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Book

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KOF Factbook Education System Singapore

Singapore

KOF

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List of Abbreviations

ATC	Approved Training Centre
ATO	Approved Training Organization
CET	Continuous Education and Training
COI	Centre of Innovations
DPP	Direct Entry Scheme to Polytechnic Programme
DSA	Direct School Admission
EDB	Economic Development Board
EU	European Union
FTA	Free Trade Agreement
GCE	General Certificate of Education
GEP	Gifted Education Programme
GLC	Government Linked Company
IAL	Institute of Adult Learning
IBD	International Baccalaureate Diploma
IBF	Institute of Banking and Finance
IP	Integrated Programme
ISC	Institute of Technical Education Skills Certificate
ISTC	Industry Skills and Training Council
ITB	Industrial Training Board
ITE	Institute of Technical Education
JAE	Joint Admission Exercise
JC	Junior College
JPAE	Joint Polytechnic Admission Exercise
MCI	Ministry of Communications and Information Singapore
MI	Millenia Institute
MNC	Multinational Company
MOE	Ministry of Education Singapore
MOM	Ministry of Manpower Singapore
MSF	Ministry of Social and Family Development Singapore
MTI	Ministry of Trade and Industry Singapore
NAFA	Nanyang Academy of Fine Arts
NCI	National CET Institutes
NIE	National Institute of Education
NITEC	National Institute of Technical Education Certificate
PAP	People Action's Party

PCP	Professional Conversion Programme
PFP	Polytechnic Foundation Programme
PMO	Prime Minister's Office Singapore
PPP	Purchasing Power Parity
PSLE	Primary School Leaving Examination
SAC	School Advisory Committee
SIT	Singapore Institute of Technology
SME	Small and Medium Sized Enterprise
TD	Technical Diploma
TFR	Total Fertility Rate
VA	Value-added
VET	Vocational Education and Training
VPET	Vocational Professional Education and Training
WDA	Workforce Development Agency
WEF	World Economic Forum
WSQ	Workforce Skills Qualification
WTS	Workfare Training Support
YLM	Youth Labour Market

FOREWORD

In the last years, vocational education and training has received more and more attention. The increased pressure to upgrade the skills of the workforce through an increasingly competitive world economy, or the high youth unemployment rates in the aftermath of the world economic crises putting pressure on politicians to provide solutions could be part of the reason why. In fact, vocational education has, among other things, been suggested as one major solution to these problems since it provides an education pathway for those who do not continue with tertiary level education and helps upgrading the skills of those who would have started working immediately and would have received some form of on-the-job training.

The increased attention for vocational education and training was in particular perceptible among policy makers. In Europe, the European Commission defined common objectives for the further development of the vocational education and training systems of the European countries for 2020 and an action plan for the upcoming years in the *Bruges Communiqué on enhanced European cooperation in vocational education and training for 2011-2020* (European Commission 2010). In the United States, Obama mentioned in a speech that he wanted to increase the investment in vocational education and training system of the United States of America (The White House 2015). But also many other countries worldwide, such as South Korea or Hong Kong, show increased interest in extending their vocational education system.

Worldwide, only a few countries have a well-elaborated and efficient vocational and professional education and training (VPET) system, among these the Swiss VPET system. It is a good example of how an education system can contribute to the successful matching between market demand and supply. It is highly efficient in getting the adolescents into the labour market (7.7% from 2005-2012, compared to the OECD average of 14.6%, OECD, 2015).

Though not many countries have VPET system that is comparable to Switzerland, many have a vocational component in their education system. To provide information about the education systems of other countries, with a special focus on the part of the education system teaching vocational skills, is the major purpose of the KOF Factbooks Education System.

SUMMARY

In the KOF Factbook Education System Singapore, we will describe the vocational system of Singapore in general and in particular refer to factors which are crucial for the functioning of the system. Among others, these comprise the regulatory framework and the governance of the VPET system, specifying the actors that are involved and which competencies and duties they have. Further, the curriculum development and the actors involved in this process, as well as the financing of the system, etc.

The Factbook is structured as follows. We will refer to Singapore's economy, labour market, and political system in the first part of this Factbook. The second part is dedicated to the description of the entire formal education system. The vocational part of Singapore's education system will be explained in the third part. And finally, the last section gives a perspective about the set of reforms Singapore's education system went through in the past and will face in the future.

1. Singapore's Economy and its Political System

One of the main purposes of an education system is to provide the future workforce with the skills needed in the labour market. The particularities of a country's economy and labour market are important factors determining the current and future demand for skills. Therefore, they will briefly be described in the first part of this Factbook. In addition, this part provides an overview of Singapore's political system with emphasis on the description of the education politics.

1.1. Singapore's Economy

From its late inception in 1965 up to this day, Singapore has achieved a tremendous amount of economic progress, to the extent that it joined the group of most prosperous economies. This success is well reflected in the 2013 GDP per capita based on purchasing power parity (in current international US$) of US$ 78,744 – which is among the highest in the world, way ahead of the 2012 OECD average of US$ 36,427 (World Bank 2014; OECD, 2014a).

However, when it comes to the distribution of its wealth, Singapore is lagging behind the OECD average. Despite a decrease in inequality from 2011 to 2013, as quantified by a drop in the Gini coefficient[1] from 0.426 to 0.412 (DOS 2013b), Singapore still depicted a higher level of income inequality compared to the OECD average in 2013 (Gini coefficient of 0.32) (OECD, 2014b).

According to the KOF Index of Globalisation[2], Singapore's economy is highly globalised (KOF 2014). Trade, as defined by the sum of exports and imports of goods and services, added up to 358% of GDP in 2013 (World Bank 2014). Singapore's openness also poses downsides: its output heavily hinges on global demand and is consequently subject to high volatility. During the Asian Financial Crisis in 1997/98, Singapore's GDP growth was heavily affected. It dropped by 10.5%-points within one year (from 1997 to 1998). Similarly, it was also heavily affected during the Dotcom Crisis in 2000/01 (drop by 9.9%-points), or during the most recent World Economic Crisis in 2008/09 (drop by 9.7%-points) (World Bank, 2014).

Nevertheless, Singapore has displayed solid GDP growth with an average of 6.4 p.a. in real terms from 1990 to 2013 (World Bank 2014). In the same time period, Hong Kong's economy

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[1] The Gini coefficient measures the differences in the income distribution (in some cases the consumption expenditure) of individuals or households. A coefficient of '0' means equal distribution of income. '100' corresponds to complete inequality where one individual or household possesses the total income (World Bank 2015, slightly adapted).
[2] The KOF Index of Globalization measures globalization in three dimensions: economically, socially and politically. In addition to three indices measuring these dimensions, we calculate an overall index of globalization and sub-indices referring to: actual economic flows, economic restrictions, data on information flows, data on personal contact and data on cultural proximity. Singapore ranks 5th in the overall index and 1st in economic globalization category.

only grew with 3.9% p.a. and the US economy with 2.5% p.a. In the time period from 1990 until 2009, GDP grew at 6.3% p.a. (MAS, 2010). The largest part of this output growth was driven through capital inputs (3.4%-points of total GDP growth). However, the input factor labour became increasingly important, especially in the time from 2000-2009 (2.3%-points of total GDP growth). According to the Monetary Authority of Singapore (2010), the economy even went through a shift in growth drivers from capital to labour. Thereby, labour quality, representing a higher level of human capital of the workforce, became increasingly important for output growth (MAS, 2010:72). In fact, labour quality in Singapore has been increasing since 1990 due to the decline in the workforce with little or no formal schooling (primary and below), a rise in the share of those with tertiary education and partly through an influx of skilled foreign workers. This development was part of a strategy of Singapore's government in order to establish or to strengthen its comparative advantage that lies in its highly educated workforce (MAS, 2010:71). Especially in the light of a lack of natural resources, this strategy seems to yield first fruits.

Table 1: Share of value added and employment by sector, 2013

Sector	Singapore: Value added (%)	EU-28: Value added (%)	Singapore: Employment (%)	EU-28: Employment (%)
Primary sector	0.0	1.7	0.0	5.0
Agriculture, hunting and forestry, fishing	0.0	1.7	0.0	5.0
Secondary sector	24.5	24.5	18.6	22.0
Manufacturing, mining and quarrying and other industrial activities	20.1	19.1	13.6	15.6
of which: Manufacturing	18.6	15.3	13.6	14.0
Construction	4.4	5.4	5.0	6.4
Tertiary sector	75.5	73.8	81.4	72.9
Wholesale and retail trade, repairs; hotels & restaurants; transport; information & communication	31.7	23.8	35.1	27.4
Financial intermediation; real estate, renting & business activities	27.8	27.1	21.4	15.8
Public administration, defense, education, health, and other service activities	16.0	22.9	24.9	29.7

Source: MTI (2013), Eurostat (2015a,b).

The services sector is the driving force of Singapore's economy. In 2013, 75.5% of the gross value added (GVA) was generated in the service sector. 20.1% was generated in the industry and 4.4% in the construction sector. This distribution of GVA is somewhat similar to that of the EU-28 countries, where the services sector accounted for a slightly smaller share (73.8%) of GVA in 2013. The distribution of employment by sector is positively associated to that of GVA: most people were employed in the sector with the highest share in GVA, namely the services sector (81.4%). Comparing the level of value addition per worker by sector

between Singapore and the European, Singapore lagged behind regarding the tertiary sector. The second largest sector with regard to its share in GVA and employment was the industry sector (13.6%) and followed by the construction sector (5%). In this regard, the EU-28 countries depicts a similar pattern. The value added and employment in the primary sector is negligible compared to the size of the other sectors.

Singapore's economy is among the most competitive economies in the World. It puts forward the small size of the government (at 17% of expenditures to GDP), the resulting low taxes environment, and high standards in the rule of law and open markets both for foreign direct investments and trade. Singapore has, in fact, free trade agreements (FTAs) with over 30 economies and holds negotiations to ramp up the number of deals (IE, 2012). Importantly, the government's interference on the labour market is low. For the same reasons, as well as efficient bureaucracy, the World Bank rates Singapore as being the most business friendly country in the World in its Doing Business 2014 report (World Bank, 2013).

The World Economic Forum (WEF) places Singapore second with regard to global competitiveness, just behind Switzerland (WEF, 2014). In its 2014-2015 publication, the WEF stresses efficient public institutions, goods and labour markets and infrastructure. The higher education system is praised; Singapore excels in math and science - it scored the second best PISA results in 2012 (OECD, 2014c).

Foreign companies, in particular, have been key to Singapore's innovativeness. While representing about 16.3% of the firms on the territory, they contribute to approximately 30% of employment, to 50% of value added of Singapore-based patents, and to 70% of private R&D spending (OECD, 2013). The figures are even more decisive in high-tech sectors. In biomed, for instance, over 90% of private R&D is foreign-made, and of over 80% for electronics and chemicals. Foreign companies thus entirely underpin the continuity of these sectors.

Over the years, the government signified the need to rebalance the one-dimensional strategy of attracting multi-national companies in favour of nurturing the domestic innovation potential (Gill and Raiser, 2012). This joint effort resulted in the provision of favourable framework conditions - a business friendly governance based on high law enforcement and intellectual property standards, quality infrastructures and a well-educated workforce.

1.2. The Labour Market

In the first part of this section, we will describe the general situation on Singapore's labour market. In the second part, we will refer to the youth labour market in particular.

1.2.1. Overview of Singapore's Labour Market

According to WEF, Singapore has one of the most efficient labour markets. The state interference therein is low. Hiring and firing practices are not impeded, wage determination is flexible (especially so in non-unionised industries) and there is no formal minimum wage, although the National Wage Council emits yearly guidelines mostly based on long run productivity gains. These guidelines serve as anchors in employer-employee negotiations (MOM, 2014).

In 2012, Singapore's labour force participation rate (LFPR) was slightly above the OECD average (73.7% of total population, versus 70.9% for the OECD average), as it can be seen in Table 2. This also holds for those aged 25 to 64 (86% versus 81.5%). However, the LFPR of the youth was substantially lower in Singapore than in the OECD countries on average (38.1% versus 47.4%). Table 2 also shows that the LFPR is increasing with educational attainment until the upper and post-secondary education level. The rates are quite similar for Singapore and the OECD average. Surprisingly, the LFPR is lower for people with tertiary education- in the average of OECD countries and Singapore equally. The problem with this data is that everyone above the age of 15 is included. This biases the overall LFPR if there are more people at the lower and/or the upper end of the age distribution (a lot of old and/or young people). Taking only those the aged 25-64 into account, the LFPR of the OECD average in 2012 was 63.3%, 79.9% and 87% for those with primary, secondary and tertiary education respectively. Unfortunately, we did not find data for people aged 25-64 for Singapore. However, we dare to guess that also for Singapore, the LFPR is an increasing function of the education level.

Table 2: Labour force participation, unemployment by characteristics 2012

	Labour force participation		Unemployment rate	
	Singapore	OECD average	Singapore	OECD average
Total (15-64 years)	73.7	70.9	2.8	8.2
Youth (15-24 years)	38.1	47.4	10.4	16.3
Adults (25-54 years)	86.0	81.5	2.0	7.2
Females (15-64 years)	65.1	62.3	3.0	8.2
Primary education(15+ years)	20.7	22.5	4.1	16.2
Lower, upper and post-secondary education (15+ years)	49.9	47.2	3.8	9.7
Tertiary level education (15+ years)	29.4	29.7	3.3	5.9

Source: ILO (2015), OECD (2014d).

In general, speaking of labour market outcomes with regard to education level, it should hold that the unemployment rate is a decreasing function of the education level. In fact, for Singapore and the OECD average, the likelihood of becoming unemployed decreases the higher the education level. In addition, the overall, youth, adult and female unemployment rate was substantially lower in Singapore than for the OECD average.

Singapore is facing a demographic challenge; after bottoming out in 2010, the total fertility rate (TFR)[3] stood at 1.19 children per woman in 2013 (Lee, 2014). The ongoing trend fluctuates around 1.2 children per woman; it is one of the lowest rates in the world and falls way short of the replacement rate of 2.1 children per woman, as present in most of the industrialized countries. As a result, the population suffers a fast-paced ageing. Without substitutes, the workforce would shrink and the ratio of active to retired would surge in the future, with the adverse consequences it entails.

The government addressed this issue by means of immigration and social policies aimed at increasing the number of children and marriages (PMO, 2013a). In 2012, the female LFPR was at 59%, above Hong Kong's, Japan's and Korea's, and below China's (World Bank, 2014). Further incentivizing a higher LFPR of women may help in the short run, but it does not fill for the structural shortfall of nativity in the long run.

Another means to keep up the level of a skilled labour force is immigration. However, immigration remains a controversial issue in Singapore. The release of the 2013 Population White Paper, which drew demographic scenarios (therewith immigration), stirred an emotional debate in the population (PMO, 2013a).

The government is thus under an increasingly complex trade-off between making up for the pyramid age and skills mismatch (that is, bringing in specialists) on the one hand, and the acceptability of the population on the other. As part of the trade-off, the government tightened immigration regulations in 2013 (PMO, 2013b). On the bright side of things, that may induce companies to engage in productivity-enhancing investments, as cheap labour is less accessible and the cost thereof increases.

1.2.2. The Youth Labour Market

To compare the labour market situation of adolescent across countries, the KOF Swiss Economic Institute developed the KOF Youth Labour Market Index (KOF YLMI) (Renold et al., 2014). The basic idea behind this index is that a single indicator, such as the unemployment rate, does not suffice to describe the youth labour market adequately and to provide enough information for a comprehensive cross-country analysis. To improve the information content of such an analysis and to foster a multi-dimensional approach, the index consists of twelve labour market indicators[4], which are summarized in four categories. The first category describes the *activity state* of the young, specifically of those between 15-24

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[3] The TFR denotes the average number of children that would be born to a representative woman over her lifetime (that is, computed by means of the fertility distribution of women aged 15-49 for the given year).

[4] The data for these indicators are collected from different international institutions and cover up to 178 countries for the time period between 1991 and 2012.

years old, on the labour market. Therein, the adolescents are classified according to whether they are employed, in education or neither of both (unemployed, discouraged and neither in employment nor in education or training, see info box to the right).

The category *working conditions* and the corresponding indicators reflect the kind and the quality of jobs of the working youth. The *education* category accounts for the share of adolescents in education and training and for the relevance of and need for their skills on the labour market. The fourth category, *transition smoothness*, shall connect the other three categories by capturing the school-to-work transition phase of the youth. Each indicator of the KOF YLMI ranges from 1 to 7. Thereby, a higher score reflects a more favourable situation on the youth labour market and a more efficient integration of the youth in the labour market.

Dimensions of the KOF YLMI
Activity state
- Unemployment rate
- Relaxed unemployment rate[5]
- Neither in employment nor in education or training rate (NEET rate)
Working conditions
Rate of adolescents:
- with a temporary contract
- in involuntary part-time work
- in jobs with atypical working hours
- in work at risk of poverty[6]
Vulnerable unemployment rate[7]
Education
- Rate of adolescents in formal education and training
- Skills mismatch rate
Transition smoothness
- Relative unemployment ratio[8]
- Long-term unemployment rate[9]
Source: Renold et al. (2014).

One of the major drawbacks of the KOF YLMI is the data availability. Often, a category is based on a single indicator or no indicator for that category exists at all. This could make comparisons across countries or groups of countries problematic or even impossible.

The KOF Youth Labour Market Index for Singapore

Only three indicators are available in the case of Singapore: the unemployment rate, the vulnerable employment rate and the relative unemployment ratio. Any interpretation must thus be made with caution. Singapore is put in perspective with the average of OECD countries[10], as a proxy for the developed world.

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[5] It is calculated as the number of unemployed and discouraged workers as a share of the entire labour force. Discouraged workers have given up the search for work (not actively seeking), although they have nor job and are currently available for work (also: "involuntary inactive").

[6] Those who cannot make a decent living out their earnings, being at risk of poverty as a percentage of the working population.

[7] Share of the employed population working on their own account or those working in their family business and thus contributing to the entire family income. Both are less likely to have formal work arrangements and are therefore less protected by labour laws and more exposed to economic risk.

[8] Is defined as the youth unemployment rate (15-24 years) as a share of the adult unemployment rate (25+). If the youth cohort is affected in the same way than the adult group with respect to unemployment, then the relative unemployment ratio will be equal to one. If the youth are relatively more affected, then the ratio will be bigger than one.

[9] Those unemployed for more than one year (52 weeks) in the total number of unemployed (according to the ILO definition).

[10] The whole 34 OECD members for "unemployment rate" and "relative unemployment rate" and a sample of 25 OECD members for "vulnerable employment rate".

Figure 1: Evolution of the YLM-index over time (year, score)
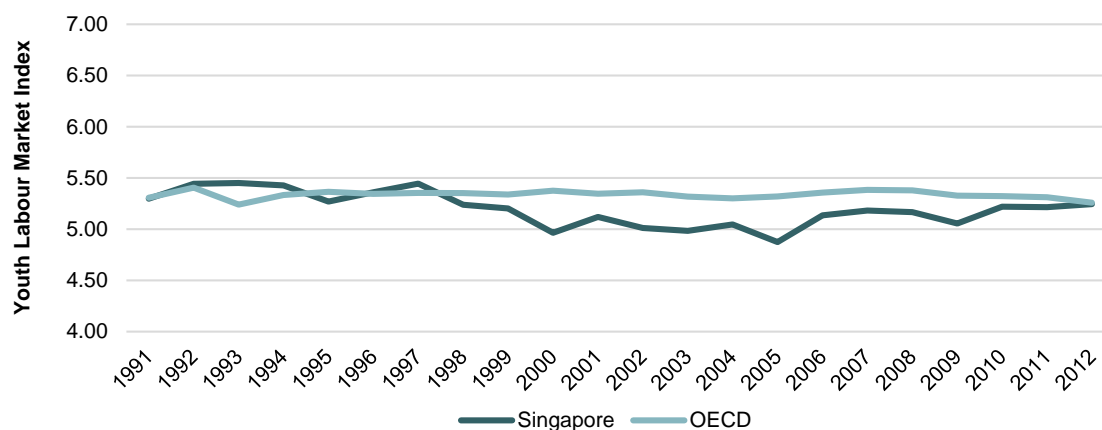
Source: KOF YLMI (2015).

Figure 1 shows the evolution of their respective KOF YLMI over the time period from 1991 until 2012. Over almost the entire time period from 1991 to 2012, Singapore had a lower score of the (limited) KOF YLMI than the average of OECD countries, especially after 1997 (the start of the Asian crisis). This is equal to saying that Singapore constantly had a higher unemployment and relative unemployment ratio, i.e. the youth unemployment rate was higher than the adult unemployment rate, as the OECD average. Also, it had a higher share of self-employed youngsters and a higher share of youngsters working in their family business than the OECD countries on average.

Singapore is pulled down because of a recurring weak performance in "relative unemployment ratio" over the years, which accounts for an artificially high one-third of the index due to the lack of indicators[11]. The performance of the OECD average seems structurally higher than Singapore's post-2000 as a result of the aforementioned indicator.

1.3. The Political System

Singapore obtained independence from the UK in 1963. After an unsuccessful attempt as part of the Malaysian federation, the Republic of Singapore was founded in 1965. Singapore's legislative branch is based on a unicameral parliament. The Prime Minister holds executive powers. Political decisions are centralized to his cabinet; the sole form of local government are five Community Development Councils which engage in administrative matters only, and whose mayors are appointed by ministers (CLGF, 2013; GOS, 2012). Singapore is not part of the OECD. It is, however, a founding member of ASEAN, an institutional framework, similar to the European Union (EU) in which a block of Southeast Asian countries cooperate, although the degree of integration – both economic and political –

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[11] In other words, Singapore's weak performance in that indicator would be weighted less, were more than 3 indicators available.

is far less pronounced than that of the EU. ASEAN notably negotiates FTAs with other partners, but contrary to the EU, it does not prevent member states to conclude FTAs of their own.

The Freedom House (U.S.-based NGO) and The Economist's Democracy indexes are critical with regard to Singapore's democratic status; while public institutions are modelled after those of the UK, the leadership, represented by the People Action's Party (PAP), exerts a tight grid over the democratic process as defined by the West (Freedom House, 2014; The Economist, 2013). Although the rule of law is an underpinning of Singapore's success story, the government is suspected to receive preferential treatment when it is one of the parties of a court case. Constitutional amendments have solidified the political status quo. The Freedom House reports, however, that "elections are free from irregularities", and the Corruption Perceptions Index underlines Singapore's quasi corruption-free environment (Transparency International, 2013).

The PAP mitigates the risks of marginal behaviours by framing the medias' and blogs' room of manoeuvre. It often brings allegations that it considers defamatory before the courts. The Freedom House states, in contrast, that in practice the enforcement of some restrictions have been eased with time (e.g. on online political discussions or civil liberties).

Unions are equally regulated. The Freedom House further points to the ties between the National Trade Union Congress (Singapore's sole federation of unions) and the PAP. There has not been a strike in 25 years, but for a 2012 incident involving foreign bus drivers, which was eventually declared illegal. As of 2008, roughly 20% of Singaporeans were union members (only citizen can join unions), close to Germany's density (OECD, 2014e, ITUC, 2008).

2.   Singapore's Formal System of Education

This section describes the different stages of Singapore's education system. Education is mandatory from age 6 to 15, which corresponds to approximately the end of secondary education[12]. Figure 2 displays the main pathways following completion of primary education. The red lines point at the most common pathways; three secondary tracks (among which two eventually converge) and *three major post-secondary institutions* namely Institutes of Technical Education (ITEs), Polytechnics and Universities. At both stages of education, the

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[12] Secondary school length can vary given the path, and exemptions such as home schooling or for disabilities may be granted (MOE 2014b).

lines cross-cutting these three pathways demonstrate the system's permeability in regard to upgrading possibilities.

2.1. Early Childhood Education

Children aged 4 to 6 have the possibility to follow a three year kindergarten curriculum. Attendance is not compulsory. Kindergartens are mostly privately operated, i.e. organized as either private non-profit making or private independent kindergartens, although the Ministry of Education has progressively stepped in and will be running ten subsidized (not yet free of charge) kindergartens by 2015 and another five in the near future[13] (MOE, 2014a). The curriculum targets at a holistic development of the children using experiences and interactions in English and another Mother tongue (MOE, 2012a). Alternatively, childcare centres offer facilities and early childhood programmes for children aged 2 months to 6 years old (MSF, 2014).

2.2. Primary Education

Primary education follows a six year curriculum, wherein most of the children are aged 6 to 11. Four of these six years are uniform for all kids[14]. Although they coexist with private schools, public schools are the norm and are almost free of charge for citizens, as opposed to permanent residents and international students[15] (MOE, 2012b). The curriculum is built on three pillars; subject disciplines, knowledge skills and character development (MOE, 2014b). Subject disciplines consist of core classes - English and mother tongue languages (Mandarin, Malay or Tamil, which are all national languages), mathematics, and science[16], complemented with classes aimed at fostering children's soft skills and social values.

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[13] They are operated under a framework defined by the Early Childhood Development Agency, an agency under the umbrella of the Ministry of Social and Family Development and the Ministry of Education (MOE 2014c).
[14] Except for disabled individuals, who have special primary education institutions.
[15] Monthly fees range in between a citizen max of S$13 and a non-ASEAN international students max of S$513.
[16] Science from year 3 onwards.

Figure 2: Main educational pathways in Singapore
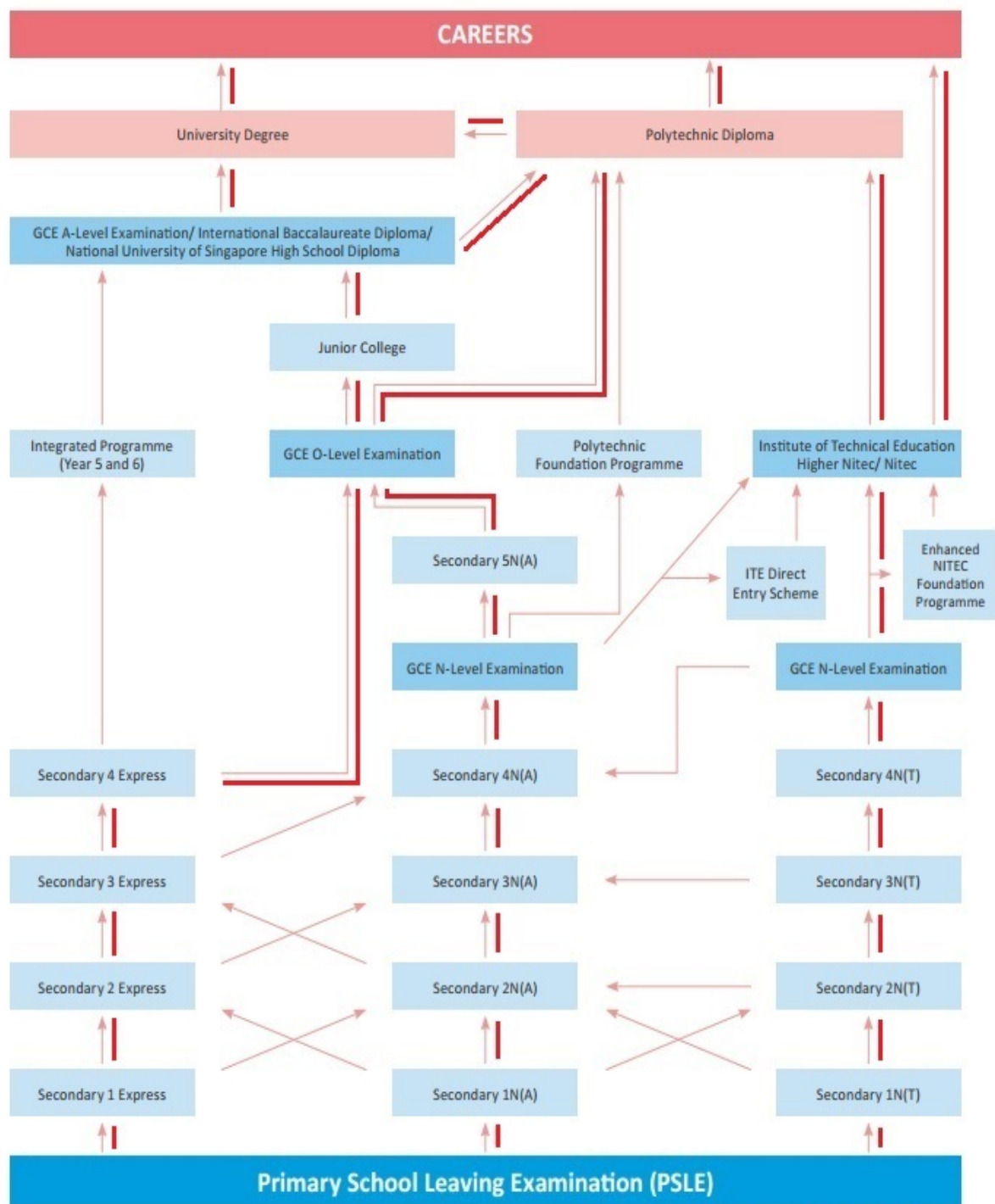
Source: Ministry of Education (slightly adapted)

The combination of English and another mother tongue holds across all stages of education. Bilingualism has in fact been a trademark of the country since 1966. English is the common denominator among Singapore's three major ethnic groups, while the upholding of mother tongues perpetuates the roots of each, and represents business opportunities for the country.

From school year 5 to 6, the core subjects are offered in different proficiency levels in order to match students' abilities. A parallel track, the Gifted Education Programmes (GEP), aims at children with outstanding potential. Year 6 concludes with the Primary School Leaving Examination (PSLE). The result of the PSLE determines students' educational path in secondary education

2.3. Secondary Education

Secondary education is split up in multiple tracks, diverse in substance and scope. Most students are between 12 to 15 years of age. Essentially, the following three tracks are offered: the *Express Course*, the *Normal Academic* and *Normal Technical Courses*. The Express and Normal Technical tracks last four years and the Normal Academic five years[17]. Their curricula differ with regard to proficiency levels and the balance between theory and practice. Students in one of the two normal tracks can attend elective modules, or a given amount of classes of the upper tracks. A fourth track exists, lasting for 6 years is offered for the most talented pupils.

The **Express Course** is the classical path leading to admission to the Junior College (that is, pre-university) and Polytechnics. The final year of the overall four years of schooling ends with the *General Certificate of Education* (GCE) "O" Level Examination. Successful completion of the GCE "O" examination enables students to take part in the Joint Admission Exercise (JAE), which consists of an application window to the main post-secondary education institutions, namely Junior Colleges, Polytechnics and ITEs. These are applications - the selection process is based on merit.

The **Normal Academic Course** also leads to a GCE "O" certificate (and thus, down the road, offers the same opportunities than the Express Course), although the path to get there differs. After four years, students are required to take the so-called GCE "N(A)" Level Examination[18] (MOE, 2014d). The logical consequence thereafter is to attend a fifth year of Normal Academic that leads to the GCE "O" Level Examination. The top 10% of the cohort are offered the possibility to enter a Polytechnic Foundation Programme (PFP) as an alternative to the fifth year of study. In case of successful completion, this one year programme guarantees an automatic access to roughly 80% of all Polytechnics' diplomas (Polytechnic, 2014). In the same lines, the top 30% of the cohort can opt out after the GCE "N(A)" and attend *ITE's Higher National Institute of Technical Education Certificate* (Higher Nitec) programs (defined in section 10) under the Direct Entry Scheme to Polytechnic

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[17] Although one can opt out after 4 years under specific conditions described hereinafter.
[18] Given their results in SEC 2N(a) and 3N(a), schools may allow great students to bypass the GCE "N(A)" and head straight to SEC 5N(A) (MOE 2014c).

Programme (DPP) of the ITEs, which lasts 2.25 years, is another way of to get direct access to Polytechnics Diplomas.

The **Normal Technical Course** paves the way for Vocational Education and Training (VET) at the ITEs. It is a 4 year practice-oriented curriculum with emphasis on English and mathematics (MOE, 2014e). It ends with a GCE "N(T)" Level Examination, which opens the door to ITE's Nitec programmes (i.e. not to be confused with *Higher* Nitec programs). These programmes are the normal educational pathway for GCE "N(T)" holders. Also at the secondary education level, public institutions are predominant and nearly free of charge[19] (MOE 2014f). The choice of an adequate school is, to some extent, discretionary to parents; they file applications for several schools in order of preference. The schools select applicants based on their PSLE score (MOE, 2014g). Alternatively, some schools provide a Direct School Admission (DSA) scheme on a voluntary basis, which allows for an application and conditional acceptation prior to the PLSE, confirmed if PLSE results meet the requirements.

Besides the three main tracks, the most promising students (mostly GEP ones) are selected into a 6 year Integrated Programme (IP) on grounds of the PLSE results or under DSA. Successful students on the GCE "O" track can also apply to join the IP from year 3 onwards (dual-tracks with the GCE "O" track are possible) (MOE, 2011). Such students do not take the GCE "O", instead, they are offered a broader and more demanding curriculum. Depending on the institution, this programme either leads to a GCE "A" (the usual post-Colleges examination), to an International Baccalaureate Diploma (IBD), or to other qualifications. Lastly, Specialised Independent Schools offer programs that emphasize a particular discipline; arts, sports, sciences or mathematics (MCI, 2014). They usually lead to a GCE "O" or an IBD or a diploma of their own. The NUS High School, a spinoff of the National University of Singapore, is a good example of this sort. Its diploma, obtained after 6 year curriculums, opens the door to domestic universities and is recognized by some of the best universities in the world (NUS High School, 2014).

2.4. Post-Secondary Non Tertiary Education

2.4.1. Pre-Academic Track: Junior Colleges

Junior Colleges (JCs) are accessible to holders of the GCE "O" certificate (i.e. mostly students who completed the Express or the fifth year of the Normal Academic track). JCs act as a gateway to university, their two year programs end with a GCE "A" Level Examination (the most advanced GCE examination) which is the common pre-requisite for university

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[19] Monthly fees range in between a citizen max of S$25 and a non-ASEAN international students max of S$670 (MOE 2012b).

admission[20]. Their tuition fees are strongly subsidized for citizens and permanent residents, but are sensibly higher for other categories of students[21]. Students are admitted based on merit during the JAE, 10% of which can be earned by means of the DSA (that is, prior to the GCE "O" and the JAE). The curriculum is quite flexible. Out of seven modules, three can be chosen freely among a wide range of topics[22].

Equivalently, the *Millennia Institute* (MI) is a public institution leading to a GCE "A" as well. It offers a format of three years instead of JCs' two years. However, with a total enrolment of 1'303 pupils in 2013, it stands far short of JCs' 30'862 pupils (Planning Division MOE, 2014). JCs' remain the well-established path to university.

2.4.2. VET track: Institute of Technical Education

The ITE is Singapore's *main provider of VET*. As such, a comprehensive description of their function is dedicated to them in the third part of the Factbook.

2.5. Post-Secondary Tertiary Education

2.5.1. VPET Track: Polytechnics

Polytechnics are Singapore's *main providers of Vocational Professional Education and Training* (VPET) and thus also developed in detail in the third part of the Factbook.

2.5.2. Academic Track: Universities

Singapore has five public universities at the moment. Among these five are the National University of Singapore and the Nanyang Technological University, which are both internationally renowned institutions. They are supplemented with three young universities; the Singapore Management University, offering degrees in law and business, the Singapore University of Technology and Design, offering engineering degrees (and which has an extensive partnership with the renowned Massachusetts Institute of Technology). And finally, the Singapore Institute of Technology (SIT), a university of applied orientation developed in 2009 especially for Polytechnics upgraders. Fees of public universities vary from one program to the other.

When subsidized, a public university typical yearly fee for citizens ranges between S$7'500 and S$12'500, with exceptions such as medicine where yearly tuitions can shoot up to over S$30'000 (Nanyang, 2014a, SUTD, 2014). Subsidized permanent residents or international

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[20] In other words, excluding IPs, Specialized Independent Schools, and upward mobility from well performing Polytechnics students.

[21] Monthly fees range in between a citizen max of S$33 and a non-ASEAN international students max of S$1027 monthly (MOE 2012b).

[22] For more details: http://www.moe.gov.sg/cpdd/alevel2006/experience/levels.htm

students may be charged up to the double amount of the fees citizens have to pay, while non-subsidized residents pay more than triple the fees. Applications are open to GCE "A" certificate holders, the relevant Polytechnic diploma graduates, and other equivalent qualifications[23] (Nanyang, 2014b).

Several private institutions complement the academic landscape. Their tuitions remain higher in comparison with publicly-run institutions even with state partial subsidies, as for example the two following institutions. The Nanyang Academy of Fine Arts (NAFA) and the LASALLE College of the Arts, as the name indicates, are institutions devoted to instruct and certify artistic formations. They offer programmes at every stage of the educational chain; certificates, diplomas and Bachelors of Arts (Hons). LASALLE further provides several Masters of Arts. The diplomas, which last three years, are somewhat analogue to those of Polytechnics in their application requirements[24] (NAFA, 2014). LASALLE's three year BAs require a GCE "A" certificate, a relevant Polytechnic Diploma or an IBD, while the BAs offered by the NAFA (in collaboration with UK universities) are accessible to relevant NAFA's Diplomas holders (and are thus a natural continuation thereof) and are delivered after 12 months (NAFA, 2014; LASALLE, 2014).

Alternatively, the BCA Academy offers a broad range of formations in the fields of buildings' elaboration. Among the different formations, seven Diplomas, lasting for three years, are proposed under similar application requirements as Polytechnics'. At the same time, the BCA Academy delivers three Bachelors and two Masters in partnership with other universities (e.g. University College London). Finally, the SIM University (UniSIM) used to focus solely on part-time programmes. However, from 2014 onwards it will offer three full-time programmes in partnership with the SIT (Hussain, 2013).

3. Vocational Education and Training

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[23] E.g. IBD holders, NUS High School graduates, etc. (Nanyang 2014b).
[24] Usually limited to GCE „O" holders and specific Nitec and Higher Nitec programmes (ITE, 2014c).

3.1. Major VET Institutions

3.1.1. VET: Institute of Technical Education

The ITE forms a publicly funded and autonomous agency under the umbrella of the Ministry of Education (ITE, 2009). It comprises three colleges, or mega-complexes, spreading across the island. Fees are strongly subsidized for citizen, and way higher for permanent residents and international students (ITE, 2014a).

Ties with the private sector are at the core of ITE's expansion strategy. They take the form of *joint-partnerships* covering among others equipment, staff and training in the three colleges, as well as work opportunities in the companies (e.g. internships). One recent example representative of that model is the training cooperation between Samsung and one of the colleges. Samsung will develop an in-house training facility, providing products and equipment (ITE, 2014b). Nearly 100 private partners across all backgrounds have entered in such relationships, ranging, for instance, from the technological to the fast-food industry, as well as SMEs or sports, for example, ABB, McDonalds and Microsoft (Tucker, 2012).

ITE certificates are distributed into six departments: the Schools of Applied & Health Sciences, Business & Services, Design & Media, Electronics & Info-communication Technology, Engineering, and Hospitality. Some of the certificates are specific to one of the three colleges. They are composed of a combination of modules which varies by subject and specialisation. The average ITE module is made of 120 hours, wherein 3 hours of applied material are provided for each of its hours of theory[25]. As a result, over 70% of certificates' curriculums are practice based (Law, 2007) Certificates take the formats of full-time, traineeships and part-time. A short note on each of the formats follows.

- **Full-time in-house (FTI):**

The base format, offers the broadest panel of programmes. FTI curriculums take entirely place in ITE colleges - in other words, are "*school-based*". ITE colleges provide all the necessary facilities to reproduce the equivalent of a working experience, in part due to the aforementioned joint-partnerships with the industry. Nearly half the full-time certificates (a rising proportion) require a mandatory internship of 3 to 9 months (ITE, 2013a).

- **Full-time traineeships (FTT):**

Is available for about a quarter of all FTI programmes. It consists of a Swiss-type of public/private "*dual-system*" wherein one spends 75% of the formation time on-the-job (that

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[25] The duration of modules varies. Ratios of application/theory as well (from 4:1 to 1:1).

is, 3 to 4 days per week as part of a firm) and the remaining 25% of the formation taking ITE modules alongside the FTI students in ITE colleges. Traineeships are compensated and tuition fees are waived[26]. Under completion, a certificate fully equivalent to FTI counterparts is granted and thus offers the same progression opportunities – along with an additional traineeship certificate.

- **Part-time in-house (CET):**

Is available for about half of all FTI programmes. It consists of weekly evening or weekend sessions based on the same "*school-based*" model as FTI's. Fewer modules are required than in FTIs and the completion timeline is flexible. In most cases, progression opportunities are limited to other CET (part-time) programmes. It usually requires a minimum age of 18 years in order not to attract secondary school leavers as it is meant for continuing education and training undertakers.

An interesting decentralization attribute is that of the **Approved Training Centre (ATC)** scheme. The ATC label is a certification delivered by the ITE to companies which grants them the right to deliver modules in lieu of ITE Colleges. As a result, the entire set of ITE degrees, in any of the 3 formats[27], can be given by firms without ever sending employees to ITE's facilities. Companies can apply for the scheme under specific criterions for a renewable 1 to 3 years period (ITE, 2010).

As of 2013, a total of 14,432 new students was enrolled in one of ITE Colleges' full-time programmes. This represents about 25% of intakes in the principal post-secondary institutions that immediately follow secondary school (that is, ITE, Polytechnic and JCs/MI, but not university)[28] (Planning Division MOE, 2014). Close to 90% of ITE graduates found employment within six months in 2013 (MOE, 2014h). 13'437 individuals completed a part-time programme. The total enrolment in traineeship programmes stood at about 600. It is declining and marginal when compared to the in-house format (Ng, 2014). The number of traineeship programmes themselves decreased by one half since the second part of the 2000s.

The ITE's two building blocks are the *Nitec* and *Higher Nitec* programmes. Additionally, it offers an entry certificate, the *ITE Skills Certificate* (ISC), and an advanced one, the *Technical Diploma* (TD).

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[26] The annual Singapore citizen fees are of respectively S$371 and S$621 for Nitec and Higher Nitec programmes in 2015, whereas international students' pay S$10'512 and S$18'812 (ITE 2014a).
[27] Mostly ISCs and Nitecs. More information on companies and programmes at: https://www.ite.edu.sg/wps/wcm/connect/ 934229004923ed5aae14bf309f78fb2b/ATCs_List.pdf?MOD=AJPERES
[28] It cannot be taken as a perfect measure of secondary school leavers since full-time intakes also include some upgraders.

Figure 3 displays a simplified representation of ITE's progression opportunities. It must be interpreted as a general representation as progression varies across certain formats and subjects. They are subject to minimal requirements and selection processes; each evocation of progression opportunities in this chapter is always subject to minima criterions and a selection process unless said otherwise. A more rigorous description of the programmes follows.

Figure 3: ITE's progression opportunities (simplified[29])

Source: own illustration
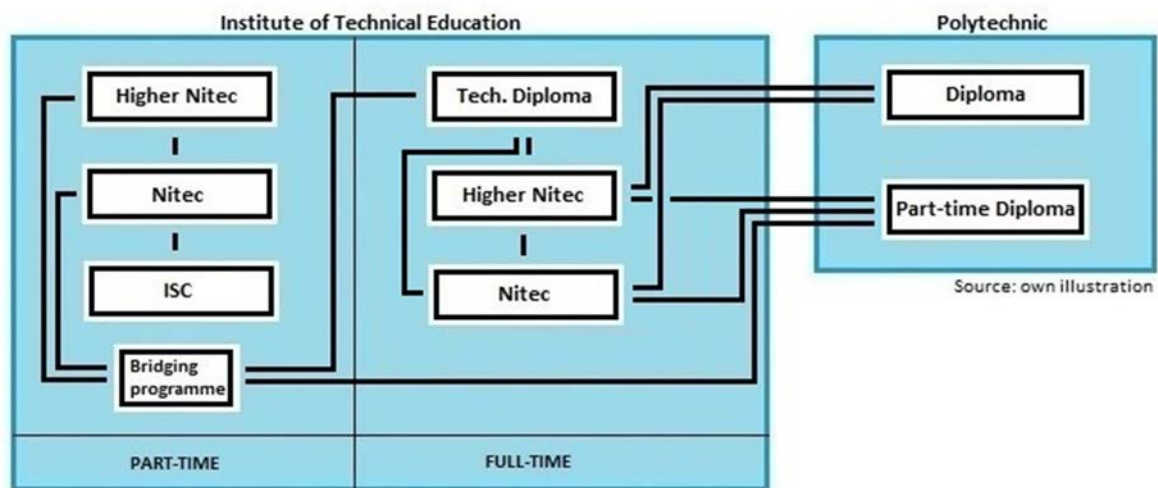
- **Institute of Technical Education Skills Certificate (ISC) (FTT, CET):**

This is an entry level certificate available part-time and in traineeship format. The application requirements are flexible enough to ensure that the degree is accessible. In its CET format, for instance, completion of primary education is sufficient to apply. The 5 CET ISCs consist of one module corresponding to roughly 120 hours in a practical subject (e.g. sanitation, electricity, etc.), and allow to apply to both FTI and CET Nitec in similar fields (ITE, 2014c). Alternatively, the FTT format requires a GCE "N" certificate, although candidates recommended are considered. On merit, they open the doors to the FTI Nitec in nursing. The ISC is thus an ideal lifebuoy for individuals that encountered problems during secondary school.

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[29] For instance, the only full-time ISC programme is not in the graph. Progression from FT to PT programmes are not sketched either.

Table 3: ISC summary[30]

Format	Programmes	Usual duration	Usual min. requirements	Usual progression opp.
FTT	2	1	GCE "N"/prof. recommendation	Nitec
CET	5	0.5	Primary educ./work exp./WSQ	Nitec

Source: Own display.

- **Nitec (FTI, FTT, CET):**

Nitec programmes cover the broadest panel of subjects across the 6 schools. FTI and FTT Nitec mostly similar in their application requirements[31], their duration of 2 years and their progression opportunities (ITE, 2014e). In particular, FTI Nitec holders can apply to 1st and 2nd years of some Higher Nitec programmes[32], as well as to TDs and a restricted set of Polytechnics diplomas under the Joint Polytechnic Admission Exercise (ITE, 2014d).

The *Enhanced Foundation Programme* (FTI+) is a pilot endeavour put forward in 2014. It targets students who, having failed or barely passed the GCE "N(T)" examination, would not have had access to usual FTI Nitecs[33]. The underlying idea is to offer them an equivalent formation taking into account their academic difficulties. In practice, that takes the form of an additional year of study (that is, FTI+ Nitecs are three year programmes) and lower pupil-to-teach ratios (about 30:1 instead of 40:1). 5 FTI+ Nitec degrees are offered under the scheme. They can upgrade to Higher Nitec, and, for some of the 5 degrees, to Polytechnics or a TD. Analogously to ISCs, this format tackles the issue of students that struggled in the past.

Table 4: Nitec summary

Format	Programmes	Usual duration	Usual min. requirements	Usual progression opportunities
FTI	53	2	GCE + specifics	Hi. Nitec, TD, Polytech.
FTI+	5	3	GCE "N(T)" + 0 or 1 pass	Hi. Nitec (TD, Polytech.)[34]
FTT	32	2	GCE + specifics	Hi. Nitec, TD, Polytech.
CET (S)	10	1.5 to 3	GCE + specifics/WSQ	Hi. Nitec, TD, Polytech.
CET (T)	20	1.5 to 3	GCE/ISC/work exp./WSQ	Hi. Nitec, TD, Polytech.

Source: Own display.

The part-time format consists in 30 programmes of roughly 700 hours of class distributed between Nitec in Services (CET (S)) and Nitec in Technology (CET (T)). While the requirements of CET (S) are somewhat similar to FTI Nitec's, those of most of CET (T) programmes are accessible under looser conditions such as holding an ISC or previous work

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[30] Table 3 and the following tables must be interpreted as a general sense of requirements and opportunities - specific programmes may offer a different set of requirements/opportunities (e.g. limited to the same type of subject).

[31] Requirements vary from one program to the other. Under the JAE; to hold any of the GCEs with passes in specific modules.

[32] Usually GPAs of 2.3, and 3.0 respectively.

[33] The number of programmes will likely increase in the future (ITE 2014d).

[34] Each of the 5 FTI+ allow for Higher Nitec progression. Only 1 of the 5 allow for a specific TD and 3 of the 5 for Polytechnic progression.

experience. This makes it an attractive degree for low-skilled workers given its fairly versatile progression opportunities. In fact, upon completion of a bridging programme (60 to 180 hours), it opens the door to TDs and a limited amount of part-time Polytechnics programmes.

- **Higher Nitec (FTI, FTT, CET):**

Higher Nitec programmes teach the subjects in more depth than Nitec's, and rebalance the practice to theory ratio from 70:30 to 60:40 (Koh, 2011). FTI and (most of) FTT programmes were standardized to two years. As for the GCEs, only the GCE "O" certificate is valid to apply for Higher Nitec programmes under the JAE. Their completion enables application to TDs and Polytechnic diplomas. CET programmes are uniform in their application requirements[35] and allow to apply to TDs and *part-time* Polytechnic diplomas under completion of a bridging programme. A special initiative, the Direct Entry Scheme to Polytechnic (FTI+), *guarantees* a place in the 1st or 2nd years of Polytechnics diplomas (as opposed to standard FTI and FTT only granting the right to apply to them under the JPAE). The scheme is offered to the top 30% of new GCE N(A) graduates. It appends a 10 weeks formation to one of the 16 usual Higher Nitec programmes offered under this scheme (2.25 years in total)[36].

Table 5: Higher Nitec summary

Format	Programmes	Usual duration	Usual min. requirements	Usual progression opportunities
FTI	45	2	Nitec + spe./GCE "N(A)" + spe.	TD, Polytech.
FTI+	16	2.25	GCE N(A) + specifics	TD, Polytech.
FTT	3	2 (1)	Nitec + spe./GCE "O" + spe.	Polytech.
CET	20	1.5 to 3	Nitec + spe./GCE "O" + spe.	TD, Polytech.

Source: Own display.

- **Technical Diploma (FTI):**

Technical Engineering Diplomas (FTI (E)) in Automotive Engineering and in Machine Technology are available in-house. These are two year programmes in cooperation with Baden-Württemberg, Germany, and whose curriculums are modelled after one of Baden-Württemberg's best VET college in those fields. Completion of the diplomas require another 1.5 years of working experience[37]. The same model applies to the FTI Technical diploma in Culinary Arts, modelled after a French culinary institute. The curricula is made of 1.75 years of in-house training followed by 9 months of working experience. All in all, the three TDs can be put on an almost equal footing with their Polytechnics counterparts as they offer the

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[35] A opposed to Nitec ones putting forward different requirements for CET (S) and CET (T).
[36] GPA requirements vary. Admission to second year restricted to some diplomas. More details at: https://www.ite.edu.sg/wps/wcm/connect/7f54e28040cfd61c917cb7b9cc0c1566/DPPcourses+-+22+Aug+2013.pdf?MOD=AJPERES.
[37] Prior experience in the field can be recognized.

opportunity to take on Bachelor studies in their respective fields, at NUS for the two Engineering Diplomas, and in the University of Lyon 3 for the Culinary Arts diploma.

Table 6: Technical Diploma summary

Format	Programmes	Usual duration	Usual requirements	Usual progression opportunities
FTI (E)	2	2 + 1.5	Nitec or Hi. Nitec + spe.	University
FTI	1	1.75 + 0.75	Nitec or Hi. Nitec + spe.	University

Source: Own display.

3.1.2. Professional Education and Training (PET): Polytechnics

Operating under the Ministry of Education, Singapore's five Polytechnics fulfil the paramount role of bridging the gap between classical VET, as provided by the ITE, and academic education. They share the task ok educating a capable middle-skilled workforce through PET. Subsidized, citizen's tuitions are nevertheless higher than at former stages of education, yet significantly lower than permanent residents' and international students' (Joint Polytechnic, 2014b).

Polytechnics enjoy some discretion with regard to their structure at the macro (e.g. schools) and micro (e.g. diplomas and modules) levels. The big picture is, however, quite similar across the five Polytechnics as they obviously share the same mandate. There is, for instance, a common objective of nurturing the fields that are strategic to the country (e.g. electronics and chemicals) - hence an emphasis on engineering and technical industries in general - but the scope of Polytechnics' educational opportunities stretches actually way further. A non-exhaustive list of Polytechnics' schools would include *business, IT, health & life sciences, chemicals, electrics, info-communication technology, and* other forms of *engineering*, and would extend to *design, film & media, social sciences, communication and the environment*.

Diplomas are the standard formation of Polytechnics. They are delivered *part-time* and *full-time*. In addition, so-called *specialist* and *advanced diplomas* are offered in a part-time format, as well as a couple of *diplomas (conversion)*. Their content is broken down into classical lectures in classrooms and auditoriums, as well as practical activities and workshops (in, for instance, laboratories or tech centres). Curriculums are meant to be holistic. Some modules are fully devoted to strengthen soft skills (e.g. solely based on enhancing communication skills). They all encourage interaction in general.

Partnerships are concluded with the private sector (e.g. IBM, Philipps), in the same spirit than those of the ITE. Among others, polytechnics and their private partners engage in the development of new modules, and applied projects involving poly students. Partner firms may provide training to poly teachers, as well as engage students in internships.

An alternative form of public-private partnership, the *Centers of Innovations* (COIs), were developed over the years. There exists seven COIs, among which five were attributed to Polytechnics (that is, one per Polytechnic). Each CIO focuses on a particular segment of the economy. They provide a wide array of services related to firms' R&D (in particular SMEs'). Within this framework, firms can notably make use of Polytechnics' researchers (up to a full-time basis) and CIOs' facilities and receive consultancy type of guidance. The resulting intellectual property, if any, is then attributed given pre-collaboration agreements. Researchers take advantage of their foot in the industry to remain up to date with the latest technological developments. It transcribes into enriched diplomas' curriculums. (A*STAR, 2010)

As of 2013, a total of 26'879 new students enrolled in one of Polytechnics' full-time programmes. This represents about 46% of intakes in the principal post-secondary institutions that immediately follow secondary school (that is, ITE, Polytechnic and JCs/MI, but not university)[38] (Planning Division MOE, 2014). About 90% of Polytechnics graduates found employment within 6 months in 2013 (MOE, 2014h).

Figure 3 displays a simplified representation of Polytechnics' progression opportunities. As for the ITE case, it must be interpreted with caution; progression varies and is limited across certain formats and subjects. They are subject to minimal requirements and selection processes; *each evocation of progression opportunities in this chapter is always subject to minima criterions and a selection process unless said otherwise.* A more rigorous description of the programmes follows.

- **Full-time Diploma (based on Singapore Polytechnic)[39]:**

Standard full-time Diplomas (FTD) are the only full-time formation delivered by Polytechnics. There are over 49 FTDs (which is the figure of the Singapore Polytechnic (SP, 2014)). They last for three years. FTDs consist of an addition of modules, each usually ranging from 30 hours to 180 hours, carrying out the aforementioned type of content. While some modules focus solely on theory, others are more practically-oriented. All-in-all, there are about 25 to 30 hours of classes per week, and the rules regarding attendance differ from one Polytechnic to the other (e.g. 75% of attendance per module is required in SP). Diplomas' frameworks usually imply a common core for one or two years of the programmes, and a limited form of module picking afterwards. An industrial internship for a couple of months[40] is mandatory. On

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[38] It cannot be taken as a perfect measure of secondary school leavers since full-time intakes also include some upgraders.
[39] May thus slightly differ with respect to other Polytechnics (e.g. number of programmes).
[40] Usually somewhere in between 6 weeks and 6 months. It varies across Polytechnics and Diplomas.

invitation students can apply for a diploma-plus format. It essentially adds one, or a couple of modules to the normal diploma, to be taken during the three years of studies.

As previously written, two schemes are offered to top GCE "N(A)" certificate graduate to have a *guaranteed* seat at Polytechnics: the top 30% graduate are offered to join the 2.25 year DPP (which consists in a Higher Nitec) and the top 10% are offered the 1 year PFP (ITE, 2014f, Joint Polytechnic, 2014a). The most common way to enrol is, however, for GCE "O" certificate holders to *apply* through the usual JAE. Several other means of application exist[41] and importantly ITE's Nitec and Higher Nitec can apply for certain programmes under the JPAE[42]. Full-time graduates can obtain the right to apply for part-time diplomas (specialist and advanced ones, etc.) and a range of university programmes (crediting modules for as much as one year of study in the process) (NUS, 2014). Among these academic opportunities, an applied (industry-focused) university, the *Singapore Institute of Technology* (SIT), was founded in 2009 especially for developing synergies with Polytechnics. Those synergies are well embodied by SIT's physical presence (that is, its buildings) spread across the 5 Polytechnics campuses (SIT, 2010). Any diploma holder can apply to its programmes, which pretty much cover the same range of topics (e.g. engineering and sciences) as those of Polytechnics' schools.

Table 7: FT degrees summary (based on Singapore Polytechnic)

Format	Programmes	Usual duration	Usual min. requirements	Usual progression opportunity
FTD	> 49	3	GCE "O"/Nitec + spe./Hi. Nitec + spe.	University
FTD+	> 19	(1 to 2)	Enrolled in FTD + spe.	-

Source: Own display.

- **Part-time Diploma (based on Singapore Polytechnic)[43]:**

CET specialisations are available to FTD holders. Priority is given to applicants with work experience, which is in some cases mandatory. As displayed by Table 8, the number of part-time programmes of each format is quite limited, however. Specialist Diplomas (PTSD) and Advanced Diplomas (PTAD) target at precise skillsets and differ with respect to the number of modules - hence the hours - one must pass in order to get the certification. PTSDs require on average 240 to 300 hours in total, that is, 2 to 4 evenings per week during a year. PTADs require about double the hours and time. (PACE Academy, 2014)

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[41] For instance prior to taking the GCE "O" under the Direct Polytechnic Admission. For more details: http://www.polytechnic.edu.sg/polyguide/AE.html
[42] Qualifying GPAs and holders of GCE „N(T)" or above, details at: http://www.polytechnic.edu.sg/jpae/Courses.html
[43] May slightly differ with respect to other Polytechnics (e.g. number of programmes).

Diploma (Conversion) (PTD (C)) enables diploma holders of any field to get a degree related to a new field of interest, hence a career reconversion. Requirement-wise (hours and number of modules), it is quite similar to PTSDs. It may be required that one shall work in that new field by the time he applies to the degree. Classical part-time Diplomas (PTDs), on their hand, are a great way to climb up the CET chain coming for instance from Nitec and Higher Nitec (potentially part-time) programmes. Four of the five PTDs are engineering-related and one focuses on business. They are shorter than their full-time counterparts and roughly require 900 of hours of evening lectures spread across 2.5 years. PTD holders are to follow a bridging programme if they want to apply to part-time university education.

Another broad range of short courses and WSQ-related CET are proposed. The former usually take the form of a few of dozen of hours in evening sessions, while Diplomas and WSQ Certificates (the concept of WSQ is comprehensively described in the next section) demand the same sort of commitment (e.g. a year) as PTSDs. As described in the following section, it is explained by the valuable recognition WSQ type of CET enjoys.

Table 8: PT degrees summary (based on Singapore Polytechnic)

Format	Programmes	Usual duration	Usual min. requirements	Usual programme opportunities
PTD	> 5	> 2.5	GCE "O"/Nitec or Hi. Nitec + spe./WSQ	PT Uni.
PTD (C)	> 6	1	Diploma	-
PTSD	> 7	1	Diploma	-
PTAD	> 7	1 to 2	Diploma	-

Source: Own display.

3.1.3. Continuing Education and Training (CET): Workforce Development Agency

The *Workforce Development Agency* (WDA) operates under the hospices of the Ministry of Manpower. It is devoted to enhance the skills and employability of Singapore's workforce, and is in this respect the *country's most significant CET contributor.*

The WDA's main initiative is the CET Workforce Skills Qualification (WSQ) system. Created in 2005, the WSQ consists in the development and the certification of industry-specific standards as well as generic employability standards. In a way, it can be seen as a national CET qualification framework.

Each industry the WSQ covers features an Industry Skills and Training Council (ISTC) of its own. ISTCs are constituted with all the relevant stakeholders - the WDA, private partners, training institutions and unions. Their job is to map out and continuously bring up-to-date the set of WSQ standards – skills and curricula-wise - of their respective industry.

The WSQ system is designed in such a way that workers of different age and professional statutes – from the low-skilled unemployed to the executive – find valuable CET opportunities. The WDA incentivizes firms to upgrade their workforces' skills by engaging in partial subsidies, especially attractive for SMEs, both on programmes' tuitions and on wages paid during formations (WDA, 2012a). Accessibility and financial affordability of WSQ CET opportunities are in fact key to its mandate.

The WDA differentiates itself from other VET, PET and CET providers in the sense that, while it developed and continuously enhances the WSQ system, it does not provide any sort of teaching activity itself. Instead, the WSQ follows a model of decentralization. The WDA grants external institutions the right to deliver WSQ-accredited degrees based upon ISTCs' standards. In that, it makes use of a powerful certification effect which relies on the shared trust the private sector places in WSQs' standards and the WDA's attribution of accreditations.

There are 3 levels of accreditations; basic Approved Training Organizations (ATOs), CET Centers, and National CET Institutes (NCIs). Each level entails more obligations (e.g. extra services to provide) and grants more privileges (e.g. funding). Their renewal is subject to WDA's periodic audits of practices. This framework enables a healthy competition and convergence of best practices.

As of 2013, there were 466 ATOs, 45 CET Centers and 5 NCIs in Singapore (WDA, 2013). Both private and public actors can apply to become an ATO, which grants the right to deliver WSQ-accredited degrees. There are 3 sorts of ATOs; in-house, public and both. In-house ones are only allowed to form employees, and public ones solely to external clients. To set a public ATOs (and ATOs that perform both tasks) and to become a trainer thereof have purposely higher requirements than for in-house ones (WDA, 2012b).

Only public institutions can apply to CET Centers. They have a duty to provide further services such as career advisory and job placement. The NCI is a certification of excellence granted to CET Centers, hence the small handful thereof. NCIs dispose of considerable influence; as their implementation of ISTCs' standards proves the very best, they become models to follow for ATOs and CET Centers.

In an attempt to ignite two clusters of CET excellence, the decentralized WSQ model was, so to speak, recentralized around two major *National CET Campuses*. Operating since 2014 and with a capacity of over 50'000 workers yearly, these hubs are to gather the very best WSQ providers (NCIs and beyond) in state of the art facilities, along with career coaching services, recruitment events, and act as a de facto marketplace between workers, WSQ providers and employers (WDA, 2009). The latter will be able to recruit tailor-made

candidates and to target specific training for their employees. One National CET Campus operates under direct supervision of the WDA, while the other will under that of the National Trades Unions Congress (WDA, 2011).

In practice, the WSQ system consists in 33 families, each declined in several programmes. Among these families, the Employability Skills WSQ (ES WSQ) deals with foundational competencies that apply cross-industries. Formal qualifications[44], well-recognized among private and public institutions, are delivered upon completion of a certain amount of modules. For instance, a gateway to ITE's part-time ISC and Nitec programmes is possible under completion of some of these.

Figure 4: Scope and levels of WSQs

Source: WDF (2015).

Most of the 33 families of WSQs, however, are either industry (e.g. aerospace) or occupational-specific (e.g. leadership). As depicted by Figure 4, one or multiple levels of qualifications are offered per each of these[45]. These qualifications are comparable to ITEs' (WSQ *Certificates*), Polytechnics' (WSQ *Diplomas*) or some of Universities' (WSQ *Graduate Diploma/Certificate*).

The WDA's system of mutual recognition with ITEs and Polytechnics is comprehensive, both ITE and Polytechnics are full-fledged CET Centers of the WDA. In the ITE case, for instance, collaboration takes shape in easier accession across the two institutions' respective certificates and module exemptions (ITE 2014f). Some of Polytechnics' part-time diplomas are also accessible via WSQs (Willmott, 2011).

More broadly, the mandate of the WDA involves other comprehensive initiatives. Among others, the 2014 Jobs Bank web platform was developed as a job market middleman, centralizing thousands of candidates and job vacancies. The Workfare Training Support (WTS) ensures the affordability of CET for low-skilled adults (35 years old and above,

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[44] The Statement of Attainment (SOA), Career Readiness Certificate (CRC) are obtained by completing modules within 3 ES WSQ Series.

[45] In other words, some WSQs only offer one level of qualification, while others offer multiple ones.

making less than $S1'900 per month) by subsiding up to 95% of tuitions of WSQ, ITE and Polytechnic's CET programmes (WDA, 2012c).

Finally, the Professional Conversion Programme (PCP) is an initiative designed for adults (usually 40 years old and above, but not necessarily) and/or unemployed individuals to re-skill themselves in another industry. It can be pursed in a format comparable to an adult traineeship, where individuals are immediately attached to a job, or be more formative in a CET institutions (WDA, 2014a). It usually (but not necessarily) works within the WSQ framework, and thus delivers a WSQ qualification when completed. It spans across a broad range of industries (for instance, computer game development), and requires from a couple of months to a few years for completion.

The WDA is by far the most comprehensive CET provider, yet it *does not enjoy a monopoly on CET*. We saw that both ITE and Polytechnics provided important part-time degrees. There are in fact plenty of other actors, both public and private, that offer other forms of CET. Short courses are abundant, and some associations of specific industries have developed their own qualification system. For example, the Institute of Banking and Finance (IBF) provides three benchmark exam certifications and developed a comprehensive range of standards, decentralized analogously to WSQs (IBF, 2014).

4. Administrative and Supervisory Structure and Operation of the Vocational and Professional Education and Training (VPET) System

4.1. Public Regulation and the Training System

The organisation of the Vocational and Professional education and training (VPET) system is indirectly subject to the authority of the Ministry of Education (MOE) and is regulated by legislation; in particular by the Singapore Institute of Technology Act, the Private Education Act and the Polytechnic Act are structuring the VPET system[46]. The control of the VPET through the MOE is indirect because it is constituted of statutory boards (board of the Polytechnic plus board of the ITE) and a council in the case of private education, whose members are always appointed (as well as removed) by the Minister. The MOE bears the full responsibility for the planning, organisation and supervision of the VPET system, but allocates specific duties to these entities. The boards of Polytechnic and ITE possess authority within their organisation and are responsible for the control and administration of the Polytechnic resp. ITE (and their assets and staff). The council for private education

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[46] Accessible online: http://statutes.agc.gov.sg

mainly registers and regulates private education institutions, enables and encourages the development of this sector and implements the organisation of quality accreditations (GOS, 2014).

The Higher Education Division of the Ministry of Education supervises the provision of tertiary and technical education (including the statutory boards of the five Polytechnics and the Institute of Technical Education) and the registration of private schools. Among other things the Higher Education Division initiate, implement, evaluate and review the policy on VPET and supervises the National Manpower Planning process, the operations of universities, polytechnics and ITE as well as the quality assurance in these post-secondary educational institutions. (MOE, 2015)

A special characteristic of the VPET system in Singapore concerns the regulation of the national manpower supply. In each sector (e.g. engineering or business and finance) is each year a number of slots available which are determined by a strategy concerning a future scenario of manpower requirements which in turn is the product of many key government agencies (e.g. National Manpower Council, Ministry of Trade and Industry or MOE). This process creates a kind of market within the VPET system, leading to higher required qualifications in highly desired sectors. So finally the distribution of students within the VPET system is not only a function of consumer demand as in many other countries, but a rather vital function of Singapore's economic development framework. (Tucker, 2012: 36-37)

Legislation on Vocational Education and Training

The legal system of Singapore is based on the English common law system in most areas of law, particularly in administrative law, contract law, property law and tort law. Apart from relevant Singaporean cases, English case law or case law from other important Commonwealth jurisdictions serve as a basis for the interpretation of Singaporean statutes. On the other hand, other areas of law, such as criminal law, company law and family law, are almost completely statutory in nature. The Singaporean legislation on VET is mainly based on the Employment Act and the Institute of Technical Education Act (Chapter 141A).

Since the 1970's Singapore followed systematic policies and recommendations to upgrade education at various levels and developed a well-established VET-system. Nowadays, Singapore is often cited as one of the most successful countries that have developed VTE. The policy-makers introduced training levies to induce enterprise interest in worker training, scholarship system for students, private Industrial Training Centers (ITCs) and constantly improved the two main bodies responsible for VET in the post-secondary level - the Institute of Technical Education (ITE) and the five Polytechnics. ITE's primary mission is to provide practical vocational training to develop skilled manpower for the economy. The polytechnics,

on the other hand, primarily aim to deliver technical education to train middle-level technologists with industry-relevant knowledge and skills. 42% of each year's graduating school cohort goes on to receive post-secondary education at one of the polytechnics these VTE institutions, ITE provides places for about a quarter of the total cohort of school leavers.

A table providing a more detailed overview on certain aspects of *VET* legislation in Singapore can be found in section 0 in the appendix. In particular regarding the overall governance including applicable statutes and administrative bodies, the role and content of education, the regulation of work-based training, financial attributes, and VET teachers' education:

4.2. The Role of Employer Co-ordination in the VPET System

The VPET system has established close ties with the private sector and is still continuing to do so, like the already mentioned partnerships of ITE and Polytechnic. The private partners enable for example applied projects involving students, provide training to teachers and engage students in internships.

The entire VPET system is shaped by this partnership: the design of the training course system, the necessity for students to spend time working in a company, the involvement of employers in advising the various VPET institutions and programs, the necessity for teachers to improve themselves by working and receive training in companies periodically, the assessing of candidates for diplomas, the providing of up-to-date equipment for instruction, as well as the advising on broad program directions lead to a productive connection between economy and state. (Tucker, 2012: 40-41)

4.3. Public Financing of Education and Vocational Training

Education is the government's second biggest budget after defence[47]. Singapore's total budget for education added up to over 14% of GDP in 2013. In 2011, Singapore spent 3.2% of its GDP for education (for comparability reasons, 2011 was chosen as a reference year). Compared to the OECD average of 5.6% of GDP in 2011 (OECD, 2014b), Singapore spent relatively less for education than the average developed country.

In 2013, total education spending summed up to 3.1% of GDP. About 14.5% of this amount was spent for VET and PET (DOS, 2014). More precisely, 3.3% were allocated to ITE and 11.2% to Polytechnics (Figure 5). These figures represent quite well that ITE's and Polytechnics' total operating expenditures as both institutions are publicly financed. The

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[47] Respectively 20.3% and 22.2% of total expenditures in 2014.

government further granted about S$0.32bn to the WDA, which provides VET and VPET types of CET with the WSQs (WDA, 2014b).

**Figure 5: Distribution of education spending (% total, 2013)**
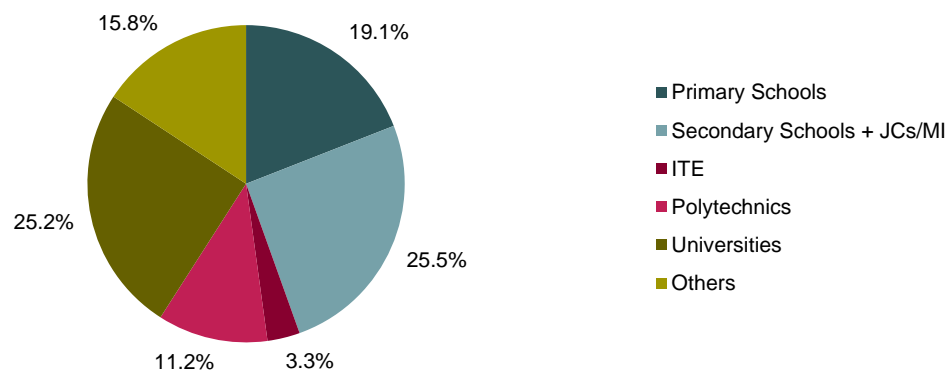
Source: Department of Statistics (2014).

Note that ITE is in small part decentralized with ATCs and WDA is fully decentralized with ATOs, CET Centers and NIEs. Therefore, it is fair to assume that the total amount invested in VET and CET goes beyond the public budget of ITE, Polytechnics and WDA, as other private (and public) players are involved. However, those external contributions are partly internalized in the public budget since the ITE and WDA offer tuition subsidies ATC and ATO participants. The significance of the contribution of external providers on top of the public budget is therefore uncertain.

Figure 6: Spending per student (S$, year)
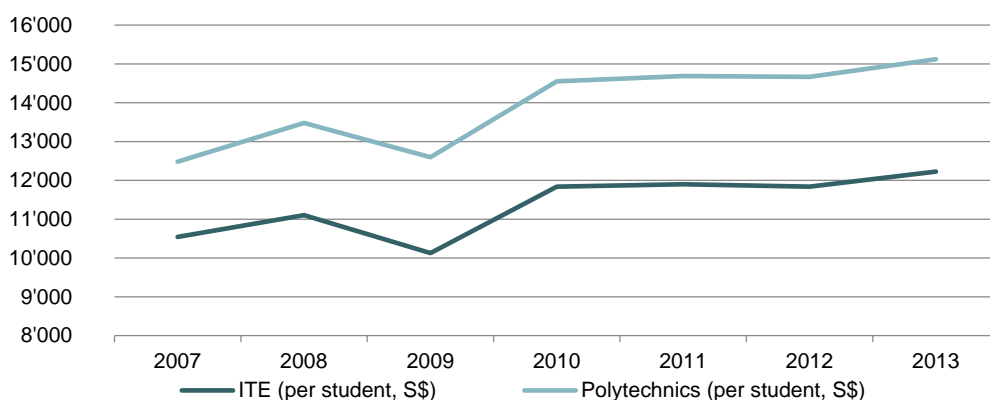
Source: Department of Statistics (2014).

The average public spending per student has followed a positive trend from 2007 to 2013, in both ITE (+16.0%) and Polytechnics (+21.1%). In order to make these increases possible, the nominal budget of both institutions had to surge during the same period (respectively +51.7% and +59.5) in order to offset the big growth of students (respectively +12.0% and +20.4%) (DOS 2014).

4.4. Trainers and Lecturers Requirements in Vocational Institutions

An entry lecturer position at the ITE usually requires a minimum of 3 to 5 years of practice in the field of the teaching position and solid interpersonal skills. There is little mention of the education required which suggest that applications are open to former ITE graduates. Some positions, however, explicitly require a Polytechnic diploma or a University degree in the field in question.

In ATCs (ITE training is conducted outside of ITE colleges), on top of the proper qualifications, the traineeship (on-the-job) training staff would have to attend complementary modules given by the ITEs: Coaching Skills and Planning & Implementing (ITE, 2013g). They are about 25 hours long each. Theory (off-the-job) training staff are usually only requested to complete the ITE Coaching Skills module.

As for Polytechnics, a minimum experience of 3 to 5 years and interpersonal skills are also the standard. A degree is explicitly requested for most of the positions, although it is not always defined what type of degree it consists of. In many instances, however, it is made clear that the degree ought to be a Bachelor or a Master. University education thus seem the convention.

In ATOs (WSQ providers), each WSQ trainer must himself partly complete an educational WSQ. As in-house ATOs are only allowed to provide WSQ training to their employees (as opposed to public ATOs providing WSQ training to external clients), the required educational WSQ of trainers is lower.

Those WSQs are exclusively given by the Institute for Adult Learning (IAL), a public institution founded in 2008. The IAL is a paramount actor of the educational landscape, it was established to create a cluster on the CET of teaching professions. It does not have a total monopole on it[48], but is its most significant contributor. That takes the form of a multitude of WSQs at different levels of qualification, as well as part-time Master degrees in partnership with Universities[49]. In parallel, it also does research on the same topic of CET teaching (Willmott, 2011).

In-house ATO trainers must have completed over 80% of IAL's WSQ Workplace Training Program (WTP, WSQ *level 2*) by the time of the teaching (WDA, 2012b). Public ATOs[50], trainers ought to have completed over 80% of the WSQ Advanced Certificate in Training and Assessment (ACTA, WSQ *level 3*).

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[48] Polytechnics and the National Institute of Education provide some forms of educational CET.
[49] For more details on the degrees, see: http://www.ial.edu.sg/index.aspx?id=11#prog-level
[50] And ATOs which perform both in-house and public training.

In general, University degrees *in the field of education*, as delivered by the National Institute of Education (NIE), do not particularly benefit prospective lecturers *in ITE or Polytechnics.* The emphasis is placed on degrees and professional experience *in the field of the particular positions.* The NIE operates under the auspices of the NTU. It provides a broad range of diplomas, bachelors, masters and doctorates, and also delivers CET certificates. The majority (e.g. every bachelor) are directly related to education, but it also offers degrees in adjacent field, such as, psychology (in master and doctorate) or life sciences. Both masters and doctorates can be taken part-time.

4.5. Curriculum Development

At the ITE, curriculum development is mostly a centralized enterprise (Koh, 2005). It starts off by determining what sort of training the economy needs today, as well as forecasting those it will need tomorrow. In order to do that, it relies on the outlook and strategies of different economic agencies, most notably the Ministry of Economy, the Ministry of Manpower and the Economic Development Board. In parallel, it conducts analyses of the demand and satisfaction of its programmes from both the students and employers prospective. The decision on whether to create or modify a programme is dictated by this overall assessment. The development thereof follows a multi-stage process: It first determines the competencies that the programme ought to transmit (Koh, 2011). A panel of 8 to 12 experts from the industry is consulted for a day or two on that purpose. Their proposals are put to a broader set of private actors, and a skills profile is drawn upon their validation. The skeleton of the programme (entry requirements, modules and examination framework) is then designed, followed by the elaboration in depth of the modules themselves. Before final approbation, those are vetted by committee made of representatives from Commerce and Industry. Teachers are then briefed with training specifications, which provide guidance as to the pedagogical framework. The effective implementation of the programme follows. It is implemented in a sufficiently flexible way, such that it is possible to make beneficial adjustments, or swiftly correct any inadequacy that is found out in the curriculum. The programme is reviewed every 3 to 5 years, based on school leavers and employers satisfaction.

Polytechnics evolve under a framework defined by the Ministry of Education, which notably determines a maximum limit to the number of student per sector of activity (FEFC, 1998). Within those sectorial constraints, Polytechnics are mostly free to elaborate their programmes. When establishing a new programme, information about present and future economic needs is gathered internally and externally (Koh, 2011). Externally, the most influential public entities in that regard are the MOE, the EDB, WDA and the national manpower council. Internally, a School Advisory Committee (SAC) – made of senior private

representatives- is assigned to each school. It follows the process of curriculum development. Once new programmes are entirely designed, the SAC validates them. Implementation and reviews of the programmes follow.

As to new WSQs, the process of new programmes is also quite similar to those of ITEs and Polytechnics. New training needs are looked for by the WDA, hand-in-hand with economic agencies and private actors (WDA, 2007). The determination of the goals of these new WSQs follows. The backing of private actors is paramount from those early stages onwards; in effect, they will provide the significant part of the training directly through firms or their public associations. It is thus a must to align everyone's point of view. The WDA and ISTCs (industry-specific representatives, as defined in section 10) then develop one WSQ's competency standards, that is, the WSQ framework in its entirety. ISTCs validate them. The WSQ is then implemented by a sample of CET Centers and external ATOs, with the objective of opening it up to everybody down the road. It is reviewed on a regular basis. Curriculum developers of in-house ATOs must complete the WSQ *Advanced Certificate* in Training and Assessment (ACTA, WSQ *level 3*) while those of ATOs open to the public must complete the WSQ *Diploma* in Adult and Continuing Education (DACE, WSQ *level 4*) (WDA, 2012b).

4.6. Short Note on the Historical Context[51]

The first forms of vocational education in Singapore emerged in the late 1950's and boomed the following decade in the form of technical secondary schools, as a necessary endeavour to deal with labour supply and demand dynamics. Labour supply was growing as a result of demographics, starting off at the bottom of the global value chain, the country's labour demand was characterized by labour-intensive and export-oriented industries. In consequence, policymakers were urged to address challenges on two fronts. First, providing enough incremental jobs to meet the active workforce growth, and second, curtailing the technical skills mismatches between that workforce and labour demand.

The government created the Economic Development Board (EDB) in order to better deal with this issue in 1961. Its mission consisted in attracting foreign direct investments in order to create a sustainable manufacture base. The initial strategy involved offering land, facilities and money to international investors in return for the training and hiring of Singaporeans[52]. That led to the opening of several training centres in partnership with multinational companies (MNCs) in the 1970's. In the same context, the first of many VET institutes -

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[51] Written after Tucker (2012), Law (2007) and MOE (2014i).
[52] They were required to train more individuals than future hires such that skilled labor were made available to the economy.

forefather of today's three ITEs - was inaugurated in 1964. Human capital was upgraded by means of the broadening of secondary education to the working class, for the attendance thereof was overwhelmingly consisting of future academic students prior to the 1960's, a commitment to literacy in English and some technical knowledge. This reflected Singapore's climb on the global value chain, rising from labour-intensive to knowledge-intensive economy and the necessity for skills to keep track therewith.

Institutions adapted to that transition phase, higher VA industries were to be attracted. In that regard, apprenticeship programs were marketed with great success to MNCs in the 1970's by the Industrial Training Board (ITB) as substitutes to in-house vocational institutes. The EDB, for its part, engaged in developing a new, vocational, education path at the post-secondary level in the early 1980's, the binational institutes, which were in practice quasi factories, with Japan, Germany and France. They enjoyed MNCs advisory inputs and a top notch training cohort. In parallel, Polytechnics (in the number of two at the time) – underpinning professional education and training - boomed in the mid-1980's. The VPET landscape was thus ever more diverse. By the end of the 1980's, a policy reversal was prompted whereby technical secondary schools were shut and post-secondary VPET institutes and Polytechnics became the de facto VPET norm. There were two rationales in prolonging education; high failure rates in the technical secondary education, and shape skills better suited to the jobs of an upgrading economy.

The 1990's and the beginning of the 2000's saw the last wave of thorough reforms. The apprentice scheme was rethought and strengthened in 1990, in particular in regard to the public certification of firms, trainers and apprenticeship programs. Polytechnics were to be modelled after binational institute, that is, provide a spirit of "*teaching factory*". It eventually made sense to merge binational institutes to the then brand new Nanyang Polytechnic (the 3rd Polytechnic out of the 5) in 1992, strengthening Polytechnics' dimension as institutions. The same year 1992 saw a fundamental overhaul of VPET institutes. The ITE was created, it centralized all VPET institutes and the new apprenticeship scheme under its roof. The authorities led a comprehensive awareness campaign to anchor VPET as an essential and laudable alternative to tertiary education. As part of that grand design, the ITE was granted facilities worthy of that name; 3 ITE Colleges - analogous to universities campuses - were built between 2005 and 2013. Finally, the Workforce Development Agency (WDA) was inaugurated in 2003 as an endeavour to steer a national CET master plan.

4.7. Trends and Reforms for the Future[53]

Singapore's educational distribution has drastically evolved in the past two decades[54]. Figure 7 displays the educational mix over time. In 1990, only 12.9% of all residents aged 25-34 were educated at the tertiary level. As of 2012, they were over 74%.

From 2002 to 2012, the mean years of schooling for the same age bracket increased from 12 to 13.6 years, while the educational gender gap – historically in favour of men – reversed as women attended 0.2 more years of schooling than men on average, driven by proportionally more university achievements (DOS, 2013a). An ethnic achievement gap remains, however, in practically every stage of education with Chinese descents outperforming the others.

Figure 7: Distribution of highest attainment, non-student 25-34 (year, % total)
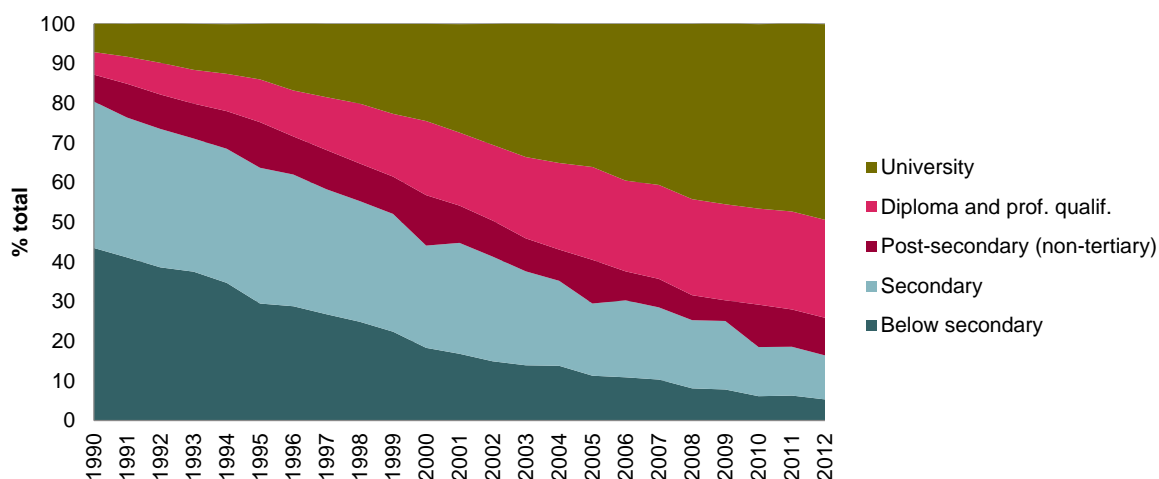
Source: DOS (2013a).

In January 2014, the Applied Study in Polytechnics and ITE Review (ASPIRE) Committee began its work on behalf of the government (MOE, 2014i). The task of the review was to analyse how the applied education in the polytechnics and ITE could be enhanced, enabling better outcome and opportunities for the graduates. For that reason different stakeholders were involved in the review, such as business representatives, education leaders and government officials with a wide range of expertise and educational background. For the review around 20,000 people were interviewed (business partners, students, alumni, parents, Polytechnic and ITE staff plus teachers) as well as study trips have been carried out to learn from other VET systems (Germany, Switzerland, Australia and New Zealand). This information and the recommendations listed below were processed in a detailed report, which also contains a response letter from the Minister, in which he accepted the recommendations and announced their implementation (MOE, 2014i).

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[53] Written after MOE (2014i).
[54] For more details regarding the classification of education: http://www.singstat.gov.sg/methodologies_and_standards/ standards_and_classifications/educational_classification/ssec2010.pdf

Key recommendations of ASPIRE (MOE, 2014i):

1. Strengthen education and career guidance efforts in schools, polytechnics and ITE.
2. Enhance internships at the polytechnics and ITE.
3. Increase *Nitec* to *Higher Nitec* progression opportunities for ITE students.
4. Establish polytechnic and ITE leads for each key industry sector to strengthen linkages with industry and help enhance programme offerings.
5. Expand online learning opportunities.
6. Provide more development and support programmes for polytechnic and ITE students.
7. Launch new programmes that integrate work and study, such as place-and-train programmes, to provide an additional skills-upgrading option for polytechnic and ITE graduates.
8. Increase post-diploma Continuing Education and Training (CET) opportunities at polytechnics for its graduates.
9. Support vocation-based deployments during National Service to help polytechnic and ITE graduates maintain their skills.

    Develop sector-specific skill frameworks and career progression pathways in collaboration with industry to support progression based on industry-relevant skills.

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Appendix

Regulatory Framework on Vocational Education and Training in Singapore

The following table gives a more detailed overview on certain aspects of VPET legislation in Singapore, in particular regarding the overall governance including applicable statutes and administrative bodies, the role and content of education, the regulation of work-based training, financial attributes, and VET teachers' education.

Different dimensions	Description	Singapore
Principal national statute	Year of publication and reference	Employment Act (Chapter 91)
Secondary statutes, amendments	Year of publication and reference, if there were any amendments	Institute of Technical Education Act (Chapter 141A) Private Education Act (Chapter 247A)
Responsible Ministry	Typically Ministry of Labour, or of Education → Sometimes competencies separated according to work-based part and school-based part	Ministry of Education (MoE) Ministry of Manpower (MoM)
National organization		
a)Administration	Who is responsible for the administration of VET-related issues?	By the MoE or directly by the education institutes (e.g. ITE, see below)
b)Representation, advice	Who/which kind of institution represents Could include: - representatives of the social partners: comprising the employees' side (works councils, trade unions) as well as the employers' side (e.g. chambers of commerce, employers' associations) - and vocational school-teachers Task: to submit expert opinions to the Economics Ministry (e.g. on the restructuring of apprenticeships)	see above a)
c) Mandatory representation of:	**Just a yes/no classification** if the three parties listed below have a say in the apprenticeship system, meaning if they have controlling and voting rights, specified in any piece of legislation/ legally based	
- Employers		Yes
-Trade unions		Yes
- Vocational teachers		Yes

Number of apprenticeable occupations	Is the number of officially recognized occupations in which apprenticeship is offered specified somewhere?	Apprenticeships within the following sectors: - polytechnics - digital media - biomedical and life sciences - hospitality and tourism management
Minimum skill level		n/a
Training duration (years)	Is the (minimum) training duration regulated somewhere?	Depends on the program, generally 2 – 4 years
Mandatory educational content		
Existence of minimum standards relating to the content of training	Are there fixed minimum standards with regard to the training content/each training company hast to stick to?	Specified in the Continuing Education and Training (CET) Qualification Framework
Part-time education	Is the provision of part-time mandatory?	
a) Apprentices	- For all apprentices?	Most of Polytechnics VET-programs are part-time. The ITE provides full-time institutional training combined with apprenticeship programs
b) < age a person is legally declared adult	- Only for those < the legal adulthood?	Post-secondary education usually starts after 10 year general education at the age of 16
Share of		
a) off job instruction	Is the share of off job instruction time (meaning the job instruction time the apprentice spends in the company, but not in productive work; for example, if the company has its own equipment for training apprentices how to work with a particular type of machine, etc.) regulated at a central level (outside the company)? If yes, what is the share (as % of total working time)?	Companies are awarded with the Approved Training Centre (ATC) status by ITE. Hence, there are different full-time, part-time and traineeships programs
b) general education	Is the share of the time spend in general education fixed at a central level (outside the company)? If yes, what is the share (as % of total working time)	See above a)
Regulation of work-based training → **relevant bodies**	Who has the competency to regulate the **work-based component** of apprenticeship training? (Could be a composition of the employee, the employer and/or the state representatives)	Institute of Technical Education (ITE) Nanyang Polytechnic (NYP) Ngee Ann Polytechnic (NP) Republic Polytechnic (RP) Singapore Polytechnic (SP)

		Temasek Polytechnic (TP) Further, there are some Private Education institutions (PEIs) specialising on certain sectors
Mandatory representation	Are the following three parties involved in the decision making process about work-based training?	
a) Employers		Yes
b) Employees		Yes
c) Vocational teachers		Yes
Statuary powers	Does the aforementioned body responsible for the regulation of the work-based training component have the right to:	
a) Trainee certification	- hand out training certifications to apprentices?	Yes
b) Validation of employer sponsorship	- to validate employer sponsorship? Meaning to verify if new companies wanting to train apprentices fulfil the necessary standards.	Yes