). (2018). *The future of education and skills: Education 2030*. TALIS, OECD Publishing. https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf

Organisation for Economic Co-operation and Development (OECD). (2019a). *Conceptual learning framework: Attitudes and Values for 2030*. TALIS, OECD Publishing. https://www.oecd.org/education/2030-project/teaching-and-learning/learning/attitudes-and-values/Attitudes_and_Values_for_2030_concept_note.pdf

Organisation for Economic Co-operation and Development (OECD). (2019b). *TALIS 2018 results (Volume I): Teachers and school leaders as lifelong learners*. TALIS, OECD Publishing. https://doi.org/10.1787/1d0bc92a-en

Organisation for Economic Co-operation and Development (OECD). (2020a). *Country note: Singapore. Results from TALIS 2018: Volume II*. TALIS, OECD Publishing. https://www.oecd.org/countries/singapore/TALIS2018_CN_SGP_Vol_II.pdf

Organisation for Economic Co-operation and Development (OECD). (2020b). *TALIS 2018 results (Volume II): Teachers and school leaders as valued professionals*. TALIS, OECD Publishing. https://doi.org/10.1787/19cf08df-en

Paradis, A., Lutovac, S., Jokikokko, K., & Kaasila, R. (2018). Canadian and Finnish upper-secondary school mathematics teachers' perceptions of autonomy. *Pedagogy, Culture & Society, 26*(3), 381-396. https://doi.org/310.1080/14681366.1468201 7.11407957

Pickering, J., Daly, C., Pachler, N., Gowing, E., Hardcastle, J., Johns-Shepherd, L., . . . Simon, S. (2007). *New designs for teachers' professional learning*. Institute of Education, University of London.

Png, L. H. J., & Liu, W. C. (2017). Mentoring and school partnerships. In O. S. Tan, W. C. Liu, & E. L. Low (Eds.), *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 217-232). Springer.

Poon, C. L. (2012). Fourth way in action: Translation of research into policy and practice. *Educational Research for Policy and Practice, 11*(1), 19–25. https://doi.org/10.1007/s10671-10011-19113-x

Sachs, J. (2016). Teacher professionalism: Why are we still talking about it? *Teachers and Teaching: Theory and Practice, 22*(4), 413-425. https://doi.org/410.1080/13 540602.13542015.11082732

Sahlberg, P. (2013). Teachers as leaders in Finland. *Educational Leadership, 71*(2), 36-40. http://www.ascd.org/publications/educational-leadership/oct13/vol71/num02/Teachers-as-Leaders-in-Finland.aspx

Salleh, H., & Dimmock, C. (2012). Singapore schools and professional learning communities: Teacher professional development and school leadership in an Asian hierarchical system. *Educational Review, 64*(4), 405-424. https://doi.org/410.10 80/00131911.00132011.00625111

Sharpe, L., & Gopinathan, S. (1993). Universitisation and the reform of teacher education: The case of Britain and Singapore. *Research in Education, 50*(1), 5-16. https://doi.org/10.1177/003452379305000102

Sharpe, L., & Gopinathan, S. (2002). After effectiveness: New directions in the Singapore school system? *Journal of Education Policy, 17*(2), 151-166. https://doi.org/110.1080/02680930110116507

Shulman, L. S. (1998). Theory, practice and the education of professionals. *The Elementary School Journal, 98*(5), 511-526. https://www.jstor.org/stable/1002328

Sim, A. (2012). Speech by Ms Sim Ann, Senior Parliamentary Secretary, Ministry of Education and Ministry of Law at the NIE Teachers' Investiture Ceremony at 9.30am on Wednesday, 11 July 2012, at the Nanyang Auditorium, Nanyang Technological University. https://www.moe.gov.sg/news/speeches/speech-by-ms-sim-ann--senior-parliamentary-secretary--ministry-of-education-and-ministry-of-law-at-the-nie-teachers--investiture-ceremony-at-930am-on-wednesday--11-july-2012--at-the-nanyang-auditorium--nanyang-technological-university

Sim, W. K., & Ho, W. K. (1990). 25 years of teacher education. In S. K. Yip & W. K. Sim (Eds.), *Evolution of educational excellence: 25 years of education in the Republic of Singapore* (pp. 153-182). Longman.

Tan, J. P.-L., Koh, E., Chan, M., Costes-Onishi, P., & Hung, D. (2017). *Advancing 21st century competencies in Singapore*. Asia Society. https://asiasociety.org/sites/default/files/2017-10/advancing-21st-century-competencies-in-singapore.pdf

Tan, O. S. (2012). Fourth way in action: Teacher education in Singapore. *Educational Research for Policy and Practice, 11*(1), 35-41. https://doi.org/10.1007/s10671-10011-19115-10678

Tan, O. S., & Chua, J. J. E. (2022). Science, social responsibility, and education: The experience of Singapore during the COVID-19 pandemic. In F. M. Reimers (Ed.), *Primary and secondary education during Covid-19*. Springer, Cham. https://doi.org/10.1007/978-3-030-81500-4_10

Tan, O. S., & Liu, W. C. (2017). Championing the teacher factor. In O. S. Tan, W. C. Liu, & E. L. Low (Eds.), *Teacher education in the 21st century: Singapore's evolution and innovation* (pp. 33-43). Springer.

Tan, O. S., Liu, W. C., & Low, E. L. (2017). Riding Towards the Future. In *Teacher Education in the 21st Century* (pp. 301-313). Springer.

Taylor, W. (1980). *Teacher education in Singapore, 1980: The role of the Institute of Education*. Photoplates.

Tichenor, M. S., & Tichenor, J. M. (2005). Understanding teachers' perspectives on professionalism. *The Professional Teacher, 27*(1/2), 89-95. https://files.eric.ed.gov/fulltext/EJ728484.pdf

Towers, E., Rushton, E. A. C., Gibbons, S., Steadman, S., Brock, R., Cao, Y., . . . Marshall, B. (2023). The "problem" of teacher quality: exploring challenges and opportunities in developing teacher quality during the Covid-19 global pandemic in England. *Educational Review*, 1-17.

Trends in International Math and Science Study (TIMSS). (2019). *TIMSS 2019 International Results in Mathematics and Science*. https://timss2019.org/reports/

Yip, J., & Sim, W. K. (1994). *Evolution of educational excellence: 25 years of education in the Republic of Singapore*. Longman.