Trends and Issues in International Technical and Vocational Education in the Indo-Pacific Region

Technological and Vocational Education Research Center
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CONTENTS

PREFACE

Taiwan has long had a well-established technical and vocational education (TVE) system. Taiwan's primary and secondary schools are required to provide opportunities for all students to explore careers. In addition, junior high schools can cooperate with technical and vocational schools or vocational training institutions for technical arts education to implement occupational exploration education, while upper- and post-secondary technical and vocational schools provide occupational preparation education in which schools design occupational/professional courses jointly with industry to help their students enter the world of work and succeed in their careers.

The practice and experience of international TVE can serve as a reference for Taiwan to enhance its TVE. At present, more than 20 countries and political entities in the Indo-Pacific Region are located between the Indian Ocean and the Pacific Ocean. Regardless of economic development or strategic geography, they all play a pivotal role in the global deployment. How they develop talents by means of TVE has drawn Taiwan's attention. In contrast, Taiwan's well-established TVE system and abundant experience are also highly praised by most countries in this region. For example, the "Industry-Academic Cooperation Special Program for Overseas Chinese" has been sponsored by the Overseas Community Affairs Council to recruit overseas Chinese from some Indo-Pacific countries to Taiwan for receiving TVE. These programs are very well received. As another example, some countries targeted by Taiwan's "New Southbound Policy" are also very interested in Taiwan's experience and trends in TVE in recent years.

Therefore, aiming to achieve the following three goals, the K-12 Education Administration, Ministry of Education, subsidized the publication of this book: “Trends and Issues in International Technical and Vocational Education in the Indo-Pacific Region” by the Technological and Vocational Education Research Center of National Taiwan Normal University: (1) to strengthen the mutual understanding and connection of TVE between Taiwan and the other countries in the Indo-Pacific region, (2) to expand more cross-country educational cooperation and flow of talent, and (3) to take advantage of the core competencies and achievements of TVE in neighboring countries as a Taiwan innovation reference for change. TVE experts and scholars in the Indo-Pacific Region were invited to write 10 chapters on country-specific TVE trends and issues. The editors-in-chief of this book and one of their international doctoral students from Vietnam then made a cross-country comparison in the 11th chapter. I am grateful to all book contributors, and I hope that this book can contribute to improving TVE, benefiting student development, and promoting international exchanges.

Fu Yuan Peng

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Technical and Vocational Education Trends and Issues in Australia

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Abstract

The aim of this chapter is to provide an introductory overview of vocational education and training (VET) in Australia. It outlines the major features of the Australian VET system including its role in secondary school education. It also provides some key statistics on the VET system including student participation, their outcomes, and student and employer satisfaction with the system. More distinguishing features of the Australian VET system are then discussed including the accessibility of the system to people of all ages and various equity groups, including Indigenous people, people with a disability, students from regional and remote areas of Australia, and those from areas of socio-economic disadvantage. In addition, the qualifications and quality assurance system of the Australian VET system is described, as is the VET teaching and training workforce, and funding arrangements for the sector. Reform to the Australian VET sector, including the introduction of some new governance structures is also highlighted. The remainder of the chapter is devoted to a discussion of various trends and issues currently affecting the sector. Trends include the impact of industry 4.0, the broadening of employment-based training, stronger alignment to the higher education sector, the rise of short courses or micro-credentials, and the use of “big data” to inform policy in the sector. Issues in the sector include ongoing concern around aspects of quality, the image of VET, the complexity of navigating the sector, the high level of complexity of funding models, and finally challenges with remaining relevant to industry and students.

Keywords: Australia, VET, governance, funding, structures

Introduction

The Australian vocational education and training (VET) system is a competency-based industry-led system that operates at the secondary and post-secondary education sectors (NCVER, 2020b). The role of VET in Australia is to provide people with occupational or work-related knowledge and skills, and to ensure they have the skills and knowledge needed to participate in the modern economy. The VET system is open to all working-age people, with most training taking place post-school. It can be undertaken as part of secondary education, but this is not the focus of this chapter.

The Australian VET system is based on occupational skills standards, and most qualifications are set out as units of competency contained within training packages structured around industry or occupational areas. The VET system in Australia has evolved into an industry driven system (Atkinson & Stanwick, 2016). This is characterized by training packages which define the knowledge and skills required by different occupations and industries that are needed to perform a job. They are made up of units of competencies, they describe how these competencies may be packaged into a nationally recognized qualification,[1] and they also contain assessment guidelines.

To understand the VET system at the macro level in Australia, it is necessary to acknowledge the federated nature of the country. The Australian federal (national) government and eight state and territory governments are collectively responsible for the governance, regulation, and support of the VET system. A council made up of Commonwealth, State, and Territory ministers responsible for skills, currently constituted as the Skills National Cabinet Reform Committee, is the peak decision-making body for the national VET system.

1 That complies with the Australian Qualifications Framework (AQF).

Constitutionally, the eight states and territories have responsibility for VET. Over 2011 and 2012, however, most states and territories referred their powers for training provider regulation and course accreditation to the Commonwealth government which led to the establishment of the national VET regulator, the Australian Skills Quality Authority.

The *Standards for registered training organisations (RTOs) 2015* (ASQA, 2015) set out the requirements that must be adhered to in order to operate as an RTO offering nationally recognized training in Australia. Registration of RTOs and their compliance with the standards is monitored by the Australian Skills Quality Authority (ASQA), the national regulator for the sector, apart from two states, Western Australia and Victoria. These states maintain their own regulatory functions for RTOs in those states which only provide training within that jurisdiction (that is, excluding RTOs that deliver training to students in other jurisdictions and/or to international students). Western Australia's and Victoria's regulatory functions are aligned to mirror those of the national regulator.

The *Standards for Training Packages and Standards for VET Accredited Courses 2021* (ASQA, 2021) set out the requirements for course accreditation of units of competency and qualifications. The former is quality assured by the Australian Industry Skills Committee (refer below) and approved by the Ministerial council, while the latter is quality assured and approved by the three regulators under mutual recognition arrangements.

There are also several other bodies and organizations that have a role in the governance of Australian VET. One of these is the national Australian Industry Skills Committee (AISC) which provides industry a formal role in policy direction for the VET sector with a primary focus on the development and quality assurance of Training Packages. The operational arms of this committee are Skills Service Organisations (SSOs) and Industry Reference Committees (IRCs). IRCs are the mechanism for considering industry requirements in training packages, and are made up of people with close links to industry. These IRCs are supported in their work by SSOs who help the IRCs with secretariat services, preparation of skills forecasts for the IRCs industry area, and assisting with developing and reviewing training packages. There are six SSOs in total representing the broad industry structure in Australia.

As of 2019, the National Careers Institute (NCI) and as of 2020, the National Skills Commission (NSC) were created as part of reforms to the VET sector arising from the Joyce review (see Ferguson, 2019). The role of the NCI is to provide careers information and support to Australians, regardless of their age and stage in career[2]. The NSC has three main goals. The first is the provision of enduring and relevant labor market information. The second is improving the quality, accessibility and relevance of VET, and the final goal is to contribute to aligning the skill needs of the labor market with education and training[3]. In addition to these two organizations, three pilot Skills Organisations have been established to deepen industry engagement with the VET sector and for the sector to be more responsive to industry needs. The three pilot Skills Organisations are in the areas of Human Services, Mining, and Digital[4].

The Australian Department of Education, Skills and Employment (DESE) and the various state and territory government skills departments also have a role in the governance, financing, and overarching policy development of the VET system.

There are some aspects of the system that are a shared responsibility between the federal government and states and territory governments. One of these is apprenticeships. The states and territories (through their state and territory

2 https://nci.dese.gov.au/, accessed 6th April 2021.

3 https://www.nationalskillscommission.gov.au/about/about-national-skills-commission, accessed 6 April 2021

4 https://www.dese.gov.au/skills-organisations, accessed 6 April 2021.

training authorities) are responsible for the regulation of apprenticeship training contracts, the prescribing of vocations suitable for apprenticeship pathways, and some apprenticeship incentive payments. The Commonwealth is responsible for the Australian Apprenticeship Support Networks (AASNs)[5] and the Australian Apprenticeships Incentives Program for employers (Australian Apprenticeships, 2021).

The VET Market

The overall VET system in Australia, in contrast to many other countries, includes a significant privately financed training market, providing commercial fee-for-service training services to individuals and businesses. A large proportion of this commercial market is focused on short course or subject only training in areas of workplace safety, emergency preparedness and authority to operate, in addition to full certificate and diploma level qualifications.

In 2019, the overall market for nationally recognized training serviced 4.2 million students, of whom 1.2 million were government funded (NCVER, 2021b).

There are a very large number of RTOs in Australia (for a country of a bit under 26 million people), around 4,000[6], the large majority of which are small, private RTOs. They are all regulated under the standards mentioned above. Table 1 shows the breakdown of students in 2019 by course type, level, and funding source.

5 These provide and deliver support for apprentices and employers nationally. Australian Apprenticeships cannot be started without an Australian Apprentice Network Provider (see https://www.australianapprenticeships.gov.au/about-aasn)

6 https://www.asqa.gov.au/about/vet-sector/what-are-rtos

Table 1 VET Students in 2019 by Course Type and Funding Source

Course type	Government funding	Domestic fee-for-service funding	International fee-for-service funding	Total
Training package and accredited qualifications				
Diploma and above	137,285	121,285	139,430	394,795
Certificate IV	204,160	189,710	58,935	446,305
Certificate III	549,355	302,410	52,995	879,310
Certificate II	274,515	148,750	6,305	394,930
Certificate I	92,255	32,480	1,175	119,195
Training package skill sets	12,320	63,720	660	76,565
Accredited courses	32,465	61,090	160	93,555
Subjects not delivered as part of a nationally recognized program	132,365	2,520,240	14,965	2,633,125
Total	1,246,360	3,105,710	224,395	4,200,205

Note: Numbers do not add to totals as some students are enrolled in more than one type of training

Source: NCVER (2021b).

Government Funding of VET in Australia

Government funding for VET is made up of Commonwealth government transfers to states and territories through the National Agreement for Skills and Workforce Development[7] and other time-limited agreements called National Partnerships Agreements, and recurrent and capital appropriations provided by states and territories through annual budget cycles.

In addition to transfers to states and territories, the Commonwealth govern-

7 https://www.dese.gov.au/skills-information-training-providers/national-agreement-skills-and-workforce-development

ment directly fund and finance some training through specific VET programs, including specialist foundation skills programs, apprentice employer incentives, and VET student income contingent loans.

In 2019, total VET government funding was $A6.4 billion, with the Australian government contributing $A2.6 billion, and the state and territory governments $A3.7 billion (NCVER, 2020a). In addition to government subsidies, students and employers also contribute to the cost of training.

The government funded market in Australia can be considered a "managed" market, albeit with differences in approaches between states and territories, where the allocation of public funds is a mixture of direct allocations to training providers (generally public training providers) and contestable funding streams with both public and private providers competing for funding on the basis of student choice.

VET and the Schooling System in Australia

While VET can be undertaken in the school system in Australia, the majority of VET takes place post school by people over 19 years of age. Indeed, only 16% are aged 19 years or younger. This distinguishes Australian VET from many other VET systems, particularly European ones, where much of VET, particularly initial VET, takes place while still at school.

The VET system is open to all working-age people, with most training taking place post-school. It can be undertaken as part of secondary education but does not have a large focus. VET for secondary school students (VETfSSS) is nationally recognized and has the same standards as VET delivered out of school. After completing senior secondary education, students are awarded a Senior Secondary Certificate of Education (SSCE)[8], issued by the Curriculum, Assessment and Certification Authorities in each Australian state or territory.

8 SSCE qualifications are not allocated a level on the AQF.

These authorities in each state and territory also recognize VET in the context of their SSCE, with completion of VET counted as credit towards the SSCE and a recognized VET qualification (ACACA, 2018). Students undertaking VETfSSS also have the opportunity to gain a university entrance score or equivalent.

Figure 1 Graphical Illustration of the Structure of the School System as a Whole and the Place of VET within It

The Status of VET in Australia

VET Key Statistics

Overall VET Students

In 2019, 4.2 million students were enrolled in nationally recognized vocational education and training, meaning an estimated 23.4% of the Australian resident population (aged 15 to 64) participated in nationally recognized VET (NCVER, 2020d). Students can enroll in more than one program and in subjects not part of a nationally recognized program, and many do a combination of both.

Institutions Offering VET Training

In 2019, 3.0 million students (72.1%) were enrolled in nationally recognized training at private training providers, 779,200 (18.6%) at TAFE institutes, 489,100 (11.6%) at community education providers, 124,400 (3.0%) at enterprise providers, 108,000 (2.6%) at schools, and 77,600 (1.8%) at universities[9] (NCVER, 2020d).

Student Outcomes

Outcomes for VET students are generally positive, with 56% of those who completed a qualification[10] reporting improved employment status after training (NCVER, 2021a). Almost two-thirds of qualification completers (64.7%) were employed before undertaking training, and of these, 13.9% were employed at a higher skill level after training, and 33.3% were employed in a better job after training. Of the third (35.3%) who were not employed before training, 36.2% were employed after training.

Students who completed a qualification indicated that their main reason for training was for employment-related reasons (75.2%), with the top reasons given being to get a job, gain skills for a current job, or because it was a requirement of their job.

Student and Employer Satisfaction Rates with VET

Results from the 2019 Survey of Employers' Use and Views of the VET

9 Percentages add up to more than 100% as students may enroll in training with more than one provider

10 As of 2020, the Student Outcomes Survey segments students by training type. Qualification completers are students who have completed a training package qualification or an accredited qualification. Outcomes for short-course completers and subject(s) are also available.

System found that 50.9% of employers use the VET system to meet training needs (NCVER, 2019a). In 2019, one third of employers had jobs requiring vocational qualifications with the most common reasons given being that it provided skills required for the job, and it was for legislative, regulatory, or licensing requirements. Of employers surveyed, 72% were satisfied that vocational qualifications provided their employees with the skills required for the job, a high number although it has been trending downwards over the past decade (Productivity Commission, 2020).

Student satisfaction with training is also high, with most students satisfied with the overall quality of training and saying they are likely to recommend their training providers, and over half of students saying they have an improved employment status after training (NCVER, 2021a). Research using longitudinal data to study student pathways has found that VSfSS programs also have an added effect on retention in Years 10 and 11, and also with overall positive attitudes and satisfaction towards school (Anlezark et al., 2005).

TVE Key Strategy and Policy Documents which Guide the Current and Future VET Practices

National Agreement for Skills and Workforce Development (NASWD, 2012)

- Commenced in 2009, updated in 2012
    - A review of the NASWD, discussed below, was announced in 2019.
    - The Heads of Agreement for Skills Reform, setting out immediate reforms to improve VET and the approach and priorities for developing a new National Skills Agreement was released August 2020. Under this, a new National Skills Agreement is due to be finalized by August 2021.

- Defines framework for intergovernmental collaboration in VET and sets out governments' roles, policy aspirations, performance measures, and reform directions.

- Two long-term national targets that were to be achieved by 2020: halving the proportion of Australians aged 20-64 without a qualification at level Cert III or above; and doubling the number of higher education level qualification completions (diploma and advanced diploma).

Heads of Agreement for Skills Reform (Department of the Prime Minister and Cabinet, 2020)

- Agreement signed by Commonwealth and all the jurisdictions that set out immediate reforms to improve the VET sector and the approach and priorities for developing a new National Skills Agreement to replace NASWD.
- Details the establishment of a Job Trainer Fund where the Commonwealth will partner with states and territories to provide free or low-cost training places for job seekers and young people in areas identified with a skill need.

National Agreement for Skills and Workforce Development Review – Productivity Commission Study Report (Productivity Commission, 2020)

- Authored by the Productivity Commission, the independent research and advisory body on a range of economic, social, and environmental issues for the Australian Government.
- Review looks at progress against targets, outcomes, and performance as directed in NASWD.
- Commission was also asked to consider options for: coordinating and streamlining government support; national consistency in VET funding and pricing that maximizes efficiency, transparency, and the supply of training workers; to promote consistency in funding and loan arrangements between VET and higher education sectors; and, to ensure government investment in VET encourages increased participation in training that is commensurate with the benefits

Strengthening Skills: Expert Review of Australia's Vocational Education and Training System ("Joyce Review"), 2019

- Independent review of Australia's VET sector, examining ways to strengthen the economy through skilled workers led by the Honourable Steven Joyce, former New Zealand Minister for Tertiary Education.
- The review made 71 recommendations, along with a six-point plan for transforming Australian VET, with the six points being: strengthening quality assurance; speeding up qualification development; simpler funding and skills matching; better careers information; clearer secondary school pathways; and greater access for disadvantaged Australians.

VET Reform Roadmap (Skills Senior Officials' Network, 2020)

- Draft report by the Skills Senior Officials' Network as directed by the Council of Australian Governments detailing a roadmap for VET reform.
- Sets out three priority areas for improvement: the relevance, quality, and accessibility of the VET system.

Review of Senior Secondary Pathways into Work, Further Education and Training (Panel for the Education Council Review of Senior Secondary Pathways into Work & Training, 2019)

- Review undertaken by an expert panel to provide the Council of Australian Governments (COAG) with advice and recommendations for how senior secondary students can be supported when choosing pathways for employment or further education.

All eyes on quality: review of the National Vocational Education and Training Regulator Act 2011 report [Braithwaite review]

- Review undertaken by Professor Valerie Braithwaite to determine the legislative capacity of the Australian Skills Quality Authority (ASQA) to efficiently and effectively regulate the sector. The review was also asked to evaluate if ASQA's functions and powers are consistent with best regulatory practice and to assess the ability of the system to meet industry and student needs. The review was further asked to investigate reforms that could improve outcomes for students.

Equity and Accessibility in Australian VET

The Australian VET system is set up to be a system for all Australians. Unlike many international VET systems, Australian VET caters for all age groups with the majority of VET taking place post school-education. It provides for initial skill training, but also reskilling and upskilling (see e.g., Circelli & Stanwick, 2020). Within this broad purview, the Australian system also caters for students belonging to equity groups.

In 2019 (NCVER, 2021b):

- 4.1% of students enrolled in VET reported a disability
- 3.5% identified as having Indigenous status
- 2.3% lived in remote or very remote areas[11]
- 16.7% lived in areas classified as being the most disadvantaged[12]

The outcomes for disadvantaged students who have undertaken VET continues to be an issue. Disadvantaged VET graduates receive fewer observed improvements to employment status compared to VET graduates overall (Panel for the Education Council Review of Senior Secondary Pathways into Work & Training, 2019).

11 Total calculated including offshore and not known.

12 According to Socio-Economic Advantage and Disadvantage (SEIFA) Index of Relative Disadvantage (IRSD).

VET Students with a Disability

Karmel and Nguyen (2008) found that educational outcomes and achievements for VET students with a reported disability were relatively poor as a whole, but there was considerable variability depending on the types of disability. Educational achievement was also important in determining outcomes, and students with a reported disability were more likely to have lower levels of prior education than other VET students. There is some evidence that students underreport mental health illnesses (Miller & Nguyen, 2008). More research is needed into the VET training choices and outcomes for diverse groups in Australia, such as students with disabilities, and gender and sexuality diverse students (LGBTQIA+), and early school leavers (Osborne & Circelli, 2018).

All RTOs are obliged to make reasonable adjustments – measures or actions that will enable learners with a disability to participate fully, with the same learning opportunities and to have the same opportunities to perform and complete assessments as those without a disability, as well as participating in and using facilities of an institution (Queensland Department of Education and Training & Queensland VET Development Centre, 2010).

Indigenous VET Students

The Overcoming Indigenous Disadvantage report (Steering Committee for the Review of Government Service Provision, 2020) notes that in 2020, the proportion of Aboriginal and Torres Strait Islanders with or working towards a post-secondary qualification has nearly doubled in the past 2 decades. However, this growth is mainly due to a significant increase in Aboriginal and Torres Strait Islander adults who have obtained a Certificate III to Advanced Diploma, with levels of attainment above the rate of those for non-Indigenous adults, and varies with levels of remoteness, with the rate of adults with a certificate III and advanced diploma in very remote areas less than half the rate in major cities.

The committee also notes that the gap between proportions of adults with bachelor's degrees and above is widening and was at 27 percentage points in 2017-19. This is an ongoing trend: Aboriginal and Torres Strait Islander people have historically engaged with VET at higher rates than with higher education and it may be the preference because of higher accessibility in terms of entry requirements and location, as well as the opportunity to do workplace learning or "earn as you learn" (Ackehurst et al., 2017).

Windley (2017) points out that although the numbers of total Aboriginal and Torres Strait Islander completions are rising in line with total enrolments, the completion rates remain low – for both program completion rates and subject load pass rates[13]. Aboriginal and Torres Strait Islanders VET students' course completion rates are below those of non-Indigenous students, with limited information available to show if completion rates are increasing (Steering Committee for the Review of Government Service Provision, 2020).

TVE Teachers and Faculty Qualification, Pre-Service Training, and In-Service Professional Development

The VET teaching workforce is diverse, with the wide range of training providers causing teachers to work in very different contexts (Smith, 2020). Most VET teachers instruct within a specific industry and may teach part-time in VET as well as working in their industry area, with some teachers working part-time or as casual employees across multiple RTOs, and teaching VET will be a second (or often third or fourth) career (Smith, 2020). The Productivity Commission, in its 2011 report on the VET workforce, observed that VET educators are "dual professionals" and "are expected, if not required, to have

13 This is the proportion of subjects successfully completed, measured in terms of hours.

strong industry currency." Non-permanent employment is high within the VET sector, and there is high use of casual employment for trainer and assessor roles (Knight et al., 2020).

In 2019, the National VET Workforce Survey estimated that there were 246,167 people employed in the VET workforce, with 71,379 (29%) employed as trainers and assessors (Knight et al., 2020). Of those employed as trainers and assessors: 52.6% were employed full-time and 47.4% part-time; 53.5% had permanent employment, 13.9% were on a contract or in temporary positions, and 32.6% were employed on a casual or sessional basis.

Training and assessment must be delivered by those with training and assessment credentials specified in the Standards for Registered Training Organisations (Australian Skills Quality Authority, 2015), although trainers without required qualifications can train and assess while under supervision. Trainers and assessors must hold a Certificate IV in Training and Assessment or a diploma or higher-level qualification in adult education. In 2019, almost all of the surveyed trainers and assessors held the Certificate IV, and for the majority it was their highest qualification[14] (Knight et al., 2020).

The Australian Workforce and Productivity Agency (AWPA, 2013) noted that there was as of 2013 no national body driving professional development in the VET sector, which followed from a report by the Productivity Commission (2011) which argued that the opportunities for personal development beyond Certificate IV were inadequate. Wheelahan and Moodie (2011) also noted back then that many of the states and territories offer programs to support industry engagement, although there is a need to develop a common under-

14 New requirements for trainers and assessors were brought in for RTOs in 2015 and needed to be met by July 1, 2019. The National VET Workforce Survey was conducted between March and May of 2019, meaning numbers from the survey need to be interpreted with caution.

standing of what this should look like. Similarly, the states and territories offer continuing personal development for RTOs, but they tend to focus on generic capabilities, and are "event" focused rather than longer programs.

VET Qualifications System

The Australian Qualifications Framework[15] is the national policy for regulation and quality assurance across Australian education and training. There are 10 levels, ranging from AQF 1 (Certificate I) to AQF 10 (Doctoral Degrees), covering 14 qualification types, with each level and type in the AQF defined by increasingly complex learning outcomes (Department of Education and Training (Australia) & European Commission, 2016). Australian VET is included in AQF levels 1 to 6, which cover Certificates I to IV, Diploma, and Advanced Diploma and Associate Degree levels.

There are multiple pathways to and from the AQF, and qualifications can be taken at school, in the workplace, and at registered training organizations (RTOs). It is possible to get recognition of prior learning (RPL), where students can make applications to RTOs to have the knowledge, experience, and skills from previous learning recognized for a nationally recognized qualification. For some VET course types, RPL towards higher education courses may also be offered.

Current VET Reforms and Policy Discussions

Atkinson and Stanwick (2016) have discussed the substantial changes that have occurred in the VET sector over the last 2 decades, where policy, funding, institutions, and training have undergone notable transformations, largely in an effort to make the VET sector have greater appeal and to improve responsiveness to the labor market. This constant process of reform and evolution has been partially driven by changes in the labor market, with the authors

15 http://www.aqf.edu.au

pointing out the size and opportunities presented by the market; growth of "services" industry; technology-driven productivity increases; increases in the proportion of workers working part-time; and the drive for global connectivity. The broader VET market has also undergone change due to a move towards contestable training markets, which is occurring via entitlement models, income-contingent loans schemes, and by increasing student and employer choice between providers from public and private sectors (Atkinson & Stanwick, 2016).

Some of the major recent policy reforms include:

Delivering Skills for Today and Tomorrow
The Joyce Review, mentioned above, identified the need for multiple reforms of Australian VET, some of which have been initiated through the *Delivering Skills for Today and Tomorrow* package announced by the Australian government in 2019.

ASQA Regulatory Practices Review
In April of 2020, the Australian government released the rapid review into ASQA's regulatory practices and processes (mpconsulting, 2020), which gave 24 recommendations to the way ASQA operates. The work to implement these recommendations to provide better regulation is ongoing (Australian Skills Quality Authority, 2020).

Creation of the National Skills Commission (NSC), National Careers Institute (NCI) and Skills Organisations (Pilots)
As mentioned earlier, three bodies were created to address recommendations coming out of the Joyce review.

Trends and Issues In TVE

As can be seen from the number of reform and policy documents mentioned in previous sections, the last few years have seen a large amount of reform in the Australian VET sector. The following sections will describe the trends and issues that are repeatedly receiving attention from the Australian Commonwealth and state and territory governments, researchers, and those interested in VET policy.

Trends in Australian VET

Infusing Industry 4.0 and Implications for the VET Sector

The fourth industrial revolution, or "Industry 4.0," refers to the increasing use of advanced technologies in the workplace, including automation, augmented and virtual reality, and artificial intelligence and machine learning, as well as the digital disruption caused to the economy from those technologies (Department of Industry, Science, Energy and Resources, 2020). The Productivity Commission (2016) has warned that digital disruption will likely have a large impact on young workers with low skills and lower experience, and older workers in industries affected by structural change.

There has been an emerging interest in the role the VET sector will take in making sure the Australian workforce has appropriate skills to address the impact of disruptive technologies as well as ensuring that VET educators have the capabilities to deliver training requirements for learners (Wibrow et al., 2020). Research looking at the Australian VET sector has shown that VET can do this by not only training new workers in the skills needed to adapt to emerging technologies, but also to upskill existing workers. Seet et al. (2018) have argued that there will be an increasing demand for knowledge and skills linked to developing the digital economy, and also an increase in the need for specialist skills, with a decrease in demand for skills related to routine tasks. VET will also be able to assist in the development of "soft skills" such as innovation, leadership, creativity, and so forth, that will be essential for workers to be flexible and to cope with rapid technological changes in the workplace (Seet et al., 2018).

Two recent ventures demonstrate the work being done to investigate the impact on the Australian workforce. The Industry 4.0 Advanced Manufacturing Forum[16], was created to formalize collaboration and sharing of information on Industry 4.0 between Australia and Germany with the goal of improving the competitiveness of Australian manufacturing industries, and has resulted in the formation of Testlabs across Australia to demonstrate Industry 4.0 technologies and benefits in smart factory prototypes (Gallagher, 2017). The Australian Industry and Skills Committee has also formed the Digital Transformation Expert Panel[17] to explore and advise on how Australia's VET system can best respond to digital disruption across industry.

Broadening the Use of Employment-Based Training and Apprenticeship-Like Training Models

Another emerging trend in Australia is the idea of broadening the use of employment-based training beyond traditional trade apprenticeships. Given that apprenticeships have a history of successfully offering employment-based training alongside skill and knowledge development, it is considered that there is a strong potential for them to provide a beneficial model for other fields of learning. The Australian Government funded several industry-led pilots since 2016 to trial alternative apprenticeship delivery arrangements (Australian Apprenticeships, 2019). Amongst these are pre-apprenticeship training with

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16 Previously called the Prime Minister's Industry 4.0 Taskforce. See https://i4amf.aigroup.com.au/ (accessed 29 March 2021).

17 See https://digitalskillsformation.org.au/ (accessed 29 March 2021).

Master Builders Australia (Master Builders Association, 2021), Higher Level Apprenticeship and Traineeship Pilots with PricewaterhouseCoopers (PricewaterhouseCooper, 2016), and an Industry 4.0 Higher Apprenticeship program to test an apprenticeship model to train technicians to a higher skill level (Ai Group, 2016; Department of Industry, 2020). The latter program is comparable to a traditional apprenticeship except that apprentices will also enroll in an associate degree covering topics to develop higher skills needed by Industry 4.0, such as advanced manufacturing, Internet of Things, cloud computing, and advanced algorithms.

The term "higher apprenticeship" has found increased usage in Australia after these recent government supported programs. While there is no formal or widespread definition of higher apprenticeships, NCVER has described them as:

> an integrated program of structured training and paid work, leading to a VET or higher education qualification at the Australian Qualifications Framework level 5 (diploma) or above, which may or may not be undertaken as a contract of training (NCVER, 2019b, p. 7).

Apprenticeship-like models of training, either at higher qualification levels than traditional apprenticeships, or in non-traditional areas, may offer learners a more "rounded" set of skills, which are highly desired by employers.

While the above pilots were already occurring in the sector, the Joyce review (Joyce, 2019) recommended that work-based VET should be extended into other areas, especially those experiencing technological change, for example in non-trades and para-professional work. Work-based training is broader than employment-based training or apprenticeship-like models, and can be broadly defined as "learning in a work environment through participation in work practice and process" (Atkinson, 2016, p. 2). While this concept has always been integral to the Australian VET sector, an increased emphasis on work-integrated learning—intentionally integrating students' experiences into a work setting—is also emerging in university education (Atkinson, 2016).

Stronger Alignment and Integration between the VET and Higher Education Sectors

The VET and Higher Education (HE) sectors in Australia operate independently with their own governance and regulatory arrangements. The sectors are also distinct in terms of curriculum, pedagogy, and assessment, and tend to attract different kinds of students. The movement of students between the two sectors has been of interest for many years, but there is a renewed push to explore mechanisms that support multi-directional movement between them (Skills Senior Officials' Network, 2020).

One driver of this trend is that the nature of rapidly changing workplaces and the need for agile skill development means that there is a need for "a more effective system of learner mobility and recognition between institutions and sectors" (Taylor, 2019, p. 3). Workers of the future are likely to require re-skilling and up-skilling throughout their lives, and the ability to move between sectors efficiently will help facilitate this lifelong learning.

Another driver is around attempting to achieve parity of esteem for VET and HE (see the issue of VET's image compared to HE, below). Enabling stronger alignment and integration between the two sectors may ensure that both are considered equally valued pathways.

Credit transfer and articulation have been the traditional means by which students would transfer between the sectors. The processes involved in seeking recognition of prior learning and other forms of credit transfer are sometimes complex, however, and can deter students from seeking appropriate recognition within or between the tertiary sectors (Curtis, 2009).

Dual sector institutions (those institutions that deliver both VET and HE) have long been the front-runners in creating pathways between their VET and HE offerings, usually through articulation arrangements or credit transfer pathways that have been formalized.

Another mechanism to enable better integration between HE and VET qualifications is via partnerships between HE institutions and VET providers (as described in Curtis, 2009). Recent examples of current and planned partnerships have been described in research (NCVER, 2019b) and recent political announcements (for example, The NSW Minister for Skills and Tertiary Education recently opened invitations for industry and HE to partner with TAFE NSW in the delivery of its Digital Technology Centre of Excellence; Lee, 2020).

The Rise of Micro-Credentials

Micro-credentials, also known as skill sets, digital badges, "nano degrees," micro-certifications, web badges, mini degrees and open badges, are mini qualifications that are often achieved through short, inexpensive (or free) online courses (NCVER, 2018). Micro-credentials are an increasingly popular method of formalizing skills or knowledge that are attained through work or experience and can be awarded for hard and soft skills and with a broad or narrow focus (e.g., using a computer programming language, or empathetic leadership in a workplace). As the Business Council of Australia (2018) notes, they have the potential to play an important part in life-long learning.

Employers may see micro-credentials as a way of ensuring workplaces are competitive as they encourage employees to continually upskill, but are also useful for giving employees recognition for skills earnt through experience, and for ensuring employees are equipped with specialized skill sets (Training and Skills Commission, 2021). Short courses in high-demand areas were recognized by the Australian Government in the response to the COVID-19 pandemic, by funding being provided to create a "one-stop-shop for micro-credentials to help students identify educational opportunities" (Tehan & Cash, 2020). They have also been identified as developments to be taken under consideration in the AQF review and also in the TAFE SA strategic capability review (Government of South Australia, 2018).

There is some concern about the rapid rise in popularity of micro-credentials. There has been little investigation into the impact of completing short courses on skills or employment outcomes. It has been argued that micro-credentials need careful scrutinization and should not just be the result of "unbundling" existing credential packages, and effort needs to be made to ensure that they build overall capacity if they are advertised as fitting into existing programs or into new ones so that students can make informed choices about enrolments (Boud & Jorre de St Jorre, 2021). Similarly, it has been pointed out that careful thought also needs to go into the way competencies are assessed (Boud & Molloy, 2013; Milligan & Kennedy, 2017).

A forthcoming report (Palmer, forthcoming) has identified that there is presently much training within the VET sector that could be identified as micro-credentials. Most of this training is related to the regulatory needs of industry, for example courses on cardio-pulmonary resuscitation, first aid and responsible service of alcohol.

The Rise of Big Data in VET

Related to industry 4.0 and advanced technologies has been the rise of what is known as "big data." Advances in computing and storage space has allowed a greater amount and more complex data to be captured. This final trend in Australian VET then is the use (or predicted use) of "big data" to address vocational education learning and learning environments. There are large amounts of data available about student activities and choices, meaning that educators have started considering how access to that data can be used to inform activities such as learning experiences, infrastructure usage and individualized student support (Kennedy, Corrin, & De Barba, 2017).

When we talk about big data, we are talking about large and complex data sets. More than that though, it includes collecting data in near real time and also linking data sets (using linking keys) to create even larger data sets. An example of a data linkage project in VET is described below (See example on MADIP).

One of the major benefits of big data for VET is the ability to research issues that perhaps we were not able to address in the past. Hence, the ability to provide greater insights into what is happening in the VET sector to assist in making more informed decisions in policy. In Australia, there are some developments in this regard which will help for more in-depth analysis of issues in the VET sector. Three examples are discussed below.

In Australia, the introduction of the unique student identifier (USI)[18] in 2015 means that individual students' journeys in the VET system and beyond can now be tracked over time. In conjunction with Total VET Activity (TVA), which since 2014 has collected information on all nationally recognized VET, it allows a much more sophisticated analysis of what is happening in Australian VET. The other benefit of the USI is that it can be used as a linking key between data sets, for example, TVA and the national apprenticeship and traineeship data. It also links across a range of Government administrative datasets through the Multi-Agency Data Integration Project (MADIP) being undertaken by the ABS, thereby potentially providing a rich source of employment, social security, and education data for all Australians.

18 The Unique Student Identifier (USI) is a national student identifier that uniquely identifies a student and stays with them for life. It allows them online access to their record of nationally recognized training in the form of a USI transcript (Naidu, Stanwick & Frazer, 2020).

The Australian Bureau of Statistics (ABS) has developed the Multi-Agency Data Integration Project (MADIP)[19]. Through the linking of various data sets including those relating to health, taxation and income, employment, government payments, demographics, and education and training it can provide insights into various aspects of groups of populations such as their interactions between education and employment. As of 2021, MADIP also includes VET information. There are many projects currently being undertaken using this data asset[20].

The final example of big data related developments relevant to VET in Australia discussed here is the Jobs and Education Data Integration (JEDI) project overseen by the Australian Government's National Skills Commission. JEDI brings together data on jobs, skills, units of study, and qualifications from diverse sources including the United States O*NET job classification system[21], the Australian Taxation Office (ATO), student outcomes information, VET course information, student enrolment and graduate information[22], and My Futures[23] data from Education Services Australia. As part of this project, JEDI has recently released the Australian Skills Classification (National Skills Commission, 2021). This skills classification details the core competencies, specialized tasks, and technology tools required by different occupations, and

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19 See https://www.abs.gov.au/websitedbs/D3310114.nsf/home/Multi-Agency%20Data%20Integration%20Project%20(MADIP) (accessed 29 March 2021).

20 See https://www.abs.gov.au/websitedbs/d3310114.nsf/home/statistical+data+integration+-+madip+research+projects (accessed 29 March 2021).

21 https://www.onetcenter.org/overview.html

22 VET course information and VET student outcomes are available from the National Centre for Vocational Education research (NCVER), while student enrolment data and graduate information for the higher education sector are available from the Australian Department of Education, Skills and Employment.

23 https://myfuture.edu.au/

enables exploration of connections and transferability both within and between jobs and qualifications. This example of big data provides information for decision making to students, teachers, policy makers, and researchers not previously available in Australia.

Issues in Australian VET

The following five issues have received considerable attention in policy, media, and research areas. After each brief summary, examples of current policy or reform initiatives are given.

Questions about the Consistency of the Quality of the Australian VET System

Questions have been raised about the quality of the VET system in Australia, particularly in regard to teaching and assessment of VET and highly variable delivery in qualification outcomes. The National Skills Standard Council (2013) identified three contributing elements:

- Inconsistencies in training and assessment of RTOs which damages the integrity and perceived value of the qualifications held by learners and employees.
- Scarcity of publicly available information about RTOs and performance for learners, employers, and governments to be able to make comparisons and decisions about training.
- A regulatory framework needing updating to reduce unnecessary regulation and to reflect "the move towards various forms of learning entitlements or subsidies and extensive and growing competition across the diverse provide cohort" (p. 10).

Teaching in VET has received a lot of attention since the introduction of the Certificate IV minimum qualification requirement, meaning that the requirements have dropped from an AQF level 7 in the 1990s to AQF level 4 (Smith, 2020). In comparison, other education sectors, including early childhood education, have mandatory university-level teaching qualifications (Smith et al., 2015). There has been some support for higher level teaching qualifications for TAFE teachers, and some TAFE industrial agreements have required qualifications higher than the Certificate IV to qualify for higher salary bands or to access more senior roles (Guthrie & Jones 2018). In 2019, the Standards for Registered Training Organisations (RTOs) broadened the mandated qualifications for delivering and assessing training in VET to include the certificate IV, diploma, or higher-level qualifications in adult education (Guthrie & Jones, 2018). The mandated qualifications also include higher level qualifications in language, literacy, and numeracy (Circelli & Stanwick, 2020). Of note is that a diploma level qualification is required in order to deliver the training and assessment qualifications for trainers and assessors (Australian Government, 2019).

The quality of the delivery of the Certificate IV has also been investigated, with reports repeatedly identifying issues with outcomes from Certificate IV delivery and issues teaching the Certificate IV (Guthrie & Jones, 2018). The Productivity Commission (2011) noted that this qualification was appropriate when taught well and should be considered as the foundation for further development, but also noted that it did not always equip VET educators with the experience and skills to teach effectively, nor did it comprehensively cover the diversity of roles within VET, and required more supervised learning.

VET teaching in relation to the reputation of VET has received a great deal of policy attention:

- The National Agreement on Skills and Workforce Development (NASWD) includes suggestions for initiatives to improve quality including faster changes to training packages, the development of an evidence-based VET workforce strategy, and independent assessments (Productivity Commission, 2020).
- In late 2020, the Australian Government released the Supporting the

VET Workforce Issues Paper (Department of Education, 2020), detailing key themes for ongoing strategies to promote high quality training and assessment in the VET workforce across diverse VET settings.

Continuing Perceptions of the Lower Status of VET Compared to Higher Education

Related to recent questions about the quality of the VET system, the perception of VET in Australia compared to other school sectors has been raised. Compared with school and higher education, VET has the "middle child syndrome" (Oliver, 2016, p. 37), and over the last few decades, has "been steadily losing the battle for hearts and minds" against the university sector (Joyce, 2019, p. 27). Although these comments were made before the National Agreement for Skills and Workforce Development Review, they do draw attention to the long-standing view of VET having a lower status in Australia, with higher education receiving most of the attention in delivering the future skill needs of the workforce (Derby, 2016).

VET has image issues in the eyes of students and parents too, with many not considering VET as a potential pathway, or seeing it as the option for students who are unable to get into university (Billett, 2018), with VET institutions and the students who study at them seen as "lacking" (Gore et al., 2017), or "less prestigious" (Panel for the Education Council Review of Senior Secondary Pathways into Work & Training, 2019). This is not helped by the separation of academic and VET subjects in senior secondary school – students can study in both, but the streams are rarely linked together, so students are unlikely to engage with both types of subjects (Torii & O'Connell, 2017). Students hold outdated ideas about studying VET and may be more interested in occupations related to VET than they are in undertaking VET as an educational pathway, indicating a misalignment between aspirations and understanding of educational opportunities (Gore et al., 2017).

Choy et al. (2020) found from surveying students that those who are certain about occupations and careers are more likely to pick VET as a post-secondary school pathway, and undecided students who have no clear idea about future options saw VET as too specific and restrictive in terms of future options. It is likely that the stigma towards VET affects the number of students undertaking VET training (Shipley & Stubley, 2018), with some students who would have been more inclined towards vocational rather than academic training, being driven towards universities (Derby, 2016). However, the guidance towards university may not happen across all students, with evidence that students from disadvantaged backgrounds are more likely to be steered towards vocational training, particularly Indigenous students (Luke et al., 2013).

Across Australia, there have been many initiatives and policies to address the image of VET. These include:

- Parts of the *VET for School Students* policy in South Australia seeks to reposition "VET as an equally valued and prestigious pathway option" (South Australian Department for Education, 2019, p. ii), and includes enhancing career education from early schooling years, and tracking and promoting student destination data and stories.
- Gonski and Shergold (2021) also addressed the negative public perceptions of VET in the report, *in the same sentence:* bringing higher and vocational education together.

The Complexity of the VET System Makes it Difficult for Students to Make Informed Choices

The Australian VET system is notoriously difficult for students to navigate. Billet (2018) has argued that there is an increasing mismatch between the skills held by students upon leaving tertiary education and the employment opportunities in their chosen field. The complexity of the VET system makes it hard for students to make informed choices about where and what to study (Joyce, 2019; South Australian Department for Education, 2019). Bowman and McKenna (2016) point out that there is not even national consensus over what information students need to make informed choices.

Surveys of high school students have found that only 19% of youth say they have a good or strong understanding of VET, and only 16% say the same for apprenticeships, compared to 49% for higher education (Shipley & Stubley, 2018), and the post-secondary school choices for students as a whole have been called a “confusing maze” (Productivity Commission, 2017). The provision of high-quality career advice appears to depend on the enthusiasm and efforts of teachers and principals (Panel for the Education Council Review of Senior Secondary Pathways into Work & Training, 2019).

The Productivity Commission (2020) has recommended that students need access to up-to-date curated information on career opportunities, training provider performance, course quality, and fees. A great deal of information about VET information and potential careers is available, but is spread over many websites and other resources, and is frequently incomplete or not up to date, making it difficult to find useful information to use as a basis for decision making (Joyce, 2019).

The need to provide students with easy-to-access information to make more informed choices was addressed in the Joyce review, and in the *Delivering Skills for Today and Tomorrow* package, mentioned above. In particular:

- The NCI has been set up to “ensure people have access to authoritative and accurate careers information and support irrespective of their age or career stage” (National Careers Institute, 2021).
- MySkills (www.myskills.gov.au) has been designed as a directory of VET courses and RTOs with the aim of improving the accessibility and quality of the information available.

VET Funding Models are Very Complicated, Creating Tensions in the System

The Australian VET system is market-orientated, with a large amount of government-funded training being delivered by private RTOs with contestable funding arrangements, although a substantial portion of government funding is also provided to public RTOs (Productivity Commission, 2020). The funding of Australian VET is largely federated, with the states and territories having the responsibility for funding as well as delivering VET, although an increasing amount of funding is being provided by the Australian federal government (Noonan, 2016). This allows the VET system to respond to regional labor market trends and shortages (Atkinson & Stanwick, 2016), but it also adds complexity to funding models and agreements.

Noonan (2016) points out five key issues that have emerged due to tensions between the Commonwealth and states and territory funding arrangements:

- Difficulties applying standardized Commonwealth funding when each state and territory has different priorities and budgets
- How to ensure reduced costs and increased efficiency
- How to deal with the Commonwealth funding initiatives for specific outcomes directly outside of agreements
- Differences between jurisdictions in terms of funding for the same qualifications and in eligibility criteria for VET student entitlements (whereas there are consistent prices and criteria for higher education)[24]
- Differences in participation levels and completion levels due to differences in funding

Bowman and McKenna (2016) are among those calling for more information and transparency of information about funding, and Burke (2016) has exam-

24 Part of the remit of the National Skills Commission, which was created in 2020, though, is the development of efficient and more nationally consistent prices for VET courses.

ined gaps in the financial information about VET that is collected, and has argued that capturing more information about how much employers, individual students, and international students contribute towards the funding of VET, as well as how much support is provided to students and employers, will give a much clearer picture about how VET is funded. Since 2019, NCVER has begun reporting a new National VET Funding Collection to provide a comprehensive, fit-for-purpose overview of public VET funding (NCVER, 2020c).

There are Ongoing Challenges with VET Remaining Relevant to Both Industry and Students

A recurring criticism of Australian VET is that the system is slow to respond to workforce and training needs and that the focus on specific fields limits the transferability of skills. While there are processes for identifying the needs of industry and occupations to update training, it was seen in the past as "sluggish" and involving too much "bureaucratic red tape" (Misko, 2010). Currently, training packages are developed by Industry Reference Committees (IRCs), which are made up of people with close links to industry and are the source for considering the industry skills requirements when developing or reviewing training packages (Australian Industry and Skills Committee, 2020). There are IRCs for specific industries, and they typically manage a small number of training packages (Smith, 2020).

Skills Senior Officials' Network (2020) has argued that "qualifications and units of competency in Training Packages are complex, highly prescriptive, and require extensive and continuous review… they are often viewed as out-of-date and unfit-for-purpose for those industries they are supposed to serve" (p. 5). If Australian training packages and courses are unable to keep up with the rapid change in technology then students will not be graduating with skills that are relevant to employers (Joyce, 2019; Reeson et al., 2016). This is also an issue with school-based VET as most students do not use the VET qualifications they obtain to go directly into a job, nor do they continue on to higher qualifications in the same field (Torii & O’Connell, 2017).

The Business Council of Australia (2018) has argued that industry should be at the center of developing training packages, with occupational standards remaining at the core of each package, and there are strong recommendations that the Australian government work with industry to make it easier for industry and schools to connect and deliver meaningful work experience and career information to students (South Australian Training and Skills Commission, 2019). The Skills National Cabinet Reform Committee (Skills Committee), created in 2020, aims to support ongoing reforms to VET, including “simplifying, rationalizing, and streamlining national VET qualifications across industry occupation clusters and the [AQF], and introducing improved industry engagement arrangements” (Department of Education, Skills and Employment, 2020).

Not only is the sector under pressure to ensure its industry relevance for jobs available now, but there is also demand that it needs to be forward-looking, ensuring that students are equipped with the knowledge and skills that will enable them to adapt to the changes they will see throughout their working lives (Griffin, 2020).

Conclusion

In this chapter we have seen some of the main distinguishing features of the Australian VET system as well as some of the prevailing trends and issues affecting the sector. Some of these are not unique such as the rise of industry 4.0, but others may be considered a bit more idiosyncratic of the Australian system.

Around a third of working people aged 20-64 in Australia have a VET qualification as their highest qualification (ABS, 2020). In 2019, around 4.2 million students enrolled in nationally recognized VET. The accessibility of the system is reflected in the participation of disadvantaged learners. The COVID-19 pandemic has put the importance of VET in Australia in the spotlight, with VET policy announcements being a key feature in government responses (Productivity Commission, 2020).

We conclude by reiterating that there are several outstanding characteristics of Australia's VET system. The first is that it is industry led, with industry involvement in many aspects of the system including: the development of training packages; the supply of trainers (many trainers work in their industry); and the provision of work placements and employment (particularly in the case of apprenticeships and traineeships). This industry involvement helps ensure the relevance of training to jobs.

A second outstanding feature is that the nationally recognized (accredited) VET system is market-based including a large privately financed market, although subject to government regulation in respect of training provider registration and quality assurance. There is a large number of RTOs (circa 4,000), the vast majority of which are privately owned, for-profit and not-for profit, businesses. There is a government funded component to the system but even within this market segment, much of the government funding is contestable, that is, private providers can also bid for government funds.

A third feature of the Australian VET system is that it is competency based. Assessment and certification are based on students demonstrating their ability to perform the competencies as listed in the relevant training package and other accredited courses. This contrasts with the curriculum-based and graded assessment model in the school and university sectors.

A fourth distinctive feature of the VET system in Australia is that it caters for lifelong learning. In addition to the strong element of initial VET, training is available for those who want to upskill or reskill throughout their working lives, with over half of all students aged over 30. This broad coverage and multiple purposes of VET in Australia means that usage of the system is high.

References

Australian Curriculum, Assessment and Certification Authorities. (2018). *Senior Secondary Certificates.* https://www.acaca.edu.au/index.php/senior-secondary-certificates/

Ackehurst, M., Polvere, R.-A., & Windley, G. (2017). I*ndigenous Participation in VET*: Understanding the Research. NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/indigenous-participation-in-vet-understanding-the-research

Ai Group. (2016). *Ai Group leads high-level Industry 4.0 apprenticeship initiative.* https://www.aigroup.com.au/policy-and-research/mediacentre/releases/apprenticeships-training-Sep5/

Anlezark, A., Karmel, T., & Ong, K. (2005). Have school VET programs been successful? In (pp. pp.56-65). SEAMEO VOCTECH.

Atkinson, G. (2016). *Work-based learning and work-integrated learning: fostering engagement with employers.* NCVER. https://www.ncver.edu.au/publications/publications/all-publications/work-based-learning-and-work-integrated-learning-fostering-engagement-with-employers

Atkinson, G., & Stanwick, J. (2016). *Trends in VET: policy and participation.* NCVER. https://www.ncver.edu.au/publications/publications/all-publications/trends-in-vet-policy-and-participation

Australian Apprenticeships. (2019). *Apprenticeship Training - alternative delivery pilots.* https://www.australianapprenticeships.gov.au/programs

Australian Apprenticeships. (2021). *Employer Incentives.* https://www.australianapprenticeships.gov.au/aus-employer-incentives

Australian Bureau of Statistics. (2020). *Education and work, Australia, May 2020.* https://www.abs.gov.au/statistics/people/education/qualifications-and-work/latest-release

Australian Government. (2019). *Standards for Registered Training Organisations (RTOs) 2015.* https://www.legislation.gov.au/Details/F2019C00503

Australian Industry and Skills Committee. (2020). *What is an IRC?* https://

www.aisc.net.au/irc/what-irc
Australian Skills Quality Authority. (2015). *Standards for Registered Training Organisations (RTOs) 2015*. Commonwealth of Australia.
Australian Skills Quality Authority. (2021). Standards for VET Accredited Courses 2021, Commonwealth of Australia.
Australian Skills Quality Authority. (2020). *Working together for better regulation.* https://www.asqa.gov.au/working-together
Australian Workforce Productivity Agency. (2013). *Future focus: 2013 National Workforce Development Strategy.* https://www.voced.edu.au/content/ngv%3A55591
Billett, S. (2018). We need to change negative views of the jobs VET serves to make it a good post-school option. *The Conversation.* https://theconversation.com/we-need-to-change-negative-views-of-the-jobs-vet-serves-to-make-it-a-good-post-school-option-101388
Boud, D., & Jorre de St Jorre, T. (2021). The move to micro-credentials exposes the deficiencies of existing credentials. *Journal of Teaching and Learning for Graduate Employability, 12*(1), 18-20. https://doi.org/10.21153/jtlge2021vol12no1art1023
Boud, D., & Molloy, E. (2013). Rethinking models of feedback for learning: the challenge of design. *Assessment & Evaluation in higher education, 38*(6), 698-712.
Bowman, K., & McKenna, S. (2016). *Jurisdictional approaches to student training entitlements: commonalities and differences.* NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/jurisdictional-approaches-to-student-training-entitlements-commonalities-and-differences
Braithwaite, V (2018), *All eyes on quality: review of the National Vocational Education and Training Regulator Act 2011 report [Braithwaite review],* Department of Education and Training, Canberra, viewed 06 Apr 2021, <https://docs.employment.gov.au/documents/all-eyes-quality-review-national-vocational-education-and-training-regulator-act-2011>.

Burke, G. (2016). *Data on total investment in VET: what should be collected.* NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/data-on-total-investment-in-vet-what-should-be-collected

Business Council of Australia. (2018). *Future-proof: Australia's future post-secondary education and skills system*. https://www.bca.com.au/future_proof_australia_s_future_post_secondary_education_and_skills_system

Choy, S., Dymock, D., Hai Le, A., & Billett, S. (2020). Understanding student decision-making about VET as a pathway: an Australian study. *International Journal of Training Research*, 1-17.

Circelli, M., & Stanwick, J. (2020). *Initial and continuing VET in Australia: clarifying definitions and applications*. NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/initial-and-continuing-vet-in-australia-clarifying-definitions-and-applications https://www.federalfinancialrelations.gov.au/content/intergovernmental_agreements.aspx

Curtis, D. (2009). *Student Transfer. At a Glance. NCVER*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/student-transfer-at-a-glance

DeakinCo. (2017). What are micro-credentials and how can they benefit both businesses and employees? Retrieved from https://www.deakinco.com/media-centre/news/Benefits-of-micro-credentials-for-business-and-employees

Department of Education, Skills and Employment. (2020). *Skills Commonwealth-State Relations.* https://www.dese.gov.au/skills-commonwealth-state-relations

Department of Education and Training & European Commission. (2016). *Comparative analysis of the Australian Qualifications Framework and the European Qualifications Framework for Lifelong Learning: joint technical report.* Commonwealth of Australia.

Department of Education, Skills and Employment. (2020). *Supporting the VET workforce: developing a VET workforce quality strategy.* https://

www.dese.gov.au/skills-reform-consultation/resources/issues-paper

Department of Industry, Science, Energy and Resources. (2020). *Industry 4.0*. https://www.industry.gov.au/funding-and-incentives/industry-40

Department of the Prime Minister and Cabinet. (2020). *Heads of Agreement for Skills Reform*. https://www.pmc.gov.au/resource-centre/domestic-policy/heads-agreement-skills-reform

Derby, S. J. (2016). CEDA overiview. *VET: securing skills for growth, August 2016*. https://www.ceda.com.au/ResearchAndPolicies/Research/Education/VET-skills-for-growth

Ferguson, H. (2019). *Delivering Skills for Today and Tomorrow - Government's response to the Joyce Review.* https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/FlagPost/2019/April/Skills_Package

Gallagher, S. (2017). *Industry 4.0 Testlabs in Australia: preparing for the future.* Department of Industry, Innovation and Science and Swinburne University of Technology. https://www.industry.gov.au/sites/g/files/net3906/f/July%202018/document/pdf/industry-4.0-testlabs-report.pdf

Gonski, D., & Shergold, P. (2021). *In the same sentence: bringing higher and vocational education together [Gonski & Shergold report]*. Department of Premier and Cabinet. https://education.nsw.gov.au/about-us/strategies-and-reports/our-reports-and-reviews/review-on-the-nsw-vocational-education-and-training-sector

Gore, J., Ellis, H., Fray, L., Smith, M., Lloyd, A., Berrigan, C., . . . Holmes, K. (2017). *Choosing VET: investigating the VET aspirations of school students.* NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/choosing-vet-investigating-the-vet-aspirations-of-school-students

Government of South Australia. (2018). *TAFE SA strategic capability review 2018.* Parliament of South Australia. https://www.voced.edu.au/content/ngv%3A80642

Griffin, T. (2020). *Workforce-Ready: Challenges and Opportunities for*

VET.'No Frills' Discussion Paper. NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/workforce-ready-challenges-and-opportunities-for-vet

Guthrie, H., & Jones, A. (2018). *How can VET teacher education and development be improved*, LH Martin Institute, https://melbourne-cshe.unimelb.edu.au/__data/assets/pdf_file/0009/2854287/VET-teaching-paper_Guthrie_Jones.pdf.

Joyce, S. (2019). *Strengthening skills: expert review of Australia's vocational education and training system [Joyce review]*. Department of the Prime Minister and Cabinet. https://www.pmc.gov.au/resource-centre/domestic-policy/vet-review/strengthening-skills-expert-review-australias-vocational-education-and-training-system

Karmel, T., & Nguyen, N. (2008). *Disability and Learning Outcomes: How Much Does the Disability Really Matter? Occasional Paper:* NCVER. https://www.voced.edu.au/content/ngv%3A41485

Kennedy, G., Corrin, L., & De Barba, P. (2017). Analytics of what? Negotiating the seduction of big data and learning analytics. In R. James, S. French and P. Kelly (Eds.). Visions for Australian Tertiary Education.*The University of Melbourne.*

Knight, G., White, I., & Granfield, P. (2020). *Understanding the Australian vocational education and training workforce.* NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/understanding-the-australian-vocational-education-and-training-workforce

Lee, G. (2020). *Calling on industry to partner with TAFE NSW.* TAFE NSW. https://nsw.liberal.org.au/Shared-Content/News/2020/CALLING-ON-INDUSTRY-TO-PARTNER-WITH-TAFE-NSW

Luke, A., Cazden, C., Coopes, R., Klenowski, V., Ladwig, J., Lester, J., . . . Spina, N. (2013). *A Summative Evaluation of the Stronger Smarter Learning Communities Project: Report-Volume 1 and Volume 2.* Queensland University of Australia. https://eprints.qut.edu.au/59535/

Master Builders Association. (2021). *Master Builders Pre-Apprenticeship*

Program. https://studyworkgrow.com.au/2019/09/10/master-builders-pre-apprenticeship-program/

Miller, C., & Nguyen, N. (2008). *Who's supporting us? TAFE staff perspectives on supporting students with mental illness.* NCVER. https://www.voced.edu.au/content/ngv%3A1014

Milligan, S., & Kennedy, G. (2017). To what degree? Alternative micro-credentialing in a digital age. *Visions for Australian tertiary education*, 41-54. https://melbourne-cshe.unimelb.edu.au/__data/assets/pdf_file/0006/2658444/MCSHE-Visions-for-Aust-Ter-Ed-web2.pdf#page=49

Misko, J. (2010). *Responding to changing skill demands: training packages and accredited courses*. NCVER.

mpconsulting. (2020). Rapid review of the Australian Skills Quality Authority's regulatory practices and processes. *https://docs.employment.gov.au/documents/asqa-rapid-review-final-report*

Naidu, R., Stanwick, J., & Frazer, K. (2020). *Glossary of VET*. Adelaide: NCVER.

National Careers Institute. (2021). *National Careers Institute*. Retrieved from https://nci.dese.gov.au/

National Skills Standards Council. (2013). *Standards policy framework: improving vocational education and training: the Australian vocational qualifications system,* NSSC, [Melbourne].

National Skills Commission. (2021). *Australian Skills Classification BETA release discussion paper,* Commonwealth of Australia, viewed 18 March 2021, https://www.nationalskillscommission.gov.au/sites/default/files/2021-03/AUSTRALIAN%20SKILLS%20CLASSIFICATION%20BETA%20DISCUSSION%20PAPER.pdf.

NCVER. (2018). *Focus on micro-credentials*. Retrieved from https://www.voced.edu.au/focus-micro-credentials

NCVER. (2019a). *Australian vocational education and training statistics: employers' use and views of the VET system 2019*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/employers-use-and-views-of-the-vet-system-2019

NCVER. (2019b). *Higher apprenticeships in Australia: what are we talking about?*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/higher-apprenticeships-what-are-we-talking-about

NCVER. (2020a). *Australian vocational education and training statistics: Government funding of VET 2019*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/government-funding-of-vet-2019

NCVER. (2020b). Getting to know VET. *VET Knowledge Bank*. https://www.voced.edu.au/vet-knowledge-bank-getting-know-vet

NCVER. (2020c). *The National VET Funding Collection Explained.* https://www.ncver.edu.au/research-and-statistics/collections/vet-funding/the-national-vet-funding-collection-explained

NCVER. (2020d). *Total VET students and courses, 2019*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/total-vet-students-and-courses-2019

NCVER. (2021a). *VET student outcomes 2020*. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/vet-student-outcomes-2020

NCVER. (2021b). *Total VET Students and Courses,* Data builder, available at: https://www.ncver.edu.au/research-and-statistics/data/databuilder#tva-students

Noonan, P. (2016). VET funding in Australia: background, trends and future directions. *Mitchell policy paper*. Mitchell Institute. http://www.mitchellinstitute.org.au/reports/vet-funding-in-australia-background-trends-and-future-options/

Oliver, D. (2016). Getting over middle child status. *VET: securing skills for growth, August 2016*. https://www.ceda.com.au/ResearchAndPolicies/Research/Education/VET-skills-for-growth

Osborne, K., & Circelli, M. (2018). *From school to VET: choices, experiences and outcomes*. NCVER. https://www.voced.edu.au/content/

ngv%3A79264
Palmer, B. (forthcoming). *An analysis of micro-credentials in VET*. NCVER.
Panel for the Education Council Review of Senior Secondary Pathways into Work, Further Education & Training. (2019). *The Review of Senior Secondary Pathways into Work, Further Education and Training: discussion paper.* https://www.voced.edu.au/content/ngv%3A84488
PricewaterhouseCooper. (2016). *PwC to design and pilot higher apprenticeships for professional and business sectors.* https://www.pwc.com.au/press-room/2016/higher-level-apprenticeship-traineeship-pilot-sep16.html
Productivity Commission. (2011). *Vocational education and training workforce: research report.* https://www.pc.gov.au/inquiries/completed/education-workforce-vocational/report
Productivity Commission. (2016). *Digital disruption: what do governments need to do?*. https://www.pc.gov.au/research/completed/digital-disruption
Productivity Commission. (2017). *Shifting the dial: 5 year productivity review.* https://www.pc.gov.au/inquiries/completed/productivity-review/report.
Productivity Commission. (2020). *National Agreement for Skills and Workforce Development Review, Study Report.* https://www.pc.gov.au/inquiries/completed/skills-workforce-agreement/report
Queensland Department of Education and Training & Queensland VET Development Centre. (2010). *Reasonable adjustment in teaching, learning and assessment for learners with a disability: a guide for VET practitioners.* https://www.adcet.edu.au/resource/7383/reasonable-adjustment-in-teaching-learning-and-assessment-for-learners-with-a-disability-a-guide-for-vet-practitioners
Reeson, A., Mason, C., Sanderson, T., Bratanova, A., & Hajkowicz, S. (2016). *The VET Era: Equipping Australia's Workforce for the Future Digital Economy Explores What Skills we Will Need in the Future*. https://web.archive.org/web/20180312142624/http://tafeqld.edu.au/resources/pdf/about-us/research-papers/vet-era.pdf

Seet, P. S., Jones, J., Spoehr, J., & Hordacre, A.L. (2018). *The Fourth Industrial Revolution: the implications of technological disruption for Australian VET.* NCVER. https://www.ncver.edu.au/research-and-statistics/publications/all-publications/the-fourth-industrial-revolution-the-implications-of-technological-disruption-for-australian-vet

Shipley, B., & Stubley, W. (2018). *After the ATAR II: understanding how Gen Z make decisions about their future.* Year13 and YouthSense. https://youthsense.com.au/research/

Skills Senior Officials' Network. (2020). Vocational education and training reform roadmap consultation draft. Department of Education, Skills and Employment.

Smith, E. (2020). The VET teaching workforce in Australia. In (pp. 39 p.). Ballarat: Federation University.

Smith, E., Hodge, S., & Yasukawa, K. (2015). VET teacher education in Australian universities: who are the students and what are their views about their courses? *Research in Post-Compulsory Education,* 20, 419-433. https://www.tandfonline.com/doi/full/10.1080/13596748.2015.1081752S mith, E., & Keating, J. (2003). From training reform to training packages: Social Science Press.

South Australian Department for E ducation. (2019). *VET for school students: repositioning VET within secondary education in South Australia.* https://www.education.sa.gov.au/sites/default/files/vet-for-school-students.pdf

South Australian Training and Skills Commission. (2019). *Future-proofing the South Australian apprenticeship and traineeship system: recommendations paper 2019.*

Steering Committee for the Review of Government Service Provision. (2020). Overcoming Indigenous disadvantage: key indicators 2020. In (pp. [4161] p. (report) + iii, 4141 p. (overview) + 4162 p. (fact sheet)). Canberra: Productivity Commission.

Taylor, M. (2019). Realising potential: solving Australia's tertiary education challenge.

Tehan, D., & Cash, M. (2020, 22 June). Marketplace for online microcredentials [Press release]. *Ministers' Media Centre, Department of Education, Skills and Employment.* https://ministers.dese.gov.au/tehan/marketplace-online-microcredentials

Torii, K., & O'Connell, M. (2017). *Preparing young people for the future of work: Policy roundtable report*. Mitchell Institute. http://www.mitchellinstitute.org.au/reports/preparing-young-people-for-the-future-of-work/

Training and Skills Commission. (2021). *Micro-credentials pilot program.* https://www.tasc.sa.gov.au/Micro-credentials.

Wheelahan, L., & Moodie, G. (2011). *The quality of teaching in VET.* Australian College of Educators.

Wibrow, B., Circelli, M., & Korbel, P. (2020). *Incorporating digital skills into VET delivery: good practice guide (support document)*. NCVER. https://www.voced.edu.au/content/ngv%3A86794

Windley, G. (2017). *Indigenous VET Participation, Completion and Outcomes: Change over the Past Decade.* Research Report: NCVER. https://eric.ed.gov/?id=ED574507

Technical and Vocational Education Trends and Issues in India

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Abstract

This chapter presents an in-depth overview of the structure of India's education system and the place of TVE within it. Key statistics about Education, Skilling, Employment, and Employability have been compiled to present the dire need for skilling in the country. The government is the central player in the education system and is the main provider of vocational education in India. To understand the role and significance of various organizations and institutions in Skill education, the evolution of skill education is introduced. The roles and responsibilities of various government & private organizations, policy documents governing current practices, and future approaches are presented. Students' and teachers' perspectives, qualification frameworks, grading practices, and quality assurance mechanisms are included for understanding the Skilling ecosystem in the country. Major trends, issues, challenges, and opportunities in skilling education, policy perspectives, demand and supply statistics, and upcoming initiatives are presented. To place current educational reforms, and especially vocational education and mobility trends, in context, an overview of current socio-economic developments in India and some key facts about the country have also been included.

Despite all the efforts of Central and State governments, the penetration of Skill education is still limited in India. The challenges in the field are illustrated with recommendations to overcome them to achieve the vision of Atmanirbhar Bharat.

Keywords: skill/vocational education, India, statistics, policies, trends, issues, recommendations

Introduction

The skill development ecosystem in India is highly diverse and comprises various ministries, government departments, and private organizations. The Government, through its Ministries and Organizations, plans, promotes, and implements Skilling in the country. The Indian skilling system can be compared with the France Model (School Model), where the government is the central player in the education system and is the main provider of vocational education. To understand the role and significance of various organizations and institutions in skill education, the evolution of skill education has been introduced. Various government and private organizations implementing, monitoring, and promoting vocational education in the country, their role and responsibilities, policy documents governing current practices and future strategies are presented in this chapter.

The Structure of the Education System as a Whole and the Place of TVE within It

To understand the role and significance of various organizations and institutions in Skill education, the evolution of skill education, and the roles and responsibilities of various government & private organizations, policy documents governing current practices and future approaches are presented.

Evolution of the Skill Development System

In India, the era of current vocational education and skill was marked by the setting up of the first set of Industrial Training Institutes (ITIs) in 1950s by the Directorate General of Training (DGT). The focus of the Government was on developing a formal technical and vocational education system. Similar moves to formalize and regulate TVET institutions for higher level skills continued in the 1980s and 1990s. In 1987, the All India Council of Technical Education (AICTE) came into existence through an Act of Parliament, as a statutory regulator for the technical education system in India, and approved and funded Polytechnics and Technical Colleges. In 1993, the National Council of Educational Research and Training (NCERT) established the Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), a similar nodal body for vocational education in the school sector.

As India was moving towards the service and manufacturing sector from Agriculture, the need to rapidly expand the capacity of the skills training sector was recognized, and a significant effort was made to bring more private sector organizations into the system. The National Skills Development Corporation (NSDC) was established, and the first National Skill Development Policy set out the vision for a National Qualification Framework (NQF) and the creation of a unified competence–based training system.

Realizing the urgency of harmonizing the efforts of all concerned stakeholders in the field of Skill Development and Entrepreneurship, the Government of India notified the establishment of the Department of Skill Development and Entrepreneurship (MSDE) on July 31, 2014 which subsequently led to the creation of the Ministry of Skill Development and Entrepreneurship on Nov 10, 2014.

Further, to enhance coordination, the government of India has brought the following institutions under the Ministry of Skill Development and Entrepreneurship:

1. Directorate General of Employment Training - DGET (from the Ministry of Labour & Employment)

2. National Skill Development Agency (NSDA)

3. National Skill Development Corporation - NSDC (from the Ministry of Finance)

With the development of the Skilling ecosystem and insight into the sector, the existing policy was revamped as the National Skill Development and Entrepreneurship Policy, 2015. Following the introduction of the New Skills Policy in 2015, the previous centrally sponsored scheme of Vocationalisation of Higher Secondary Education (providing vocational education in classes XI and XII) was subsumed under the Rashtriya Madhyamik Shiksha Abhiyan (RMSA) scheme and has been renamed Vocationalisation of Secondary and Higher Secondary Education.

In 2018, the National Council for Vocational Education and Training (NCVET) and the National Skill Qualification Committee (NSQC) were set up to ensure a qualification framework and quality assurance. In 2020, despite the national lockdown and Covid-19 pandemic, the New National Education Policy, 2020 was approved. This shall be a transformative step in reforming vocational education in India and a game-changer.

Table 1 Evolution of the Skill Development System in India

Year	Initiative	Objective
1956	National Council for Vocational Training (NCVT)	Designing of curricula, maintaining quality standards, deciding norms for affiliation, and granting affiliation
1961	Apprenticeship Act	Provides for regulation and control of training of apprentices
1988	Vocationalization of education in India	To offer vocational courses alongside other subjects in higher secondary education for 2 years
2008	National Skill Development Corporation (NSDC)	Aims to promote skill development by catalyzing the creation of large, quality, for-profit vocational institutions The Human Resource Requirement Reports understanding the sectoral and geographical spread of incremental skill requirements across 24 high-priority sectors between 2013-17 and 2017-22 are developed.
2009	The first National Policy on Skill Development (NPSD)	The NPSD laid out the broad framework as well as objectives and outcomes for the skilling landscape in the country.

Table 1 Continued

Year	Initiative	Objective
2011	Vocationalization of Higher Secondary Education (VHSE)	To offer optional vocational courses in schools, alongside academic subjects. Multi-entry, multi-exit learning opportunities and vertical mobility/ interchangeability in qualifications created.
2013	The National Skill Development Agency (NSDA)	Quality assurance and policy research body.
2013	National Skill Qualification Framework (NSQF)	Organizes all qualifications according to a series of levels of knowledge, skills, and aptitudes. Guides and supports States for the development of qualifications and their alignment to NSQF.
2014	The Department of Skill Development	DSD was notified under the Ministry of Sports & Youth Affairs which later got notified as the Ministry of Skill Development & Entrepreneurship in November 2014 (9.11.2014). Annually, more than 10 million youth have been joining and benefitting from the Skill India program, a mission under the Ministry to equip youth with skills for better livelihood.
2015	Sector Skill Councils (SSCs)	SSCs are led by industry leaders in the respective sectors. They create occupational standards, develop competency frameworks, and conduct training of experts and test the candidates.
2015	National Skill Development Mission	It is expected to converge, coordinate, implement, and monitor skilling activities on a pan-India basis. Aims to train over 400 million people in India in different skills by 2022.
2015	Vocationalization of Secondary and Higher Secondary Education	Introduction of vocational education from Class IX onwards, i.e., at the secondary stage and to include secondary school, or 9th and 10th standard.
2015	National Policy on Skill Development & Entrepreneurship, 2015	It aims to provide an umbrella framework of all skilling activities being carried out within the country, to align them to common standards, and to link skilling with demand centers.
2018	National Council for Vocational Education and Training (NCVET)	An overarching regulator mandated to regulate both long- and short-term vocational training in the country. NCVET was set up by merging the existing NCVT and NSDA

Table 1 Continued

Year	Initiative	Objective
2018	National Skill Qualification Committee (NSQC) is anchored in National Skill Development Agency (NSDA)	NSQC is the final apex body for approving qualifications for NSQF alignment, in addition to performing other functions such as approving accreditation norms, prescribing guidelines to address the needs of disadvantaged sections of society, reviewing inter-agency disputes, and alignment of NSQF with international qualification frameworks.
2020	New National Education Policy	The NEP 2020 aims to integrate vocational education into mainstream education in a phased manner by the creation of a National Higher Education Qualification Framework (NHEQF), which will be coordinated with the National Skills Qualification Framework (NSQF) for ease of mobility between streams. The policy has planned vocational skill exposure starting from the middle and secondary grades through internship opportunities with indigenous artisans, craftsmen, and blue-collar professionals.

An Overview of the Education System and the Place of TVE within It

The Ministry of Education (MoE) governs primary education, secondary education, senior secondary education (also called higher secondary education), and higher education. The secondary and senior secondary education are of 2 years' duration each. Higher education in India starts after passing the higher secondary education. Doing graduation in India after the 12th standard can take 3 to 4 years. Postgraduate courses are generally of 2 years' duration. After completing post-graduate courses, the scope for doing research in various academic/ research institutes also opens.

- The Higher Education Department under the ministry caters to UGC; University education (Arts, Science, Commerce, etc.), AICTE; Technical education (engineering education, polytechnics, etc.), other Sector-Specific Councils/ Regulatory Bodies, Central Universities, Institutes of National Importance, IITs and IIMs, etc. This is one of the world's biggest higher education systems with 993 Universities, 39,931 Colleges, and 37.4 million students enrolled.

- The School Education and Literacy Department caters to the Central Board of Secondary Education (CBSE), the National Council for Educational Research and Training (NCERT), the National Institute of Open Schooling (NIOS), and the National Council for Teacher Education (NCTE). Elementary and secondary education comprises more than 1.5 million schools, 9.4 million teachers, and almost 250 million children.

Table 2 Overall Configuration of TVET in India

Academic	Technical	Vocational		On the Job	Examples of Jobs
Doctorate 126,500 enrolled **Ages 24+**	**Doctorate in Engineering** 30,600 enrolled			Medical Residents Junior Research Fellows	Scientists Economic Advisers University Faculty Astronomers Policy Experts
Master's 3,900,000 enrolled **Ages 22+**	**Master's in Engineering** 257,000 enrolled	**Advanced Training** 28 institutions 350,000 have enrolled since 2007.	**Master's of Vocational Education** Launched 2015		Engineers Managers Data Analysts Teachers Stock Brokers Journalists Architects Lawyers
Bachelor's 800 universities 27,400,000 students **Ages 19-21**	**Engineering Courses** 3200 colleges 4,200,000 enrolled **Polytechnic 3-Year Diploma** 3900 institutes 1,500,000 enrolled	**Industrial Training at ITIs** 13,550 institutions 1,200,000 enrolled	**Bachelor's of Vocational Education** 162 institutions 10,200 students **Community Colleges** 157 colleges	**Apprenticeship and Internships** (2-4 year certificate) 2,400,000 apprentices and interns	Junior Engineers Technicians Construction Supervisors Office Workers TV Camera Operators
Higher Secondary (Grade 11-12) 112,600 institutions 24,700,000 students **Ages 17-18**		**Vocational Higher Secondary** 7400 schools provide 472,000 students			Plumbers Electricians Construction Workers
Secondary (Grade 9-10) 239,500 schools 39,100,000 students **Ages 15-16**		**Vocational Secondary** 108 schools provide			Textile Workers Retail Clerks Hospitality Workers Beauty Therapists
Elementary (Grade 1-8) 1,450,000 schools 196,716,500 students **Ages 6-14**					Low skilled Workers

Source: NCAER, 2018.

Table 2 illustrates the various levels of Academic education with the probable age of aspirants. The vertical and horizontal mobility between Academic, Technical, and Vocational education has been presented with subsequent prospective job roles. The number of institutions and students enrolled gives a glimpse of the world's largest education system.

Types of Institutions Offering Technical and Vocational Training

In India, skill training takes place through two basic structural streams, formal and informal.

The formal vocational education:

The formal vocational education system includes

a. Vocational education in schools at the post-secondary stage
b. Higher technical education imparted through professional colleges
c. Technical training in specialized institutions, and
d. Apprenticeship training

a. Vocational Education in Schools at the Post-secondary Stage

A centrally sponsored scheme on vocationalization of secondary education provides financial assistance to the states/UTs to set up the administrative structure, area vocational surveys, preparation of curricula, textbooks, workbook curriculum guides, training manuals, teacher training programs, strengthening technical support systems for research and development, training and evaluation, etc.

Under the Scheme:

- Vocational education is provided in 9,619 schools with 21,000 centres covering about 1 million students.
- About 150 job-oriented courses at the 10+2 level are being provided in the areas of Agriculture, Business, Commerce, Engineering and

Technology, Home Science, Health and Paramedical, Social Sciences, Humanities, etc.

- Students going through the formal vocational education system at the secondary school level can continue their education in the general education system or access vocational training options available at the post-secondary level (like polytechnics, also managed by the education ministry, and offering diploma-level programs in engineering and technology trades).

b. Higher Technical Education Imparted TVE Through Professional Colleges

AICTE and UGC are the two regulatory bodies for Technical and Non-Technical Higher education and are connected with central universities, state universities, private universities, deemed–to-be universities, autonomous standalone institutes, university-level institutions and their affiliated colleges. They may function as skill centers. The present structure of vocational courses at Higher Education level is as follows:

- Universities and Technical Institutions Imparting Skill-Based Courses: There are 21 Universities under UGC and 372 institutions under AICTE offering vocational courses at the Higher Education level.
- Some State Skill universities are also approved by State governments to run various Vocational courses. However, approval of AICTE is necessary for offering Vocational education in Technical subjects.
- National Skill Universities: The Ministry of Skill Development and Entrepreneurship has initiated the process of establishment of National Skills Universities. The universities are envisioned to provide nationally recognized university degrees and certification for vocational skills, design and conduct assessments, design curricula (with Sector Skill Councils) to promote horizontal and vertical mobility, offer faculty training courses, and conduct research in the skills landscape.

c. Technical Training in Specialized Institutions

The Indian Directorate General for Training (DGT) (part of the Ministry of Skill Development and Entrepreneurship, Government of India) manages the Craftsmen Training Scheme (CTS) which aims to provide skilled craftsmen to industries. The programs under CTS focus on industrial trades and are operated by Industrial Training Institutes (ITIs) and Industrial Training Centers (Private ITIs). There are a total of 14,323 IITs in the country providing skill education to more than 2.3 million students.

In addition to ITIs, there are six Advanced Training Institutes (ATIs) to provide training for instructors in various trades, and two ATIs for offering long- and short-term courses for the training of skilled personnel at technician level in the fields of Industrial, Medical and Consumer Electronics, and Process Instrumentation.

After completion of the ITI course students appear for a test, conducted under the aegis of the National Council for Vocational Training (NCVT), and successful students receive a National Trade Certificate (NTC).

d. Apprenticeship Training

i. **National Apprenticeship Training Scheme (NATS):** The National Apprenticeship Training Scheme (NATS) offers a variety of training in a wide spectrum of 259 occupations in 39 areas. There are two types of apprentices under the scheme:

- Trade apprentices, where 360,000 seats are available per year under the responsibility of the MSDE and are part of vocational training.
- Graduate/ technician/ vocational apprentices are for students of higher education who want to acquire additional practical skills. Here training is given in more than 137 subject fields as post-qualification training for a period of 1 year and is monitored by the MoE. There are

100,000 seats per year.

- As per MSDE, more than 80% of all the apprentices are from ITIs and these apprenticeships are mainly in engineering, but the service sector, despite being the dominating sector is not providing enough apprenticeships.

ii. **National Apprenticeship Promotion Scheme (NAPS) 2016:** The GoI implemented a new initiative named the National Apprenticeship Promotion Scheme in 2016, to raise the acceptance and involvement of employers and to increase the number of apprentices, targeting 2 million in 2020.

iii. **Other Apprenticeship Schemes:** Apart from these two main pillars of apprenticeship training, there are schemes like the National Employability Enhancement Mission (NEEM), Skills Training Foundation 2020, and the National Employability through Apprenticeship Programme (NETAP), which is a public–private partnership program targeting unemployed youth.

Various Ministries and Departments

Some of these are:

- The Ministry of Rural Development: MoRD implements some schemes for creating sustained employment opportunities for the rural poor, so that they can secure a minimum level of income. These are the Employment Assurance Scheme, Jawahar Rozgar Yojana (JRY), the Programme for Development of Women and Children in Rural Areas (DWCRA), the Integrated Rural Development Programme (IRDP), and the Training of Rural Youth for Self-Employment (TRYSEM).
- The Department of Women and Child Development also implements

Support to Training and Employment Programs (STEP), assisted by NORAD. The scheme offers condensed courses for women.

- The Khadi and Village Industries Commission (KVIC) has 51 training centers, including 12 village industry training centers. Prime Minister's Rozgar Yojana provides wage employment and self-employment to educated unemployed youths aged between 18 and 35 years.
- Entrepreneurship Development Centres/Institutes provide entrepreneurial training in different fields specific to the area.
- The Ministry of Agriculture's Krishi Vigyan Kendra (KVK) imparts training to all the stakeholders of Agriculture including farmers, farm women, rural youth, and concerned government department officials.

In addition to the above, a large private and informal network also exists, through which TVET is provided. For example, community polytechnics, adult education, non-government organizations (NGOs), and MSMEs.

Informal Vocational Education

The informal sector which constitutes about 93% of the workforce is not supported by any structural Skill Development and Training system, and skilling takes place through informal channels like family occupations, on-the-job training, self-learning or learning under master craftsmen.

Technical Institutions in India

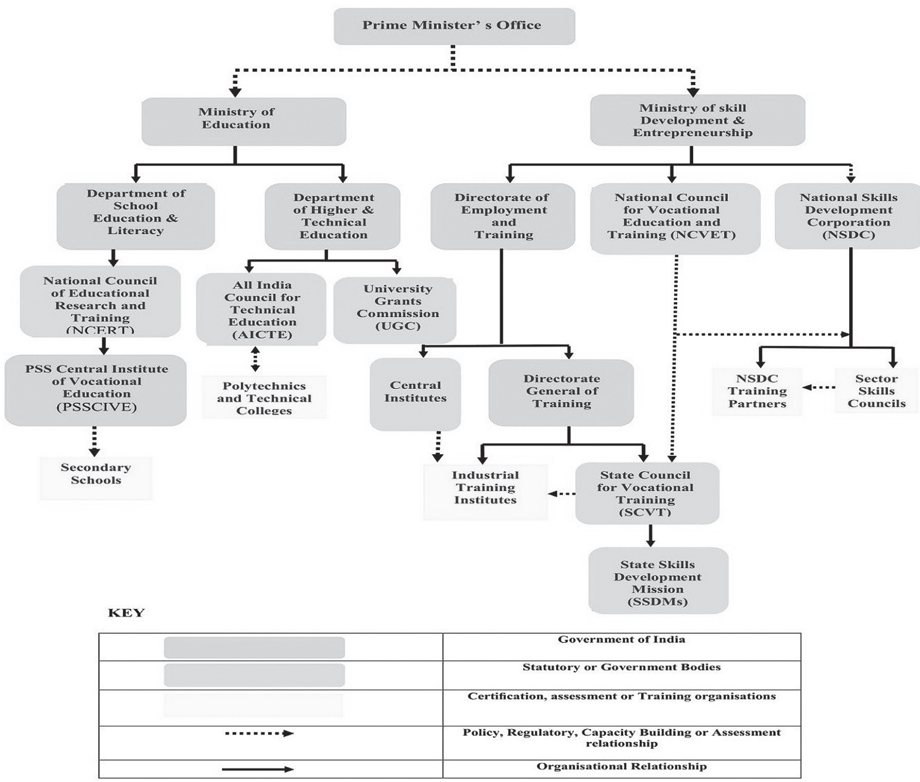
Technical Education makes a remarkable contribution to the economic growth of any country by producing suitable manpower as per the needs of the industry, society, and the world as a whole.

Technical Education encompasses courses and programs in engineering & technology, management, hotel management and catering, applied arts & crafts, architecture, town planning and pharmacy in India. A total of 6379 Technical Institutions (offering UG and PG courses), and 4459 Institutions (offering diploma courses) were approved by AICTE for the academic year 2020-21.

The Skill Development Ecosystem of India: Ministries and Government Organizations Involved and Their Influence on Vocational Education

Two major Ministries govern the majority of skill initiatives, namely the Ministry of Education (MoE) and the Ministry of Skill Development and Entrepreneurship (MSDE). Following is the organization chart of MSDE and MoE in the country:

Figure 1 Overview of the Skill Development Ecosystem in India



The Ministry of Skill Development and Entrepreneurship (MSDE) is responsible for co-ordination of all skill development efforts across the country, removal of the disconnect between demand and supply of skilled manpower, building the vocational and technical training framework, and quality training, not only for existing jobs/trades but also for upcoming jobs/ trades. The MSDE aims for large-scale skilling with speed and quality in order to achieve its ambitious vision of a Skilled India.

a. *Major Organizations in Skill Education under the Ministry*

- The National Council for Vocational Education and Training (NCVET)

The major functions of NCVET are the recognition and regulation of Awarding Bodies, Assessment Agencies, and Skill-related Information Providers; approval of Qualifications; monitoring and supervision of recognized entities and grievance redressal.

- Directorate General of Training (DGT)

Directorate General of Training (DGT) is an apex organization which provides the maximum number of skilled manpower to the economy.

Following are major schemes under DGT:

- Apprenticeship Training Scheme (ATS): for meeting the requirement of skilled manpower for industry.
- Craft Instructor Training Scheme (CITS): for hands-on training to students/ instructors through National Skill Training Institutes (NSTIs) located in 33 locations across the country.
- Advanced Vocational Training Scheme (AVTS): for upgrading the skills of serving industrial workers.
- Dual System of Training (DST) wherein the ITIs are encouraged to

join hands with multiple industry partners for providing mandatory industrial exposure to the trainees.

- The Flexi-MoU model offering customized, industry-relevant training, entirely on the industry premises has also been introduced for providing flexibility to make tailored skilling programs.

b. *Regional Directorate of Skill Development and Entrepreneurship (RDSDE)*

To ensure effective integrated development and monitoring of Skill Training and Apprenticeship training at the state level, the Ministry of Skill Development and Entrepreneurship, Government of India has decided to set up the Regional Directorate of Skill Development and Entrepreneurship (RDSDE) for each State / UT. At present 22 RDSDEs are functional in different states.

c. *Role of State Governments in Skilling*

As a federal country, the Constitution of India defines the distribution of responsibilities for key policy areas by creating three lists, the Union List, State List, and Concurrent List. Skill and Education is on the concurrent list. Policy, process, and standards are central responsibilities, while implementation and training are the responsibility of states.

The Ministry of Skill Development and Entrepreneurship (MSDE) at the Centre is responsible for coordinating all skill development efforts, while at the State level, it is the responsibility of the state skill ministries (which are often combined with the education ministry).

Two examples of state-level responsibilities are the management of Industrial Training Institutes (ITIs), which impart skill training to students, and the State Skill Development Missions, which are responsible for integrating various skill development efforts within the states.

d. ***Organizations established under PPP/ Private Sectors***

- National Skill Development Corporation

The National Skill Development Corporation (NSDC) is a not-for-profit, Public-Private Partnership organization set up by the Ministry of Finance, now under the Ministry of Skill Development and Entrepreneurship which focuses on catalyzing Skill development by the creation of quality, for-profit vocational institutions.

NSDC has established a framework for short-term skilling in India through a network of 11,000 centers and 37 Sector Skill Councils. It has trained about 25.3 million individuals. NSDC has also implemented many new technology platforms, conducted several research studies, and expanded into international partnerships with various countries such as Singapore, Japan, and the UAE. Some of the achievements of NSDC are as follows:

- NSDC has thus far prepared industry reports for 24 sectors analyzing the skill gaps and also state wise skill gap analysis reports for states.
- 710 PMKKs established as of Dec 2019.
- 2,504 QPs, 1,439 Model Curricula, 532 unique Participant Handbooks, 919 Participant Handbooks including 263 in Hindi and 137 in other regional languages created as of Dec 2019.
- 628 Training Partner Proposals approved as of Dec 2019.

The work is ongoing.

- Sector Skill Councils (SSC)

Sector Skill Councils are set up as autonomous industry-led bodies by NSDC. They create National Occupational Standards (NOS), Qualification Packs (QPs) and Qualification Bodies, develop competency frameworks, conduct Train the Trainer Programs, conduct skill gap studies, and assess and certify trainees on the curriculum aligned to National Occupational Standards developed by them. To date, the NSDC Board has approved proposals for setting up 37 Sector Skill Councils. There are approximately 450 Corporate Representatives within the Governing Councils of SSCs.

- Private Skills Training Institutions

Earlier skill training in the private sector was offered by the private ITIs (earlier ITCs) and NGOs on a small scale for specific trades and target groups. Later private companies saw opportunities within the market and started training institutes; the National Institute of Information Technology (NIIT) and Jet King within the software and hardware areas of the IT sector are examples of such commercial training providers within the private sector.

NSDC has become affiliated with more than 235 Private Skills Training Providers in the past years, and several others have entered the skill-training field seeing the emerging opportunities.

- Skill Assessment & Certification Agencies

With the notification of the National Skills Qualification Framework (NSQF) in December 2013, it has become mandatory for all training/educational programs/courses to be NSQF compliant.

The following agencies have been approved, among others, as non-statutory certification agencies for certification work:

i. National Council for Vocational Training
ii. State Council for Vocational Training
iii. Sector Skill Councils

NSDA recognized the following three organizations as Assessment & Certification Bodies on Dec 5, 2019, for training conducted in NSQF compliant qualifications:

i. Centurion University of Technology and Management, (CUTM), Odisha
ii. Sri Vishwakarma Skill University (SVSU), Haryana
iii. National Power Training Institute (NPTI)

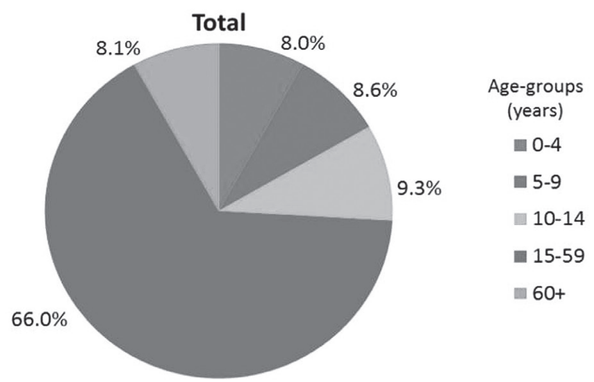
The Status of TVE

Key Statistics Including the Current Percentage of TVET Students, Numbers, etc.

Demographic Dividend

The young population of India is what gives India its demographic dividend. The Sample Registration System Statistical Report 2018 stated that India has a very young population, that is, 25.9% below the age of 14; 66% in the working-age group of 15-59, and only 8.1% above 60 years.

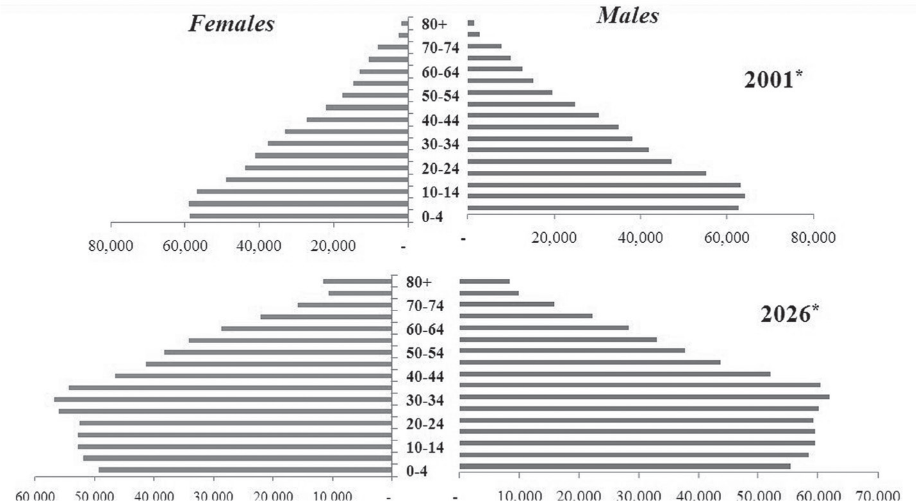
Figure 2 Percentage Distribution of the Population by Broad Age Groups, India 2018



Source: Office of the Registrar General & Census Commissioner, 2018.

This potential demographic dividend of rising working age will continue for the next 20 years. The country's population pyramid is expected to bulge across the 15-64 age group over the next decade. Around 860 million persons would be in the age group of 15 to 59 by 2022 (as compared to about 725 million currently). Thus, 12 million persons are expected to join the workforce every year. This unique demographic dividend of India may continue until 2040. Therefore, a very short time frame is available to reap the benefit of the demographic dividend and by overcoming its skill shortages.

Figure 3 Projected Population till 2026



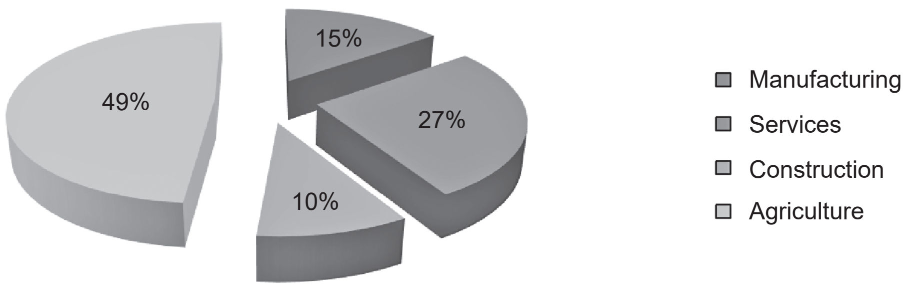
Skilling Capacity

India's skilling capacity was approximately 7 million per annum during the period 2013-2014. With the current demographic scenario, about 12 million persons are expected to join the workforce every year and 3.4 million persons are already in the skill development facilities. Therefore, it is required to enhance the skilling and technical education capacity to about 15 million per annum in the country.

Changing Sectoral Scenario and the Need for a Skilled Workforce

Another important issue is that the Agriculture sector, which is the primary sector for the country, is not growing at the speed of secondary and tertiary sectors, that is, Manufacturing and Service. Thus, a large portion of the workforce continues to migrate from the primary sector (agriculture) to the secondary and tertiary sectors. However, the skill sets that are required in the manufacturing and service sectors are quite different from those in the agriculture sector. This implies that there will be a large skill gap when such migration occurs. This imposes the need for speedy and large-scale skill development initiatives on the country.

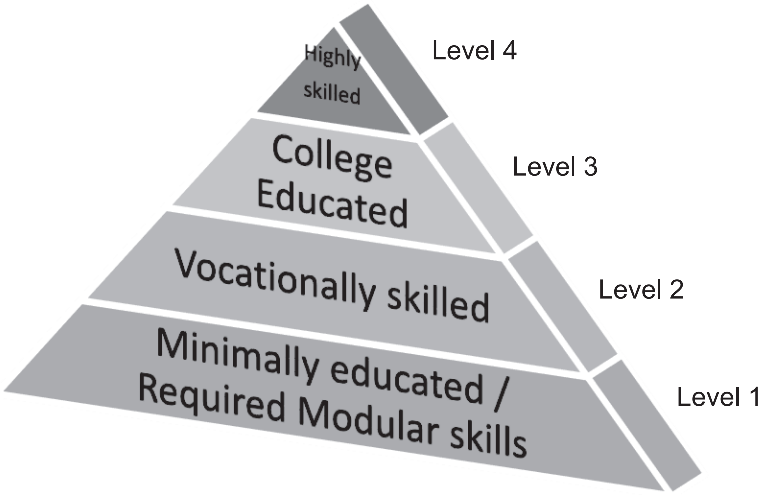
Figure 4 Present Sectoral Scenario in India



Skilling Pyramid and Skilling Needs at Different Levels

The requirement of skilling is not only at higher levels (which is key to ensuring industry competitiveness through research and IP, etc.), but also at the lower levels (i.e., where much of the workforce is concentrated).

Figure 5 Skill Pyramid



Accordingly, it is required that skill development initiatives be targeted at all levels of the Skill Pyramid.

Upcoming Skilling Needs in the Urban Population

The Census of India indicates that between 1951 and 2011 the urban population in India grew six times from 62.4 million to 377.1 million in comparison with the rural population that grew less than three times from 298.7 million to 833 million; therefore, skilling of the workforce may be focused for urban projects. It is thus the hour of need for identifying such issues, areas, and advance planning.

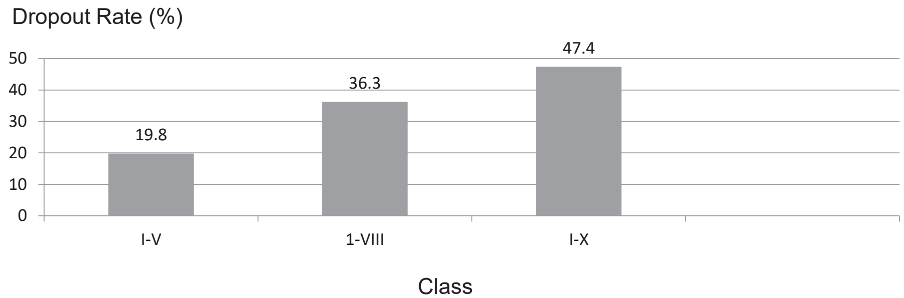
Literacy Levels in India

According to Census 2011, India achieved a literacy rate of 74.04% as opposed to 64.80% in 2001. Credit goes to Right to Education. However, this has not corresponded to a skilled workforce.

High School Dropout Rates

The school dropout rate is also high, with 19.8% dropping out after Class V, an additional 16.5% dropping out after class VIII and a further 11.1% dropping out after class X (Ministry of Education, 2019).

Figure 6 School Dropout Rates in India



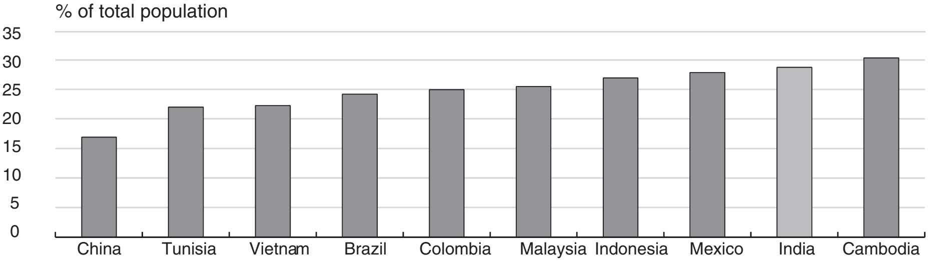
Source: Ministry of Education, 2019.

The maximum annual dropout rate is observed at the secondary education level. Hence, there is still a significant need for skilling among this population.

Status of NEET (Not in education, employment, or training)

The percent of youth neither in education nor in employment nor training (also known as "the NEET rate") is also very high in India. Figure 9 shows that more than 30% of Indians in the age group of 15-29 years are in NEET.

Figure 7 Percentage of Youth Aged 15-29 Neither Employed nor in Education nor in Training, 2015

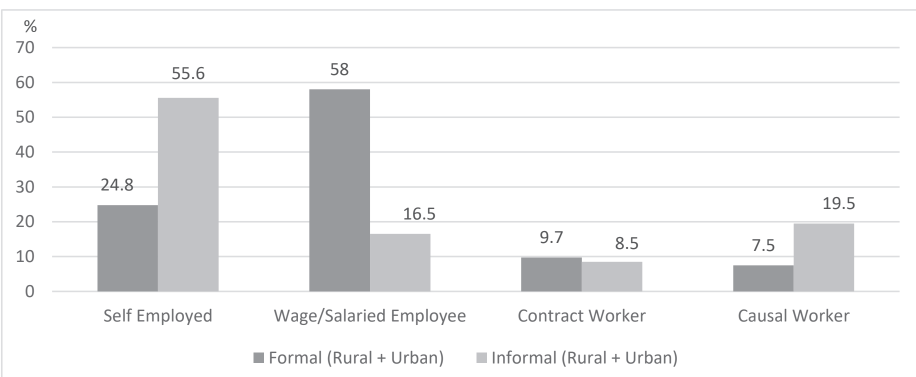


Source: OCED, 2017.

The Employment Status of Persons Receiving Skill/ Vocational Education

Among formally trained employed persons, more than 50% were reported to be employed in the wage/salaried category followed by the self-employed category. In the case of informally trained employed persons, more than half were reported to be employed in the self-employed category, followed by casual workers.

Figure 8 Distribution of Persons Aged 15 Yrs. and Above who Received/Were Receiving Vocational Training and Pursuing Different Economic Activities Based on the Usual Principal Status (PS) Approach



Source: Ministry of Labour & Employment, 2016.

Availability of Technical and Vocational Training Opportunities in the Country

The major chunk of formal vocational education is provided by ITIs under the Director-General of Training. There are 14,886 ITIs in the country with an admission capacity of 35,30,707 in 107 trades (NCVT MIS, 2015).
Around 10,158 schools are also offering vocational education covering 55 job roles in 19 sectors under Pandit Sundar Lal Sharma Central Institute of Vocational Education (PSSSCIVE). (Source MoE)

Formal and Non-Formal Vocational Training Statistics

In Table 3, the percentage distribution of persons of age 15-59 years by the status of vocational /technical training received is presented. It is seen that nearly 2% had received formal vocational training and only 6.1% had received non-formal vocational/ technical training. In both cases, a higher percentage of males compared to females had received vocational/technical training.

Table 3 Percentage Distribution of Persons in the Age Group 15-59 Years by the Status of Vocational/ Technical Training Received

<table>
<tr><td colspan="6">Percentage of persons received vocational training</td><td rowspan="2">Did not receive vocational training</td></tr>
<tr><td>Formal</td><td colspan="5">Non-Formal</td></tr>
<tr><td></td><td>Hereditary</td><td>Self-learning</td><td>Learning on the job</td><td>Others</td><td>Total (Non-Formal)</td><td></td></tr>
<tr><td>2.0%</td><td>1.6%</td><td>1.8%</td><td>2.2%</td><td>0.5%</td><td>6.1%</td><td>91.7%</td></tr>
</table>

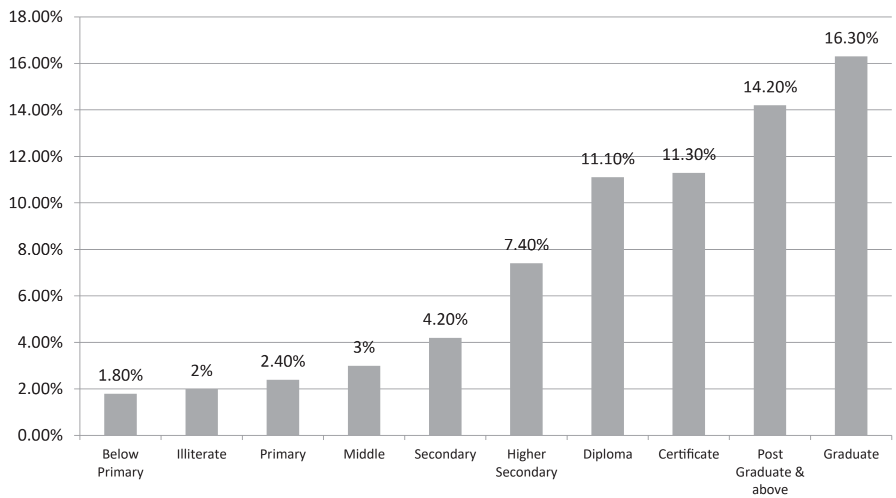
Inadequate Training Capacities

Around 26 million people enter the workforce age group every year. The average labor participation rate is 90% for males and 30% for females, so at least 16.16 million will enter the workforce and should have the required skills. However, the current annual skilling capacity in India is estimated at only 7 million.

Unemployment after Higher Education

The unemployment rate in the country is high among youth with higher educational qualifications. On the contrary, the majority of the population below higher secondary education level are already in some form of employment.

Figure 9 Share of Unemployment



Unemployment Made Worse by the Pandemic

The unemployment rate has been growing in the country for the last couple of years. The coronavirus (COVID-19) pandemic only accelerated the unemployment rates when unemployment went up to nearly 24% in April 2020, but the situation is expected to improve in the post-pandemic days. In January 2021, India saw an unemployment rate of over 6% due to improvement in the situation.

Key Strategy and Policy Document Which Governs the Current and Future TVE Strategy

The National Skill Development Mission is an ambitious project launched by Prime Minister Narendra Modi with the aim of making India the skill capital of the world. Billions of Rupees and a high-powered organization structure have been allocated for this project.

The Mission aims to converge, coordinate, implement, and monitor skilling activities across the country. It seeks to provide the institutional capacity to train a minimum of 300 million skilled people by the year 2022.

Major activities under the mission are:

1. Align employer/industry demand and workforce productivity.
2. Establish and enforce cross-sectoral, nationally and internationally acceptable standards by creating a sound quality assurance framework.
3. Build capacity for skill development in critical un-organized sectors.
4. Develop a network of quality instructors/trainers by establishing high-quality teacher training institutions.
5. Leverage existing public infrastructure and industry facilities for scaling up skill training and capacity-building efforts.
6. Offer a passage for overseas employment through specific programs mapped to global job requirements and benchmarked to international standards.

7. Enable pathways for transitioning between the vocational training system and the formal education system, through a credit transfer system.

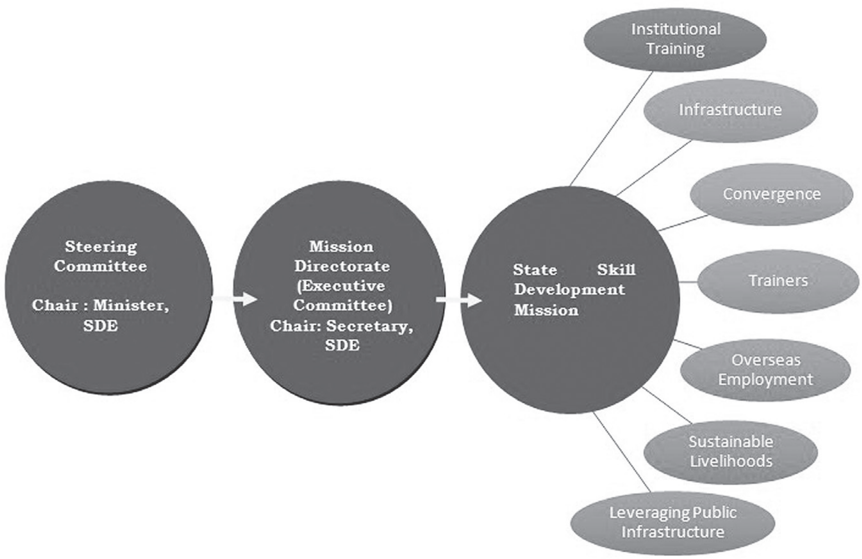
8. Promote convergence and coordination between skill development efforts of all Central Ministries/Departments/States/implementing agencies.

9. Support weaker and disadvantaged sections of society through focused outreach programs and targeted skill development activities.

10. Propagate aspirational value of skilling among youth, by creating social awareness of the value of skill training.

11. Maintain a national database, known as the Labour Market Information System (LMIS), which will act as a portal for matching the demand and supply of skilled workforce in the country.

Figure 10 The Institutional Framework of the NSDM



The Sub-Missions under NSDM and their Major Objectives

The National Skill Development Mission consists of seven sub-missions as follows:

a. Institutional Training

- To reform in areas such as curriculum flexibility, training equipment, and workshops, pedagogy, industry interface, and financial model.

b. Infrastructure

- capacity building and quality assurance in infrastructure for projected requirements.
- Recognition of prior learning (RPL) and upskilling of existing workers in the sector.

c. Convergence

- Convergence and coordination of various efforts across different central and state Ministries/Departments, private training providers, assessment agencies, industry bodies, and workers.

d. Trainers

- To ensure sufficient availability of trainers in the skills space.
- Conduct Train the Trainers (ToTs) programs.

e. Overseas Employment

- To facilitate international mobility of skilled workers in the country
- To improve the global competitiveness of skilled manpower and help them access employment opportunities abroad.

f. Sustainable Livelihoods

- Assistance to trainees to escalate the prospective of skill training by guiding them to ascertain long-term sustainable livelihoods.

g. Leveraging Public infrastructure

- Existing public infrastructure should be used to the maximum to expedite the skill development efforts across India

h. Financing

- Funding of skilling activities as per the budget provisions from MSDE.

State Skill Missions/Nodal Agency for Skill Development

To manage the activities of the State Skill Mission, most of the states have set up the State Skill Mission or notified a nodal agency for coordination at the state level.

National Policy for Skill Development and Entrepreneurship, 2015 (NPSDE, 2015)

Vision:

To create an ecosystem of empowerment by Skilling on a large Scale at Speed with high Standards and to promote a culture of innovation-based entrepreneurship that can generate wealth and employment to ensure Sustainable livelihoods for all citizens in the Country.

Thrust Areas:

- Ensure quality vocational training for youth.

- The infrastructure of the training facilities.
- IT-based solution to observe the demand and supply of workforce.
- Introduction of skill development along with formal education.
- Recognition of Prior Learning (RPL) through globally recognized certification.
- Support skill development at Universities and institutes.
- Skilling for socially/geographically marginalized and disadvantaged groups and women
- Focus on entrepreneurship education, thereby boosting micro-enterprises.

Impact of NPSDE, 2015:

- By offering a variety of incentives for institutions as well as for trainers, NPSDE has impacted 1.5 million schools, 3,000 polytechnics, 25,000 colleges, and 83 youth hostels across the country. Participants can enroll through 1.5 lakh post offices and over a lakh kiosk across the country.
- Incentivized apprenticeship with a stipend to support Micro, Small and Medium Enterprises.
- The National Labour Market Information System (LMIS) has been set up to keep a record and analysis of the growth of employment following the skill development courses.
- The skill development programs are relevant to 25 existing working sectors falling under the ambit of Make in India.
- Specific training modules have been formalized to include women in the scheme
- For trainers and assessors of the scheme, a National Portal has been set up for registration and so on.

TVE Students or Trainees, Including Their TVE Accessibilities, TVE Programs Available for Them, Their TVE Learning Achievements Such as Graduates' Employment Rates and Socioeconomic Status

Generally, the students who perform poorly in the general education stream end up joining Vocational education. Students are admitted to the ITIs and ITCs purely based on marks secured in the public examinations. Wherever there is no public examination, the State Directorate of Training conducts written examinations for admission into the particular trade.

There are a total of 14,323 ITIs in the country providing skill education to more than 2.3 million students, although an admission capacity of 3.5 million plus in 107 trades is available. This indicates that students have less interest in the skill training offered by the country.

An ILO efficiency/impact evaluation study of the ITIs and ITCs in three states of the country (Andhra Pradesh, Maharashtra, and Orissa) (Gasskov et al., 2003) indicated that in the Andhra Pradesh, Maharashtra and Orissa states, 41, 35, and 16.2% of pass outs from ITIs could get, respectively, wage employment/self-employment/join the family business. Similarly for ITCs, the figures were only 22.8, 35.6, and 21.3%, respectively.

A World Bank report on skill development in India (Dar, 2008) also mentioned that more than 60% of all graduates remained unemployed even 3 years after completion of a course.

However, a study on the impact of vocational training on the wages of an individual showed that having formal training increases the wage by 4.7% as compared to a person without any training. This impact is highest in the primary sector, where the individuals with vocational training had a wage increase of 36.9%. Workers in the secondary sector with formal vocational training had an increase in wages of 17%. This clearly indicates that good economic returns come with formal vocational training, and it makes sense to invest resources in vocational training

As per Skill India Report 2021, the majority of students said they were well-informed to choose a career path. As per Statista.com, India had the world's second-largest internet population with over 483 million users in 2018. Of these, 390 million users use mobile phones to access the internet. Estimates suggest that this figure would reach over 500 million by 2023 (Keelery, 2021). With access to educational sites, news networks, online courses, and MOOCs, students are certainly becoming more aware of the opportunities.

Due to more vocational training facilities in urban areas, urban dwellers have more possibilities of getting Vocational Training. Being male increases the odds of receiving vocational training, implying that certain special interventions are required to encourage girls to enroll in formal vocational training programs.

Hence, it seems that students are not opting for vocational education due to low employment opportunities after the same. The reason could be a mismatch between industry demand and the Skill training provided. It is also observed that most of the students make well-informed decisions. Hence forms of communication such as educational sites, news networks, the internet, etc. can be used for sensitization and awareness creation for promoting vocational education.

TVE Teachers and Faculty Qualifications, Pre-Service Training, and In-Service Professional Development

The ITI teachers are directly recruited through a selection process involving written examinations and interviews.

The qualifications for the post are:

- Principal/Vice-Principal: Degree in Engineering with 5 years' experience or a Diploma in Engineering with 8 years' experience in the industry;
- Superintendent/Group Instructor: Diploma with 5 years' experience in the industry; and
- Instructors: National Trade Certificate/National Apprentice Certificate/Diploma in Engineering.

For the capacity building of skill trainers/ teachers, the following provisions are available:

- Training of trainers/ Crafts Instructor training for the potential and existing Instructors of Training Institutes in 27 trades with an annual intake capacity of 1,099 is offered at Five Advanced Training Institutes (ATIs) and One Central Instructor Training Institute at Chennai. The objective of the program is to train the trainers in imparting industrial skills and also up-to-date Training Methodology, who in turn would train semiskilled/ skilled manpower for the world of work. Apart from the above, 11 women-exclusive training institutes, National Vocational Training Institute (NVTI) For Women, at Noida, and 10 Regional Vocational Training Institutes (RVTI) also provide instructor training.

- In order to train a large number of instructors who have completed more than 5 years of services, a 3-month module covering the pedagogic aspect has been introduced in 11 institutes under DGE&T.

- The New Education Policy, 2020 has appropriately addressed the inadequate availability of teachers in the country including vocational teachers. The following provisions have been created:

- States/union territories have been urged to adopt innovative mechanisms to ensure access to an adequate number of resources, counselors/teachers teaching all subjects (including vocational subjects).

- The Policy notes the necessity to recruit an adequate number of teachers across subjects and recommends the sharing of teachers across schools in accordance with the grouping of school norms adopted by the state/union territories. Schools have also been encouraged to hire "master instructors" in various subjects who are local eminent persons or experts in traditional local arts, vocational crafts or entrepreneurship to benefit students and help preserve and promote local knowledge and professions.

- The Policy also envisions the establishment of the National Professional Standards for teachers by 2022 in consultation with various bodies/authorities, including expert bodies on Vocational Education. A new and comprehensive National Curriculum Framework for Teacher Education (NCFTE) will be established by 2021, which will take into account the requirements of the teacher education curriculum for Vocational Education. The NCFTE will be revised once every 5-10 years based on emerging needs in teacher education.

- The National Council for Vocational Education and Training will function as a professional standard-setting body for VE.

The India Labour Report (Teamlease & IIJT, 2009) confirms the skills-education mismatch which indicates that there is an incremental requirement for about 5.8 million teachers and trainers up until 2022.

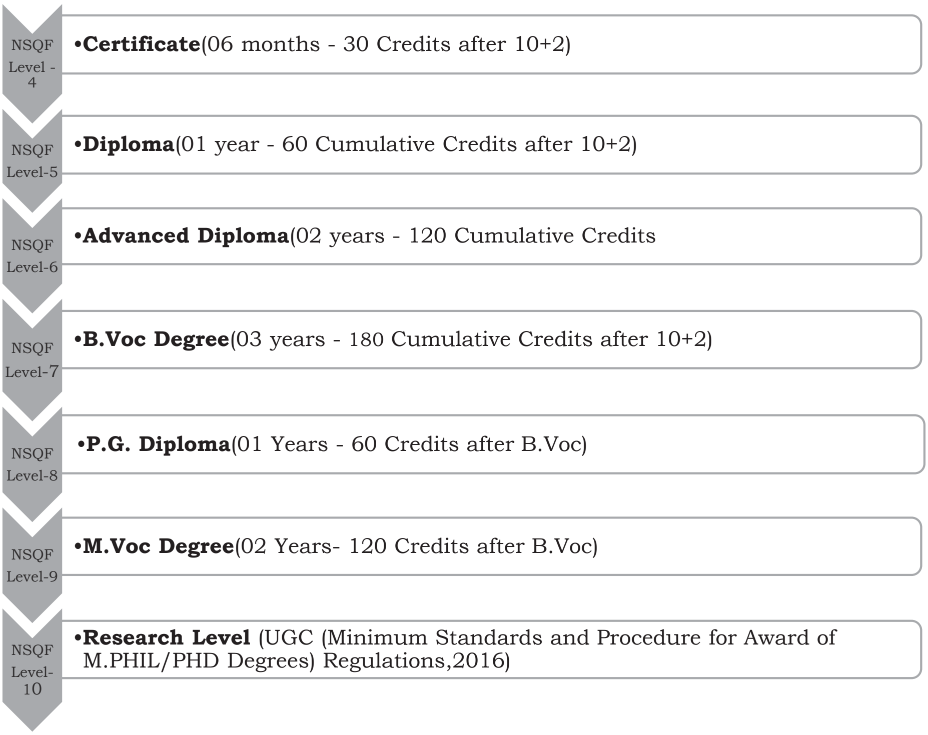
TVE Qualifications System and Quality Assurance

TVE Qualifications System and Framework National Skills Qualifications Framework (NSQF)

The National Skills Qualification Framework (NSQF) was notified through the Gazette of India Extraordinary, Part 1, Section 2 Ministry of Finance on December 27, 2013. It is a competency-based framework that categorizes all skill qualifications according to a sequence of levels of knowledge, skills, and aptitudes.

NSQF systematizes qualifications into 10 levels, with the entry-level being 1, and the highest level 10. The duration and credit requirement is presented in the illustration given below.

Figure 11 NSQF Level



The status of NSQF alignment of qualifications as of August 2019 was as follows (Ministry of Skill Development and Entreprenureship, 2020)

Table 4 Status of NSQF Alignment of Qualifications

No.	Submitting Body/Scheme	No. of Qualifications Aligned
1	Sector Skill Councils	2250
2	Directorate General of Training (DGT)	625
3	Central Ministries (Self Run courses) and Institutes	682 (677+5 for institutions)
4	State Governments	70
	Total	3627

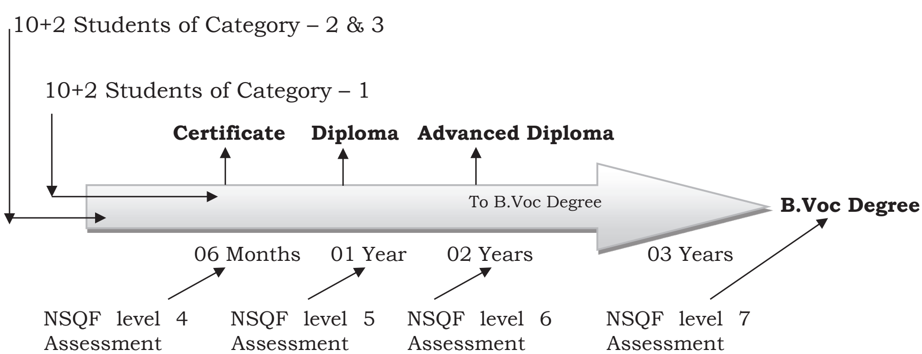
Source: Ministry of Skill Development and Entreprenureship, 2020.

Skill Assessment Matrix for Vocational Advancement of Youth (SAMVAY)

The Skill Assessment Matrix for Vocational Advancement of Youth (SAMVAY) is an effort to integrate skill and vocational training with mainstream education by promoting lateral and vertical mobility. This document supports the mobility of students between various levels of general education, community colleges, and Bachelor of Vocational Courses (B.Voc) run by polytechnics and colleges approved by UGC and AICTE. The highlights of the SAMVAY document are as follows:

An academic progression for the students in the vocational stream after the senior secondary level is illustrated in Figure 12 below.

Figure 12 Academic Progression for the Students in Vocational Stream after Senior Secondary Level



After successful completion of class 10 or Matriculation, one can join a Technical course in any ITI. In ITIs, some courses can be of 6 months, 9 months, 1 year or even 2 years, but the courses after which a 12th pass student is eligible for entering the engineering diploma, are of 2 years' duration. These students will also be considered equivalent to 12th Pass.

Quality Assurance System in Skilling

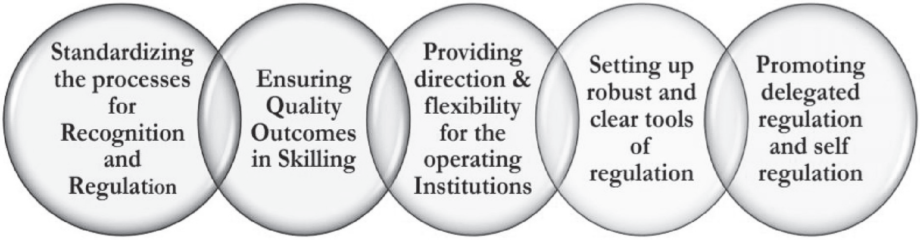
For the success of the National Skill Development Mission, it is crucial to create a quality assurance framework harmonized with global standards. UGC and AICTE being the regulatory bodies of higher education in the country are responsible for the approval of Vocational courses being offered in their affiliated institutions. AICTE has a strict approval process for approving running vocational courses in its affiliating institutions. The AICTE requirements include the availability of updated curricula, trainers, and infrastructure facilities in the institutes. UGC also provides funding for skill-based courses under various schemes to its affiliated institutions.

The State-level Directorate of Technical Education (DTEs) also plays an important role in the regulation of courses being offered by Polytechnics in the country.

Current Structure of Quality Assurance for Skill Education

As the earlier existing NSDA and NCVT were subsumed into the NCVET, the National Council for Vocational Education and Training (NCVET) became the nodal agency for setting policy and standards, and conducting assessment in the skill development system. Figure 13 presents the quality assurance system under NCVET.

Figure 13 Quality Assurance System Under NCVET



NCVET regulates the Awarding Bodies, Assessment Agencies, and Skill-related Information Providers.

National Quality Assurance Framework (NQAF)

The NQAF provides the benchmarks or quality criteria which the different organizations involved in education and training must meet to be accredited to provide education and training/skills activities. This applies to all organizations offering NSQF-compliant qualifications.

Current TVE Reforms and Policy Discussions

The National Education Policy (NEP) 2020: Re-imagination of Vocational Education for Building Competencies

The National Education Policy (NEP) 2020 of India paves the way for the transformational growth of vocational education in the country since it requires all educational institutions to integrate vocational education into their offerings. This will empower around 2,800,000 secondary and higher secondary schools and more than 40,000 higher education institutions to initiate Vocational Training on their premises.

To “overcome the social status hierarchy associated with vocational education,” integration of VE with mainstream education is proposed to be achieved in a “phased manner.” The aim is to increase the Gross Enrollment Ratio in higher education including vocational education from 26.3% (2018) to 50% by 2035.

Highlights of NEP 2020
School Education: • Universalization of education: target of 100% GER in school education by 2030. • Bring 20 million dropouts back through the open schooling system. • 5+3+3+4 curricular structure corresponding to ages 3-8, 8-11, 11-14, and 14-18 years respectively. • Vocational Education to start from Class 6 with Internships. • No language will be imposed on any student. • 360-degree Holistic Progress Card, tracking Student Progress • A new National Curriculum Framework for Teacher Education. **Higher Education** • GER to be raised to 50% by 2035 • Flexible curricula, integration of vocational education, and multiple entry and exit points with appropriate certification. • Academic Bank of Credits. • Multidisciplinary Education. • National Research Foundation. • Higher Education Commission of India as a single overarching umbrella body for entire higher education.

This mammoth task will be accomplished by "Starting with vocational exposure at middle and secondary school and incorporation of quality vocational education into the higher education system." As envisaged in NEP 2020, every child will learn "at least one vocational skill" and be "exposed to some more" during their school education. The strategy would be introduction of vocational courses in secondary schools "in a phased manner over the next decade" and setting up "skill labs" in collaboration with polytechnics and local industries. Vocational courses through online mode will also be offered.

Major Trends and Issues

Trends

Skilling is a Continuous Demand: Lifeline for Economic Growth of the Country

India has a potential demographic dividend, but the country at present is facing a dual challenge of scarcity of skilled manpower in jobs and low skill level of those who are presently in jobs. Vocational Education can be a game-changer to attain desired economic growth of the country. Strategically planned skill initiatives are needed at different levels.

However, despite phenomenal capabilities, India is seriously handicapped with only a 26% gross enrollment ratio at the Higher Education level. Therefore, the need of the hour is to convert the available human resource potential into a reality by escalating training opportunities for youth on a massive scale in diverse fields such as science, technology, engineering, architecture, management, etc. to reap the demographic dividend. Understanding this, in the Union Budget of 2021-22, the Government of India has taken several measures to ensure that Education, Research, and Skill development remain at the forefront of Government initiatives to boost the clarion call of Atmanirbhar Bharat or Self Reliance by the Honorable Prime Minister.

- School enrollments have increased but dropout rates remain high along with high NEET (Not in Education, Employment or Training) rates.
- Only 5% of the persons above 15 years of age are vocationally trained.
- 58% of formally trained persons are in salaried jobs and 55.6% of infor-

mally trained are self-employed.

Government Strongly Intends to Improve Vocational Education

- NEP envisages that 50% of the learners will receive vocational education in the next 5 years: National Education Policy (NEP) 2020 heralds the transformative growth of vocational education. The NEP necessitates all educational institutions to incorporate vocational education into their curricula. This will result in around 280,000 secondary and higher secondary schools and around 40,000 higher education institutions starting to provide TVET to millions of students.

- Skilling capacity (infrastructure and human resources) needs a boost in the country: The present Skilling Capacity of the country is 7 million. An additional skilling capacity of 5 million is needed, but this will depend on the creation of Skilling aspiration among the NEET/ Dropout and Upskilling/ reskilling among the existing workforce. However, mobilizing students in this segment can be a challenge and this is where State Skill Development Missions (SSDM) will play a significant role.

- The thrust towards Emerging Technologies: There is a newly developed thrust towards cutting-edge technologies in vocational education. Advanced skilling courses in the upcoming emerging sectors need to be designed. This will create highly skilled manpower ready for jobs, and industry will benefit from skilled manpower to improve productivity and global competitiveness. Setting up of world-class Centers of Excellence on New Emerging Technologies such as Core ICT; Artificial Intelligence; Data Science & Analysis; 3D Printing; Energy Storage Systems; Quantum Technologies; Cell & Gene Therapy, Gene Editing; etc. is also part of future strategies.

- Innovative approach in Vocational Education: One such example is The

Skill Development Institute (SDI) of Bhubaneswar managed by the Indian Oil Corporation Limited, under the aegis of the Ministry of Petroleum and Natural Gas. It is an example of research and technology-driven skilling through entrepreneurship and upskilling in trades related to hydrocarbons. It is also a one-of-its-kind skilling center which includes courses on industry 4.0 and the use of immersive technologies. The academy aims to train 50,000 students in the next few years.

- Another initiative is Future Skills Prime. It is a learning platform built by the government together with the IT Industry to re-skill and up-skill around four lakh professionals in the next three years with the objective of propelling India into a leadership position in the digital world.

- Setting up of Indian Institutes of Skills (IISs): At the post-secondary level, vocational education is typically provided by an institute of technology, or by a local community college. Setting up of Indian Institutes of Skills (IISs) is one such step to enhance training standards beyond the current programs available in the skill eco-system and to provide hands-on skills training to trainees in specialized areas in collaboration with industry, catering to local/ regional industry requirements.

- Knowledge Translational Clusters; Building Interdisciplinary Teams for Missions allied with SDG and national priorities.

- State-run Innovative School category: An initiative of the Skill division of CBSE. The requirement of such innovative schools is due to:

    - Change in Pedagogy structure and alignment with New Education Policy.
    - Considering the job market and portfolios in the future.
    - Needs-based specialized schools that could excel and innovate in specialized fields such as Sports, Arts, Skill Education, and Literature.
    - The combination of Skill and Academic subjects.

Vocational Education is Tightly Guided by Employment and Employability Trends (Wheebox, 2021)

- **The Future Job Demand:** The future job demand in areas like internet businesses, cloud computing, customer services, business analysis, business process outsourcing, design technology, and marketing are expected to increase.

- **Skills in Demand:** Soft Skills are vital. Some of the soft skills listed were Problem Solving, Communication, Active Learning, Resilience, Flexibility, Digital Dexterity, Analytical and Critical thinking, and Work Ethics.

- **Trending New Skills:** A survey on hiring intent also showcased the emergence of data analysis and cloud computing as key IT skills that are trending.

- **Skill Gap Analysis:** Data Science, Artificial Intelligence, and Natural Language Processing are the areas where the maximum skill gap was reported. There is growing demand for data analysts, cloud architects, network engineers, programmers, AI scientists, and ML experts.

- **The Employability of Women** in technical education was observed to be higher than that of males. This increase in the number of job-ready women is an opportunity to address the underlying social issues and create an option of economic upliftment of the Nation.

Vocational Education Faces the Emergence of a Skill Gap due to COVID-19

According to the data collected, the youth employability stood at 45.9% which is a little lower than the previous year due to the COVID-19 effect. The emergence of a skill gap due to COVID-19 has given rise to computer courses, language classes, and online skill assessments.

A positive hiring trend despite the global pandemic, especially in pharma & healthcare, engineering & manufacturing, and core & energy has been observed. It was reported that 47% of employers showed a positive hiring intent.

There has been a hiring Spree in the Pharma & Healthcare sector with an upward trend of 37%, followed by Engineering & Manufacturing with a 33% increment followed by the Core & Energy sector with a 30% uptrend in hiring. Through the last year, BFSI took the first position in hiring. In 2021, the informal sector is expected to hire more at 32% followed by logistics at 29%, BFSI standing at 27%, and IT industries at 25%.

Vocational Education is Expected to Contribute to the Economic Growth Projections

India is one of the fastest-growing economies of the world. The Government of India's Make in India and Atmanirbhar Bharat are key initiatives for sustaining this growth rate.

- 24 High-Growth Sectors and Manpower Requirements (2017-22)

The National Skill Development Corporation (NSDC) under the Ministry of Skill Development and Entrepreneurship commissioned the Human Resource Requirement Reports. The objective of these reports was to understand the incremental skill requirements across 24 high-priority sectors between 2013-17 and 2017-22. The report states that there will be a requirement of 109.73 million skilled manpower by 2022 across 24 key sectors.

Table 5 Incremental Human Resource Requirements Across Sectors by 2022

No.	Sector	Employment in 2013 (million)	Projected employment by 2022 (million)	The incremental requirement from 2013-2022 (million)
1	Auto and Auto Components	10.98	14.88	3.90
2	Beauty and Wellness	4.21	14.27	10.06
3	Food Processing	6.98	11.38	4.40
4	Media and Entertainment	0.40	1.30	0.90
5	Handlooms and Handicrafts	11.65	17.79	6.14
6	Leather and Leather Goods	3.09	6.81	3.72
7	Domestic Help	6.00	10.88	4.88
8	Gems & Jewelry	4.64	8.23	3.59
9	Telecommunication	2.08	4.16	2.08
10	Tourism, Hospitality and Travel	6.96	13.44	6.48
11	Furniture and Furnishing	4.11	11.29	7.18
12	Building, Construction, and Real Estate	45.42	76.55	31.13
13	IT and ITES	2.96	5.12	2.16
14	Construction Material and Building Hardware	8.30	11.00	2.70
15	Textile and Clothing	15.23	21.54	6.31
16	Healthcare	3.59	7.39	3.80
17	Security	7.00	11.83	4.83
18	Agriculture	240.40	215.60	-(24.8)
19	Education/ skill development	13.02	17.31	4.29
20	Transportation and Logistics	16.74	28.40	11.66
21	Electronic and IT Hardware	4.33	8.94	4.61
22	Pharma and Life Sciences	1.86	3.58	1.72
23	BFSI	2.55	4.25	1.70
24	Retail	38.60	55.95	17.35
	Total	461.10	581.89	120.79
	Removal of Duplication in Retail Sector	(10.37)	(21.43)	-(11.06)
	Total Requirement	**450.73**	**560.46**	**109.73**

Source: Skill Reporter, 2016.

The 24 key sectors, job roles in demand, and incremental human resource requirements have been assessed by NSDC. Therefore, a Skilling Roadmap is ready for the country which can be implemented after addressing some key issues.

Issues Impeding Growth of TVET in India

Given the current state of affairs and the future requirements, the challenges related to skill development in India are enormous. The major challenges are as follows:

Limited Participation of the Private Sector

This is the major reason for the inadequate size of the formally skilled workforce. The Industry-Academia collaboration is the key for developing a balance in demand and supply of skill education. The quality of training will also improve by bringing the industry's perspective on the skilling syllabus. The TVET system cannot be successful without the involvement of relevant industries at each level of the skill value chain.

Some of the Challenges that Defy VET

The low significance of vocational education courses to job market needs exists in India.

Inadequate Availability of Qualified Trainers

This is a major issue because mostly short-term/ contractual appointments take place, resulting in no job security. There is no provision for pre-teaching training of vocational teachers and limited opportunities for in-job capacity building.

Lesser Enrollment of Students in Vocational Education

The 12th Five-Year Plan (2012–2017) estimated that only a very small percentage of the Indian workforce in the age group of 19–24 (less than 5%) received formal vocational education, whereas in countries such as the USA the number is 52%, in Germany 75%, and South Korea it is as high as 96%. These numbers only underline the urgency of the need to hasten the spread of vocational education in India.

Lower Status Associated with Vocational Education

The skill development ecosystem in India is skewed towards a formal education system with limited vocational training because vocational education has been focusing on some specific trades such as automobile mechanics or welders and is therefore considered suitable for the lower social classes. As a result, it has attracted a sort of social stigma of blue-collar jobs.

The Industrial Training Institutes (ITI's) have Failed to Achieve Near-complete Admissions to Various Trades

Over the last 3 years, the enrolments in private ITIs have reduced drastically, further hampering their performance. Therefore, there is an imminent need for quality assessment of ITIs in the country.

Free Vertical/Horizontal Movement or Lack of Credit Framework

In General Education, vertical progression is possible, but in Technical Vocational Education & Training (TVET) this linkage is yet to be fully developed. For example, there is no system of integration between ITI and VE in higher secondary schools. Integration of ITI to Polytechnics is defined but hardly used. Some bridge courses are needed if a Diploma Vocational student wants to take admissions in the higher course in Engineering College, and lateral entry from VE to General Education is also not properly defined.

The Skill Development Structure is Quite Fragmented

It is fragmented and is spread across more than 20 Ministries/Departments without any strong monitoring mechanism to ensure convergence.

The Assessment and Certification Systems are not Harmonized/ Standardized

This makes them less acceptable to employers.

Aspirational Development among the Prospective Trainees and Employers is Missing

That is, the unavailability of updated curricula exists.

Conclusion

Skilling and Education are two pillars of economic and social development for any country. Stepping forward and expanding access to higher education and vocational training can enhance India's competitiveness in the global economy, thereby reinforcing the social and economic development of the country.

There is an imminent need for the fundamental transformation of Indian school education. The introduction of vocational education and skill development within the school system will help integrate the vocation education system with mainstream education. The NEP 2020 has recognized the same and reformed the whole education system for mainstreaming vocational education.

Industry Alignment and Accountability

There is an urgent need to bring industry alignment and accountability to the education system in the country. As technology changes very fast, there is an apparent gap between the education system and the skills required in the job world. Therefore, carefully structured skilling programs that prepare students to deal with real-world problems is an imminent need.

Quality Assurance in Vocational Education

Research is needed to take a more dynamic view of the qualitative aspects of TVET and to identify and evaluate the impacts of training, assessment, and outcomes in terms of access, equity, social cohesion, and social inclusion. Quality will have to be driven by the following dimensions at the level of each/individual institute/center:

- Strong Governance and Administration
- Adequate and quality faculty
- Updated industry-aligned curriculum
- Relevant infrastructure and training equipment.
- Science, Technology, and Innovation are driving the TVET system; therefore, institutions that could provide innovative ideas through research and development should be promoted by countries.
- Laboratories and workshops in TVET institutions should be equipped with modern equipment and technology to provide training in state-of-the-art technology.

Efforts are needed to ensure greater enrollment of girls/women and disadvantaged or marginalized groups, and especially persons with different abilities. As per ISR 2021, there is an increase in the number of job-ready women in the country. However, their enrolment in jobs is still very low. It is an opportunity to address the underlying social issues and create an option of economic upliftment of the nation through encouraging women's participation in the world of work.

International Harmonization

TVET in India should liaise with the national networks of other countries such as Australia, Germany, and France, and also with international networks such as VETNET.

Implementing Vocational Education in Schools

Vocational Education in schools should be enhanced, offering a channel for students to acquire skills, both core skills, and industry-specific skills during schooling.

Creating a Large Talent Pool Through Modular Employable Skills

The NEP framework provides a means for multiple-entry and multiple-exit skill development. It also introduced flexibility to offer short-term, needs-based courses with industry partnerships, and will help achieve the required scale in skill development.

Employing Technology to Achieve Scale

ICT-led interventions will help achieve scalability, standardization, and maximization of impact. ICT can play a role in the following areas:

- Certification and Assessment (through online tests, supporting current theory and practical tests)
- Centralized placement systems.

Formulation of Institutional Mechanisms for Content Formation, Delivery, and Assessment

As the demand for training grows, there will also be a cascading impact on the demand for content, standardized processes for training delivery, and uni-form assessment practices. This will necessitate the availability of trainers. Furthermore, there would be a need for quality systems formulation, quality assessment, quality certification/training processes, and certification with the growing demand for training. Therefore, institutional mechanisms of specifying quality and standards will be a must.

Expediting the Formulation of Sector Skill Councils

To ensure standards, industry involvement and industry-led initiative formulation of Sector Skills Councils will have to be expedited. The National Skill Development Policy (NSDP) has proposed the following roles for the Sector Skills Councils:

- Identification of skill development needs.
- Development of a sector skill development plan and maintaining skill inventory.
- Determining skills/competency standards and qualifications.
- Participation in affiliation, accreditation, examination, and certification.
- Plan and execute Training of Trainers.
- Promotion of academies of excellence.

Setting up of a National Human Resource Market Information System (A National Skill Exchange)

An ICT-enabled market information system will help both employers and employees provide details on specific industry demand, as well as the availability of the skilled workforce. This platform should be available for all skill levels including the higher skill levels.

The TVET situation in India is very promising due to various government initiatives including the skills development policy. Setting up of governing bodies such as the National Skills Development Corporation and Directorate General of Training at the central level has helped in the formulation of a robust ecosystem and policy framework. Though India is still a long way from achieving full enrolment in TVET and even secondary education, the introduction of the New Education Policy will transform its skilling sector and education system, and will take full advantage of its demographic dividend by improving the global competitiveness of its workforce.

References

Dar, A. (2008). *Skill development in India: The vocational education and training system (English)*. The World Bank. *http://documents.worldbank.org/curated/en/798621468041438738/Skill-development-in-India-the-vocational-education-and-training-system*

Gasskov, V., Aggarwal, A., Grover, A., Kumar, A., & Juneja, Q. L. (2003). *Industrial training institutes of India: the efficiency report.* ILO. *https://www.voced.edu.au/content/ngv%3A1141*

Keelery, S. (2021). *Number of mobile phone users in India from 2015 to 2018, with estimates until 2023*. Statista. https://www.statista.com/statistics/558610/number-of-mobile-internet-user-in-india/

Ministry of Education. (2019). *Dropout rate by gender, level of education and social category*. https://dashboard.udiseplus.gov.in/#/reportDashboard/sReport

Ministry of Labour & Employment. (2016). *Report on education, skill development and labour force 2015-16 (Vol. 3). https://cse.azimpremjiuniversity.edu.in/wp-content/uploads/2018/01/EUS_5th_2015-2016_Vol_3.pdf*

Ministry of Skill Development and Entrepreneurship. (2015). *NCVT MIS. https://www.ncvtmis.gov.in/Pages/ITI/Count.aspx*

Ministry of Skill Development and Entrepreneurship. (2020). *Annual report 2019-20. https://www.msde.gov.in/sites/default/files/2020-12/Annual%20Report%202019-20%20English.pdf*

NCAER. (2018). *Skilling India no time to lose*. https://www.ncaer.org/image/userfiles/file/SkillingIndiaOct2018/Skilling%20India%20presentation.pdf

OCED. (2017). *OECD economic survey, India 2017*. https://www.oecd.org/economy/surveys/INDIA-2017-OECD-economic-survey-overview.pdf

Office of the Registrar General & Census Commissioner. (2018). *Sample* *registration system statistical report 2018*. https://censusindia.gov.in/Vital_Statistics/SRS_Report_2018/SRS_Statistical_Report_2018.pdf

Skill Reporter. (2016). *24 sectors to require human resource of more than 500 million by 2022*. https://www.skillreporter.com/2016/03/news/nsdc/24-sectors-to-require-human-resource-of-more-than-500-million-by-2022/

TeamLease & IIJT. (2009). *India labour report 2009. https://www.teamleasegroup.com/sites/default/files/resources/teamlease_labourreport2009.pdf*

Wheebox. (2021). *India skill report 2021*. https://indiaeducationforum.org/pdf/ISR-2021.pdf

Abbreviations

AICTE	All India Council of Technical Education
ATIs	Advanced Training Institutes
ATS	Apprenticeship Training Scheme
AVTS	Advanced Vocational Training Scheme
B.Voc	Bachelor of Vocation
CBSE	Central Board of Secondary Education
CITS	Craft Instructor Training Scheme
CSA	Certified Skill Assessors
CTS	Craftsmen Training Scheme
CUTM	Centurion University of Technology and Management
D.Voc	Diploma of Vocation
DDU-GKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
DGE&T	Directorate General of Employment & Training
DGT	Directorate General for Training
DST	Dual System of Training
DTE	Directorate of Technical Education
DWCRA	Development of Women and Children in Rural Areas
HECI	Higher Education Commission of India
ICT	Information and Communication Technology
IIS	India Institute of Skills
IIT	Indian Institute of Technology
IRDP	Integrated Rural Development Programme
ITC	Industrial Training Centres
ITI	Industrial Training Institute
IT-ITES	Information technology-information technology enabled services
JRY	Jawahar Rozgar Yojana
KVIC	Khadi and Village Industries Commission
KVK	Krishi Vigyan Kendra

M.Voc	Master of Vocation
MES	Modular Employable Skills
MoE	Ministry of Education
MSDE	Ministry of Skill Development and Entrepreneurship
NAPS	National Apprenticeship Promotion Scheme
NATS	National Apprenticeship Training Scheme
NCERT	National Council of Educational Research and Training
NCF	National Curriculum Framework
NCTE	National Council for Teacher Education
NCVET	National Council for Vocational Education and Training
NCVT	National Council for Vocational Training
NEET	Not in Education, Employment or Training
NEP	National Education Policy
NETAP	National Employability through Apprenticeship Programme
NGOs	Non-Government Organizations
NIIT	National Institute of Information Technology
NIOS	National Institute of Open Schooling
NPSD	National Policy on Skill Development
NPSDE	National Policy for Skill Development and Entrepreneurship
NPTI	National Power Training Institute
NQAF	National Quality Assurance Framework
NQF	National Qualification Framework
NSDA	National Skill Development Agency
NSDC	National Skills Development Corporation
NSDM	National Skill Development Mission
NSQC	National Skill Qualification Committee
NSQF	National Skill Qualification Framework
NSTIs	National Skill Training Institutes
PG	Postgraduation
PMKK	Pradhan Mantri Kaushal Kendra
PPP	Public Private Partnership

PS	Principal Status
PSSCIVE	Pandit Sunderlal Sharma Central Institute of Vocational Education
QF	Qualification Framework
QPs	Qualification Packs
RDSDE	Regional Directorate of Skill Development and Entrepreneurship
RMSA	Rashtriya Madhyamik Shiksha Abhiyan
RVTIs	Regional Vocational Training Institute
SAMVAY	Skill Assessment Matrix for Vocational Advancement of Youth
SDI	Skill Development Initiative
SSCs	Sector Skill Councils
SSDM	State Skill Development Missions
STEP	Support to Training and Employment Programs
SVSU	Sri Vishwakarma Skill University
TE	Technical Education
TRYSEM	Training of Rural Youth for Self-employment
TVE	Technical & Vocational Education
TVET	Technical Vocational Education & Training
UG	Under Graduation
UGC	University Grant Commission
UTs	Union Territories
VE	Vocational Education
VHSE	Vocationalization of Higher Secondary Education

Technical and Vocational Education Trends and Issues in Indonesia

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Abstract

This chapter was written with the aim of providing a comprehensive overview and in-depth analysis of Technical and Vocational Education (TVE) in Indonesia. Particularly, this section describes formal TVE in Indonesia focusing on that offered at senior secondary and postsecondary level but below bachelor's degree, even though TVE in the country also covers higher levels up to doctorate level. The chapter explains where TVE is situated in the structure of the national education system, including important statistics, and expounds the strategy and policies guiding TVE in the country. The structure and the level of TVE programs is also categorized according to the International Standard Classification of Education, vis-à-vis the national qualification framework, and the ASEAN Qualification Reference Framework. The paper also elaborates the condition and quality of TVE institutions, the programs offered, and the performance of the graduates, especially in securing employment. The preparation of TVE teachers through pre-service education and improvement through in-service training is also explained to ensure that at the end they are qualified and certified. Considering the large number of secondary vocational schools, numbering more than 14,000 including public (government run) and private (non-government run) schools, the quality varies, and TVE is confronted by issues and challenges that are also listed in this chapter. At the end, the chapter explains trends and current policy reforms in addressing those issues and challenges and at the same time in seizing opportunities to capitalize on the demographic bonus whereby the population is dominated by young and productive citizens.

Keywords: technical and vocation education, trends, issues, policies, Indonesia

Introduction

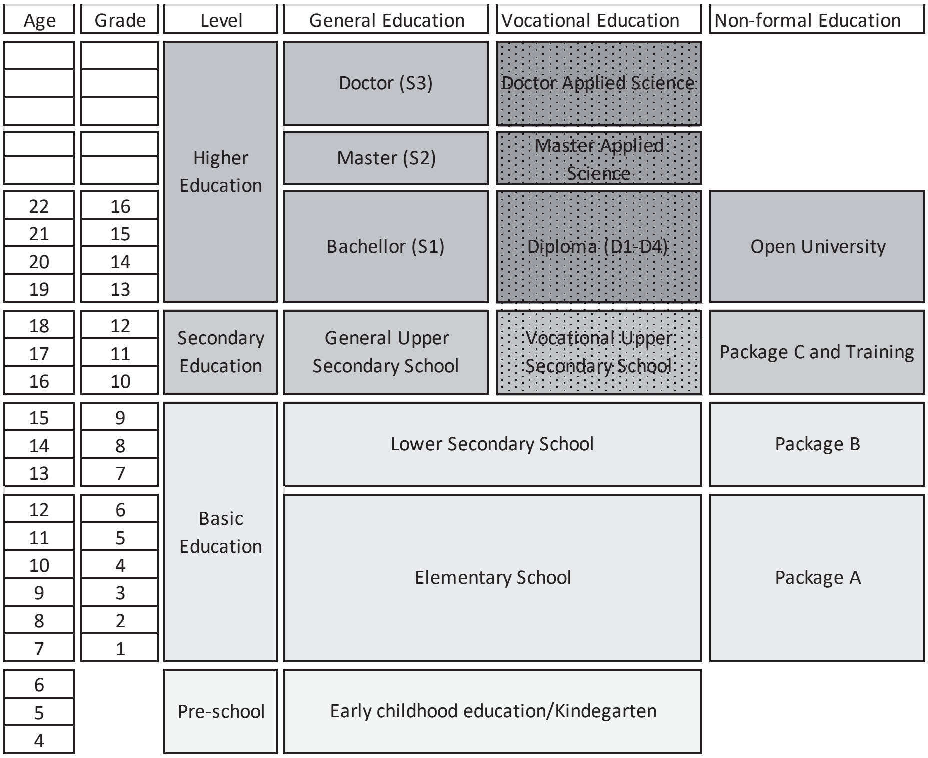
TVET in Indonesia

The Indonesian education system follows 6 years elementary/primary education, 3 years junior secondary, 3 years senior secondary, then postsecondary and higher education; see Figure 1. Formal technical and vocational education and training or TVET starts at senior secondary education level, age 16, and lasts for 3 to 4 years. For consistency, the term TVET here covers formal, non-formal and informal types of education and training, while TVE focuses only on formal type of schooling. For furthering their TVET, students may continue with diploma programs and applied degree or higher run by universities, colleges, academies, and polytechnics. Non-formal and informal TVET in the forms of short courses is available outside the schools, run by training centers and communities.

Several Ministries are responsible for TVET in Indonesia, but the most prominent are the Ministry of Education and Culture (MoEC) and the Ministry of Manpower and Transmigration (MoMT). The MoEC is responsible for planning and implementing educational services at primary, secondary, and tertiary levels. The MoEC carries out its functions to oversee Technical and Vocational Education and Training through the Directorate General for Vocational Education (*DG Pendidikan Vokasi*), the newly established Director General in December 2019. Before then, the Directorate of Secondary Vocational Education (*Direktorat Pembinaan Sekolah Menengah Kejuruan/Direktorat PSMK*) oversees the Technical and Vocational Education (TVE) at secondary level, while TVE at postsecondary and higher education levels is managed by the Directorate General for Higher Education. The new Directorate General for Vocation Education oversees Secondary Vocational Education run by Secondary Vocational Schools or *Sekolah Menengah Kejuruan (SMK)*, polytechnics and diploma programs, and applied degrees run by Community Colleges and universities, institutes, *sekolah tinggi* (higher institution), and academies

(UNISTA). The Ministry of Manpower and Transmigration (MoMT) is responsible for skills training centers or *Balai Latihan Kerja (BLK)* that prepare citizens (school leavers) for employment (SEAMEO VOCTECH, 2020).

Figure 1 Education System of Indonesia



Source: Ministry of Education and Culture, 2017.

In Figure 1, the shaded and dotted boxes represent TVE in the country. The formal TVE at secondary level, otherwise called Sekolah Menengah Kejuruan (SMK), runs for 3 years and produces graduates with a Level 2 qualification referring to the Indonesian Qualification Framework (IQF). The plan to extend the school duration from 3 years to 4 years or even 5 years of SMK is underway, and it will meet qualification Levels 3 and 4. The secondary vocational schools are under the auspices of the Ministry of Education and Culture, the Ministry of Religious Affairs, and the Ministry of Industry. The next level is the postsecondary level that produces diploma holders with qualification levels 3, 4, 5, and 6 according to IQF. TVE in Indonesia can go higher up to IQF levels 7 to 9 for those who pursue an applied Master's to Doctorate degree. Community colleges offer diplomas 1 and 2 which are equal to Levels 3 and 4 of IQF. Polytechnics, applied colleges, and academies offer diploma programs ranging from diploma 3 to diploma 4, and applied universities can offer applied programs up to Doctorate degree or level 9 of IQF.

TVE institutions comprise public (government) or private institutions. At all levels, private institutions are more than the public/government institutions. Private TVE institutions may seek support from the government in the form of seconded teachers or additional funding to run the TVE, normally through competitive grants.

Secondary Vocational Education. Secondary vocational education in Indonesia is offered at Secondary Vocational Schools or Vocational High Schools (*Sekolah Menengah Kejuruan/SMK*). According to Law Number 20 of 2013, Article 18 paragraph [3], SMK is a form of formal education unit that provides vocational education at the secondary education level as a continuation of SMP (Junior High School)/MTs (Islamic Junior High School) or other forms of equivalent or advanced learning outcomes that are recognized as equal/equivalent to SMP/MTs. Vocational education is secondary education that prepares students specially to work in certain fields (Law Number 20 of 2013, Elucidation of Article 15) (Direktorat Pembinaan SMK, 2020).

Considering the large size of the country, since 1999 the government of Indonesia has created a law (Law Number 22) about autonomy that was revised in 2004 (Law Number 32), and then in 2014 (Law Number 23). This has affected the educational management which is distributed into three levels: local (district or municipality), provincial, and national level. For secondary vocational education, the management affairs fall under the authority of the provincial government. The national curriculum of SMK is prepared by the national government, but adaptation is carried out at the provincial level to accommodate the needs of local industry. School accreditation is performed at the national bureau for accreditation, BANSMK.

SMK offers 3-year upper secondary vocation education which is equal to level 2 of IQF. Recently, the government announced extension of the 3-year SMK to 4 and 5 years to ensure that SMK graduates have the right level of competence to enter the labor market and have both education and career progressions (Direktorat Jenderal Pendidikan Vokasi, 2020a, 2020b).

Meanwhile, according to the Directorate General for Vocational Education, for 2020-2024 the government will facilitate the development of Centers of Excellence (CoE) in SMK. The foci of CoE are to help strengthen selected schools with industrial-based school learning management and improve the quality of teachers through the following target interventions: 1) Facilities; 2) Infrastructure; 3) Application of Industrial Learning; 4) Certification; and 5) Work Culture.

The largest population of Indonesia is on the islands of Java and Sumatra with the proportion of SMK on the two islands reaching 78%. Currently, the total number of SMK is 14,234 schools. The high number of SMKs in Java and Sumatra is due to the high number and growth of employment opportunities on the two islands as well as their demographic population (Direktorat Jenderal Pendidikan Vokasi, 2020b).

Community Colleges. The government started to establish 20 pilot community colleges (akademi komunitas) in several cities in Indonesia in 2012. These community colleges prepare vocational graduates at diploma levels 1 and 2 or equal to IQF Levels 3 and 4. The intakes of the community colleges are secondary education graduates who have not worked or who have worked but aspire to pursue further education. Secondary education graduates who come from low economic families can continue their education at higher education in their own regions.

Community colleges are established by considering the local economy of a region to meet the special needs of an area. The community colleges support the community by allowing local students to continue their education to the higher education level. Community colleges play an important role in fulfilling the social, economic, and cultural needs and potential of each region. In addition, the community colleges work with local industries in the regions to produce graduates who can work in local industries.

In 2019, the number of community colleges was 36 including public and private colleges (Direktorat Jenderal Pendidikan Vokasi, 2020a, 2020b). Based on the current website of Community Colleges, however the number of those listed is much higher, at 91 colleges (Kementerian Pendidikan dan Kebudayaan, 2021).

Polytechnics. Polytechnics offer applied higher education courses to strengthen vocational graduates at the diploma 3 (IQF Level 5), diploma 4 or applied undergraduate degree (IQF Level 6), and applied Master's and applied Doctorate levels (IQF Level 7-9). Polytechnic education was initially pioneered by the opening of the Swiss Mechanic Polytechnic in Bandung in 1976 which became the model for polytechnic education in Indonesia. Currently, there are 304 polytechnics including public and private institutions. Polytechnics in Indonesia are a form of higher education besides academies, institutes, colleges, and universities (Politeknik, 2020)

The main objective of establishing polytechnics in Indonesia is to produce graduates who have knowledge and skills in accordance with the qualifications required by industry, so polytechnic graduates have high competitiveness to get jobs. Polytechnic education is offered to meet the needs of the professional workforce in industry. In other words, polytechnics provide a professional education that is directed at preparing students for job readiness in certain skills. To achieve this goal, polytechnics provide adequate learning experience and training to build professional skills in the fields of science and technology (Politeknik, 2020).

Vocational schools at higher education institutions. In the past 10 years, many higher education institutions, that is, universities, institutes, *sekolah tinggi*, academies or *UNISTA*, have been strengthening their vocational programs by unifying all of the diploma and applied programs under one umbrella, called *sekolah vokasi* (vocational school) at higher education institutions. This type of vocational school is similar to polytechnics, except that this is under UNISTA. This *sekolah vokasi* offers diploma programs, Diploma 3 and Diploma 4, or even higher (applied Master's and applied Doctorate). In the Indonesian context, the term *kejuruan* is usually associated with vocational education at the secondary level, while the term *vokasi* is usually associated with vocational education at postsecondary and tertiary levels. Thus *sekolah vokasi*, which literally means vocational schools, is a vocational or applied school at a higher education institution that offers diploma level and higher level programs.

In 2017, there were 1,103 UNISTA in Indonesia that offered vocational diploma programs or applied programs at higher levels (diploma 3 and higher), excluding polytechnics (LLDIKTI Wilayah XII, 2019).

From vocational secondary to higher education levels, the Indonesian government takes major responsibility for TVE. The Ministry of Education and Culture has played a major role. Regardless of more private TVE institutions than the public or government sponsored institutions, the roles of the government are dominant. Thus, the TVE model in Indonesia falls under the school model where the government takes major responsibility for TVE with some lower degree of state-regulated market model where the government manages companies' involvement in training.

The Status of TVE in Indonesia

TVE Key Statistics

The government of Indonesia aimed at increasing the ratio between secondary vocational and technical education students and general education students to 70:30. During the academic year of 2019/2020, the number of secondary vocational education (SMK) students was 5,249,200 and that of secondary general education (SMA) students was 4,976,100 or (51:49). In the same academic year, the number of secondary vocational schools was 14,301 and that of secondary general schools was 13,939 (Kementerian Pendidikan dan Kebudayaan/Kemendikbud, 2020b). The number of secondary vocational schools, students, and teachers based on field of study can be seen in Table 1.

Table 1 The Number of Secondary Vocational Schools, Students, and Teachers by Field of Study

No	Field of Study	Vocational schools	Student	Teacher
1	Technology & Engineering	6,656	1,667,909	53,476
2	Business & Management	6,491	1,225,561	41,941
3	Information & Communication Technology	8,086	1,170,211	34,088
4	Tourism	2,325	417,382	13,230
5	Health and Social Services	1,743	208,522	8,462
6	Agribusiness & Agrotechnology	2,001	219,704	10,397
7	Maritime	873	88,876	5,157
8	Art & Creative Industry	505	66,670	3,131
9	Energy & Mining	189	14,551	584
	Total	14,252*	5,079,386**	170,466***

Note: * One school can have more than one field of study (Source: Kemendikbud, 2020b).
** Source: Kemendikbud, 2020b.
*** Source: Kemendikbud, 2020b.

The number of secondary vocational schools in Table 1 comprises 3,615 public (government) schools with 2,248,283 students (44%) and 10,637 private schools with 2,849,490 students (56%).

There are nine fields of study (*bidang keahlian*) being offered in SMK within which there are a number of study programs *(program keahlian*), with a total of 39. Under each study program, there is a list of skill competences (*kompetensi keahlian*), with a total of 146 (Direktorat Pendidikan Dasar dan Menengah, 2018).

Under Technology & Engineering, there are 13 study programs: *Teknik Elektronika* (electronics), *Teknik Ketenagalistrikan* (electrical), *Teknik Perkapalan* (shipping), *Teknologi Tekstil* (textiles), *Teknologi Pesawat Udara* (aircrafts), *Teknik Grafika* (graphics), *Teknik Otomotif* (automotive), *Teknik Mesin* (mechanical), *Teknik Konstruksi* (construction), *Poperti* (property), *Teknik Kimia* (chemistry), *Teknik Industri* (industrial engineering), and *Instrumental Industri* (instrumentation). Under Business and Management, there are four study programs: *Akuntansi dan Keuangan* (accounting and finance), *Bisnis dan Pemasaran* (business and marketing), *Manajemen Perkantoran* (office management), and *Logistik* (logistics). Under Information and Communication Technology there are two study programs: *Teknik Telekomunikasi* (telecommunication) and *Teknik Komputer Informatika* (computer informatics). Under Tourism there are four study programs: *Tata Kecantikan* (beauty), *Tata Busana* (clothing), *Kuliner* (culinary), and *Perhotelan dan Jasa Pariwisata* (hotel and tourism). Under Health and Social Services there are five study programs: *Pekerjaan Sosial* (social work), *Kesehatan Gigi* (dental health), *Teknologi Laboratorium Medik* (medical lab technology), *Keperawatan* (nursing), and *Farmasi* (pharmacy). Under Agribusiness and Agrotechnology there are six study programs: *Agribisnis Tanaman Pangan dan Holtikultura* (agribusiness of food crops and horticulture), *Agribusiness Tanaman Perkebunan* (agribusiness of plantation crops), *Pemuliaan and Perbenihan Tanaman* (plant breeding and seeds), *Lanskap dan Pertamanan* (landscape and gardening), *Produksi* *dan Pengolahan Perkebunan* (plantation production and processing), and *Agribisnis Organik Ekologi* (ecological organic agribusiness). Under Maritime there are four study programs: *Pelayaran Kapal Penangkap Ikan* (fishing vessel voyage), *Pelayaran Kapal Niaga* (merchant shipping), Perikanan (fishery), and *Pengolahan Hasil Perikanan* (processing of fishery products). Under Arts and Creative Industry there are eight study programs: *Seni Rupa* (arts), *Desain dan Produk Kreatif Kriya* (craft creative design and products), *Seni Musik* (music arts), *Seni Karawitan* (musicals), *Seni Pedalangan* (puppetry), *Seni Teater* (theater arts), and *Seni Broadcasting dan Film* (broadcasting and film). Under Energy and Mining there are three study programs: *Teknik Perminyakan* (oil engineering), *Geologi Pertambangan* (mining geology), and *Teknik Energi Terbarukan* (renewable energy). Considering the long list of skill competences, they are not listed here. This list can be found in the *Spektrum Keahlian SMK* on the Ministry of Education and Culture website at https://smk.kemdikbud.go.id/.

At the postsecondary level, this paper only focuses on community colleges, polytechnics, and sekolah vokasi under universities, institutes, colleges, *sekolah tinggi*, and academies (UNISTA). The majority of polytechnics offer vocational programs at diploma levels 3 to 4 (D3-D4), and community colleges offer lower diploma programs, at diploma levels 1 and 2. The applied programs at degree and post degree levels will not be covered in detail in this paper considering the difficulties of getting accurate data that clearly segregate between applied and academic programs.

Table 2 The Number of Postsecondary Vocational Institutions, Students, and Teachers

Postsecondary Vocational Education	Institution			Student**			Teacher/Lecturer		
	Public	Private	National*	Public	Private	National*	Public	Private	National*
Polytechnic	43	170	304	148,138	89,615	377,893	8,518	6,110	22,185
Community College	4	30	36	527	1,056	1679	46	83	147

*National includes those managed by the MoEC and other Ministries.
**Enrolled students in the 2019 academic year.
Source: Ministry of Research, Technology, and Higher Education. (2019).

Table 2 shows that there are more private polytechnics and community colleges than public (government). The number of private polytechnics was 170, while the number of public institutions was only 43. Similarly for Community Colleges, the number of private institutions was also more than the number of public ones, with 30 and 4 institutions respectively.

Interestingly, even though the number of private polytechnics is more than the public, the number of teachers/lecturers in private polytechnics is fewer than that of the public polytechnics (6,100 teachers vs. 8,518 teachers). This might be due to the overall number of students in private polytechnics being less than those of the public ones (89,615 students vs. 148,138 students). It can be concluded that private polytechnics on average are smaller than the public ones in terms of student population.

The number of s*ekolah vokasi* (higher level vocational schools run by various higher educational institutions) or UNISTA was 2,249 institutions with a total of 538,841 students (Direktorat Jenderal Pendidikan Vokasi, 2020a, 2020b). The data pertaining to vocational programs at UNISTA is very scattered and limited. The Directorate General for Vocational Education started to report the general data in this regard in 2020. There were no data on the number of lecturers or students by type of institution whether public or private. This information, however, is too important to ignore considering the large size of institutions, programs, and students in the sekolah vokasi. Similar to polytechnics, sekolah vokasi run TVE programs at diploma levels 3 and 4 (Applied Bachelor's degree), Applied Master's degree, and Applied Doctorate degree.

TVE Key Strategy and Policy Documents Which Guide the Current and Future TVE Practices

National government strategy and policy. Based on the President's policies to accelerate the development of excellent human resources 2020-2024, the following are key themes as guidelines, as summarized from *Rencana Pembangunan Jangka Menengah Nasional 2020-2024* (Medium Term of National Development Plan 2020-2024): (1) Character development: "Prioritizing character development and applying Pancasila (the Five Principles of Indonesian State philosophy)", (2) Technology empowerment: "Strengthening technology as a means of equity. Remote areas and big cities both get the same opportunities and supports for learning," (3) Investment and innovation: "Government policy must be conducive to mobilizing the private sector in order to increase investment in the education sector," (4) Labor market creation: "All government activities are oriented towards labor market creation. Prioritizing new and innovative approaches to vocational education and training," and (5) Deregulation and de-bureaucratization: Cut all regulations that impede innovations and investment" (Bakrun, 2020; Kementerian Perencanaan Pembangunan Nasional / Bappenas, 2021).

According to the National Mid-Term Development Plan 2020-2024, human development is conducted based on three pillars: (i) Basic Services and Social Protection, (ii) Productivity, and (iii) Character Building. The overarching objective is creating high-quality and competitive Indonesians. This National Mid-Term Development Plan provides the following policy directions:

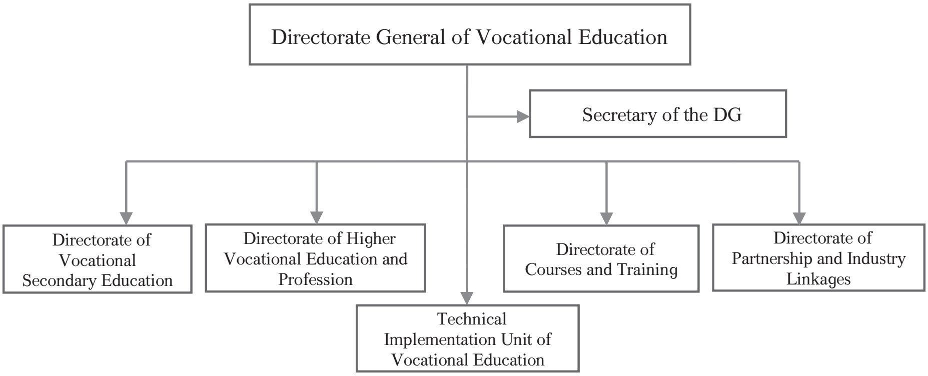
1. Controlling the population and strengthening population governance
2. Strengthening the implementation of social protection
3. Enhancing health services towards universal health coverage
4. Enhancing the distribution of quality education services
5. Enhancing the quality of children, girls, and youth
6. Poverty alleviation

7. Enhancing the productivity of competitiveness
8. Mental revolution and *Pancasila* ideology guidance
9. Increasing the enhancement and preservation of the culture
10. Strengthening religious moderation
11. Improving literacy, innovation, and creativity.

Ministry of Education and Culture's key strategies and policies. According to the Ministry of Education and Culture's Strategic Plan 2020-2024, four factors affect the development of human resources: (1) fast technological advancement, (2) socio-cultural shift, (3) environmental change, and (4) a different set of workplace skill competency requirements. In more detail, here are the explanations of each factor. First, technological advancement that drives the Industrial Revolution 4.0 together with the breakthroughs that accompany it affect all sectors of life. Around the world and in all industries, automation, artificial intelligence, big data, 3D printing, and so on are being applied. Connectivity between humans is also increasing, facilitated by technology, such as 5G connectivity which allows the emergence of autonomous vehicles and drone delivery. Second, in socio-cultural terms, there has been a shift in the demographics and socio-economic profiles of the world population. A growing number of people have a longer life expectancy and are therefore able to work for longer. Developing countries will experience increased migration, urbanization, cultural diversity, and a large middle class. The workforce will have increased flexibility and mobility, thus blurring the boundaries between work and daily life. Consumers will increasingly care about ethical, privacy, and health issues. Third, in the environmental sector, the need for energy and water will continue to rise, while natural resources will be depleted in the next 20 years. The use of alternative energy or clean energy will increase to counter the impacts of climate change and pollution. The efforts made to maintain environmental sustainability and overcome various environmental problems will also be even greater. Fourth, the future world of work will be very different from the present situation. The three major changes previously mentioned shape the world of work that is different in terms of structure, technology, and the concept of self-actualization. The work structure will be more flexible, there will be fewer geographic boundaries, and workers will not be tied to just one institution throughout their career. The number of freelance and temporary workers will grow rapidly. Workers of all ages can work together because life expectancy is getting longer, thus demanding respect for diverse backgrounds. Technology makes everyday work easier, but also requires the acquisition of new skills and knowledge. The workforce of the future is also better able to control the direction of their careers and seek personal satisfaction in their work. (Kementerian Pendidikan dan Kebudayaan, 2020c).

Directorate General for Vocational Education's strategies and policies. To enhance the governance of vocational education, the Directorate General for Vocational Education under the Ministry of Education and Culture was established on December 31, 2019. Before this, secondary vocational education was under the management of the Directorate of Secondary Vocational School Management (Direktorat PSMK) and at postsecondary level, community colleges and polytechnics were under the Directorate General of Higher Education. The current structure of the Directorate General of Vocational Education can be seen in Figure 2.

Figure 2 Organizational Structure of the Directorate General of Vocational Education



As stated in the 2021 Workplan of the Directorate General of Vocational Education, the development of Indonesia 2020-2024 is aimed at forming quality and competitive human resources, namely human resources who are healthy and intelligent, adaptive, innovative, skilled, of character, and can master science and technology. Mastery of this knowledge is evidenced by the competence of Higher Order Thinking with an emphasis on six main competencies (6C's), namely Communication, Collaboration, Compassion, Critical Thinking, Creative Thinking, and Computation Logic (Direktorat Jenderal Pendidikan Vokasi, 2020a).

The Directorate General for Vocational Education has developed a strategic plan for 2020-2024. The pillars for the strategic plan are the following: (1) Improving the quality of teachers/lecturers/instructors through enhancing the recruitment system and performance incentives, continuous professional development, mapping the need for vocational and technical teachers, creating learning platforms, and industrial attachment; (2) Developing a technology-based national education platform for improving pedagogy, assessment, and administration; (3) Providing incentives to industries, improving private sector's engagement, utilizing CSR (Corporate Social Responsibility), and tax incentives, (4) Encouraging school ownership and autonomy, industry involvement in curriculum development, and public-private partnership; (5) Improving national curriculum, pedagogy and assessment, content adjustment that focuses on industry needs and character development; (6) Simplifying mechanisms for accreditation; (7) Empowering local management, autonomy and transparency; and (8) World class higher education with a strong industry collaboration, global partnerships, center for excellence, and self-reliance (Direktorat Jenderal Pendidikan Vokasi, 2020b).

These pillars are then translated into these strategic goals: (1) Improve learning quality and relevance of vocational education at all levels: Yearly performance indicator (YPI) is to increase graduates' employment from 46.50% in 2019 to 52.60% in 2024. (2) Enhance the quality of TVET personnel at the level of vocational education: YPI is to increase the number of teachers with industrial experience from 10% in 2019 to 40% in 2024.

From these strategic goals, the target (*Sasaran Program*) and more detailed performance indicators (*Indikator Kinerja Sasaran*) are described in the Strategic Plan.

The Strategic Plan also explains policy and strategic direction, which considers the global trends in technological and industrial changes, socio-cultural and environmental aspects, and changes in workplace requirements.

The Directorate General of Vocational Education promotes “link and match” between vocational educational institutions and industry. This cooperation program between vocational schools and industry includes aligning education curricula with industrial needs, providing competency infrastructure, complementing minimum industry requirements, facilitating the provision of instructors and practitioners, industrial work practices and apprenticeships, as well as providing competency certificates (Bakrun, 2020).

“Vocational education in many regions must be linked to industries so that graduates match the demands, and are ready to face new development”

This is in response to the fact that reliable labor market information that is not yet available and low industry involvement has resulted in a mismatch between the provision of educational services, including vocational education and training. The study programs developed at the tertiary level of higher education also have not fully answered the potential and needs of the job market. Currently, students and university graduates are mostly dominated by social humanities study programs. Meanwhile, the number of students and graduates in the fields of science and engineering is still limited (Direktorat Jenderal Pendidikan Vokasi, 2020a, 2020b).

The development of vocational education is not only highly influenced by internal conditions, but also external conditions such as demography, socio-culture, environment, economy, technology, and politics. The image of TVE has improved gradually, but there are still perceptions that pursuing further education to TVE was not based on the first choice of the applicants and if it is the first choice, those choices are from students with low or mid economic background or those who are less academically inclined.

Open unemployment data of 2019 show that Vocational High Schools had the highest position at 10.42% unemployment rate, followed by Senior High School (SMA) graduates at 7.92%, Diploma I / II / III) 5.99%, University 5.67%, Junior High School (SMP) of 4.75% and the lowest open unemployment rate was those from the elementary level of education and below, which was 2.41%. In other words, there was a mismatch between the TVET graduates' competencies and the workplace requirements. (Direktorat Jenderal Pendidikan Vokasi, 2020a, 2020b).

The technology factor has also been considered by the government and this will affect TVE. The industrial revolution provides challenges and opportunities for future economic and skills development. In Indonesia, it is estimated that 51.8% of potential jobs will be lost. At the same time, new occupations will also be created; TVE programs must respond to and provide for these new jobs accordingly.

Pertaining to Indonesian demographics, the country will experience a peak demographic bonus/dividend in 2030. This means that the productive population (15-64 years) in 2030 will be bigger than the non-productive population (under 15 years and over 64 years). In the year of 2030, 64% of the total population (projected at 297 million) will be productive. This is a great opportunity for the country if the productive workforce has proper competences required to contribute to the new economy; otherwise these workers could be a burden for the nation (Direktorat Jenderal Pendidikan Vokasi, 2020b).

Revitalization of TVE also applies to the higher education level. The target is that up to 2024, there are several areas that will be revitalized, as follows: 1) vocational higher education will change to university level so that it will not only have flexibility in collaborating with various parties, especially industry but also for graduates who will be more competent; 2) human resource development will target not only lecturers, but also technicians and polytechnic directors and the heads of the departments; 3) involving industry intensively in vocational education; 4) developing institutional flexibility so that it can carry out better tasks; 5) making improvements to accreditation / certification; and 6) collaborating with industry in terms of training both in the context of curriculum development and apprenticeships.

Kampus Merdeka (Independence Campus) is one of the popular policies initiated by the Minister of Education and Culture. *Kampus Merdeka* means that every student enrolled in diploma 3 or degree programs has the right (not mandatory) to three semesters of study, work, and internship outside of campus. This program encourages students to undertake interdisciplinary study and have experience working in industry or in society. The list of activities that the students can take part in include lectures, responses and tutorials, seminars, practicums, studio practice, workshop practice, field practice, work practice, research, design, or development, military training, student exchange, internships, entrepreneur, and/or other forms of community service (Bandanadjaya, 2020).

Directorate of Secondary Vocational Education's strategy and policy. The general strategic objective of the Directorate of Secondary Vocational Education (PSMK) is to strengthen vocational education and life skills to produce a workforce that has personal attributes, basic skills, ICT competencies, and vocational skills, to support economic growth and national development. With this objective, the directorate has implemented the following strategies to achieve it:

- Encouraging SMK to partner with industry,
- Vocational school development and revitalization towards a Center of Excellence according to the focus of vocational revitalization,
- School management and accreditation by industry,
- Equipment assistance according to industry standards,
- Assisting the development of product and service,
- Facilitating the provincial government in organizing SMK, and
- Development of the character of the students

The Directorate of SMK also promotes the motto, "*SMK Hebat!*" meaning "SMK is Great!". The Directorate of PSMK shared Vocational Education Policies 2020: (1) Provide a pathway and link between training institutions, as well as recognition of prior learning for students and teachers: (a) Improve the quality, relevance, and efficiency of SMK through facility consolidation, improvement of school facilities, thorough teacher preparation and strengthening of school accountability, (b) Ensure that SMK provide advanced school graduates who have a strong foundation in basic skills, ICT, and vocational skills; (2) Improve the quality and relevance of training by recruiting industry experts in priority sectors as visiting teachers at SMK: (a) Increase the responsiveness and relevance of vocational education to economic development and market demand by strengthening government cooperation through ministries and industry, (b) Supporting character, religious, as well as citizenship and civil society through education in the family, as well as increasing community involvement in improving the quality of vocational education (Bakrun, 2020).

The Directorate of PSMK's Vocational Education Policies 2020, the Directorate General for Vocational Education (DGVE), developed the Strategic Plan 2020-2024. Together with the National Strategic Plan and the Ministry of Education and Culture's Strategic Plan 2020-2024, they are all significant documents in determining the current and future status of TVE in the country.

Students' Access to Quality TVE Programs and Their Achievements

After completing junior secondary school, graduates may continue their education at either general/academic senior high schools (SMA) or senior vocational high schools (SMK). They can also select to enroll in either public or private schools. As depicted in Table 2, there are more schools and students in private than in public vocational schools. The access to SMK for those living in cities or suburbs is considered sufficient, but those who live in remote areas or those with special abilities are still experiencing difficulties in finding suitable vocational schools. The more urgent issues are related to providing quality and relevant TVET (Sitorus, 2016). As many as 60% of SMK have yet to be accredited, 6% of SMK received C grade in accreditation, 20% received B, and 14% received A. There are many new private SMK establishments which did not meet the requirements for infrastructure, such as building facilities and equipment, and not having qualified teachers, or having irrelevant programs (Direktorat Jenderal Pendidikan Vokasi, 2020b).

There are numerous TVE programs offered at both secondary and postsecondary institutions. Secondary TVE programs in Indonesia are grouped under nine areas of study (*bidang keahlian*) as listed previously. Among these nine areas, the first three are the most popular among students (i.e., they have the highest enrollment): (1) Technology and Engineering (25.19%), (2) Information Technology and Communication (22.97%), and (3) Business and Management (22.72%) (Direktorat Jenderal Pendidikan Dasar dan Menengah, 2018).

Under areas of study, there are 49 specializations or areas of specialization/expertise (*program keahlian*), followed by 146 areas of competence (*kompetensi keahlian*). These TVE programs indicate that there are options for students to select based on their interest and that are relevant for employment at the national level. At the local level, however, the TVE program options may be limited due to some constraints of resources, meaning that the schools are not able to offer certain programs that students and industry require.

The number of *program studi* (study programs) of TVE at the higher education level is even higher. Based on the Politeknik website, the number of study programs offered at polytechnics is 253 (Politeknik, 2020). Considering the long list, those study programs are not listed in this chapter, but can be accessed at the Politeknik's website listed in the References.

Pertaining to graduates' employment, 42% of SMK graduates and 46.60% of postsecondary TVE were employed or were entrepreneurs within 1 year of graduation. Among those who were working, 64.28% received a salary as much as or above the minimum wage. Of those employed graduates from One-year Diploma (D1), Two-year Diploma (D2), and Three-year Diploma (D3), 53.98% received a salary equal to or 1.2 times the minimum wage. As many as 52.20% of D4 employed graduates received a salary equal to or 1.6 times the minimum wage. For those who completed short courses or training programmes, 53.90% had a job or were entrepreneurs (Direktorat Jenderal Pendidikan Vokasi, 2020b).

TVET Teachers and Faculty Qualifications, Pre-Service Training, and In-Service Professional Development

TVET teachers for secondary vocational and technical schools are trained at the universities that offer vocational and technical teacher education formerly known as the Institute of Teacher Training and Education (IKIP), the Faculty of Teaching and Educational Sciences (FKIP) under universities, and private STKIPs (Colleges of Teaching and Educational Sciences). In addition, Vocational Education Development Centers, now called P4TK (*Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan*/ Center for Development and Empowerment of Teachers and Education Personnel) are also in charge of providing in-service training for TVET teachers (Paryono, 2015).

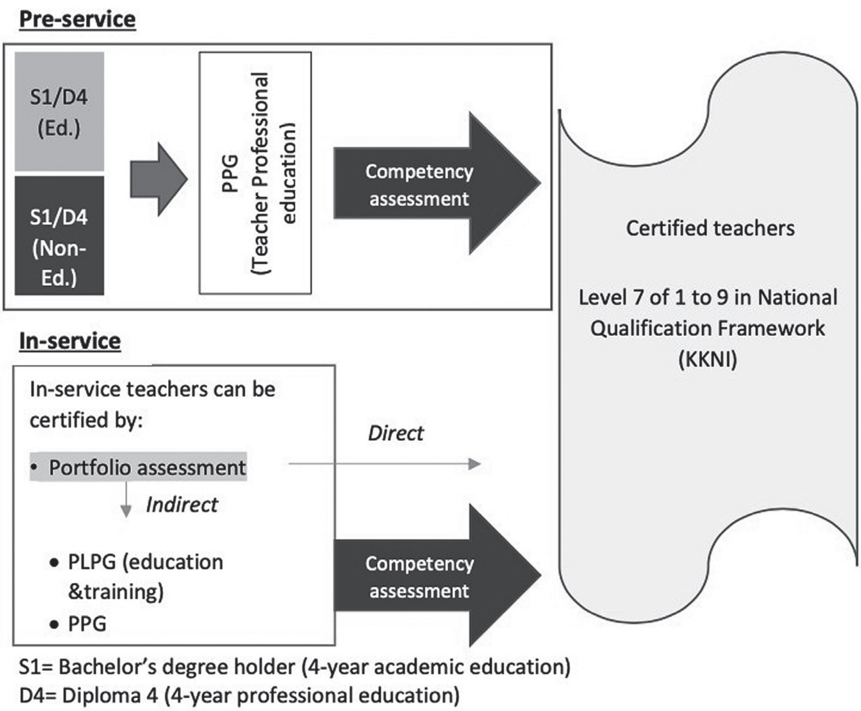
One of the current policies of TVET teacher education is teacher certification. The initiative is intended to ensure that the teachers have mastered the required competencies that lead to the improvement of the quality of education in Indonesia. It is carried out as an in-service program for teachers, and is expected to produce better quality education due to having professional teachers. The teacher certification process is conducted through (1) the direct provision of the certificate, (2) portfolio assessment, (3) education and training of the teacher (PLPG), and (4) teacher professional education (PPG). The teachers are free to select the route they prefer considering their capability and capacity. Starting from the year 2011, the implementation of the in-service teacher certification is recommended to be education and training (PLPG) without neglecting the willingness of the teachers to take direct provision and portfolio assessment with certain requirements. In addition, a collaborative Teacher Professional Education (PPG) program is being initiated for pre-service teachers of vocational high schools (see Figure 3).

According to Law Number 14 (2005), general requirements for becoming a teacher in Indonesia include completing a 4-year university degree or 4 years of higher education, obtaining a teacher certificate, and demonstrating professional, pedagogical, personal, and social competencies. Similarly, the *Peraturan Menteri Pendidikan Nasional No. 16 Tahun 2007* [Ministry of National Education's Regulation No. 16 Year of 2007] stipulates that educational qualification to be teachers at primary schools and secondary schools, including SMK, is Diploma 4 (D4) or degree (S1).

Under the Teacher Professional Education Programme (PPG), the graduates from D4 or Bachelor (S-1) may pursue one to two semesters of teacher education and training. For those graduated from non- pedagogic programs (*non-kependidikan*) in the areas not offered by LPTK, they may pursue the teaching profession through PPG with an additional one to two semesters of teacher education and training. The model for PPG is represented by the process and product components of education. The process of education takes two semesters, one for strengthening pedagogic (including practice teaching workshops) and relevant technical/vocational competencies, and the second semester for practice teaching. The students then take a competency assessment to qualify for two certificates: a teaching certificate and a vocational/technical expertise certificate.

Based on December 2019 data, 28.49% of SMK teachers had a professional certificate, which was the lowest compared to those of other teachers such as 45.77% of certified primary school teachers, 48.44% of certified junior secondary school teachers, and 41.09% of certified general high school teachers. (Jayani, 2019)

Figure 3 Pre-Service and In-Service Vocational Teacher Education in Indonesia



Source: Hanafi, 2012; Nurlaela, 2014.

According to the Directorate General for Vocational Education, SMK still needs more teachers. Up to 2019, 31% were adaptive teachers (those teaching basic competencies such as mathematics, chemistry, and biology), 29% were normative teachers (those teaching languages and guidance/counseling), and 40% were productive teachers (those teaching vocational and technical course subjects such as technical, agriculture, and science) (Direktorat Jenderal Pendidikan Vokasi, 2020b).

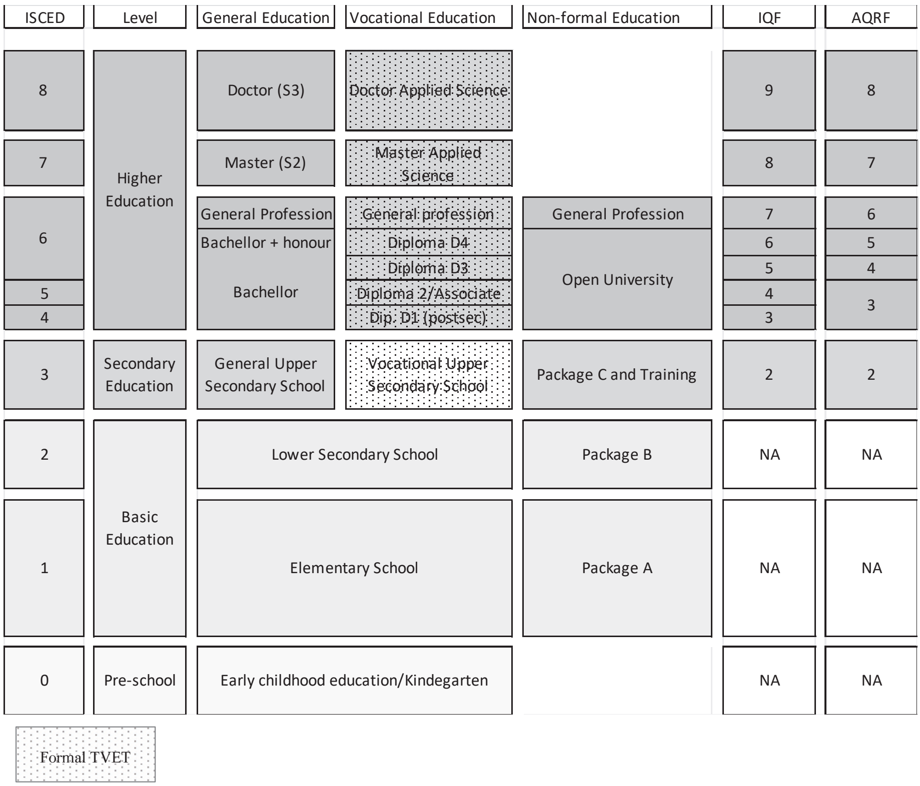
Looking at student-teacher ratios, in the academic year 2019/2020, SMK had a student-teacher ratio of 17—including school principals, which ideally should be 15, meaning one teacher per 15 students (Kementerian Pendidikan dan Kebudayaan, 2020b).

At postsecondary and tertiary level, community colleges have a low student-teacher ratio of 11 for national, 11 for public, and 12 for private colleges. Polytechnics have a student-teacher ratio of 17 for national, 17 for public, and 15 for private polytechnics. These student-teacher ratios are derived from Table 2.

TVE Qualifications System and Quality Assurance such as the TVE Qualifications System in NQF, TVE Institutional and Program Accreditation

The TVET qualifications system follows the Indonesia Qualification Framework (IQF) which has nine levels, compared to eight levels of the ASEAN Qualification Reference Framework (AQRF), and eight levels of the International Standard Classification of Education (ISCED). To place them in the context of Indonesia's Education System, the link between IQF, AQRF, and ISCED in the Indonesian context is illustrated in Figure 4.

Figure 4 Mapping the Education System onto ISCED, IQF, and AQRF



Source: Improvised from Kementerian Pendidikan dan Kebudayaan, 2020a.

Figure 4 shows that the only difference pertaining to the leveling qualifications under AQRF and IQF is that level 3 of AQRF is equated with levels 3 and 4 of IQF. The rest are very similar. Considering that both AQRF and IQF were developed based on skill competence and there was no formal education that prepared skill competence below senior secondary level (SMK), Level 1 is not applicable through formal education, but can be filled by those completing short training programs and those with work experience.

IQF Level 7 is equated with postgraduate professional education required to enter certain professions such as accountants, tax consultants, pharmacists, medical doctors, nurses, engineers, teachers, counsellors, architects, and so forth.

Accreditation of secondary vocational schools is carried out by the National Accreditation Body for Secondary Education (BANSM). Accreditation criteria generally refer to national standards of education and specifically focus on the standard of content and process, graduates' competencies, personnel, infrastructure (facilities, equipment, learning resources), management, finance/ operational cost, and evaluation/assessment.

Referring to accreditation criteria, secondary vocational schools are given a score or grade as the result of the accreditation. Grade A is Extraordinary or the highest with a score of 91-100; B is Good with a score of 81-90, and C is Ordinary with a score of 71-80. Below C is considered as not meeting the standard of accreditation and is grouped under non-accredited schools. Those who received D (unsatisfactory) are those with a score of 61-70, and E (very unsatisfactory) are those with a score of 0-60. Based on these groupings, the results of 2019 accreditation for SMK (secondary vocational schools) are presented in Table 3.

Table 3 Number of Secondary Vocational Schools by Accreditation Attainment

Accreditation	A	B	C	Non- accredited schools or Yet to be accredited	Total
Secondary Vocational Schools (SMK)	1,998 (14%)	2,815 (20%)	810 (6%)	8,661 (60%)	14.284 (100%)

Note: Direktorat Jenderal Pendidikan Vokasi (Dirjen Vokasi), 2020b.

Table 3 shows that there was diverse quality of secondary vocational schools in the country and the number of SMK that were not accredited was more than half, showing quality concerns that require serious attention. There have been numerous openings of new private vocational schools that are yet to meet the requirements, especially in terms of facilities and equipment as well as teachers (Dirjen Vokasi, 2020b). There are no statistics found on the results of accreditation of polytechnics and community colleges, as well as *sekolah vokasi* run by UNISTA in the country.

Accreditation for higher level TVE programs is performed by *Badan Akreditasi Nasional Perguruan Tinggi (BAN-PT)* (the National Accreditation Bureau for Higher Education Institutions). Based on data provided by the Ministry of Education and Culture, the achievement of a minimum accredited study program B in 2015 was 52.64% of the total study program. In 2019, the achievement of accreditation had reached 68%, far above the Ministry of Education and Culture's Strategic Plan target of 46% (Kementerian Pendidikan dan Kebudayaan, 2020c). No segregated data were found that could pinpoint the accreditation results for diploma and applied programs.

Current TVE Reforms and Policy Discussions

The most recent and significant reform on TVET in Indonesia began in 2016, and is called Revitalization of TVET, including TVET at the secondary and postsecondary levels. As mandated by Presidential Instruction No.9, 2016 on the Revitalization of Vocational Secondary Schools, the aim is to improve the quality and competitiveness of Indonesian human resources. Concerned ministries are to take steps in order to support government policy to improve vocational schools through the following initiatives: (1) creating a road map for vocational education development, (2) curriculum development and alignment, (3) innovation to fulfill and increase the professionalism of teachers and staff, (4) school cooperation with business, industry, and universities, (5) improving access to vocational graduate certification and vocational education accreditation, and (6) forming a vocational education development working group.

To strengthen TVET and the link between secondary, postsecondary level, and industry, as well as to address high unemployment among secondary vocational school graduates, the government of Indonesia created a new Directorate

General for Vocational Education on December 31, 2019. Previously, secondary TVET was under the Directorate of Vocational Education and polytechnics were under the Directorate General for Higher Education.

Under the Directorate General for Vocational Education, there are strategic pillars that guide the policy development and program implementation. Those strategic pillars have been enlisted and explained in the previous section. From these pillars, the Directorate General developed strategic targets as performance indicators covering the following: (1) Policy directions and strategies to achieve strategic goals of strategic objectives for supporting *Nawacita* (the nine agendas of the President) by way of improving the quality of learning and education relevance across the network through (a) Increasing the number of vocational education and training graduates who obtain employment and become entrepreneurs within 1 year of graduation; (b) Increasing industrial standard vocational education; (c) The realization of quality and industrial standard vocational higher education; (d) The realization of vocational training in accordance with industry needs and standards; (e) The realization of quality management and governance of the Directorate General for Vocational Education; and (2) Increasing the quality of educators and educational personnel at all levels (Direktorat Jenderal Pendidikan Tinggi, 2020).

On June 10, 2020, the Minister of Education and Culture through the Directorate General for Vocational Education announced a gradual extension of secondary vocational schools from 3 years to 4 years to improve the graduate readiness for employment. The graduates from the 4-year vocational education (SMK) will receive diploma 1 or 2 (Antara News, 2020).

The above examples of TVE reforms indicate that the government is the major player in TVE in Indonesia. Even though there is participation from the community and industry in the form of establishing private TVE institutions, overall TVE development is considered as the government's responsibility as part of its responsibility for preparing the future workforce.

Trends and Issues in TVE

Trends

Based on the country profile of Indonesia published at SEA-VET.net, the following are the trends of TVE in Indonesia:

Shifting the Vocational Education Paradigm

Lately, there has been a shift from a supply-based to a demand-based TVET system that is responsive to the needs of the labor market. The government is encouraging TVET providers to equip students with skills, and especially 21st century skills, to enable them to become more employable after their graduation. With the new Directorate General for Vocational Education, it is expected that collaboration with the private sectors will improve with the "link and match" initiative where every TVE institution must find industry partners.

Emphasizing Practical Skills over Knowledge Only (Theoretical)

Due to skills gaps and mismatches in the competences provided by TVET institutions and those required by industry, the Indonesian government (through the MoEC) is prioritizing skills over knowledge as a new education goal. This entails application of demand-driven curricula, involvement of industrial partners in conducting TVET activities such as curriculum synchronization, certification, and assessment of students. TVET institutions are encouraged to have a "teaching factory" where students can have "real" experiences of working in industry by having an industry-like setting in the school.

Prioritizing Skills Development in Economically Vibrant Industry Sectors and Occupations

The Government has identified key sectors and occupations to boost the economy, reduce imports, and increase exports. These include real estate, e-commerce, food security, and cash crops (for boosting exports), and engineering and manufacturing (lean manufacturing, ship building, infrastructure, textiles, fashion, and industry). In addition, other strategic sectors include food and beverages, steel, mining, transportation services, ICT, cyber security, accounting and finance, marketing and sales, procurement and supply chain, and health and life sciences. The digital sector is witnessing rapid growth. All of these fields call for the development of new skills through programs offered at TVE (SMK and polytechnics) in the country.

Increasing the Ratio between the Enrollment in Vocational Education and in General Education

A few years back, the share of enrolment of students in general education was larger than that of vocational education (70:30). However, due to the demand for more human resources with relevant skills and competences, the government has been shifting the ratio of enrollment to vocational high school (SMK) over general education, to 30:70 respectively. In support of this, more vocational high schools (SMK) are being established. During the academic year of 2019/2020, the ratio between students enrolled in secondary vocational schools and general high schools was 51:49 (Ministry of Education and Culture, 2020).

Increasing Popularity of TVE at the Higher Education Level

Since the introduction about 10 years ago of sekolah vokasi, which is a school or faculty at a university, institute, or an academy (UNISTA) dedicated to managing diplomas 3 and 4 and applied programs for degree and above, higher level TVE has been gaining in popularity. This trend will complement polytechnics and community colleges in preparation for a higher level workforce in the country.

Issues and Challenges

TVE in Indonesia has shown significant progress pertaining to students' enrollment and to a certain degree its image in society. Nevertheless, there are salient issues that require mitigation. Among them are quality disparity among TVE institutions, unemployment of TVE graduates, and fragmentation of TVE management. TVE institutions are facing various challenges in producing qualified and relevant graduates, such as lacking labor market information, the quality and number of teachers who train technical and vocational subjects, and limited resources and facilities in rural private secondary schools, especially those that are yet to be accredited. The following are the descriptions of these issues and changes.

1. Quality gaps of TVE institutions. With more than 60% of 14,284 secondary vocational schools not having or yet to be accredited (DJPV, 2020); this shows that the majority of TVE institutions are still below standard. This is a serious concern considering that TVE is in the forefront for preparing a skilled workforce. A concerted effort from the government, the private sector, and the community is needed to address this issue. Some initiatives could be introduced such as more stringent regulation for opening new schools and more private sector and government supports for the existing schools.

2. Unemployment. The unemployment of TVE graduates was still high in the past 4 years even though it showed some improvement: 9.84% in February 2016, 9.27% in February 2017, 8.92% in February 2018, and 8.63% in February 2019 (Direktorat Jenderal Pendidikan Vokasi, 2020a). This unemployment issue could be due to the mismatch between supply and demand. The number of TVE graduates could far exceed what the economy can absorb, and the areas of TVE graduates' specialization may not match the requirements of industry. Examining and synchronizing the link between the economy, employment, and TVE is needed.

3. Fragmentation of TVET management. In Indonesia, there are several ministries in charge of TVET. Among them are the Ministry of Education and Culture, the Ministry of Industry, the Ministry of Manpower, and the Coordinator Ministry of Human Resource Development and Culture. Coordination through signing a Memorandum of Understanding was undertaken in 2016, but real policy and program synchronization may take time to take place. Even within one ministry, the link between departments or divisions is still lacking.

From SEA-VET.net and UNESCO UNEVOC TVET country profiles, there are some salient challenges raised. Among them are the following:

4. The quality of TVET graduates is still low and does not meet the industry demands and competences. This problem is exacerbated by skills mismatch due to, among others, limited information of the labor market. As a result, the unemployment rate of SMK graduates continues to remain high in comparison with other education levels. A well-established quality apprenticeship model with industries (which is still currently missing) can help address this problem. A dual VET System, such as that in Germany, could be a good solution for bridging the skill mismatch between vocational schools and industry.

5. The quality of TVET teachers has been one of the major challenges affecting the quality of TVET graduates. Many TVET teachers do not meet the required qualifications as indicated in Law No 14 of 20056 and No 74 of 200840 about teachers and lecturers. Many of them lack industry experience and certification that makes them incompetent in their fields of teaching. Many of them do not even have a strong background in the technical and vocational areas that they teach due to conversation from general subject teachers. Many general subject teachers, such as those teaching language, mathematics, and physics are assigned to teach technical and vocational subjects with limited

training, thus their competences in teaching these technical and vocational skills are still questionable.

6. Learning infrastructure and facilities including training equipment are inadequate, obsolete, and oftentimes not in line with the new and changing requirements of TVET institutions. Due to the high cost involved in buying such equipment, SMKs are unable to simulate real work environments in classrooms, which in turn affects teaching quality and outcomes. To overcome this, SMKs are forging institutional partnerships with industry to improve equipment; however, sometimes such cooperation is unsuccessful due to administrative and financial constraints.

7. Matching standards and certification towards mutual recognition of TVET graduates, as well as industry certifications and occupational standards, are key to improving the quality of TVET institutions. Many industries have yet to fully accept this because of the perceived high costs associated with certification and disruption in business operations anticipated due to integration of school activities. With the central and local governments allocating only a small budget for subsidies for quality assurance, incentives for motivating industries to engage in quality assurance for TVET are limited.

8. *Kampus Merdeka-Merdeka Belajar* (literally means Independence Campus-Learning Independence) is an excellent opportunity for diploma and degree students to learn independently outside campus so that they can strengthen their interdisciplinary subjects and have a real working experience. This excellent idea, however, creates a number of issues in the implementation if no proper planning takes place. Three semesters are a significant duration within the total study duration to complete a degree program, which normally takes 4 years. If the planning and implementation are not properly executed, students may

waste their precious time and may fail to achieve their learning objectives.

9. There is a need for better coordination among TVE providers. TVE providers at secondary level should have a strong link and coordination with TVE providers at the higher level, such as those running community colleges, polytechnics, and UNISTA. At the higher level TVE, considering that graduates from community colleges may continue their education to polytechnics or UNISTA, coordination and links among these TVE providers also need strengthening.

Conclusion

TVE in Indonesia has progressed very significantly regardless of persistent issues and challenges faced by the institutions as well as the government in managing the education that in the end also affects the transition of graduates from school to work. In terms of number, TVE institutions at secondary level have increased tremendously, even more than for the general schools. Members of society are more willing for their children to enroll in technical and vocational schools than before. TVE programs are continuously expanding in response to industry needs and students' interests. TVE teachers are more motivated and have better qualifications than before due to better recognition in the form of financial incentives. There are many more accomplishments of TVE in the country due to serious efforts and commitment by TVE stakeholders led by the government. Nevertheless, certain issues and challenges persist; among which are the quality gap among TVE institutions, graduates' unemployment, fragmented management, and the mismatch between graduates' competences and industry requirements.

TVE reforms have taken place by way of restructuring the TVE management as well as creating policies to encourage school-industry collaboration, increase access to TVE, and most importantly TVET revitalization as mandated by the President. Emboldening TVE management by creating a Directorate General position under the Ministry of Education is expected to address TVE issues and challenges, especially on quality and relevance of TVE graduates as well as improving their employment after graduation. “Link and Match” that was popular in 1994 has been re-energized through a “mass wedding” between TVE institutions and industry partners. The Directorate General of Vocational Education and the Directorate of Secondary Vocational Education also introduce SMK-4 years, instead of 3 years to improve graduates’ work readiness and to enhance their competences.

TVE at the higher education level focusing on diploma programs and Applied Bachelor’s, Master’s, and Doctorate degrees, especially run by universities are gaining in popularity. These programs together with those run by polytechnics and community colleges will be able to prepare the higher level skilled workforce that will be needed in the near future.

To accompany those policy reforms and efforts to enhance the quality and relevance of TVE with industry requirements, several aspects still need strengthening. Among them are labor market information (LMI), lifelong learning through recognition of prior learning, responsive TVE programs, and school-industry collaboration.

Employment of TVE graduates, whether working for others or self-employed, is an important criterion for a successful TVE program. Considering the high unemployment rate among TVE graduates in the past years, it is important for TVE policy makers and providers to find solutions by scrutinizing the supply and demand so that the mis-matches can be minimized. Knowing that TVE does not exist in a vacuum and must have a strong link with industry and economy, the analysis should go hand-in-hand and be holistic so that more comprehensive and effective policies can be created.

References

Antara News. (2020). *Kemendikbud jadikan SMK empat tahun atau setara diploma 1 atau 2 [Ministry of Education and Culture establishes 4 year secondary vocation schools that equals to Diploma 1 or 2]*. https://www.antaranews.com/berita/1545496/kemendikbud-jadikan-smk-empat-tahun-atau-setara-diploma-1-atau-2

Bakrun, M. (2020). *Vocational education policies 2020: TVET strategies for TVET 4.0*. A paper presented during 31st SEAMEO VOCTECH's Governing Board Meeting.

Bandanadjaya, B. (2020). *Program & kebijakan Direktorat Pendidikan Tinggi Vokasi & Profesi, Kemendikbud dalam penerapan kegiatan kampus merdeka – merdeka belajar [Programs & policies of the Directorate of Vocational & Professional Higher Education, Ministry of Education and Culture in implementing independent campus activities - independent learning]*. Delivered at Online Seminar on 04 July 2020 during Strategi Perguruan Tinggi / Program Studi Vokasi dalam Menghadapi Kebijakan Kampus Merdeka : Merdeka Belajar. http://lldikti6.id/wp-content/uploads/2020/07/08-Bahan-Dir-PTVP-Kemdikbud-01-KMMB-LLDIKTI-VI.pdf

Direktorat Jenderal Pendidikan Dasar dan Menengah. (2018). *Spektrum Keahlian SMK (Perdirjen Dikdasmen No. 06/D.D5/KK/2018 tanggal 7 Juni 2018).* https://smk.kemdikbud.go.id/konten/3818/spektrum-keahlian-smk-perdirjen-dikdasmen-no-06dd5kk2018-tanggal-7-juni-2018

Direktorat Jenderal Pendidikan Vokasi. (2020a). *Program Kerja Tahun 2021. [Workplan 2021].* https://vokasi.kemdikbud.go.id/storage/document/September2020/N9Fo3EIt50SkUGEye2In.pdf

Direktorat Jenderal Pendidikan Vokasi. (2020b). *Rencana strategies Directorat Jenderal Pendidian Vokasi 2020-2024 [Strategic Plan of the Directorate General for Vocational Education]*. https://www.vokasi.kemdikbud.go.id/storage/document/September2020/GLEp3oxkwFHYWbgNQ5sE.pdf

Direktorat Pembinaan SMK. (2021). *Definisi Sekolah Menengah Kejuruan [Definition of Secondary Vocational School]*. http://eksis.ditpsmk.net/artikel/definisi-smk-sekolah-menengah-kejuruan

Hanafi, I. (2012). *Teacher Certification Program in Indonesia: An Effort in Realizing a Qualified Vocational Education.* A country paper presented during the Experts Meeting organized by SEAMEO VOCTECH and UNESCO-UNEVOC in Conjunction with International Conference on The Excellence in Teacher Education and Research Innovation by Rajabhat Universities Network, Bangkok, Thailand, 25-28 December 2012.

Jayani, D. H. (2019). *Jumlah Guru yang Tersertifikasi Belum Sampai 50% [The number of teachers having professional certification not reaching 50%].* https://databoks.katadata.co.id/datapublish/2019/12/12/guru-sertifikasi-belum-sampai-50

Kementerian Pendidikan dan Kebudayaan. (2021). *Data Akademi Komunitas [Community Colleges Data]*. http://akademikomunitas.ristekdikti.go.id/akademi/index

Kementerian Pendidikan dan Kebudayaan. (2020a). *ASEAN Qualifications Reference Framework Referencing Report of Indonesia*. Komite Nasional Kualifikasi Indonesia.

Kementerian Pendidikan dan Kebudayaan. (2020b). *Data pokok pendidikan (Dapodik)[Base data on education]. Directorate General for Early Childhood, Primary and Secondary Education.* https://dapo.kemdikbud.go.id

Kementerian Pendidikan dan Kebudayaan. (2020c). *Rencana Strategis Kementerian Pendidikan dan Kebudayaan 2020-2024.[Strategic plan of the Ministry of Education and Culture 2020-2024]*. https://dikti.kemdikbud.go.id/wp-content/uploads/2020/10/RENSTRA-KEMENDIKBUD-full-version.pdf

Kementerian Perencanaan Pembangunan Nasional/Bappenas. (2021). *Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020-2024 [Midtern National Development Plan 2020-2024].* https://www.bappenas.go.id/id/berita-dan-siaran-pers/rencana-pembangunan-jangka-menengah-nasional-rpjmn-2020-2024/

LLDIKTI Wilayah XII. (2017). *Pendidikan tinggi vokasi cari bentuk – Jerman menawarkan dukungan [vocational higher education search models - Germany offers support]*. https://lldikti12.ristekdikti.go.id/2017/02/10/pendidikan-tinggi-vokasi-cari-bentuk-jerman-menawarkan-dukungan.html.

Ministry of Education and Culture. (2017). *Policy on TVET in Indonesia 2017*. Country report Indonesia, 3rd High Official Meeting on SEA-TVET, Kuala Lumpur, 23 – 25 May 2017. Directorate of Technical and Vocational Education Directorate General of Primary and Secondary Education.

Ministry of Research, Technology, and Higher Education. (2019). *Higher education statistics 2019*.

Nurlaela, L. (2014). *Model PPG Guru Vokasi (Models of Vocational Teacher Professional Education)*. Paper presented during 3rd International Conference on TVET, Universitas Pendidikan Indonesia, 12-15 November 2014.

Paryono, P. (2015). Approaches to preparing TVET teachers and instructors in ASEAN member coun- tries. In: *TVET*@Asia, issue 5, 1-27. http://www.tvet-online.asia/issue5/paryono_tvet5.pdf

Politeknik. (2020). *Selayang pandang politeknik [Polytechnic perspectives at a glance]*. Politeknik - Kementerian Pendidikan dan Kebudayaan Republik Indonesia. http://politeknik.or.id/detail/profil

SEAMEO VOCTECH. (2020). *SEA-VET.net country profile: Indonesia.* https://sea-vet.net/indonesia.

Sitorus, R. A. (2016). *Tantangan dan harapan pendidikan kejuruan di Indonesia dalam mewujudkan SMK yang memiliki daya saing ketenagakerjaan [Challenges and expectation of vocational education in Indonesia in meeting the workplace requirements]*. National best practice competition. http://simposium.gtk.kemdikbud.go.id/karya/files/tendik_1/RITAANDRIANISITORUS,S.Sos_16112016004200.pdf

Technical and Vocational Education Trends and Issues in Japan

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Abstract

This chapter clarifies the system characteristics of Japanese technical vocational education and training (hereafter called vocational education), and the current situation and reform trends and challenges faced by each vocational education institute from the perspective of comparative vocational education. The Japanese vocational education system is highly segmented and includes three subsystems: a broad, school-based vocational education system which is regulated by the Japanese Ministry of Education and complemented by in-company training; a narrow system that offers occupation-specific training and is supported by the national qualification or skill testing system; and a mixture of both the aforementioned systems. We mainly discuss three points regarding the current situation and trends of Japanese vocational education. First, all vocational education institutes shifted from the secondary level to the higher education level after the 1990s. Consequently, in 2019, a university and a college of applied sciences were started within the university system. Second, to address the institutes' didactical level, a Western model, particularly the German dual model, was gradually developed after the 2000s. The model is characterized as "a bridge between schools and companies in the process of curriculum transition of vocational education." Finally, a transparent quality assurance and qualification framework that does not depend on only school graduation certificates was developed. By this system construction, which is accompanied by some difficult conflicts and discussions, we position the equivalency of vocational education and academic education and the development of a special training college, which is the most important institute in the vocational education sector.

Keywords: Japanese style of vocational education, in-company training, internal labor market, dual vocational education, comparative vocational education

Introduction: Overview of Japanese Vocational Education

Vocational education in Japan has a complex meaning and the system is both pluralistic and segmented (Figure 1). According to the 2020 survey by the Ministry of Education, Culture, Sports, Science and Technology (abbreviated as MEXT), there are more than 20,000 elementary schools, 10,000 junior high schools, and 5,000 high schools (upper secondary schools) in Japan. Nine years of education (from the age of 6 to 15) is compulsory. More than 98% of junior high school graduates choose to go on to high schools. Generally, every prefecture (for public high schools) or educational corporation (for private high schools) requires students to take an entrance examination. In high schools, about 70% of the students tend to choose general courses. In addition, about half of all high school graduates enter universities or junior colleges, while 20% decide to work, and 30% will participate in various forms of vocational or training education.

Terminology of Vocational Education

In Japan, the term "vocational education" is generally used without adding the term "technical" (as in "technical and vocational education"). Vocational education is usually considered school-level vocational education under the jurisdiction of MEXT, and has been distinguished from vocational training. However, currently, vocational training is understood as a concept that includes educational training. Vocational education is officially defined as "education that fosters the knowledge, skills, abilities, and attitudes necessary to engage in a certain or a specific occupation" (The Central Council for Education's report on Career and Vocational Education, 2011, p. 16).

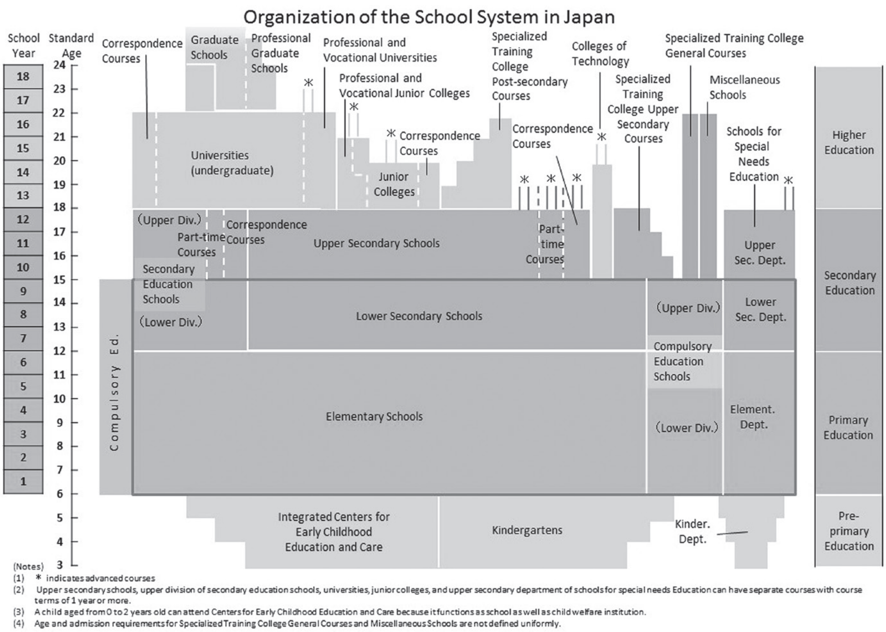
Vocational Education in the Broad Sense (Industrial Education)

Education in Japan is characterized by the existence of vocational education, which can be broadly referred to as "education to engage in a certain occupation," or basic vocational education, as described in the abovementioned official definition. Under vocational education, there are vocational departments of general high schools (3-year system), with most being stand-alone vocational high schools (referred to as specialized high schools since 1993), where vocational education is conducted with respect to specific industries, such as manufacturing, commerce, and so on, and is not restricted by profession or type of occupation. In relation to these, although they are substantively minor, there are comprehensive departments and high schools, which are "departments that provide general education and specialized education in a comprehensive manner as elective study" (Ministry of Education, Science, Sports and Culture, February 1993 notification). Intensive vocational education is not provided in these institutions; however, students are able to study the subjects of their choice.

The college of technology system, a 5-year program of study established in 1962, is the higher vocational education equivalent to a specialized high school or department. The colleges offering this program were established as institutions for training intermediate engineers in industrial fields, while junior colleges, which after World War II were viewed as higher vocational education institutions, specialized in offering vocational education for women, and liberal arts education. The college of technology is a very unusual system internationally, as it combines 3 years of high school education with 2 years of short-term higher education. These colleges do not have degree-awarding rights because they offer a secondary-level education.

These specialized high schools and colleges of technology are stipulated in Article 1 of the School Education Act and are schools that are required to be in harmony with the liberal arts and academic nature of the general education and higher education stages. Consequently, the vocational education objectives of these institutions are suppressed. Vocational education has been referred to as industrial education (sangyo-kyoiku, derived from the name of the Industrial Education Promotion Law, a vocational education finance law in effect since 1951), which is predominantly a Japanese concept of vocational education. When translated into English, industrial education is a concept that has no direct equivalence, but prior to World War II, it was called "business education" (Jitsugyo-kyoiku), which is a concept that aimed at educating individuals in a capitalist nation (Terada, 2011).

Figure 1 Educational System in Japan



Note. The data are collected from the homepage of MEXT and supplemented by Terada.

The reason behind vocational education in Japan's Article 1 schools being positioned within the broad category of industry (loose specialization) is that with the exception of professions based on national qualifications, there is no Western-style cross-sectional external labor market for each occupation; rather, it caters to an internal labor market (career development within companies). This pattern is due to the fact that basic school vocational education oriented toward classroom lectures (school model) and corporate employment/in-company training (market model), so-called “a serial complementary relationship” (Terada, 2007).

Vocational Education in the Narrow Sense (Vocational Training)

Non-university educational institutions at the tertiary level mainly provide Western-style vocational education and occupation as well as qualification-oriented job training. One such type is the specialized training college, which is under the jurisdiction of the prefectural government, rather than the MEXT (Article 1 school), although the School Education Act regulates it. This type of school was established based on certain criteria, and as a result of the revision of the School Education Act in 1975, was promoted from being categorized under “miscellaneous schools” that were not Article 1 schools. Among these, they have become major vocational educational institutions for providing professional courses for high school graduates. Private corporations run approximately 95% of such institutions, which confirms that the private nature of vocational education oriented toward vocational qualifications is deeply ingrained in Japan. Even if the title or professional qualification as a professional engineer (or advanced professional engineer for 2- to 3-year and 4-year courses) is obtained in these institutions, a degree is not awarded.

Another vocational education institution that is oriented toward a vocational qualification is the vocational ability development colleges and polytechnic colleges under the jurisdiction of the labor administration. This institution was originally created by the Vocational Training Law of 1958, and was initially a public training facility for industrial skilled workers who were middle school graduates. However, since the revision by the Vocational Ability Development Promotion Act in 1985, it was shifted to continuing education for adults and high school graduate training. The latter was reorganized into junior colleges (specialized courses) and universities (applied courses) after 2010. Unlike the “Daigaku” (universities) of the MEXT, “Daigakko” institutions are non-degree-awarding institutions.

Complex Vocational Education Institutions

In addition to these, a combination of vocational education of the abovementioned broad, new industrial field-oriented vocational education and vocational qualification-oriented vocational education is being organized.

First, the majority of departments and students in junior colleges (2- to 3-year associate degree programs), which have been positioned as a type of university since World War II, are related to liberal arts and industrial fields, such as humanities, liberal arts, agriculture, and industry, as well as to fields oriented toward women, such as health (nursing), home economics, and education (kindergarten teaching).

Additionally, there are universities (colleges) of applied science and junior colleges, which belong to a type of university specified under Chapter 9 of the School Education Act, which were launched after the spring of 2019 after years of policy debate on higher vocational education reform. In Japan, the MEXT recommends the use of the term "Professional University-College," although internationally this term corresponds to "Universities (Colleges) of Applied Sciences." These universities and junior colleges include, on the one hand, vocational education in a narrow sense (mainly rehabilitation, etc.) corresponding to national qualifications for semi-professional occupations such as those offered at specialized training colleges, and, on the other hand, vocational education in a broader sense oriented to industries such as information, business, and agribusiness.

The Status of Vocational Education

Key Statistics

In Japanese vocational education, there are vocational high schools and specialized training colleges at the secondary education level, and universities (4 years), junior colleges (2 years), specialized training colleges and colleges of technology in order to develop human resources in industrial enterprises. In addition, even though there is only a small number, there is still a choice of polytechnic colleges (see Table 1 below).

Table 1 Educational Sectors for Vocational Education (2019-2020)

	Type of Shool	Number of Schools (Number of Students)	Terms of Shool	Provision of a Law	Purpose/Mission
Secondary School	Specialized High School	1972 (550,000)	3 years	School Education Act Article 1	Providing vocational and technical education.
	Specialized Training College (Upper Secondary Course)	404 (34,075)	1 year or more	School Education Act Article124	Promoting skills required for occupation and real life and aiming to improve knowledge and culture.
Higher Education	University	765 (2,623,572)	4 years	School Education Act Article 1	As the core of scholarly activities, Univesities are to contribute to the development of society by cultivating advanced knowledge and specialized skills, inquiring deeply into the truth to create new knowledge, and broadly offering the fruits of these endeavors to society.
	Junior College	323 (104,871)	2 years or more	School Education Act Article 1	Cultivating advanced knowledge and specialized skills, inquiring deeply into the truth to create new knowledge, and promoting skills required for occupation and real life.
	Specialized Training College (Postsecondary Course)	2,779 (604,415)	2 years or more	School Education Act Article124	Promoting skills required for occupation and real life and aiming to improve knowledge and culture.
	College of Technology	57 (56,974)	5 years	School Education Act Article 1	Cultivating advanced knowledge and specialized skills required for occupation.
	Polytechnic University (including 2-year course)	34 (2,555)	2 years each (Specialized Course/ Applied Course)	Human Resources Development Promotion Act Article 15	[Specialized Course] Vocational training through which workers can acquire the advanced trade skills needed for their jobs and knowledge. [Applied Course] Promoting workers who can be the leardership among their fields

Note: The data are collected from the homepage of the School Education Act and Human Resources Development Promotion Act, the School Basic Survey in 2020 and supplemented by Horai.

As one of the institutions for vocational education for secondary education, specialized high schools and specialized training colleges are provided.

Specialized high schools are established based on the School Education Act Article 1, and they mainly focus on eight types of department (agriculture, technical industry, business, fisheries, home economics, nursing, information, and welfare) with general courses (language, mathematics, science, social arts). Each student is able to learn or experience several different types of content from the departments they choose and various extracurricular activities. In these eight departments, technolooy courses have the most students (approximately 230,000 students, as shown in Table 2). On the other hand, most students are enrolled in high schools with general courses. Moreover, as one more choice, specialized training colleges (upper secondary courses) are operated and legislated in the School Education Act Article 124. Its purpose is to promote skills required for occupation and real life, and to improve knowledge and culture. As described already, specialized training college is an educational institution that provides students with practical and vocational education.

Table 2 Number of Students and Schools for Specialized High Schools (2020)

Division		Number of Students(%)	Total Number of Schools	Number of Schools with Single Department
Sepecialized High School	Agriculture	75,260(2.4%)	303	123
	Technology	230,934(7.5%)	526	259
	Business	178,159(5.8%)	609	164
	Fisheries	8,161(0.3%)	411	21
	Home ecomonics	36, 651(1.2%)	273	5
	Nursing	13,570(0.4%)	97	6
	Information	2,679(0.1%)	36	-
	Welfare	8,030(0.3%)	97	1
	Subtotal	553,444(18%)	1.972	579
General Course		2,254,161(73.1%)	3,733	2,602
Others		275,257(9%)	952	328
Total		3,082,862	6,657	3,509

Note. The data are collected from the School Basic Survey in 2020 and supplemented by Horai.

The main courses are designed to prepare students for national occupational qualifications and certification examinations in the fields of technical industry, medicine, health, education/welfare, commercial practice, and garment making/home economics. In 2020, 3.5 million students were enrolled in 404 specialized training colleges after graduation from junior high schools.

Concerning higher education fields for offering vocational education or encouraging students to obtain specific qualifications/licenses, junior colleges play a highly important role in Japan. After studying in junior college for 2 years (3 years in the case of a major course), graduates enter various industries such as business, nursing, kindergarten education, welfare, and so on. In 2020, the number of junior colleges was 323 (17 were public and 306 were private), and the number of students was over 100,000. One of the biggest differences between junior colleges and universities is the terms of study. In 1964, the junior colleges system took the first step, and they were expected to open up opportunities of higher education and vocational education for females. The traits of junior college are to contribute to local industry's development and instructing both basic culture and specialized subjects in the short term. In order to enhance and clarify those traits, from 2005 junior colleges have allowed graduates to be awarded associate degrees, as in other countries. Nowadays, over 120,000 students are studying in junior colleges, most of whom are female (94,600 students, 88%).

Specialized training colleges (postsecondary courses) are another choice for students. This is a higher stage of specialized training college (upper secondary courses), and is regulated by the School Education Act Article 124. In addition to nursing or kindergarten education, students are able to gain licenses of a cook, a cosmetician, and for language and tourism. After 2 years of training, students get a diploma, and if they require further training or learning, they can be awarded a higher diploma. Some students determine to transfer to university after graduation from specialized training colleges (postsecondary courses).

Colleges of technology are one of the schools of higher education through 5-year enrollment from high school (most students are 16-20 years old). In colleges of technology, students learn not only various theories, but also applied abilities for specific fields. In addition, in the final grade, graduation research is required so that students can strengthen their skills or creativity. Ordinarily, the fields taught at colleges of technology are divided into technical industry and marine mercantile. In the field of technical industry, students choose mechanical engineering, electrical engineering, electrical control engineering, information engineering, material engineering, architecture, and environmental urban engineering. Other than technical industry or marine mercantile, some schools have established departments of management information, information design, communication, and international distribution.

In the different jurisdictions under the school education system, polytechnic colleges (including 2-year courses) are another option. Polytechnic colleges are the vocational institutions that provide higher/specialized training based on national prefectures or authorized entrepreneurs. Their programs are long-term training (specialized and applied courses) and short-term training (specialized short-term courses and applied short-term courses). In the education system, polytechnic colleges are not schools based on the School Education Act but are institutions established under the Ministry of Health, Labor and Welfare in order to cultivate advanced technicians regulated by the Human Resources Development Promotion Act. According to the report, "A Structure of Future Employment Ability Development (final report)," the purpose of the stage of specialized courses is defined as "vocational training through which future workers can acquire the advanced vocational skills needed for their jobs and knowledge." The purpose of the stage of applied courses is to "cultivate and develop specialized and applied vocational skills through advanced vocational training." The scale or function of a polytechnic college is limited, but they are considered to play an important role.

Key Strategy and Policy Documents

As it has become an urgent challenge to enhance career/vocational education, one of the key strategies was proposed in the Central Council for Education's report in 2011, namely "how career education and vocational education is to be implemented in schools in the future." In this report, not only the idea of career education through elementary schools to higher education was argued, but also vocational education was defined as one of the complete stages of specialized career education continuing after the general career education. As well as the vocational education under the Ministry of Health, Labor and Welfare (polytechnic colleges), this report discussed what vocational education in each institution is like.

According to vocational education in high schools, reinforcement of vocational education in general courses is insisted on. In fact, looking at the ratio of employment of high school graduates, most of them are from general courses in high schools, rather than from other courses. The number of employees who had graduated from high schools in March 2020 was 61,830, which is only 8.1% in all students who had taken general courses. On the other hand, comparing absolute value with other courses, engineering is 53,585 (68.2) and commerce is 26,574 (43.1) (MEXT, 2020).

According to vocational education in professional/ specialized departments, their reconstruction is claimed from the perspectives of 1) combining classroom learning and practical skills from the viewpoint of focusing on the training of basic knowledge and techniques, 2) systematizing quality assurance and quality improvement in vocational education, 3) cultivating human resources in developmental potentials (Central Council, 2011). In terms of vocational education in higher education, four points below are described (Central Council, 2011)

1. Clarification of the ideal type of human resources and career awareness

through internship or problem-based learning, development of practical or applied abilities, and strengthening the relationship with continuing, life-long learning are presented.

2. In universities or colleges (including colleges of technology), reorganization of departments in order to promote human resources for new types of industry or partnership with industrial arena is required.

3. In specialized training colleges (postsecondary courses), faculty development through partnership with each college, and preparation (maintenance) of evaluation systems for educational activities without the control of educational bodies such as prefectures or school boards are needed

4. And then, as the biggest topic, legislation of a “framework which is specified to vocational/ practical education” is mentioned.

From the perspective of viewing career education as a comprehensive stage in vocational education, the development of career education that is positioned as one part of vocational education is suggested. Vocational education as specialized career education practices, three basic and general abilities have been indicated: 1) abilities for human relationships and social formation, 2) abilities for self-understanding and self-control, 3) abilities for problem solving, and 4) abilities for career planning. These are regarded as being convergent notions as social and vocational independence for individuals. On the other hand, the abilities promoted through vocational education, “required knowledge, skills or attitude for specific occupations” and educational activities are seen as experiences connected to individual and concrete vocations.

Careers of Graduates (Students or Trainees)

In this section, the status of graduate students from vocational high schools, junior colleges, and colleges of technology will be presented based on a basic survey of schools (MEXT, 2019, 2020).

Specialized Vocational High Schools

First, the number of students who graduated from all high schools in March 2020 was 103 million, of whom approximately 30 million were graduates of specialized vocational high schools. Their paths after graduation from specialized vocational high schools were highly diverse. In case of industry (manufacturing), the employment rate is 68.2%, which is the highest rate. Although some graduates had chosen to go on to higher education such as universities or specialized training colleges (postsecondary course), the rate is less than 15% each. On the other hand, the employment rates of several fields are not so high, for example, commercial (43.1%), home economics (37.4%) and information (24.0%). The graduates from these courses decided to study at the higher education level in order to develop their academic ability or expertise.

Remarkably, having industry (manufacturing) at the head of the list, employment rates of graduates from high schools are still quite strong in Japan. In other words, both famous, worldwide companies and small or medium-sized enterprises establish the employment system or strategies to secure young workers and try to let them adapt to the culture of companies. According to Terada (2011, Ch.7), that system has been functioning as a “friendly relationship between high schools and companies that are constructed through long-term sending out and acceptance,” “recommendation for specific companies through selection at high schools,” and as a result, “one student-one company (narrow down options).”

Higher Vocational Education

In order to understand the rate of higher education level, the report “Basic Research on Schools” published by MEXT and the survey by the Ministry of Health, Labor, and Welfare are useful (see Table 3).

Table 3 The Survey of Employment Rates Among Universities, Colleges of Technology, and Specialized Training Colleges (2019 graduates)

Division	Job Seeking Rate	Employment Rate	Number of schools
University	77	98	61
National/Public	57.3	98.2	
Private	86.7	97.9	
Junior College	83.7	97	20
College of Technology	58	100	10
Specialized training college (Postsecondary course)	88.4	96.8	20

Note: The survey is from MEXT and the Ministry of Health, Labor, and Welfare and supplemented by Terada.

As described above, the employment status or rate of students who have finished university, junior college, college of technology, and specialized training college has been satisfactory. Almost 100% of graduates could find jobs right after completing their tertiary education. This is because of the traditional employment practices that are called new graduate recruitment (most graduates start working from April 1). At the same time, Japanese society has some of the hardest problems to solve among young people, namely unemployment after higher education, early turnover after employment, and permanent part-time workers.

The differences in rates of job seeking are related to entering graduate schools after employment. Although the same as national and public universities, the scale is not so big (less than 4,000 people), about 40% of graduates from colleges of technology (especially departments of technology) tend to transfer to universities. On the other hand, most students of junior colleges or specialized training colleges decide to start working after graduation, so students who choose to enter or transfer to universities or graduate schools have been very few. In addition, graduates with a diploma from junior college tend to choose local employment. As a result, those young workers support the local industries and make a significant contribution to regional promotion.

Teachers and Faculty Qualifications

In principle, high school teachers responsible for specialized subjects in vocational education are required to have completed a master's degree or a bachelor's degree from a teacher training course at a 4-year university, for example, engineering, economics, science, and agriculture, and to have passed the prefectural employment examination. The requirements for the latter training program are 23 credits of teaching-related coursework including subject education methods such as vocational guidance, 20 credits of specialized courses related to the subject, 16 credits that fall under one of the two categories, and 8 credits from other subjects. Students are required to earn approximately 30 additional credits from regular specialized courses (MEXT, 2021).

Article 41 of the Standards for the Establishment of Specialized Training Colleges (MEXT, 2016) stipulates the following requirements for postsecondary course instructors at specialized training colleges:

1. Those who, after completing a post-secondary course at a specialized training college, have been engaged in education related to the education they are responsible for at a "school, research institute, or similar" for a total of 6 years or longer;
2. For those holding a bachelor's degree, those who have been engaged in education, research or technology related to the field of responsibility at a school, research institute, or similar for 2 years or longer, or for 4 years or longer for those holding a junior college degree or an associate's degree;
3. Those with at least 2 years of experience as a supervising teacher, guidance counselor, or teacher at a high school (including the second semester of a secondary education school); and
4. Those holding a master's degree, or a professional degree as prescribed in Article 5-2 of the Degree Regulations (Ordinance of the Ministry of Edu-

cation No. 9, 1953).

For faculty members of specialized training colleges, industry associations such as the Association for Technical and Career Education or those consisting of recognized specialized training colleges, provide training to become new instructors for those who possess the teaching qualifications stipulated in the Standards for the Establishment of Specialized Training Colleges. Such faculty members have the desire to become teachers, and have been teaching for less than 3 years. Those who successfully complete the training receive the "Certified Specialized Training College Instructor" credential. To ensure the qualifications of teachers at specialized training colleges, the implementing organization conducts training and issues certification, and registers those who have completed the training in the organization's directory.

For junior college instructors, the Standards for the Establishment of Junior Colleges (MEXT, 2019) require the holding of one of the following qualifications: a doctoral degree, research achievements equivalent to those mentioned in the previous item, or recognition of having outstanding practical skills in the case of a field focusing on the acquisition of practical skills.

For Colleges of Technology as well, the requirements are nearly identical to those applicable to junior colleges but are more rigorous due to these institutions' status in higher education in engineering and their recent accreditation by the Japan Accreditation Board for Engineering Education (JABEE). Most of the instructors at such institutions are graduates of master's or doctoral programs in engineering, are engaged in research activities (Terada, 2011), and provide research guidance to 5th-year students. Many of the criteria for hiring are similar to those required for university faculty, including academic background, teaching experience, and research achievements.

Lastly, polytechnic college faculty members are required to hold a doctoral degree if they are faculty members of a polytechnic college (the only institution that trains instructors), a master's degree if they are faculty members of other polytechnic colleges, and an instructor's license from the polytechnic college in other cases.

TVET Qualifications System and Quality Assurance

National Qualifications

In Japan, there are about 300 national qualifications corresponding to professional and vocational education with restrictions on employment and use of titles. Many of these qualifications are in the medical and industrial technology fields under the jurisdiction of the Ministry of Health, Labor and Welfare, and are obtained through education at universities and specialized training colleges.

National Skill Test

Meanwhile, there are about 130 industrial skill certification systems (which grant the title of "skilled worker")—also under the jurisdiction of the labor administration—that evaluate and test vocational abilities such as skills, although not necessarily as a condition for employment. In addition, there are certification systems that are administered by various organizations such as economic organizations, certification bodies, and principal associations (often in technical high schools), rather than being governed by national law, and various vocational education institutions are promoting taking and passing examinations as a guideline for learning outcomes or as being effective for employment. The Institute of Jitsumu Ginou Kentei offers a secretarial certificate (often offered at junior colleges), and the Japan Chamber of Commerce and Industry offers a bookkeeping certificate (for commercial high schools).

Job Card System

In addition, the Ministry of Health, Labor and Welfare's Job Card System is a competency evaluation system to promote employment, retraining, and continuing education. Since 2008, the ministry has provided support for career planning, training incentives, and proof of proficiency after completion of training (three-stage assessment of job performance) (MEXT et al., 2017).

Systematization of Vocational Skills in Each Field

Moreover, there are some attempts to construct the framework of a vocational competency system. That creates stages for vocational careers from the graduation stage to later stages based on several indicators. In some fields, such as the medical field, construction of an evaluation system that places the completion of vocational education in the context of overall vocational career development is already underway. The Japanese Nursing Association's "Clinical Ladder" is one such example of this. According to the system, which was revised in 2016, a "clinical ladder" was proposed and put into practice from Level I, which is the level immediately after training in a 3-year course at a specialized training college or a nursing college, to Level V, which is for senior staff and managers such as head nurses and specialists who have graduated 6 years ago or earlier. There are five foundational elements (practical competencies): the ability to understand needs, the ability to provide care, the ability to collaborate, and the ability to support decision-making (Japanese Nursing Association, 2016).

There is also the career tier system which started in 2010. Although this was mainly created for dealing with the issue of underemployed workers, under the jurisdiction of the Cabinet Office, the creation of tiers for careers (vocational skills) from graduates to adults was promoted in several fields. It is currently being continued in three areas: nursing care professionals, carbon managers, and producers of sixth industrialization of food (Cabinet Office, 2021).

Job Grading System in Companies

In Japan, with the exception of occupations that are linked to official qualifications, most non-professional occupations (jobs) are based on an employment system that does not require the acquisition of the occupational qualifications mentioned above. In other words, the standard is an internal labor market and internal career development based on new employee training for graduates, continuous in-company training and seniority-based, lifelong employment. The competence evaluation system for adult professionals relies on a company-specific system for each job function, which is linked to personnel evaluation (Terada, 2014, Chapter 10). In addition, because the laws and regulatory bodies of vocational education institutions are spread across several ministries, a quality assessment system, similar to the European EQF and the British NQF, which integrates academic and vocational completion qualifications by educational level, has not yet been developed.

Inventory of Common Educational Outcomes

However, in response to the international trend of defining key competencies and establishing qualification frameworks, Japan has also made efforts to spread awareness of indicators of school completion outcomes, including those for vocational education (Terada, 2015). The basis of the work was the listing of the key competencies common to each institution. These competencies include the “human ability” of the Cabinet Office (2003); “basic skills for finding employment” of the Ministry of Health, Labor and Welfare (2004); “basic skills for working people” of the Ministry of Economy, Trade and Industry (2006); the “basic and generic skills” of MEXT (2002, 2011) related to career development consisting of four areas (8 competencies); and “graduate attributes” of the Central Council for Education with regard to 4-year bachelor’s degree programs (Central Council for Education 2011). Among these, the Ministry of Economy, Trade and Industry’s “basic skills for working people” have relatively close affinity with vocational education and are widely adopted by vocational education institutions as a basic educational goal and quality assurance item, along with the acquisition of specialized knowledge and skills in each field.

Quality Assurance and Improvement System

The inventory and systematization of the quality objectives for each field are conducted in the process of quality assurance and accreditation. Universities, junior colleges, and colleges of technology have led this effort. In the case of universities, internal self-evaluation was mandated by the Standards for the Establishment of Universities in 1991, external (school-related party) evaluation was mandated in 1998, and (third-party) accreditation has been mandatory since 2003 based on Article 109 of the School Education Act.

On the other hand, in the case of specialized training colleges, the obligation to "publish the evaluation of the school management status" (of the self-evaluation) in Article 42 of the School Education Act was applied mutatis mutandis in 2007, and since 2014, in the case of vocational practical postsecondary courses—which are expected to be the focus of specialized training colleges—the evaluation of the persons concerned has become an accreditation requirement (by ministerial notice) (Kawaguchi, 2015). The same applies to specialized high schools.

In the quality evaluation cycle, an internal self-evaluation is conducted every year, and the internal self-evaluation is applied to the related party's (external) evaluation. In the case of universities, junior colleges, and colleges of technology, the certification evaluation of organizations certified by MEXT (e.g., Japan Institution for Higher Education Evaluation, Japan University Accreditation Association, National Institution for Academic Degrees and Quality Enhancement of Higher Education, Japan Association for College Accreditation, etc.) is received every 7 years. The following are some specific examples.

Taking Aichi Prefecture's specialized high schools as an example, the "perspectives for quality assurance and improvement" include six items: highly specialized knowledge and skills, various problem-solving abilities, practical learning at industrial sites, and so forth, curricula for various career paths, improvement of teachers' qualifications, and measures according to departmental characteristics (Council of Vocational Education in Aichi Prefecture, 2019, p. 6).

In the case of specialized training colleges, MEXT and the Office of Specialized Training Colleges are currently promoting various projects on quality assurance and improvement, and there are leading initiatives from organizations of the people related to specialized training colleges, such as the Institution for Accreditation and Quality Assurance of Professional Higher Education, and the Organization of Private Vocational School Accreditation. The latter lists nine major evaluation indicators for specialized training colleges (postsecondary courses), including educational philosophy, school management, educational activities, academic achievement, and finance. Among them, "devising and developing curricula and educational methods from the viewpoint of practical vocational education," "practical vocational education (systematic positioning of internships, practical skills and practices, etc.)," and a "guidance system for acquiring qualifications" are examples of educational activities related to quality assurance, while "improvement of employment rate," "societal success of graduates and current students," and "career development after graduation" are examples of learning outcomes (NPO Organization for Private Vocational School Accreditation, 2013). Rather than checking the formation of students' qualities, the focus is more on the external aspects of quality assessment.

Current Reforms and Policy Discussion

As mentioned above, the Central Council for Education in 2011 indicated the basic direction for vocational education.

Specialized Vocational High Schools and Their Specialized Courses

The number of students who enrolled in specialized high schools for specialized courses peaked in 1970 (about 40%) and has been declining ever since (about 20% as of 2021). This has been attributed to a majority of graduates shifting away from seeking employment to pursuing higher education. Under such circumstances, the objective of complete vocational education, since the implementation of the 1978 Course of Study for High Schools, has drastically changed from training self-employed farmers, mid-level technicians (industrial), and commercial and administrative workers, to instilling students with fundamental and basic knowledge and skills (technical skills) in relation to further education and in-company training (Terada, 2011). In the 1998 Report of the Science and Industrial Education Council, training of "future specialists" was cited as the ideal direction to work toward, instead of specialists at the graduation stage. Further, in the 2011 Report of the Central Council of Education, expanding and advancing specialized knowledge and skills, improving and ensuring the quality of vocational education, and promoting specialized technical high schools into colleges of technology were proposed as measures in response to economic globalization and computerization. These measures are also being discussed and incorporated into reforms by the boards of education in each prefecture. For example, in Osaka Prefecture, there have been efforts to strengthen the connection between technical high schools and engineering universities by establishing a "Specialized Course in Preparing for Engineering University," and carrying out a systemic reform where technical high schools make their curriculum incrementally specialized from the 2nd year onwards, instead of offering choices of specialized subjects from the 1st year (Terada, 2018).

Junior Colleges

The number of students who enrolled in junior colleges, which are institutions that provide short-term higher general education and vocational education, peaked in 1993 (about 250,000 students compared to the approximate 1.76 million students in 4-year universities), and has now fallen to about 100,000 as prospective students shift toward 4-year universities. The current vision for the future is indicated in the 2014 Report of the Working Group of Junior Colleges under the Central Council of Education. The report proposed “measures that should be adopted by junior colleges.” These measures were: (1) enhancing the training of professionals in fields such as medical care, nutrition, and welfare; (2) training human resources who will be the foundation of local communities (by aiming to create “Japanese community colleges”); and (3) developing educational institutions with a cultured grounding.

Colleges of Technology

Despite being small-scale institutions (with a capacity of about 10,000 students per grade) that trained mid-level engineers in industrial fields, colleges of technology that were established post 1962 have trained a considerable number of professionals, comparable to the Faculty of Engineering in universities. These colleges are also highly regarded in society, including the business community. However, similar to junior colleges, the existence of colleges of technology has been questioned since the 1990s because of the growing preference for 4-year universities among high school graduates, and the growing preference for graduate schools of engineering.

The ideal state and direction of reform for this type of college (institution) is presented in the 2008 Report of the Central Council of Education titled “Enhancing Colleges of Technology.” In the report, it was suggested that colleges of technology that offer 5-year programs should enhance their educational content by improving collaborative education via industry-academia cooperation, securing enrollments by transferring high school graduates into the 4th year stream of their programs, transferring their own students to universities after graduation, promoting their advanced courses (continuation courses that lead to a 2-year degree), and reorganizing their programs to accommodate new fields linked to ICT, biotechnology, medicine, and so forth (Central Council of Education, 2008).

As an initiative to implement the suggested ideas of reform, the National Institute of Technology, Sendai College, for example, worked alongside a nearby college of technology, known as the Sendai National College of Technology, to accommodate the emergence of new fields by establishing a “Department of Materials and Environmental Engineering” and a “Department of Information Network Engineering,” as well as responding to the advancement of industrial technology (Terada, 2018).

Universities (Colleges) of Applied Sciences

After around 10 years of discussions and debates, universities (colleges) of applied sciences were established from 2019 (Terada, 2020) as institutions designed to offer vocational education that was restructured and standardized from what was originally provided in higher education. In addition, German universities of applied sciences and Korean technical colleges were used as the benchmark for these institutions. However, these universities (colleges) of applied sciences were unlike the universities or technical colleges in both these countries as they implemented a education system that allowed students to take a 4-year integrated university course, a 2- or 3-year college course, or a connected set of early period and late period university courses (1- or 2-year bachelor courses). In addition, the focus was on differentiating universities (colleges) of applied sciences from other institutions, as the existing universities, junior colleges, colleges of technology, and specialized training colleges continued to exist. These universities (colleges) are unique because they provide compulsory practice-oriented courses (for a 4-year course, at least 600 hours of practicum in enterprises are required) as opposed to higher education institutions that are academically inclined.

Specialized Training Colleges

Similar to the above, specialized training colleges were created in 1975 as a type of formal education due to the partial revision of the School Education Act (Article 82 (2)) being added at the time. Despite this, they are still excluded from the category of Article 1 schools, and continue to suffer disparities compared with other higher education institutions in terms of government subsidies and diplomas (which are not considered as certificates or degrees). The staff in these colleges face these challenges in implementing an integrated reform and movement. During the process in which these universities (colleges) of applied sciences were being institutionalized, specialized training colleges adopted practical vocational courses in 2013 as a means of providing mock industry experience.

These courses were modeled after the German dual system (secondary education) and dual courses (universities) as they implemented a curriculum that is designed for industry-academia collaboration and require students to engage in practical training at companies. Unlike existing specialized courses, practical vocational courses are approved not by the prefectures, but by the national government (Ministry of Education, Culture, Sports, Science and Technology). Hence, in making specialized training colleges equal to other higher education institutions, the establishment of practical vocational courses has become the most significant undertaking in the popularization and reform of specialized training colleges.

Polytechnic Colleges

As mentioned above, although polytechnic colleges (including 2-year courses) are small, they have contributed to refining and strengthening junior college or specialized training courses and applied courses. Here is one example of X polytechnic college (Terada, 2018)

This X polytechnic college is attempting to reorganize correspondence for high school students entering universities and the development of technology. As a "Technician Engineer" is the ideal type of human resource, the purpose of X polytechnic college is to cultivate both intermediate technicians and skilled engineers.

In any case, because the trait of this college is promoting practical technicians and engineers, the curriculum involves 1,470 hours for classroom learning and 1,530 hours for practical training in 2-year courses. In addition, for 4-year courses, students have to spend 630 hours on classroom learning and 2,178 hours on practical training. Especially, in the latter case, as one of the styles of practical training, more than half of the total hours is used for manufacturing problems or applied problems training, and these styles have been influencing newly established professional university /colleges. In addition, in order to develop vocational training, there is a 2-year "dual course" that is provided for workers who study at a college while working at their companies.

Trends and Issues in TVE

Trends

In this section, as one of the trends for vocational education in Japan, a tendency of political and industrial contexts is described as follows.

Corresponding to the Fourth Industrialization or the Fifth Industrialization

One of the biggest challenges in the Japanese economy or vocational education is correspondence to Society 5.0 (Society 5.0 is regarded as the Super Smart Society occurred after the "IT Society=the fourth industrialization"), expressed as the vocational education reform in each education stage. In order to solve the problem or develop Japanese career education, it is necessary to create new fields or upgrade existing fields such as mechatronics (combining machine, electronic circuits, and computer software), and machine materials (materials plus organism), and to consider the needs of innovative technology (relating to sense, value, or creation) (Co-operative Committee 2010). That is why cultivating applied or generic abilities for the challenge against unknown problems is discussed and required in the further Japanese vocational education. Based on the tide of that discussion, several competencies are focused on in the next section.

Promoting Basic Competency-Oriented Education and Quality Assurance

In the light of vocational education in high schools, completed (self-contained) vocational education had shifted to the formation of basic skills, considering employment or connection with higher education. As discussed above, not only MEXT with the context of school education, but also several Ministries concerned with welfare or economic development competed to formulate an evaluation index. Moreover, this competition focused on the "quality assurance" and "certification evaluation" of vocational education. The movement has been promoted because of the advancing commonality in the international direction. In Japan, the cycle of evaluation below is mostly accepted and has been practiced for several years.

(1) Evaluation of each class or school operation by teachers

(2) Organizational and internal quality assurance in each school

(3) External (school-related party) evaluation

(4) Assessment of MEXT, Prefectures' school board

(5) Accreditation

Moving from Vocational Education in High Schools to Connection to Higher Education

Japanese vocational education shifted from junior high school to high school in the 1960s, and then gradually moved to tertiary education or postsecondary education after specialized training establishment from 1975 to the 1990s. Since the 1990s, enhancement of cooperation between high schools and universities has been one of the issues, along with OECD or international movement (Fromberger, 2019). Through that movement or discussion, fostering relations among vocational education in the short-term and universities, and establishment of specialized training colleges in 3-4 years courses, and universities (colleges) of applied science (including junior college) have been institutionalized.

Increasing Focus on Practice-Oriented and Dual-Oriented Education

As one of the significances of the purpose of vocational education or its pedagogical methodologies after the Vocational Training Law (Act) was legislated in 1958, and after introducing various national skill tests, there were strong concerns about the German dual system model based around labor administrative authorities or related researchers. With the discussion of basic skills in the 2000s, the Japanese version dual system was introduced. Polytechnic colleges, specific courses at specialized training colleges, and some specialized high schools have implemented the practices of this dual system in advance. Then, since 2019, the idea of a dual system is one of the key philosophies of universities of applied sciences (professional university/college). In the university sector, practical skills or abilities are required for new graduates and then learning or experiences through the dual system are seen as a significant model of vocational education beyond school-based vocational education practices.

Being Challenged by Part-time Work After Graduation and Job-type Employment

As mentioned earlier, employment customs or the procedure whereby students (especially at high school level) are recommended or selected in each school-based evaluation has enabled continued high employment rates (Terada 2011). However, since 1990, no matter what their educational background (any type of higher education or high school), many young workers (almost 30%) tend to choose to withdraw from the labor market or quit their jobs within 3 years. As a result, even now the number of permanent part-timers has increased, and many of them have a hard time with low income in the severe environment of re-employment.

On the other hand, relating to improvement of employment conditions for young people and to training policy, we are able to find other approaches that focus on the job-type society (employment) such as the Job Card System, and the Japanese version dual system (Hamaguchi, 2013, 2016). Moreover, in the context of the COVID-19 calamity which has led workers to change their way of working, home working (working remotely) has been one of the popular working styles, and job-type employment has been expanding rapidly (Recruit Works Institution, 2021). Job-type employment means that companies hire workers based on their abilities or skills needed for specific jobs. In this case, workers recognize what they do with job descriptions (as is well known in Europe or America). On the other hand, historically, the Japanese employment custom has been based on "membership-type employment," which means that companies hire workers based on their basic potentialities and organizational adaptabilities and start to think about allocation after they hire workers. This change (from membership-type employment to job-type employment) means that the labor market requires workers who have abilities to work individually or who have completed specific training courses rather than being educated in OJT (On the Job Training). For that situation, the new issues or difficulties related to human resources development or capacity development after graduation from vocational education would occur.

Issues

In terms of issues, the research-based discussion of trends described above will be illustrated.

Conflict between Basic Competency-Oriented Education and Specialization of Vocational Education

The trends of vocational education in Japanese high schools, which are competencies-oriented (career education-oriented) and policies of sophisticated vocational education are synonymous with conflict. There is of course an ongoing major academic and political debate. Critics of vocational education in high schools, which focuses on basic knowledge and skills, highlight the undervaluation of specialized training courses. Taking an example of this argument, the research or findings from Hasegawa (1997) and Terada (1999) are highly recommended.

In addition, according to sophisticated vocational education, there is a similar argument. In Japan, although it is hard to find enough discussion or knowledge about the relevance between key competencies and specialization, it tends to be transformed to exploit new industrial fields and for problem-based learning. For the future discussion or works, making the traditional industry more sophisticated should be considered from many points of view in order to extend the period of vocational education.

The Qualification Framework and Quality Assurance System Have Not Yet Been Well-Constructed

The reason why building a framework for vocational qualification is still limited is because of the characteristics of the internal labor market in Japan (Taniguchi, 2015). In the discussion of the labor market in Japan, the system of promotion by seniority, lifelong employment, and a trade union for each company was established and implemented right after World War II. The internal labor market debate (Koike, 1979 etc.), inspired by the internal labor market debate by Doeringer and Piore (1970) in the United States in the early 1970s, led to intense discussions on internalization and externalization (Terada, 2014). However, no one denies the tradition of Japanese labor practice, differences in perceptions of the degree of labor market externalization notwithstanding. The standardization of qualification systems and quality standards, or in other words the cross-sectional development of labor markets, will rightly lead to conflicts with Japanese employment practices.

In addition, movement of quality assurance or accreditation depends on a common index of evaluation, and in the case of vocational education, attention to individual characteristics for specific jobs or professional knowledge or skills remains inadequate. For example, like the reorganization of the colleges of technology, it is said that the practices that promote vocational education let various fields combine (interdisciplinary) and develop problem-based learning in order for students to apply their abilities. For further development of vocational education in Japan, a strong relation between specialized skills and basic generic skills is needed.

Internal Market for Job-Type Based Employment has Negatively Affected Job-Training Programs

Regarding the tendency of job-type employment, we easily find similar discussion about the qualification system and qualification framework. Although it is still a small and immature argument, one of the biggest companies, Recruit, published a book focusing on those topics and suggested how schools and universities can reform "School to Work" in order to deal with Job-type employment (Recruit Works, 2021).

Most Companies Lack the Driving Force to Work on Vocational Education or Training with Schools

In order to improve the functionality of the dual system, the important point is to consider how OJT or the collectivist approach is able to "draw" new graduates who are like "a blank sheet." Terada (2011) proposed the importance of a "bridge of transition (dual model)" in Japanese vocational education; companies therefore need to work actively on vocational education/ training through better relationships with schools.

The Potential of Universities (Colleges) of Applied Sciences has not Been Well Integrated

In addition to several practices of vocational education in and outside of the school system, universities (colleges) of applied sciences (professional universities/ colleges) have been playing an important role in further development. This movement has not been smooth because traditional institutions with vocational education courses or universities (colleges) of applied sciences seek to differentiate themselves and improve their school operation. Taking universities (colleges) of applied sciences as an example, their establishment and departments are extremely different from other higher education facilities. For that reason, their capacity for number of enrolments remains small (less than 100 students in one grade). Integrated reform or reorganization at the whole higher education level is required as soon as possible (Terada, 2021).

Specialized Training Colleges have not Been Included as "Article 1" Schools

In addition to universities (colleges) of applied sciences, one more discussion is about specialized training colleges (postsecondary courses), especially about the official recognition under MEXT. As already mentioned, specialized training colleges are not operated by the School Education Act Article 1, but

Article 124. This means that the culture of private or market theory is embedded in Japanese vocational education or specialized training colleges. For that reason, the argument would not be expanded. First, its postsecondary courses were taken to construct the argument of "a new institution of higher education providing practical and vocational training" (university of applied sciences). After the establishment of universities (colleges) of applied sciences in 2019, the courses (established at about 40% of all specialized training colleges) have been unstable. In February 2021, the problems of quality assurance including all specialized training colleges were discussed in a specific MEXT council meeting (Terada, 2021).

Challenges Related to COVID-19

With the spread of COVID-19, one of the most significant issues is how vocational education would work and how vocational education services can be provided to students. In many cases, social distancing is needed, meaning that online classes or instructions are required, and face-to-face involvement is forbidden. Corporate in-service training or internships that facilitate the "bridge of transition (dual model)" in vocational education expressed by Terada would thus be difficult to achieve. Without the on-site training that is required by several regulations in order to meet qualification criteria, students' experience "simulated" on-site training in school, and are allowed to graduate. In addition, to tackle the coronavirus pandemic, enrichment of in-site training and freshman (beginner) training are key aspects for uncertain social conditions.

Before the COVID-19 pandemic, the number of young people out of work had been increasing. They are called "Freeters" in Japan, and they spend their time doing part-time (mainly unskilled) work. Their daily lives are hard and it looks impossible to find a new job without vocational or training education. Around 9% of high school graduates leave school without choosing higher education (or vocational institutions) or employment as their next step. Lifelong employment as Japanese laborers tends to prevent young workers who left school or quit their jobs from gaining or changing their jobs. This environment among young people has got worse with COVID-19 because of not only changing our work styles but also being deprived of opportunities for face-to-face communication. For those who are experiencing a hard time, vocational educational programs and various types of support are essential actions that should be led at the country level.

Conclusions

As a conclusion of this chapter, we would like to summarize the main points in each section. Firstly, the term, "vocational education" has three meanings and systems. One is used in a broad sense, especially in the context of schools under the jurisdiction of the MEXT. Another is utilized in a narrow sense such as specific occupational qualifications or occupational training. Then, as the third meaning, there are hybrid forms that are able to implicate both a broad sense and a narrow sense.

The second type of dual system and vocational education connects directly with occupations and vocational education at the tertiary level, as this final stage is one more option among the various types of vocational education in Japan. In terms of practical vocational education in the dual system, the conditions of the School Education Act Article 1 include both advantages and disadvantages in the development of vocational education policy. This is because of the revelation of many systematic malfunctions and limitations of specialized or vocational education provided by each company. Now, the innovative relationship between vocational education and corporate society is strongly demanded.

Thirdly, the Japanese labor market has changed from fostering human resources at the traditional internal market to cultivating workers at the job-type employment and external market. Moreover, in order to promote personnel exchange, not only with other Asian countries, but also at the international level after COVID-19 convergence, the vertically segmented administrative system that is unique to Japan has to be improved. In addition, quality assurance at post-vocational education and clarification of the program in vocational education are seen as future tasks. Regarding this point, although Japan has little experience of that, based on the Job-Card system introduced by administrative agencies (public bodies) or evaluation systems in specialized training colleges, junior colleges, and colleges of technology, it would be expected that employment opportunities could be expanded. In addition to individual competencies cultivated in each institution that provide vocational education, unless there is the establishment of comprehensive sustainable key competencies, it will be difficult to reach a solution to various problems.

Lastly, indicating the possibilities and problems of systemic reform in Japanese vocational education, segmental policy in the higher educational stages should be improved for the future work, especially vocational education practices that do not fall under the Article 1 schools system or School Education Act. Through those works, it is obvious that the Japanese vocational education as a comprehensive and integrated system is highly needed.

References

Cabinet Office. (2021). *Kyaria daniseido* [System of career rank]. https://www5.cao.go.jp/keizai1/jissen-cu/jissen-cu.html

Central Council of Education. (2011) *Kongo no kyaria kyouiku, shokugyou kyouiku no arikata ni tsuite* [How career education and vocational education to be implemented at schools in the future].

Central Council of Education. (2008). *Koutou senmon gakkou no Jyuujitu nitsuite* [Enrichment for college technology]. https://www.mext.go.jp/component/b_menu/shingi/toushin/__icsFiles/ afieldfile/2008/12/26/1217069_001.pdf

Co-operative Committee for the State of Practical Engineering Education in Universities. (2010). *Daigakuni okeru jissentekina gijyutusha kyouiku no arikata* [How practical education for engineer to be implemented at universities]. https://www.mext.go.jp/b_menu/shingi/chousa/ koutou/41/houkoku/__icsFiles/afieldfile/2010/06/07/1294583_1.pdf

Council of Vocational Education in Aichi Prefecture. (2019). *Henka suru jidai ni motomerareru sisitsu, nouryoku wo ikusei suru sangyou kyouiku no arikata* [How industry education to be implemented to cultivate competencies or abilities in changing times].

Doeringer, P. B., & Piore, M. J. (1970). *Internal labor market and manpower Analysis* (ED048457). ERIC. https://files.eric.ed.gov/fulltext/ED048457.pdf

Fromberger, D. (2019). *Berufliche Bildung im Vergleich. Historische Unterschiede und internationale Trends. In. Matthias Pilz usw. (Hrsg.)* Berufsbildung zwischen Tradition und Moderne, Festschrift für Thomas Deißinger zum 60. Geburtstag, S Hamaguchi, Keiichiro (2013, 2016) Wakamono to Rodo [=Young generation and Labor]. Springer.

Hasegawa, M. (1997). *Kogyou Kyoka (Kogyou-kiso, Jisshu, Kadai-kenkyu) no Naiyou ni kansuru Chousa-hokoku* [Survey report on contents of the subjects technical industry (Basic technology, practice and problem based

learning)].
Human Resources Development Promotion Act. http://www.japaneselawtranslation.go.jp/law/ detail/?id=1854&vm=&re=

Japanese Nursing Association. (2016). *Byouin ni okeru jissenrei* [Examples in hospitals]. https://www.nurse.or.jp/nursing/education/jissen/ladder/pdf/jissen_hospital.pdf

Kawaguchi, A. (2015). *Koutou shokugyou kyouiku no riron to shitsu hoshou* [The theory and practices in higher vocational education]. Gyousei.

Koike, K. (1979). *Shokuba no Rodo-kumiai to Sanka* [Trade union at shops and participation to management: Comparison between Japanese and American industrial relationship]. Toyo-keizai.

Ministry of Education, Culture, Sports, Science and Technology [MEXT]. https://www.mext.go.jp/en/policy/education/overview/index.htm.

MEXT. (2016). *Senshuu gakkou secchi kijyun* [Standards for the establishment of specialized training colleges]. https://elaws.e-gov.go.jp/document?lawid=351M50000080002

MEXT, et al. (2017). *Shin jobu kaado seido suishin kihon keikaku no omona shinchoku jyoukyou ni tsuite* [The state of progress about a plan for promoting of new job card system]. *https://www.mhlw.go.jp/file/05-Shingikai-11801000-Shokugyounouryokukaihatsukyoku-Soumuka/0000170965.pdf*

MEXT. (2019). *Tanki daigaku secchi kijyun* [Standards for establishment of junior colleges]. https://elaws.e-gov.go.jp/document?law_unique_id=350M50000080021 20190813_ 501M60000080011

MEXT. (2020). *Gakkou kihon chousa; Sotsugyou go no jyoukyou chousa 2020 nendo* [School basic survey: Survey after graduate in school year 2020]. https://www.e-stat.go.jp/stat-search/files?page=1&toukei=00400001&tstat=000001011528

MEXT. (2021). *Kyouin menkyojyou shutoku ni hitsuyou na tannisuu* [Number of credits required for teaching license]. https://www.mext.go.jp/b_menu/shingi/chukyo/chukyo0/toushin/attach/1337063.htm

Ministry of Education and Ministry of Labor. (2020). *Daigaku, tanki daigaku, koutou senmon gakkou oyobi senshu gakkou sotsugyou yoteisha no shuushoku naitei jyoukyou tou chousa 2019 nenndo* [Employment rate survey for graduates of universities, junior colleges, college of technologies, and specialized training colleges in school year 2019]. https://www.e-stat.go.jp/statsearch/files?page=1&layout=datalist&toukei=00400402&tstat=000001016 935&cycle=0&tclass1=000001134665&tclass2=000001141842&tclass3val=0 [April 14, 2021]

NPO Organization for Private Vocational School Accreditation. (2013). *Gakkou hyouka kenshuu kyoutsuu tekisuto* [Common texts for training for school evaluation]. *http://www.hyouka.or.jp/n-shiryo/kenshu-140124-text.pdf*

Recruit Works Institute. (2021). *Jobu gata koyou to Daigaku* [Job oriented employment and university], Works No.164.

School Basic Survey in 2020. https://www.mext.go.jp/en/publication/statistics/title01/detail01/1373636.htm

School Education Act. https://www.mext.go.jp/b_menu/hakusho/html/others/detail/1317990.htm, in Japanese.

Taniguchi, Y. (2015). Shokugyou kyouiku kunren kara mita wagakuni no shokugyou nouryoku hyouka seidono genjyou to kadai [Current status about the evaluation system of our vocational abilities from the view of vocational education and training] . *The Japanese journal of labour studies,* 697. JILPT (Japan Institute for Labour Policy and Training)

Terada, M. (1999). *Koto-gakkou ni okeru Senmon-kyouiku no Shosou* [Some actual aspects on the Vocational Education in High Schools] (Private publication).

Terada, M. (2008). Transition from Vocational Education and Training to Working Life in Japan. In Budesinstitut für Berufsbildung (2008): *Dokumentation 5. BIBB-Fachkongresss, Zukunft berufliche Bildung* [BIBB].

Terada, M. (2011). *Nihon no shokugyou kyouiku: Hikaku to ikou no shiten ni* *motoduku shokugyou kyouikugaku* [Vocational education in Japan: vocational education based on comparison and transition]. Koyo shobou.

Terada, M. (2014). *Kyaria Kyoiku-ron* [Theory of career education]. Gakubunsha.

Terada, M. (2015). Daigakusei no Shokugyouteki-shishitsu ni kansuru Kokusai-hikaku: Nihon, Amerika, Kankoku, Doitsu no yondaisei to tandai, shokudaisei no hikaku [International comparative study on the formation of students' vocational competencies: University students and vocational college students in Japan, USA, South Korea and Germany]. *Journal of the Research on Lifelong Learning and Career Education, 11*, pp. 33-45. Nagoya University.

Terada, M. (2018). Chapter 3--Nihon no chuu koutou shokugyou kyouiku no genkyou to kadai [Chapter 3--The present status and problems of secondary and higher vocational education in Japan]. *Nicchuu no chuu koutou shokugyou kyouiku seido* [Vocational education policy of secondary and higher level in Japan and China]. Japan Science and Technology Agency.

Terada, M. (2020). Conflicts between Japanese structure and German Model in Higher Vocational Education. *The Collection of Papers of AASVET 2020: Studying and Training for Work and Vocation in Society 5.0 (4.0).*

Terada, M. (2021). Shokugyou Kyouiku to Kyaria Kyouiku to Koto Kyouiku [Relevance of Vocational Education to Career Education and Higher Education]. *Keishin-Kenkyuu Janaru* [Keishin Journal of Life and Health], 5(1).

Working Group of Junior College under the Central Council of Education (2014). *Tanki daigaku no kongo no arikata* [How junior college to be implemented in the future]. https://www.mext.go.jp/component/b_menu/shingi/toushin/__icsFiles/afieldfile/2014/09/19/1351965_1.pdf H26

Technical and Vocational Education Trends and Issues in Korea

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Abstract

This chapter examines the current status, trends, and issues of TVE in Korea. Although Korea's education system is 6-3-3-4 single-line, it has a double-line feature as it has separate schools and universities dedicated to vocational education. Korea's vocational education model has been developed by the government, centered on schools. The development process of vocational education began with secondary vocational education, followed by post-secondary vocational education, and gradually developed into a tertiary vocational education system. The current status of each vocational education institution is briefly presented, and trends and issues of vocational education are also analyzed and presented.

In recent years, there has been a trend whereby there is a changing role of central and local governments, continuous reorganization and reformation of the school system, continuous revision of training courses that reflect industrial demands, increased emphasis on field-oriented lifelong learning, and a diversification of student composition and career paths. Despite the continuous improvements, there are still several issues that demand attention which include, among others, changes and confusion due to new policies and institutions, insufficient staffing and increased workload, decreasing quality of vocational instruction due to skill mismatch and diseases, passive participation of industries and related ministries, and reduced employment opportunities and job retention. These trends and issues can be useful for understanding and benchmarking vocational education in Korea. Perhaps a future vocational education system should be explored and developed in preparation for the development of the 4th industrial revolution and post-COVID 19 era.

Keywords: Korean educational system, vocational education and training, national qualification framework, national competency standard

Introduction

The current education system in Korea is based on a 6·3·3·4 linear system which comprises 6 years in elementary school, 3 years in middle school, 3 years in high school, and 4 years in university (see Figure 1). The highlighted boxes in figure 1 represents the vocational education institutions.

The types of schools in Korea as outlined in figure 1 are according to the Early Childhood Education Act (2004/2010), Elementary and Secondary Education Act (1997/2012), Higher Education Act, Lifelong Education Act and the Act on the Development of Vocational Skills of Workers. It can be seen that the Korean schooling system is divided into a school for academic education and a school for vocational education, just like a double-line system.

According to the Early Childhood Education Act (2004/2010), kindergarten refers to children's education from the age of 3 to elementary school, but it is not included in the regular school system and is not compulsory. Several curricula have been created which are not included in the formal education. One is called the Nuri Curriculum, which started in 2012 for 5-year-old students and in 2013 for 3- and 4-year-olds (Nuri curriculum Homepage, 2021).

Meanwhile as stipulated in the Elementary and Secondary Education Act (1997/2012), the types of high schools are divided into general high schools, special purpose high schools including Meister high school, and specialized vocational high schools. While higher education institutions, as in Higher Education Act (1997/2011), are made up of general universities, industrial universities, universities of education, junior colleges, distance universities such as Korean National Open University and Cyber university, technical colleges, and the newly introduced Meister College which is currently being selected and developed.

Higher educational institutions that are stipulated under the Lifelong Education Act (1999/2021) include college in the company, specialized college and Academic Credit Banking System, which are used as a path for many workers to enroll and obtain low-cost degrees. Under the Act on the Development of Vocational Skill Workers (2004/2021), Korea Polytechnics was established. (Ministry of Education, 2020b). Additionally, graduate universities cultivate experts in a specific field such as counselling, language interpretation, or theology. They do not offer bachelor's degree programs, but only master's and a doctoral degree program.

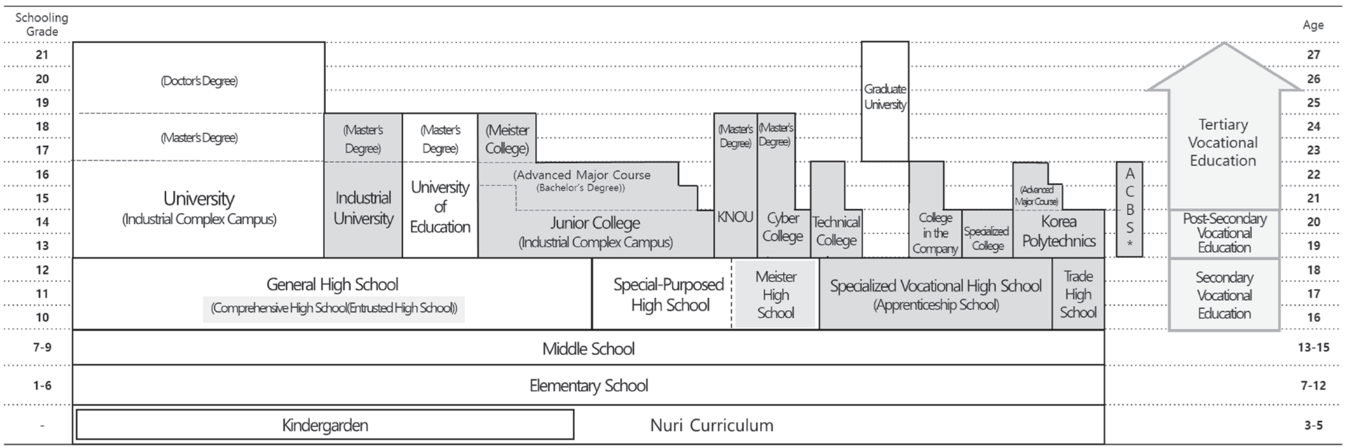
Compulsory education in Korea is free for the 6 years in elementary school and 3 years in middle school. High schools are not compulsory, but free education was provided in 2020, excluding special-purpose high schools, such as some independent private and foreign language high schools.

Among the school model, market model, and national regulatory market model, Korea's vocational education model corresponds to the school model in which the government is mainly responsible for vocational education. However, although there are polytechnics for public vocational education, vocational training in Korea can generally be said to correspond to the national regulatory market model.

The Status of TVE

The current status of TVE in Korea could be categorized into secondary vocational education, post-secondary vocational education, and higher vocational education. In this chapter, the current status of vocational education at each level is examined, focusing on key statistics, number of students, curricula and programs, teachers, and career paths for graduates according to the type of school and university institution. TVE teachers or faculty qualifications, related vocational education core strategies and policies, reforms and policy discussions especially pertaining to the National Technical Qualification System and National Qualification Framework will also be considered.

Figure 1 Education System and Vocational Education Institutions in Korea



* ACBS: Academic Credit Banking System

Secondary Vocational Education

According to the revised 2010 Elementary and Secondary Education Act, Secondary vocational education is mainly conducted at Meister High Schools, which are special purpose high schools, and at specialized vocational high schools (Yu et al., 2020). There is, nevertheless, still quite a number of comprehensive high schools which offer a mixture of vocational subjects and general subjects. Table 1 shows the total number of vocational high schools (Ministry of Education, 2020a).

Table 1 Number of Schools and Students by Type of Vocational High School

Type of School	Vocational High Schools		Vocational High School Students	
	No	%	No	%
Meister HS	51	2.15	18,673	1.4
Specialized VHS	463	19.55	209,410	15.65
Comprehensive HS	69	2.91	10,006*	0.75
Sub-total	583	24.62	238,089	17.8
Total HS	2,368	100	1,337,763	100

Note: Excluding students (19,553) in the general class (Ministry of Education, 2020a).

In the mid-1990s, the ratio of general high school students to vocational high school students was set at 50:50, and an expansion policy was actively pursued. However, in the 2000s, the percentage of vocational high school students had decreased significantly. In 2016, the Ministry of Education announced that it would keep the proportion of vocational high school students to at least 30% (Ministry of Education, 2016). Currently there are 53 agricultural and life science high schools, 240 technical schools, 214 business and management schools, 11 fishery and ocean schools, and 65 housekeeping and trade schools. The distribution of student proportions is similar to that of schools (Ministry of Education, 2020a). The total number of teachers in vocational high schools is 10,981 in general subjects, 14,754 in vocational subjects, 5,096 teachers such as nursing and nutrition teachers who do not teach general subjects, and

55 industry-academic adjunct teachers (Ministry of Education, 2020a).

Specialized Vocational High Schools

Specialized vocational high schools specialize in education for the purpose of cultivating talents in a specific field for students with similar aptitude and ability, or for experience-oriented education such as field practice, with a scale of 100 students per grade (Raduan & Na, 2017). In 2009, Ministry of Education, Science, and Technology presented the goal of fostering 400 specialized vocational high schools, and the overall performance of specialized vocational high schools at that time was generally satisfactory and evaluated positively. With reference to this reputation, all vocational high schools were renamed as specialized vocational high schools in June 2010 (Na et al., 2011).

As of April 1, 2020 (Refer to Table 2), there were 463 specialized vocational high schools, with a total of 209,410 students enrolled, accounting for about 15.7% of all high school students and 81.2% of all vocational high schools (Ministry of Education, 2020a). As of September 2020, nine ministries and two offices were funding approximately KRW 80 billion annually to 417 specialized vocational high schools and Meister high schools (Ministry of Education, 2020a).

Table 2 Number of Schools, Classes, Students, and Teachers by Vocational Content Category

Content Category	Schools	Classes*	Students*	Teachers			
				General	Vocational	Other	Adjunct
Agriculture	53	955 (812)	17,677 (14,707)	815	1,040	562	-
Manufacture	240	5,812 (5,693)	115,172 (112,619)	4,416	7,630	2,255	40
Business	214	4,903 (4,374)	98,805 (86,977)	4,547	4,648	1,748	-
Fishery	11	163 -155	2,638 -2,510	154	190	67	-

Table 2 Continued

Content Category	Schools	Classes*	Students*	Teachers			
				General	Vocational	Other	Adjunct
Home/ Trade	65	1,153 -1,056	23,350 -21,276	1,049	1,246	466	-
Total	583	12,986 -12,090	257,642 -238,089	10,981	14,754	5,096	55

* Although it is a legal scale, the statistics in parentheses are actually filled numbers.

Apprenticeship Schools

The apprenticeship school is a new vocational education model in which students learn from school and companies, and this school has benchmarked the dual system of Germany and Switzerland. It was introduced in 2015 under the name of industry academic integrated apprenticeship school. Existing specialized vocational high schools are selected to be in this "project" to meet the needs of the industry (Na, 2020) and therefore, it is not an official high school type. If the project is successful in the future, it could be established as a new type of vocational high school.

In March 2015, nine specialized vocational high schools conducted a pilot operation of the apprenticeship school. As of February 2020, 67 project groups with 162 specialized vocational high schools were being operated. The 67 project groups are divided into four models depending on who leads the project group (Refer to Table 3). The financial resources are shared and operated jointly by the Ministry of Education and the Ministry of Employment and Labor. The results of the introduction and operation of apprenticeship schools so far are generally evaluated as positive and successful (Na, 2020).

Table 3 Type of Apprenticeship Models and the Courses offered as of February 2020.

Type of Apprenticeship models	No. of schools
Joint Practice Center Models	4
Base School Models	37
Single School Models	23
Industry-led Models	3
Total	67
Major	**No. of courses**
machines	74
electrical and electronic	63
information and communication (IT)	11
business accounting	10
food service	6
hairdressing	5
materials	4
chemicals	4
business sales	3
tourism and leisure	2
construction	1
Total	183

Meister High Schools

Meister High Schools are special purpose high schools that foster young Meisters in connection with specialized industrial demands in promising fields. Most graduates either go into top companies, military service with special skills, or go to college (HiFive Homepage, 2021). Selection of schools to become a Meister high school occurred through evaluation among existing vocational high schools (HiFive Homepage, 2021).

The Ministry of Education designated the establishment of a Meister High School Support Center at the Korea Vocational Skills Development Institute on April 13, 2009 to establish a system dedicated to support and management for Meister High Schools (Korean Research Institute for Vocational and Training, 2015). The benefits given to students include exemption from tuition, admission fees, and school operation support fees, and separate scholarships are provided to excellent and low-income students; training overseas vocational colleges, national and local governments; and they support students' overseas advancement in connection with the organization's globalization project (Korean Research Institute for Vocational and Training, 2015).

A total of 6,562 students were recruited from 52 Meister High Schools every year, and the employment rates of Meister High School graduates were 90.9% in 2015, 93.3% in 2017, 91.3% in 2018, and 87.3% in 2019, showing a slight decline since 2017 (Ministry of Education, 2020a). Graduates whose employment is confirmed can postpone military enlistment for up to 4 years, and can work in the specialty field by making use of their skills in military service. In addition, after 3 years or more of working life, students can go on to study through special admissions, contract departments, or in-company universities to obtain a degree.

General High School

1. Comprehensive High School Students

The first Pyeongtaek Comprehensive high school was introduced in January 1966, from a benchmark of general high schools in the United States. These schools were established during the time when the government was trying to produce technical manpower through education which is a mixture of both vocational and humanities education. They are commonly found in outer suburban areas other than Seoul, Busan, and Incheon (Encyclopedia of Korean Culture, 2021). In June 2010, the Elementary and Secondary Education Act was amended to reclassify comprehensive high schools from vocational high schools to general high schools. As of April 1, 2020, there were 69, consisting of 36 public and 33 private schools. The general and other specialized departments are divided into agricultural life, industry, commercial information, fisheries and shipping, and housekeeping. There are about 40 schools with commercial information departments (Ministry of Education. 2020). The number of enrolled students is 29,559, with 10,006 students in vocational classes, and the others are students in general classes. The number of teachers is 3,222 (Ministry of Education. 2020).

2. Entrusted Vocational Education Students

Among the students enrolled in general high schools, students who wish to work after graduating from high school are selected and entrusted to an external institution for 1 year in the 3rd year to receive vocational education. There were 13,119 students in 2017, and in 2020, the number decreased significantly to 9,654 students (Ministry of Education, 2020a). Entrusted institutions include industrial information schools and vocational education base schools under each Office of Education, establishment and operation of local governments, Korea Polytechnics, Korea Commercial Human Resources Development Institute, junior colleges, and other institutions (Department of Human Resources Development, 2020).

Education expenses are provided free of charge from each office of education. More in-depth consideration should be given to whether these opportunities should continue because vocational high schools are unable to recruit new students every year as middle school students prefer general high schools. Since the cost of vocational education entrusted to general high school students that is being paid is more than that of vocational high school students, it is also a problem in terms of equity (Department of Human Resources Development, 2020).

Trade High School

Trade high schools, introduced under the Education Act promulgated on December 31, 1949, are an educational institution that teaches career knowledge and skills to people who cannot attend regular school. The number of students had significantly increased from 10,000 in the 1970s to 20,000 in 1980, and then gradually decreased during the 1990s. In 1997, about 9,400 students were enrolled in 19 schools. As of April 2020, there were five trade high schools nationwide, which are private. There are about 531 daytime students and 21 nighttime students. (Ministry of Education, 2020a)

TVET Teacher Education and Professional Development

Vocational teachers in regular schools are trained through the teacher education department and college of education, teaching courses, and graduate school of education. The teaching course can be operated with approval from the Ministry of Education in the major of the university related to the subject marked with the teacher's certificate.

The first vocational education department for vocational teacher training was established in 1962 as both the Department of Agricultural Education and the Department of Engineering Education, Seoul National University (SNU Homepage, 2021), and the Department of Fisheries Education, Pukyong National University (PKNU Homepage, 2021). The Department of Business Education was established in Gongju National University (KNU Homepage, 2021) and Daegu Catholic University in 1978 (DCU Homepage, 2021). The undergraduate program of the Department of Agricultural Education at Seoul National University was reorganized into the Program in Vocational Education and Workforce Development from 2005. However, the training function for agricultural teachers was replaced with a teaching course.

As of 2021, the representative engineering education department has been maintained at Chungnam National University since 1970 (CNU Homepage, 2021), the agricultural education department at Sunchon National University since 1982, the fisheries teacher education department at Pukyong National

University since 1962, and the business education department at Gongju National University since 1978. In addition, vocational teachers are trained through teaching courses in many universities and minority vocational education departments. The faculty qualifications of vocational teacher education departments are those who majored in either subject education or content studies.

Hiring a new teacher usually takes place in three stages. The written test is entrusted to the Korea Institute of Curriculum and Evaluation. About 1.5 to 2 times the actual number of employees that is expected to be hired by the end of all the stages will be selected through the first stage written test examinations. They will then undergo a class demonstration or practical examinations in the second stage in each school district and in the third stage, an interview. (Korea Institute for Curriculum and Evaluation, 2019).

Secondary Vocational Education Reforms and Policies

Secondary vocational education policy (Ministry of Education, 2019c) is developed by the Secondary Vocational Education Policy Division of the Ministry of Education. In general, high school vocational education policies tended to be consistently pursued by the previous government, while the current government is placing an emphasis on innovation in secondary vocational education and activation of high school graduate employment (Ministry of Education, 2019b).

In 2021, the Ministry of Education will promote several secondary vocational education policies including voluntary innovation based on industry supported through the specialized high school innovation support project. Moreover, vocational high school departments are being reorganized into new industries (Office for Higher Education Policy, 2020), and five vocational education innovation district projects are being developed to enable high school graduates to find employment at top companies in the region and continue to develop their competencies at local universities. In the vocational education innovation district project, vocational high schools operate training courses tailored to the strategic industries of the local community, while local companies operate on-site job training such as apprenticeship training, field trips, and internships. Local universities manage a curriculum in connection with specialized high schools and a dedicated course for employees of local companies.

There are also policy plans to establish a database for high-quality high school graduate jobs centered on the Central Employment Support Center, and linking with local employment centers. Moreover, 700 job support officers will be assigned to vocational high schools as of 2021 (Vocational Education Policy Office, 2021).

Post-Secondary Vocational Education

Post-secondary vocational education institutions include junior colleges directly managed by the Ministry of Education and Korea Polytechnics, a subsidiary of the Ministry of Employment and Labor.

Junior Colleges

According to the Higher Education Act, junior colleges focus on technical and vocational practice and teach specialized theories and technologies to cultivate middle-level professionals. The length of study is from 2 to 3 years and in some cases it is 4 years (Korean Council for University College Education, 2021). About 93% of all 136 junior colleges are private. There are two national junior colleges and seven provincial colleges. The reason for this high dependence on private colleges is that many national junior colleges have been incorporated into 4-year national universities.

As of 2019, the freshman quota for all junior colleges was 165,892 students. The proportion of freshmen according to the length of study is 64.5% for 2-year courses, 29.2% for 3-year courses, and 6.4% for 4-year courses. However, as of April 1, 2020, the recruitment rate of new students at junior colleges nationwide was 93.6%, 97.8% in the metropolitan area, and 90.5% in local colleges, but it varies somewhat depending on the location of the college and university (Ministry of Education, 2020a).

As of April 1, 2020, the total number of students enrolled in all junior colleges was 621,772. The number of graduates in 2020 was 167,607. The average employment rate for college graduates in the last 5 years is 70%. It was 69.5% in 2015 and 71.1% in 2018. On the other hand, the average employment rate of 4-year college graduates is 64% (Ministry of Education, 2020a).

Advanced Major Course (Bachelor's Degree)

Since 2008, the Advanced Major Course has been opened to confer a bachelor's degree at a junior college (Korean Council for University College Education, 2021). At the time of its introduction, it was intended to provide continuing education opportunities to junior college graduates working in the industry, but recently, it has been opened to allow completion of advanced major courses even without industry experience. In other words, the qualifications for admission to advanced major courses with industry experience are currently applied to those who have graduated from a junior college in the same field or have an equivalent academic background and have worked in the relevant field for more than 1 year (9 months for those who graduated from the previous year). Anyone who has graduated from college or has the same educational background can apply.

The term of study for the advanced major course is 2 years or longer for 2-year departments, and 1 year or longer for 3-year departments. In the 2021 academic year, 831 people were recruited from 21 universities and 28 departments, but 687 people were actually enrolled in the advanced major course that recruits experienced workers in industry. On the other hand, 16,415 students from 103 junior colleges and 765 departments were recruited for the advanced major course, which did not require industry experience, but 14,487 students were actually accepted. The total recruitment rate was about 88%. Of all courses, 83% are offered as night courses, which has the advantage of students being able to work and study simultaneously (Korean Council for University College Education, 2021).

Korea Polytechnics

Korea Polytechnics are technical colleges established under the Act on the Development of Vocational Skills of Workers under the jurisdiction of the Ministry of Employment and Labor. They were established as technical colleges in February 1998 (Korea Polytechnics, 2020). This institution was established in June 1968 as the National Vocational Training Institute, and it has gone through a number of changes till today. In particular, in March 2006, 24 technical colleges and 21 vocational colleges were integrated into Korea Polytechnic colleges. In March 2008, the name was changed to a school corporation, Korea Polytechnics. Korea Polytechnics consist of eight colleges and one specialized college on 34 campuses across the country. Each college provides non-degree vocational training courses, Global Multi Technician courses that award associate degrees to junior colleges according to the Higher Education Act (Higher Education Act Article 28, 1997/2011), and advanced major courses that award bachelor's degrees. Except for the Gangseo Campus in Seoul, the other campuses provide dormitories for all enrolled students.

Graduation credits for the 2-year program were 90 credits as of 2020, and the tuition fee was 1.2 million won per semester. Advanced major courses are offered as evening courses. Students attending these colleges can also apply for and receive national scholarships, depending on their family's income level.

Korea Polytechnics also provide P-TECH (Pathways in Technical Education, oriented Convergent High-Technology). This P-TECH recruits those who have graduated from high school vocational education courses, and awards an associate degree upon graduation (Korea Polytechnics, 2021). Advanced major courses for bachelor's degrees were also established; they are offered as evening courses.

Post-Secondary Vocational Education Reform and Policies

Post-secondary vocational education and higher vocational education policies are managed by the Vocational Education Policy Bureau of the Ministry of Education. In particular, vocational education through junior colleges is mainly handled by the Junior College Policy Department and the Junior College Support Department, while vocational education and employment policies for 4-year colleges are handled by the Industry-Academic Cooperation and Job Policy Department.

The core of the junior college policy is to reinforce the role of junior colleges as a higher vocational education institution. Accordingly, the Junior College Innovation Plan was established (December 19), the system is being improved, and financial support is being implemented to strengthen junior colleges' competency.

In 2021, the Ministry of Education will select five junior colleges through screening and evaluation, and has promoted a pilot operation of Meister University. Meister University operates at various levels of job-centered training courses, from short-term job courses to training high-skilled professionals. It provides advanced technical education such as practical project education and practice, and introduces a new master's course in professional technology that allows for a master's degree. In addition, junior colleges also support the development of curricula for new industries and improvement of the educational environment by establishing a new industry-specialized leading junior college support project (Ministry of Education, 2021b).

In 2021, all junior colleges will be verified for their basic university competencies. If the verification result is good, it will be selected as a university for the innovation support project and receive support. As a result, education is hindered by the compromising of performance as all colleges are preparing self-assessment reports (Ministry of Education, 2021b).

Tertiary Vocational Education

Higher vocational education institutions in Korea include the Industrial University, Meister colleges, Korea National Open University, and the Academic Credit Banking System.

Industrial University

According to the Higher Education Act, an industrial university is an industry that will contribute to the development of the country and society by providing opportunities for higher education to those who want to continue to receive education for research and polishing of their academic or professional knowledge or skills required in the industrial society (Higher Education Act Article 37, 1997/2011)

At the end of 1980, national technical colleges were converted into open colleges, and at the same time, they were promoted to 4-year colleges. Later, when the Higher Education Act was revised, all former open colleges were replaced by industrial universities. Humanities departments have been newly established since the 2000s, and only Chungwoon University and Howon University have remained nationwide since 2012. About 16 industrial universities were converted into general universities, and four were integrated with general universities. When the industrial university was converted to a general university, it was mainly reorganized into a University of Science and Technology. Accordingly, it is possible to open a master's program and a doctoral program in graduate school.

Both universities have an annual recruitment quota of 2,388. As of April 1, 2020, the total number of enrolled students was 15,384. The number of faculty members at both universities was 346 (Education Statistics Service, 2020).

The private Chungwoon University was established in March 1995 as Chungnam Industrial University. The university also has Hongseong Campus in Chungnam and Incheon Campus from March 2013. The number of enrolled students is about 8,350, about half of whom are from the metropolitan area. The predecessor of the private Howon University was opened in 1977 (Howon University Homepage, 2021) as the Kunsan Technical College. In 1984, it was promoted to a 4-year Kunsan Open University, and in 1992, it was renamed Jeonbuk Industrial University. Currently, the total number of enrolled students is about 5,400.

Chungwoon University offers a master's program. It is divided into a general graduate school and an industrial consignment course. Basically, a person must have a bachelor's degree or an equivalent academic background, and in particular, for an industrial consignment course, a person with at least 9 months of work experience in an industry must be employed as of the time of enrollment. Individual business owners can enroll if they have more than 9 months of business registration certificate (Chungwoon University Homepage, 2021).

Meister University (Master's degree) In February 2021, the Higher Education Act was amended to allow the establishment and operation of master's programs in junior colleges to cultivate highly skilled and technical talents. Five junior colleges were selected by dividing the whole country into regions, and Meister University is scheduled to be operated on a pilot basis from 2022 (Ministry of Education, 2021a).

On April 14, 2021, the Ministry of Education selected five junior colleges and partner universities. Two billion Korean won will be provided for the pilot operation of this university, which will be conducted over the course of 2 years, to each selected college (cooperation university). In the first year of this pilot operation, educational conditions and systems such as curriculum development and teacher competency enhancement are being reorganized, and short-term job courses are being operated; in the second year of the pilot operation, degree students will be selected and all Meister curricula will be in in operation. Through this pilot project, system improvement tasks will be discovered and an excellent model of Meister University will be derived (Ministry of Education, 2021a).

Therefore, at the Meister University, students can acquire an associate degree through a 2-year or 3-year course at a vocational college, and continue to acquire a bachelor's degree through an advanced major course of 1 or 2 years, and then can acquire a master's degree in professional technology through a 2-year master's program at a graduate school. However, through a pilot project, it is necessary to thoroughly monitor and manage the quality through appropriate measures to meet the purpose of the unirersity (Ministry of Education, 2021a).

Industrial Complex Campus

The industrial complex campus was established in 2012 by the Ministry of Education's Industrial Complex Campus Project, and the Ministry of Trade, Industry and Energy's Industry-Academic Convergence District Project. Of the 35 industrial complex campuses created by 2019, 21 were created as industry-academic convergence district projects by the Ministry of Trade, Industry and Energy (Ministry of Education, 2019a).

The purpose was to recreate the production-oriented industrial complex as a complex space where production, education, and culture harmonize while expanding opportunities for lifelong education for workers and improving the quality of working life. In this respect, the industrial complex campus should also be regarded as a type of higher vocational education (Chae & Lee, 2017).

As of January 1, 2019, 34 universities had been approved nationwide, and 35 industrial complex campuses were operating. Mokpo National University is the only one to have two industrial complex campuses (Mokpo National University Homepage, 2021). There are eight junior colleges, 20 departments and about 4,000 students participating in the entire industrial complex campus. The rest are 4-year universities, with 89 departments and about 16,000 students. The major field reflects the industrial characteristics of the industrial complex, but industrial departments dominate. This project is being supported by the Ministry of Education and the Ministry of Industry.

Technical College

Technical College aims to cultivate professional manpower equipped with theoretical and practical skills by allowing industrial workers to continue to receive education for research and hone specialized knowledge and skills in the industrial field according to the Higher Education Act (Higher Education Act Section 6 Article 55, 1997/2011). Accordingly, an associate degree or bachelor degree course is provided, but only with a high school or junior college graduation certificate and a certain period of work experience in the industry (1 year and 6 months) to be admitted. Therefore, technical colleges can be viewed as higher vocational education institutions.

Technical colleges have a bachelor's degree program and an associate bachelor's degree program, which is both a 2 year program. The type of degree is determined by academic regulations, as in colleges and vocational colleges. Those who graduated from a junior college can apply for the bachelor degree program; while those who graduated from high school can apply for the associate bachelor degree program. Those who enter the bachelor's program can acquire a bachelor's degree in 2 years because they have already graduated from a junior college or have an equivalent academic background.

The Department of Business Administration and the Department of Industrial Engineering are bachelor's courses, and the Department of Aeronautical Systems Engineering is a specialized bachelor's course. The total number of recruits is 100.

Korean National Open University

Opened in 1972, Korea National Open University is the first national distance university in Korea, and the second distance university in the world after the British Open University. KNOU can also be regarded as a tertiary vocational education institution considering the purpose of establishment and the characteristics of enrolled students (Korea National Open University Homepage, 2021). KNOU is composed of four colleges which is made up of various departments, and has regional universities in 13 special cities and metropolitan cities (Korea National Open University Homepage, 2021). Students in this university comprise various age groups. After graduating from a 2-year college, students in their 20s usually apply to obtain a 4-year college degree online at very low tuition, without moving from where they live, while simultaneously engaging in economic activities such as full-time or part-time work.

The tuition fee of Korea National Open University is about 350,000 won per semester for general students, so it is about 700,000 won per year (Korea National Open University, 2020), which is cheaper compared to other national universities. In addition, with national scholarships, even students from the 7th quintile of household income group will be sponsored 100%, and the people in the 8th quintile of household income will only pay around 40~50,000 won. Graduate school tuition is about 1.3 million won per semester, but business school requires about 1.8 million won per semester. Since KNOU graduate school is a special graduate school, it offers a 2-year and 6-month course (5 semesters) (Korea National Open University Homepage, 2021).

The number of credits for undergraduate graduation is currently 140, but will be reduced to 130 from August 2022 (Jang, 2021). KNOU has produced

680,000 graduates over 46 years, and the cumulative number of applicants exceeds 2.95 million. Its classes are held remotely and are accessible anywhere at any time, so there is no burden on the students (Jang, 2021).

Cyber University

Korea's first cyber university was opened in March 2001. Based on the Lifelong Education Act at that time, cyber university was classified as a lifelong education facility in the form of a distance learning university. With the revision of the Higher Education Act in 2008, Cyber University was formally added as an institution of higher education (Kang et al., 2010).

As of April 1, 2020, there were 19 cyber universities, two of which are junior colleges and the rest are 4-year university courses. The total number of cyber university students is 130,311. The number is increasing little by little every year. The total number of professors is 602 (Ministry of Education, 2020a). Students entering this university are selected through an entrance examination that is different from that of general universities. High school grades or college entrance examination grades are not reflected, but are evaluated using the aptitude evaluation and academic plan for each university.

Initially, office workers accounted for 80%, but as the years go by, the percentage of school-age students who graduate from high school has been increasing. In many cases, it is used as a route for them to upgrade from a 2-year college graduate to a 4-year bachelor's degree.

Cyber colleges also receive student loans, as well as benefits such as graduate school entrance, transfer admission, and military enrollment postponement. Grades consist of attendance, mid-term, and final examinations, and homework evaluation. The evaluation method for each subject could be independently decided by the professor in charge (Kang et al., 2010).

Academic Credit Banking System (ACBS)

The ACBS is an open educational system which recognizes diverse learning experiences gained not only in school but also out of school. It was introduced in 1997 as a system to realize an open learning society and a lifelong learning society (National Institute for Lifelong Education, 2019). The first graduates from ACBS were in 1999, with 25 bachelors and nine associate degrees, and the cumulative number of associate degrees produced by 2020 was 409,829, and 397,938 bachelors (Ministry of Education, 2020a). A total of 431 educational institutions had participated in the credit banking system, with 194 university-affiliated lifelong education centers, 61 accredited vocational training centers, 104 lifelong education facilities, 36 government-related institutions, and 13 academies (National Institute for Lifelong Education, 2020).

College in the Company

College in the company refers to lifelong education facilities operated by managers with more than 200 employees for workers who cannot go to college due to lack of time and money. With the revision of the Lifelong Education Act in 2000, an in-house university system was established in which academic backgrounds and degrees equivalent to those of a junior college or university were recognized. After earning a bachelor's or associate bachelor's degree at an in-house university, they can also obtain bachelor's and master's and doctoral degrees through contracted departments.

As of April 1, 2020, there were eight Colleges in the Company (Ministry of Education and Korea Educational Development Institute, 2020). The total number of registered persons was 414. There were five full-time professors, and it can be seen that the progress is mostly dependent on external instructors. There were 778 in 2016 and 504 in 2018, which is gradually decreasing. In the future, demand is expected to continue to decrease (Ministry of Education and Korea Educational Development Institute, 2020).

Specialized College

Specialized colleges are educational institutions accredited by the Ministry of Education under the Lifelong Education Act of 2008. In other words, when graduating from a major college, academic background and degree equivalent to those of a junior college are recognized. With regards to the academic management of specialized colleges, the regulations of in-company colleges are applied accordingly.

As of April 1, 2020, specialized colleges included Kukje University of the Arts, Baekseok University of the Arts, and Jeonghwa University of the Arts, which are all located in Seoul. As of April 1, 2020, 15,267 students were enrolled, which shows a tendency of increasing by 1,000 students each year from 11,939 students in 2016. The number of faculty members was 275, increasing from 246 in 2016 in proportion to the increase in the number of students (Ministry of Education, 2020a).

Faculty Qualifications and Teaching Skills

The Higher Education Act stipulates the qualification requirements for university professors and staff (Higher Education Act Article 14-2, 1997/2011). The teachers assigned to a university comprise professors, associate professors, assistant professors, and instructors. Moreover, the act describes the classification of school personnel which comprise administrative staff and assistants which are necessary for school management. As of 2019, instructors must be appointed by a written contract, and the length of contract must be at least 1 year (Higher Education Act Article 14-2, 1997/2011). In addition, emeritus professors, adjunct professors, and invited teachers may be appointed to be in charge of education or research. According to the regulations on qualification standards for university teachers, based on university graduates and equivalent qualifications, assistant professors must have at least 2 years of research achievement and 2 years of educational experience, while associate professors must have 3 years of research achievement and 4 years of educational experience (Higher Education Act Article 14-2, 1997/2011). Candidates must have 4 years of research achievements and 6 years of educational experience. On the other hand, junior college graduates and equivalent qualifications generally require an additional year of research achievement and 2 years of educational experience for each position.

However, it is not easy to find a job as a professor even if almost all applicants have a doctorate degree and have excellent research achievements. In addition, it is expected to be more difficult in the future as the school-age population sharply declines. And unlike in the past, when hiring university professors, teaching methods and pedagogy are now importantly reflected in the screening process. This is because a great deal of attention is being paid to the learning outcomes of students.

Tertiary Vocational Education Reforms and Policies

Higher vocational education policy is overseen by the Industrial-Academic Cooperation Job Policy Division, Vocational Education Policy Bureau, Ministry of Education. The industry-academic cooperation job policy department mainly focuses on industry-academia cooperation and strengthening support for employment and entrepreneurship. It oversees and leads youth policies in the field of industry-academia-research cooperation and education across ministries. It is contributing to the strengthening of the university's capabilities by promoting various projects that support various industry-academic cooperation activities such as cultivating industrial talents and technology transfer (Refer to Table 4).

Table 4 Type of Financial Support Projects

Financial Support Projects	No. of Universities
LINK+	134
4th industrial revolution innovation leading university	40
BRIDGE+	24
university-industry cooperation complex	4
Campus Innovation Park	3
laboratory-specific startup leading universities	15
Total	220

Additionally, tertiary educational reform policies also include the Career Exploration Credit System for Employment Support. This policy creates a recruitment link between graduates and small and medium-sized companies, and thus provides career and employment support for college students and this was expanded to include an additional 7,112 students in 2020.

In 2021, the Ministry of Education plans to promote the Innovation Sharing University project to cultivate new digital technology talents. Special curricula will be designed for university students who wish to receive education in new technology fields regardless of their major. KRW 83.2 billion is expected to be invested annually, and six participating universities including one junior college have been selected as the host universities for this project. Similar to this, a third stage industry-academic cooperation leading university (LINC) project is also currently being developed.

Technical Qualification System and NQF

The National Technical Qualification System has been in effect since 1974. The qualification consists of five levels: Craftsman, Industrial engineer, Engineer, Meister, and Professional engineer. There are 526 qualification items. These qualifications are screened through examinations (NCS Home page, 2021).

In order to break the discrimination based on academic background and graduate school which is prevalent in Korea and to realize a competency-based society, National Competency Standards (NCS) development and National Qualification Framework (NQF) establishment were adopted as national agendas since 2013. As a result of this, NCS learning modules, the National Competency System, the Process Evaluation Type Qualification System and an NCS-based recruitment system have been established (Na & Oh, 2016).

The Ministry of Education enacted administrative rules on the Korean National Qualification Framework in February 2019. This is a level system based on NCS that enables academic background, qualifications, field experience, and educational training completion to be interconnected with each other. The components of KQF were set as knowledge, skills, autonomy, and accountability, and were set to eight levels, and explanatory indicators for each component required for each level were presented. It was also decided to be reviewed every 3 years. Meanwhile, the Ministry of Employment and Labor is promoting the project to establish the Sector Qualification Framework. In the future, it will be necessary to focus on establishing a practical NQF at the level of the ministry (NCS Home page, 2021).

TVE Institutional and Program Accreditation

Junior College Accreditation. In April 2009, the Korea Accreditation Board for Vocational Higher Education (KABVHE), affiliated with the Korean Council for University College Education, was established. It was designated and approved by the Ministry of Education in December 2010 (Korea Academic Recognition Information Center, 2019). Accreditation refers to the process whereby the quality of universities or institutions is ensured to meet or exceed the standards of quality of education proposed by KABVHE. The evaluation accreditation criteria were presented in three stages, and the validity period of accreditation is 5 years. If accreditation is conditionally awarded for 1 year or if accreditation is suspended, it is judged again and accreditation is valid for

4 years (Korea Academic Recognition Information Center, 2021). As of April 2021, 115 junior colleges had received institutional accreditation.

University and Program Accreditation. In 1999, the Accreditation Board for Engineering Education of Korea (ABEEK) was established. From 2005, accreditation criteria for engineering education (KEAC) and computing (KCAC) were established, and in 2009, the accreditation criteria for engineering technology education (KETAC) held at junior colleges were established (ABEEK Homepage, 2021)

As of May 2020, a total of 83 universities and 449 programs were accredited. KEAC has 77 universities and 402 programs, KCAC has 34 universities and 43 programs, and KETAC has four universities and four kinds of degree program, respectively. This engineering education and engineering technology accreditation can be understood as a quality assurance system linked to higher vocational education (Na et al., 2020).

Trends and Issues in TVE

Trends in TVE

Several TVE trends could be seen from the review of the current Korean educational institutions in the previous sections. This trend may vary depending on the type and institution of vocational education level, but it can be comprehensively presented as follows based on common factors.

Changing Roles of Central and Local Governments and Decentralization of Education

The Ministry of Education is in charge of the national vocational education plan including the post-secondary and higher vocational education, while the city and provincial education offices oversee the secondary vocational education. There is more autonomy provided to the local education offices for secondary education. Since 2008, central government departments other than the Ministry of Education such as the Ministry of Defense, Agriculture and Forestry, the Ministry of Culture, Sports and Tourism, the Ministry of Information and Communication, the Ministry of Culture, the Ministry of Maritime Affairs, Small and Medium Business Administration, the Intellectual Property Office, and others have participated and provided financial support to foster specialized high schools and Meister High Schools (Na et al., 2011). These central ministries and local governments participate in higher vocational education to secure the necessary human resources through financial support and cooperation of universities.

As the autonomy of local governments spreads, it can be seen that the central and local governments are developing a direction whereby their roles and cooperation are equally shared. In particular, cooperation between institutions under jurisdiction will be centered on local governments in the future.

Continuous Reorganization and Reformation of the School System

The reformation of the high school and university system for extensive vocational education at the national level is usually decided at the time of presidential change. For example, the Lee Myung-Bak administration had planned to establish Meister High School in 2008 which would also provide full scholarships for all specialized high school tuition fees from 2011, and the Park Geun-hye administration had introduced the NCS-based work-study system in 2014 and the industry-academia integrated apprenticeship school in 2015. In 2013, the Specialized College of Korea (SCK) was introduced.

The Moon Jae-in government set six major educational tasks, namely Strengthening publicity of education from young children to college, Innovation in public education through classroom revolution, Restoration of the ladder of hope for education, Quality of higher education and enhancement and innovation of lifelong and vocational education, Creation of a future educational environment and realization of a safe school, and Restoration of educational democracy and autonomy.

Policies related to secondary vocational education include realizing free high school education, reorganizing student-centered curricula, transitioning to a career-specific high school system, expanding support for high school graduates, abolishing the practice of academic background and scholarship, promoting professionalism for teachers in line with the future society, simplifying college admissions, and enhancing fairness.

The national tasks for post-secondary and tertiary vocational education include strengthening national responsibility for vocational education, improving the quality of junior colleges, activating lifelong learning for adults such as K-MOOC, and activating university establishment and industry-academia cooperation (KMOOC Homepage, 2021). Moreover, the reorganization of the system of unit schools and universities or the reorganization of departments and majors has been continuously promoted as necessary from time to time.

In general, the tasks promoted by the previous governments tend to continue, but there are some differences depending on the political ideology and orientation of each government. Although there are few differences in the understanding of the importance of vocational education by each government, there may be differences in the direction and intensity of implementation. Therefore, vocational education experts and workers should be attentive when pursuing the direction of state administration in the future, so that the school system and reconstruction will continue.

Periodic Revision of the Curriculum to Reflect Industrial Demands

Vocational education in high school changes according to the curriculum at the national level. It is the curriculum revised in 2015 that is currently in effect. In short, this is a curriculum based on the National Competency Standards (NCS), and has been applied since 2016. The 2022 revised curriculum is currently being prepared.

Meanwhile, all public institutions responsible for the Ministry of Strategy and Finance have introduced an NCS-based competency-based recruitment system for hiring new employees from 2014, and since 2018, a blind recruitment system has been adopted.

In 2014, the National Technical Qualifications Act was amended, and a “process evaluation type qualification” system was introduced. From 2015 to the present, about 150 national technical qualification items have been set as course evaluation type qualification items. Institutions that have undergone screening and evaluation through the Human Resources Development Service and have been approved can operate “process evaluation-type qualification courses.” On the other hand, the Ministry of Employment and Labor announced that the percentage of acquirers through the process evaluation-type qualification course will increase from 0.5% in 2019 to 10% by 2022 (NCS Home page, 2021).

Currently, course evaluation-type qualification courses are mainly operated for craftsmen and industrial engineers’ qualifications. Engineer qualifications are mainly obtained through non-degree vocational colleges. Specialized high schools and Meister high schools mainly operate the qualification courses for industrial engineers, not for craftsmen. Although it is difficult to establish a process evaluation-type qualification course, it is understood that teachers and students actively participate because of the advantage of obtaining advanced qualifications (Na & Cho, 2019).

On the other hand, non-degree vocational colleges receive training costs in proportion to the number of hours and trainees from the Ministry of Employment and Labor. Since post-secondary vocational education has also innovated the NCS-based curriculum through certain programs and specialized universities, it can be said that a competency-centered curriculum is being used to train human resources with the necessary skills that are demanded by the current labor market.

Increased Emphasis on Field-Oriented Lifelong Learning

The core goal of vocational education is to cultivate the manpower required in the industrial field. To date, the reorganization of the curriculum into a work-based curriculum has been emphasized. This will accommodate the needs of the industrial site, or provide opportunities for students to directly work at the relevant industrial site as practice. Students who participate in the industry-academia integrated apprenticeship school learn by going back and forth between schools and businesses. In college, field training or internship is reflected in the curriculum, and practical experience is further emphasized.

In general, high schools and universities have formed MOU with industries to support people-to-people exchange and field trips to industries. The core of various financial support projects promoted by the government is also considered when evaluating, with emphasis on cooperation with related industries.

Diversification of Student Composition and Career Paths

Due to the change in population and its related policy support, the composition of students who have completed vocational education is becoming more diverse, and their career paths after graduation are gradually diversifying. One positive change is that more students choose to enroll using their aptitude and talents rather than just their academic grades. However, on the downside, the number of schools that cannot fill their enrollment capacity is increasing due to the rapid decline in the school-age population. In the case of rural areas, the number of students per class is less than 10 due to the decrease in enrollments, and the school size is gradually becoming smaller.

Despite this, compared to the past, there are more multicultural students and adult learners being enrolled. After graduating from high school, career paths or opportunities are gradually becoming more diverse. In the past, students graduated from high school only with the purpose of getting a job or going to university. However recently, there is an increasing number of people who work and study simultaneously. Even the number of graduates who enter the path of entrepreneurship or farming succession is growing in size. Moreover, vocational high schools could provide a route to becoming a professional soldier. And those who have been incumbent for more than 3 years after graduating from high school have the benefit of entering college through special admission. Students can also study abroad by becoming a state-funded international student.

Even in higher vocational education, the demographic characteristics of students are becoming increasingly diverse. The proportion of students of school age is gradually decreasing due to the declining population, although it depends on the break in tertiary vocational education. The number of adult learners is increasing.

Issues in TVE

There are several issues that are evident and which require attention. These vocational education issues may somewhat vary depending on the type of vocational education and institution.

Changes and Confusion due to New Policies and Institutions

To date the government has promoted various policies and system improvements in order to solve specific educational issues or to reorganize the purpose of vocational education. However, these initiatives are leading to a great deal of foreseeable and unexpected confusion. If the new policies consider the anticipated issues in advance, there should be no consequential problems arising from them. However, when confusion and objections to the policies grow, the original plan may be abandoned or changed within a short period of time. Therefore, policy performance is low or ends in failure.

In Korea, these policy changes usually occur when the president or superintendent is replaced. They are elected by the residents, and the president has a single term of 5 years, but the superintendent of education has the advantage of being able to pursue the policy more stably and for a longer period of time because the superintendent can serve for 4 years and for three consecutive terms. During the intersection of terms of office, if the superintendent has a disagreement with the president, it will lead to conflict and confusion for the vocational high schools and teachers in the jurisdiction.

Insufficient Staffing and Increased Workload

The quality of vocational education depends on the quality of teachers or professors. However, when a vocational high school teacher retires, their successor is not immediately recruited; instead, the teacher is replaced by fixed-term teachers. The main reason is that teachers of newly established schools are preferentially hired according to the creation of new cities or large-scale residential complexes. As a result, regular teachers in vocational high schools are aging, and the number of jobs is increasing. This is because, unlike regular teachers, fixed-term teachers are limited in taking on tasks. Private schools are usually hesitant to hire new teachers due to their intention of facilitating possible restructuring. The proportion of fixed-term teachers in public specialized vocational high schools in the metropolitan area is over 40%. Due to this, the work of regular teachers is gradually increasing, the level of dissatisfaction is high, and the number of burnout teachers is also increasing.

Moreover, the Ministry of Education is reducing the scale of the teaching profession through the evaluation of teacher training institutions. This is because the training of teachers in ordinary and specialized subjects is much higher in supply than demand. Training through the Teacher Education Department has gradually decreased. It is deemed necessary to maintain the current teaching curriculum at an appropriate scale because the proportion of training through the college of education is not large. Recently, the teacher personnel system has been continuously reorganized, making the teaching profession less attractive, and moreover, the number of teachers retiring early is due to the difficulty of conducting non-face-to-face classes due to the spread of COVID 19.

In order to improve the quality of vocational education, the curriculum has been reorganized to meet the needs of industry by utilizing the NCS and hiring industry as industry-academia adjunct teachers. From 2010, Meister High Schools have been employing industry CEOs as principals, and vocational high schools are gradually expanding the Principal Selection System. The utilization of industry-academic adjunct teachers tends to be less likely as they are farther from urban areas or industrial complexes (Yu et al., 2020).

On the other hand, the recruitment rate of professors at universities is high at national and public universities, but not at private universities, especially junior colleges, which constitute less than 60%. The lower the full-time professors' recruitment rate, the more classes that are operated by part-time instructors or non-tenure track professors. Even with such a low faculty recruitment rate, it is questionable whether the quality of higher vocational education can be properly guaranteed.

Decreasing Quality of Vocational Instruction due to Skill Mismatch and the Pandemic

To ensure the quality of vocational instruction, the curriculum must first be reorganized to reflect the needs of the industrial field and to secure excellent teachers who can teach students well. More recently, an issue of schools not conducting appropriate teaching was raised, due to COVID-19 in 2020. Due to the social distancing guidelines to prevent the spread of COVID-19, classes are generally conducted online, and there is a lack of practical training or field trips, which leads to poor quality of vocational instruction. The quality of field-based vocational instruction will reduce, so supplementary learning and countermeasures must be prepared. In particular, appropriate follow-up support will be needed for the subsequent employment guidance of graduates and adaptation.

Under the proliferation of COVID 19, the situation of vocational instruction in colleges and universities is similar to that of high school, but relatively less. Depending on the university, there were relatively more face-to-face classes, and even if they were online, they were operated similarly to the classroom instruction. Nevertheless, the quality of instruction in general will not be as good as it was pre-COVID-19. For this reason, there have been requests for the refund of tuition fees by college students, and some universities have returned a certain amount of money to individuals.

Appropriate measures should be taken so that the quality of vocational instruction does not deteriorate continuously until normalization, and special support and measures should be prepared, especially for the employment of graduates. In July 2020, the introduction of a one-year compulsory early childhood education (Choi, 2018) and the introduction of a free-year junior high school system (South Korea Policy Brief, 2021) was discussed. Although the two systems have yet to be established, it will perhaps continue to be discussed in the near future.

In addition, it is difficult to guarantee the quality of vocational instruction with the development of the 4th industrial revolution. Industrial production methods are automated or shifted on demand. Teachers with expertise to teach state-of-the-art technology and field practice are required. However, regular teachers generally do not have practical experience and are thus vulnerable. Therefore, an industry-academic adjunct teacher system is operated. However, the possibility of using an industry-academic adjunct teacher is less likely because the standard amount for support in rural areas or labor costs is too low.

Passive Participation of Industries and Related Ministries

In order to overcome the limitations of the school-centered workforce training system, the participation of industries and ministries in need of an industrial workforce has been emphasized. Since 2008, ministries that need high school graduates will invest money in high school vocational education, participate in curriculum management, and hire new personnel after graduation. Despite that, some ministries are passively involved.

Moreover, some companies cannot financially afford to participate continuously in the effort. In Korea, the proportion of SMEs is more than 99%. Therefore, compared to large companies, wages are low and working conditions are poor. Although it is important to provide opportunities for on-the-job training for students, small companies tend to avoid it because accepting the students in would mean that they have to invest more time and effort into managing the personnel and the organization, and this might take more time and physical resources away from the immediate profit-making material production.

On the other hand, students also prefer large companies rather than small and medium-sized businesses when they are on field trips or when seeking employment. However, in order to induce more active participation, it is necessary to prepare various support measures such as tax incentives for participating companies. In addition, vocational high schools and universities should make their own efforts to cooperate with related industries and institutions autonomously, and establish and implement strategies and detailed plans for mutual growth.

Reduced Employment Opportunities and Job Retention

Getting a vocational education should help a student be employed in a decent job. However, even after completing vocational education, this is often not possible because there is either no job opportunity or because what is available in the market is not considered sufficiently decent. On the other hand, with the international economic downturn, the domestic economic downturn has not increased the number of jobs, but rather decreased them. In fact, it is said that currently this is an era of growth without employment.

The government has tried an initiative to tackle this issue such as the Government-wide High School Graduate Employment Activation Plan and the 2020 Vocational High School Support and Employment Activation Plan (Ministry of Education, 2020b). Additionally, the Ministry of Education announced plans to “Revitalize high school graduation employment” in January 2019 (Ministry of Education, 2019a).

Admission to college is recognized as a shortcut to success, resulting in social side effects such as competition for entrance examinations and overuse of private education. As the growth path of adolescents is fixed by entering college immediately after high school graduation, the structural discrepancy of youth jobs is intensifying. This could be seen through the difficulty of recruitment in small and medium-sized enterprises, and the rise of the unemployment rate for college graduates. In fact, looking at the outlook for the supply and demand of manpower over the next 10 years, the excess supply of college graduates or higher is estimated at 750,000, and the excess demand for high school graduates is 1.13 million (Korea Employment Information Service, 2018).

Accordingly, the Ministry of Education has set a goal to achieve a 60% employment rate of vocational high schools by 2022 (Ministry of Education, 2019a). However, the actual employment rate in 2019 was 57%, which is very low due to the employment rate of other graduates, excluding college students and military enrollees. The employment rate was 72.5% in 2015, 75.1% in 2017, and 66.3% in 2018 (Ministry of Education, 2020a). Therefore, it is questionable whether the Ministry of Education’s goal of achieving 60% by 2022 is appropriate.

In general, vocational education reform has been consistently promoted. However, there seems to be a limitation to it being adequately responsive to changes in the world of work such as changes from the reduction of the school-age population, the COVID 19 pandemic, changes in economic conditions, the development of the 4th industrial revolution, and rapid technological change (Kim et al., 2019). In addition, the time difference between training the workforce through regular schools also leads to a mismatch in manpower and skills.

A more accurate manpower supply and demand plan should be prepared, and there is a need to establish a career development plan to help graduates enter their field, and for them to be able to retain their jobs in the long term and support their career development process.

Conclusion

This chapter has looked at the Korean TVE current status, trends, and issues through three different lenses, namely the Secondary vocational level, Post-secondary vocational level, and Tertiary vocational level. Vocational education in Korea has developed through national planning and intervention, contributing as a driving force for industrial and economic development. The development of vocational education is expanding from high school to associate degree to bachelor degree, and currently there is a new expansion into Master's degree. To date, vocational schools and universities have been reorganized and innovated. Existing vocational high schools and universities will have no choice but to continue to transform.

It can be seen that Korea's vocational education system and policies change every 5 years depending on the term of the president. This constant reform could be seen as an advantage in terms of its sensitivity to the industrial demand and environmental changes and response to changes in the environment. Yet, the frequent changes could also be a disadvantage due to an increase in the burden of teachers and the fact that these changes can be confusing. Nevertheless, several vocational education trends have been discovered, and at the same time, there are several issues that are persistently difficult to resolve. These issues should be monitored and objectively explored to improve systems, or alternative solutions should be created. In particular, it is necessary to prepare for post-COVID19 by attentively exploring the progress of the 4th industrial revolution and the pre- and post-COVID19 education situations. In addition, the supply and demand of industrial manpower and skill mismatch must be resolved, and the well-being and career development and management system of workers must be innovated. In other words, a future vocational education system must be established to prepare for and lead the future. Therefore, vocational education policy makers and researchers should proactively review and prepare the future vocational education system and related regulations.

References

ABEEK Homepage. (2021). *Accreditation Introduction.* http://www.abeek.or.kr/intro

Act on the Development of Vocational Skill Workers. (2004 & Rev 2021). https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%EA%B7%BC%EB%A1%9C%EC%9E%90%EC%A7%81%EC%97%85%EB%8A%A5%EB%A0%A5%20%EA%B0%9C%EB%B0%9C%EB%B2%95

Chae, M. S, & Lee, J. H. (2017). Evaluation and improvement plan of industrial complex campus project as a project to strengthen competitiveness of industrial complex: Changwon Industrial Complex Campus Project as an example. *Journal of Economic Geography of Korea*, 20(2), 228-244.

Choi, Y. J. (2018). *In order to expand the publicity of early childhood education, we need compulsory education at age five*. Chosun Edu.http://edu.chosun.com/site/data/html_dir/2018/10/30/2018103002664.html

Chungwoon University Homepage. (2021). *University introduction*. https://home.chungwoon.ac.kr/home/index.do

CNU Homepage. (2021). *University introduction*. https://plus.cnu.ac.kr/

DCU Homepage. (2021). *University introduction*. https://www.cu.ac.kr/

Department of Human Resources Development. (2020). *'20 general high school specialized vocational skills development training guidelines*. Ministry of Employment and Labor.

Early Childhood Education Act. (2004 & Rev 2010). https://www.law.go.kr/lsSc.do?section=&menuId=1&subMenuId=15&tabMenuId=81&eventGubun=060101&query=%EA%B3%A0%EB%93%B1%EA%B5%90%EC%9C%A1%EB%B2%95#undefined

Education Statistics Service. (2020). https://kess.kedi.re.kr/index

Elementary and Secondary Education Act. (1997 & Rev 2012). https://www.law.go.kr/lsSc.do?section=&menuId=1&subMenuId=15&tabMenuId=81&eventGubun=060101&query=%EA%B3%A0%EB%93%B1%EA%B5%90%EC%9C%A1%EB%B2%95#undefined

Encyclopedia of Korean National Culture. (2021). *High school*. http://encykorea.aks.ac.kr/Contents/SearchNavi?keyword=%EA%B3%A0%EB%93%B1%ED%95%99%EA%B5%90&ridx=0&tot=374

HiFive Homepage. (2021). *Meister school*. https://www.hifive.go.kr/school/meisterSchoolIntro.do?rootMenuId=02&menuId=020201

Higher Education Act, Article 37. (1997& Rev 2011). https://elaw.klri.re.kr/eng_service/lawView.do?hseq=42696&lang=ENG

Higher Education Act, Article 14-2. (1997& Rev 2011). https://elaw.klri.re.kr/eng_service/lawView.do?hseq=42696&lang=ENG

Higher Education Act, Section 6 Article 55. (1997& Rev 2011). https://elaw.klri.re.kr/eng_service/lawView.do?hseq=42696&lang=ENG

Higher Education Act, Article 28. (1997& Rev 2011). https://elaw.klri.re.kr/eng_service/lawView.do?hseq=42696&lang=ENG

Howon University Homepage. (2021). *University introduction*. https://www.howon.ac.kr/english/Jang, B.N. (2021, February 6). *Graduation credit from 140 to 130*. KNOUWeekly. https://weekly.knou.ac.kr/articles/view.do?artcUn=1764

Kang, W. J., Kim, C.W., & Lee, J. (2010). A study on the current status and problem improvement of Cyber university. *Journal of the Korean Multimedia Society*, 304-306.

Kim, N. Y., & Oh, Y. S. (2019). *Analysis of key programs effects and risk factors in upper secondary vocational education policy*. Report number 2019-010. Board of Audit and Inspection Research.

KMOOC Homepage. (2021). *About KMOOC*. http://www.kmooc.kr/about_st/# KNU Homepage. (2021). https://www.kongju.ac.kr

Korea Academic Recognition Information Center. (2019, April). *Statistics*. https://karic.kr/com/cmm/EgovContentView.do?menuNo=1010106000&lang=eng

Korea Academic Recognition Information Center (2020, August). *Quality assurance*. https://karic.kr/com/cmm/EgovContentView.do?menuNo=1010104000&lang=eng on 20Korean Council for University College Education. (2021). Advanced major course. https://www.kcce.or.kr/web/majorBusiness/webMajorOperation.do

Korea Employment Information Service (KEIS). (2018). *Mid- to long-term manpower supply forecast 2016-2026 Handbook.*

Korea Institute for Curriculum and Evaluation. (2019). *Secondary teacher appointment examination*. https://www.kice.re.kr/sub/info.do?m=010602&s=kice

Korea National Open University Homepage. (2020). *Announcement of tuition fees for the 2021 Korea Open National University* (Number -2020-16). https://www.knou.ac.kr/knou/6512/subview.do?epTicket=LOGKorea National Open University Homepage. (2021). School introduction. https://engknou.knou.ac.kr/engknou/index.do?epTicket=LOG

Korea Polytechnics. (2020). *University introduction*. https://www.kopo.ac.kr/index.do

Korea polytechnics. (2021, June 2). *PTECH introduction presentation*. https://www.kopo.ac.kr/jungsu/board.do?menu=10722&mode=view&post=614943

Korea Research Institute for Vocational Education and Training. (2009, April 13). *Establishment and opening ceremony of Meister High School Support Center at Korea Vocational Skills Development Institute*. [Press Release]. https://www.krivet.re.kr/ku/ea/kuDCAVw.jsp?gn=F4-F420090012

Korean Research Institute for Vocational Education and Training (KRIVET). (2015). *Meister high school operations monitoring and consulting Report.*

Korean Research Institute for Vocational and Training. (2020). Local trend. *The HRD Review*, 24(1).

Lifelong Education Act. (1999& Rev 2021). https://www.law.go.kr/%EB%B2%95%EB%A0%B9/%ED%8F%89%EC%83%9D%EA%B5%90%EC%9C%A1%EB%B2%95

Ministry of Education. (2016). *Ministry of Education's business plan 2016.* https://www.moe.go.kr/2016happymoe/attach/2016_moe.pdf

Ministry of Education. (2019a). *Regulations on the operation of industrial complex campus and industry-academic convergence zone development projects.*

Ministry of Education. (2019b, January 24). *A plan to activate high school graduation employment*. [Press Release]

Ministry of Education. (2019c, June 10). Expanding innovation in secondary vocational education and strengthening employment support. *Policy Briefing*. https://www.korea.kr/news/actuallyView.do?newsId=148861445Ministry of Education. (2020a). Education statistics yearbook. Korea Institute of Education and Development

Ministry of Education. (2020b, May 22.). *2020 vocational high school support and job promotion plan presentation*. the Department of Education.

Ministry of Education. (2021a, February 3). *Announcement of the framework plan for pilot operation of Meister University*. [Press Release] https://www.moe.go.kr/boardCnts/view.do?boardID=294&boardSeq=83441&lev=0&searchType=S&statusYN=W&page=1&s=moe&m=020402&opType=N

Ministry of Education. (2021b, April 16). *Announcement of results of selection of Meister University pilot project* [Press release]. https://www.moe.go.kr/boardCnts/view.do?boardID=294&boardSeq=84078&lev=0&searchType=S&statusYN=W&page=1&s=moe&m=020402&opType=NMinistry of Education, & Korea Educational Development Institute. (2020). 2020 lifelong education statistics data sheet. (Report No. SM 2020-13). https://kess.kedi.re.kr/mobile/publ/publFile?survSeq=2020&menuSeq=3653&publSeq=23&menuCd=89372&menuId=3_1_16&itemCode=02

Ministry of Education Decree No. 188. (2019, September 17). Rules for competition examination for selection of candidates for appointment of education public officials. Korea Law Information Center.

Mokpo National University Homepage. (2021). https://www.mokpo.ac.kr/ Na, S. I. (2012). Trends and challenges of vocational education and training in Korea. In M. Pilz, (Ed.), *In The future of vocational education and* *training in a changing world* (pp.143-169). VS Verlag für Sozialwissenschaften, Wiesbaden.

Na, S. I., & Cho, J. Y. (2019). *A study on the reorganization of course evaluation qualifications items*. HRD of Korea.

Na, S. I., & Oh, S. G. (2016). *Shoelaces rather than bag straps: NCS, the era when work ability rather than specification is recognized is here*. Miraeyunghapseo.

Na, S. I. (2020). *Introduction and achievements of industry-academia partnership Apprenticeship School in Korea*. Proceedings of AASVET 2020 (16th Conference in Japan): Study and Training for Work and Vocation in Society 5.0 (4.0). http://www.ubonasm.net/aasvet2020/program/Na, S. I., Cho, J. Y., Hong, S. J., Kim, C. H., & Kang, S. H. (2020). *A study on management plan for the reformation of professional engineer assessment method*. ABEEK

Na, S. I., Kim, K. I., Jeong, D. Y., & Cho, S.W. (2011). A diagnosis of the performance of specialized high schools for 'linked government ministries'. *Agricultural Education and Human Resources Development*, 43(2), 127-150.

National Institute for Lifelong Education. (2019). *2018 lifelong education white paper: An overview*. (Report number PM2019-70) . http://203.235.44.44:7010/eng/_upload/12920191127162243.pdf

National Institute for Lifelong Education. (2020). *Academic Credit Banking System*. https://www.nile.or.kr/contents/contents.jsp?bkind=html&bcode=FAEAAAA&bmode=view&idx=FAEAAAA National Curriculum Information Center Homepage. (2021). National Curriculum of Korea. http://www.ncic.go.kr/mobile.kri.org4.inventoryList.doNCS Homepage. (2021). What is NCS. https://www.ncs.go.kr/th01/TH-102-001-01.scdoNuri Curriculum Homepage. (2020). What is Nuri Curriculum?. https://i-nuri.go.kr/main/html.do?menu_idx=12

Office for Higher Education Policy. (2020). *Office of Higher Education Work Plan 2021*. Internal data from the Ministry of Education.

PKNU Homepage. (2021). *University introduction*. https://www.pknu.ac.kr/

Raduan, N. A., & Na, S. I. (2017). Rethinking the Goals of Korean Vocational High Schools based on Expertise Development Models. *Journal of Asian Vocational Education and Training, 10*, 27-43.

SNU Homepage. (2021). *University introduction*. https://www.snu.ac.kr/

South Korea Policy Brief. (2021). *Free school year*. https://www.korea.kr/special/policyCurationView.do?newsId=148865339

Yu, J. Y., Kim, S. N., Yoon, H. H, Lee, M., Kang, S., & Kwon., H. J. (2020). *Meister High School System in Korea 2020.* Korea Research Institute for vocational Education and Training.

Vocational Education Policy Office. (2021). *2021 work plan of the vocational education policy office*. Internal data from the Ministry of Education.

Technical and Vocational Education Trends and Issues in Malaysia

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Abstract

Technical and Vocational Education (TVE) in Malaysia is faced with complex challenges due to the rapid development of the industry, ever-changing technology in IR 4.0, and high expectations on TVE graduates. The skills demands for TVE graduates are now substantially different. In the past, the focus of technical institutions was solely on producing a skilled workforce, but nowadays, having technical skills alone is no longer sufficient to secure a good job. Apart from technical skills, a worker must also possess self-confidence, problem-solving skills, decision-making skills, and other skills related to the 21st century. In the light of this scenario, the existing TVE curricula must therefore be changed to align with the current development and demand. To cope with this circumstance, the Malaysian government is reforming the TVE system by ensuring that the needs of stakeholders are fulfilled through the implementation of the Malaysia Education Blueprint 2015-2025 (Higher Education). This paper provides general insights into Malaysia's TVE ecosystem, from school to higher education that aims at preparing future skilled workers to ensure sustainable economic and social development in Malaysia. Specifically, this paper highlights five main issues namely governance of TVE, digital transformation in TVE, encosystem in TVE, public-private partnerships, as well as equality and inclusiveness in TVE contexts. In conclusion, Malaysia is moving on the right track towards attaining a high-income country status. To achieve this noble goal, Malaysia's government has invested enormous effort and introduced several initiatives through new policies and funding in order to broaden access to skills training for the young generation and at the same time synergize the momentum to enhance the TVE standard and quality to cater for the demands of local and global industries.

Keywords: public-private partnership, digital transformation, governance, equality, inclusiveness

Introduction

Malaysia is one of the countries in South East Asia with the most open economy, with a trade to Gross Domestic Product (GDP) ratio of over 130% since 2010. The country survived the Asian financial crisis of 1997-1998 with an upward trajectory of average growth of 5.4% since 2010, and is expected to achieve the transition from an upper middle-income economy to a high-income economy by 2024 (World Bank Group, 2021).

In recent years, the Malaysian GDP growth rate dropped from 4.8% in 2018 to 4.3% in 2019, and further increase to 5.6% in 2020. Due to the Movement Control Order (MCO) implemented by the Malaysian government to contain the spread of Covid-19 in early 2020, domestic and international economic activities have been badly affected. On top of that, there are also other influential factors, such as a weak currency rate, a high employment rate due to retrenchment, and an ineffective economic recovery plan, that have led to the negative growth in GDP. Based on the latest statistics, the service sector contributed the highest percentage to GDP and became the main stimulus to the economic growth before 2020. However, in 2020 the service sector recorded a negative growth of 5.5% as compared to the previous year (2019: 6.1%, 2018: 6.3%). In fact, all economic sectors in Malaysia experienced negative growth in 2020, which is mainly due to the Covid-19 pandemic that has affected the world economy as a whole. In detail, the agriculture sector recorded a decline of 2.2% (2019: 2.0%; 2018: -0.2%), followed by the mining and quarrying sector at negative 10.00% (2019: -2.0%, 2018: -0.6), the manufacturing sector at negative 2.6% (2019: 3.8%, 2018: 4.9%), and the construction sector at negative 19.4% (2019: 0.1%, 2018:4.5%). As for the unemployment rate, the percentage increased to 4.2% as compared to previous years (2019: 3.3%, 2018: 3.3%;) (Ministry of Finance Malaysia, 2021). These negative statistical data have significantly contributed to the decrease in the Gross National Income (GNI) per capita from RM45,212 (2019) to RM42,532 in 2020 (Department of Statistics Malaysia, 2021c) (refer to Table 1).

Table 1 GDP Growth Rate (%) in 3 subsequent years

Sector	2018	2019	2020
Agriculture, forestry, and fishing	-0.2	2.0	-2.2
Mining and quarrying	-0.6	-2.0	-10.0
Manufacturing	4.9	3.8	-2.6
Construction	4.5	0.1	-19.4
Services (including government services)	6.3	6.1	-5.5
Unemployment Rate	3.3%	3.3%	4.2%[1]
Gross National Income (GNI)	RM43,307	RM45,212	RM42,531

Source: Department of Statistics Malaysia (DOSM); [1]Economic Outlook 2019, Ministry of Finance (MoF).

Meanwhile, the total jobs available in the private sector declined significantly by 204,000 to 8.46 million in 2020. Of the total, 97.9% were filled jobs and the remaining 2.1% were vacant. Most of the filled jobs (62.2%) were in the semi-skilled category, 13% were in the low-skilled category, and only 24.4% were in the skilled category. Furthermore, 4.37 million jobs were concentrated in the service sector, making it the biggest jobs provider sector. On the other hand, the highest percentage of job vacancies was in the semi-skilled category (55.8%), whereas the skilled category and low-skilled category yielded 23.0% and 21.2% respectively (Department of Statistics Malaysia, 2021b). It is noteworthy that the majority of semi-skilled workers are produced by TVET institutions. For that reason, the government of Malaysia has been focusing on strengthening TVET to respond to the national demand for semi-skilled as well as skilled workers and to create more jobs for Malaysians.

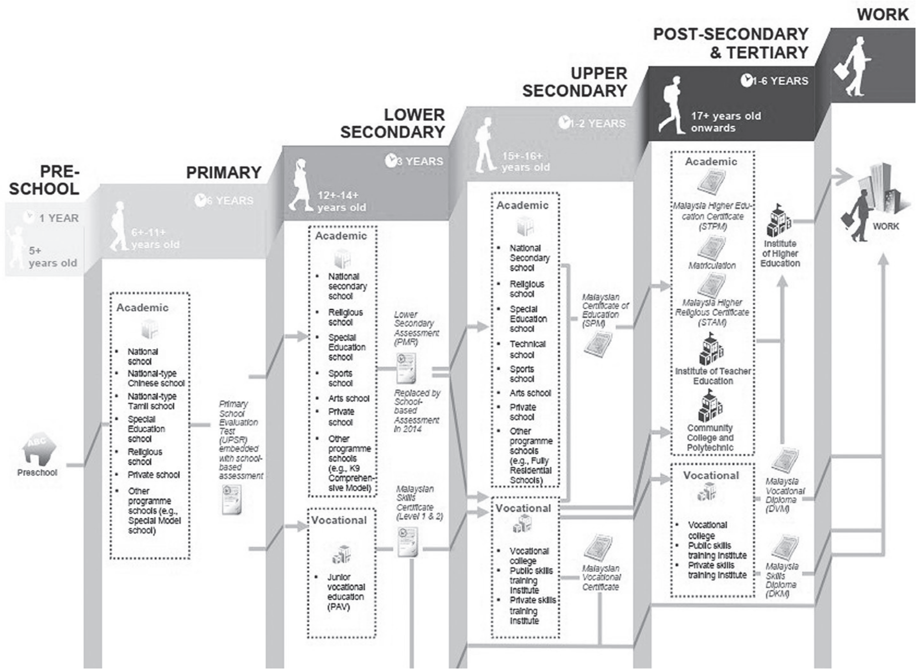
The education system in Malaysia comprises five main stages, beginning with preschool, primary, lower secondary, upper secondary, and post-secondary/tertiary. The total number of years depends on the individual education pathway in the post-secondary or pre-university level, but Malaysian students in general have 12 to 13 years of formal schooling. Those who take pre-university level would spend another 2 years for the Malaysian Higher School Certificate (equivalent to A-level qualifications), and those who take the religious alternative or the Matriculation program will finish in 12 years. Meanwhile, students with special needs require an additional 2 years to finish school (Ministry of Education Malaysia-MOE, 2013b).

In the early stage of school, parents begin to send their children to pre-school from as early as 4 years of age to attend day-care centers, under the Early Childhood Care and Education (ECCE) managed by the Ministry. The reason for universal enrolment of preschool for 5+ years old is to provide equal access to preschool for all children, since it is important for brain development that is a cumulative layering of foundational skills influenced by relationships, experiences, and environments (Scott, 2017). Thus, nurturing emerging social, emotional, cognitive, and language skills in the early stages of development is critically important.

Entering formal education, it is compulsory for Malaysians to have 6 years of schooling at the primary school level, starting at the age of 7 until 12 years old. The final assessment for this level is the Primary School Achievement Test (UPSR) that is compulsory for all Year 6 students. It was introduced in 1988. However, due to the Covid-19 pandemic, the UPSR has been abolished as one of the milestones of the Malaysian examination system (Ministry of Education Malaysia, 2020).

When entering the secondary education level, Malaysian pupils have to undergo lower- and upper-level secondary education, either in the academic or vocational stream. For the lower secondary education, the schooling lasts for 3 years from Form 1 to Form 3. In the academic stream, parents have several options to send their children to either national secondary school (SMK), religious school, sports school, arts school, private school, or other program schools such as the K9 Comprehensive Model. The final assessment for students will be a Lower Secondary Assessment (PMR), but later in 2014, this assessment was replaced by School-based Assessment (PT3). As for the vocational stream, students may enroll in Junior Vocational Education (PAV). Upon finishing school, the vocational students would be awarded the Malaysian Skills Certificate (Levels 1 and 2).

Figure 1 Malaysia's Education Journey



In Upper secondary education, students have to spend 1 to 2 years of schooling. Those in the academic stream can further their study with several school options including national secondary school (SMK), religious school, technical school, sports school, arts school, private school, or other program schools such as full boarding schools. Students in this system will end up with the Malaysian Certification of Education (SPM), that determines the next stage in the students' post-secondary (pre-university) and tertiary education pathways. As for the vocational pathway, the students would have to further their study via three vocational pathway options, namely Vocational Colleges, public skills training institutes, or private skills training institutes. In this pathway, the students will be awarded the Malaysian Vocational Certificate (Levels 3 and 4), depending on their competency level.

Next, post-secondary and tertiary education in Malaysia can take up to 6 years, depending on the respective education level. Those coming from the academic stream would be able to further their education to post-secondary education (pre-university), pursuing the Malaysia Higher Education Certificate (STPM) in national secondary schools, or joining a Matriculation college, Malaysia Higher Religious Certificate (STAM) in religious schools, Institutes of Teacher Education, or community colleges, and polytechnics. Then, students would be able to further study to tertiary education level. Meanwhile, for vocational education students, they would be able to further their post-secondary education in the same institution or join a community college or polytechnic. Upon finishing school, vocational students will be awarded the Malaysia Vocational Diploma (DVM) or Malaysia Skills Diploma (DKM) based on their performance. Those who decide to further their study may enroll in tertiary level programs in the selected higher educational institutions. Most graduates will start their career upon finishing the tertiary education level. Figure 1 shows the Malaysian education journey (Ministry of Education Malaysia, 2013b).

TVE Institutes in Malaysia

There have been several ministries involved in governing TVET institutes in Malaysia including the Ministry of Human Resources, the Ministry of Youth and Sports, the Ministry of Rural Development, and the Ministry of Agriculture. Through the Manpower Department, the Ministry of Human Resources has become one of the major providers of the skill training programs in the country. These programs are offered through three institutions, namely Industrial Training Institutes (ITI/ILP) which offer craft / vocational and technical courses; Japan-Malaysia Technical Institutes (JMTI) which offer advanced technology courses, and Advanced Technological Training Centres (ADTEC) which offer advanced vocational courses (Ministry of Human Resources, 2021). The strength of these skill training institutions is that they have new machines and technology facilities that are close to those used in the respective industries. This provides students with authentic experiences and industrial exposure.

In addition, the Ministry of Youth and Sports through The Youth Skills Development Division (BPKB) runs the Youth and Sports Skills Training Institution (ILKBS) which offers practical training to provide youths with the skills needed to continue participating in selected careers after graduation. ILKBS has three institutions, including the national youth skills institute (IKBN), the national high youth skills institute (IKBTN), and the golf youth skills academy (AKBG). The programs offered include full-time skills courses at IKBN/IKBTN, Human Development Courses (Leadership, Entrepreneurship, and Discipline) for youth, Special Short-Term Skills tailored to youths and skills courses at private institutions (trainee sponsored programs). Among the skill areas that are offered are Automotive Technology, Marine Technology, Hospitality, and Photography Technology.

Next, the skills training institute is also governed under the Ministry of Rural Development, through the Majlis Amanah Rakyat (MARA). It involves several training institutes such as the MARA Educational Institutions (IPMA), Universiti Kuala Lumpur (UniKL), seven branches of MARA Poly-Tech Colleges (KPTM), GIATMARA, MARA High Skills Colleges (KKTM), MARA Skills Institutes (IKM), MARA Professional Colleges (KPM), MARA Colleges (KM), German-Malaysian Institute (GMI), MARA Poly-Tech University College (KUPTM), and MARA Japan Industrial Institute (MJII) (Majlis Amanah Rakyat, 2021).

Under the governance of the Ministry of Agriculture and Food Industry, the skills training is managed under the Agricultural Skills Training Division, focusing on the agriculture field program including agriculture and veterinary science. The Training Centres run long-term training programs, including in the areas covered by the Agriculture Certificate, Veterinary Certificate, and Fisheries Certificate at various levels of Malaysian Skills Certificate to Diploma level throughout Malaysia (Ministry of Agricultural and Food Industry, 2020). Although the TVE system in Malaysia is managed by several ministries, the main references of training standards are generally controlled by the Ministry of Human Resources. Nevertheless, the challenges of several TVE providers have been a major issue to be resolved, including aligning governance across ministries, which is the most challenging, as well as enrolment, promotion, and improving public perceptions of TVE.

PAV implements the Basic Vocational Education Program Curriculum, which focuses on identity building, entrepreneurial competence development, and vocational skills competency development at the Malaysian Skills Certificate (SKM) Levels 1 and 2. Students who are not successful in obtaining SKM will be given a modular certification of Statement of Achievement (PC) by the Department of Skills Development, Ministry of Human Resources (MHR). The MHR is the custodian of the Malaysian Skills Certificate program recognized by the Public Service Department and the Malaysian Qualifications Agency. The SKM curriculum was developed based on the National Occupational Skill Standard (NOSS) which is administered by the Ministry of Human Resources agency. After completing PAV in Form 3, students have the opportunity to further upgrade their skills in several institutions, either at the Public Skills Training Institute (ILKA) or at the Private Skills Training Institute (ILKS), where they pursue SKM level 3 and level 4 (Diploma Skills Certificate-DKM) in the Industrial Training Institute (ILP), National Youth Skills Institute (IKBN), Advanced Technology Training Center (ADTEC), Mara Higher Skills Training Institute (KKTM), and Construction Industry Development Board (CIDB). Additionally, PAV graduates will also have the opportunity to enter into Vocational Colleges to pursue level 4 skills certificates. Based on the basic Vocational Education and skills certificates, these vocational graduates would typically step into careers in the public and private sectors.

Furthermore, in upper secondary education, TVE is provided by several institutions including Technical Schools, Vocational Colleges, Public Skills Training Institutes, and Private Skills Training Institutes. The Technical Schools and Vocational Colleges are governed by the Ministry of Education Malaysia. For the Technical Schools, students will enroll for 2 years, which is Form 4 and Form 5. Currently, there are nine Technical Schools in Malaysia and the courses offered include civil engineering, mechanical, electrical, agriculture, and commerce. Meanwhile, Vocational Colleges are the result of the government's effort to transform the TVE system in the country. To date, 72 vocational schools and eight technical schools have been converted into vocational colleges. They offer a 4-year program whereby students have to spend 2 years in the certificate program and an additional 2 years at Diploma level (Ministry of Education Malaysia, 2021b).

In post-secondary education, TVE institutions available for students include community colleges and polytechnics under the Ministry of Higher Education, and vocational institutions including Vocational Colleges, public skills training institutes and private training institutes (ILKA/ILKS) as mentioned above. The community colleges and polytechnics in Malaysia are both managed by the Ministry of Higher Education Malaysia, through the Department of Polytechnic and Community College. Currently, there are 39 polytechnics and 103 college communities all over the country that are offering Certificate, Diploma, and Degree level courses, besides several lifelong learning education programs. These programs aim to improve the skills and academic qualifications of the targeted group, improve productivity, develop industry-academic links, increase incomes, and develop talent. Meanwhile, in community colleges, the lifelong learning programs target the hard-core poor, indigenous people, single mothers, youth and senior citizens/retirees with life skills and technical knowledge as well as entrepreneurship. The aim of the program is to improve the potential of the targeted groups in the local community, including upskilling and reskilling (Ministry of Higher Education Malaysia, 2021).

As in tertiary education, TVE programs are mainly offered by the Malaysian Technical University Network (MTUN), namely Universiti Tun Hussein Onn Malaysia (UTHM), Universiti Malaysia Pahang (UMP), Universiti Malaysia Perlis (UNiMAP), and Universiti Teknikal Malaysia Melaka (UTeM). The network was established as early as 2000. After several rebrands and upgrades, the network was officially formed in March 2006. UTHM is the only university that offers a TVE teacher training program, under the Faculty of Technical and Vocational Education (FPTV). The FPTV branding has been widely known from the international recognition including the status as the UNESCO-UNEVOC center (Uni/Research) in Malaysia since 1999 (UNESCO-UNEVOC, 2021). In addition, to recognize the contribution and initiative of the FPTV staff members, the national independent TVE research institute was established. This center is known as the Malaysia Research Institute for Vocational Education and Training (MyRIVET), and was originally established in 2019 to serve as a main platform for research, consultation as well as national and international networking and collaboration within the sphere of TVE. In the national context, MyRIVET serves as a national research and TVE data center that assists the government in planning and policy formulation related to TVE (MyRIVET, 2021).

Government Influence on Malaysia's TVE System

TVE in Malaysia is largely driven by the government as the main contributor to TVE development through enormous financial investment. As part of the Government's human capital development policy to mainstream TVE, the allocation for TVE has annually increased from RM5.7 billion in 2019 to RM5.9 billion in 2020, and further increased to RM6 billion in 2021. The allocation was meant to make TVE become a mainstream form of education on a par with general education, to stimulate more partnerships and collaboration between the public and private sectors, to develop public skills training institutions, to provide more platforms and pathways for further studies, and to create jobs (Ministry of Finance Malaysia, 2019).

Based on the 2021 budget, the government has allocated a total of RM6.5 billion to enhance quality educational access to selected institutions such as MARA and UiTM by conducting specialized programs including the digitization of TVE learning and upgrading certificate level programs to diploma level. As for the TVE students in both public and private skill training institutions, a total of RM300 million is provided through the Skills Development Fund Corporation (PTPK), which is an increase of RM100 million compared to the previous year. To encourage more involvement from industry in implementing TVET-based programs, Malaysia's government has introduced the National Dual Training System in which the participating trainees are given monthly allowances of RM1,000. This initiative involves a total allocation of RM60 million and has benefited 10,000 participants. Furthermore, a total of RM29 million is also allocated for TVE program implementation under the Ministry of Education including the Islamic education and lifelong learning initiatives. This will benefit up to 15,000 students in Tahfiz institutions and boarding schools (Ministry of Finance Malaysia, 2020). However, it is important to note that, a "one size fits all" approach does not work for the TVE sector in Malaysia (Seel & Phuong, 2020). Therefore, the budget needs to be flexibly and wisely spent, and more importantly, the concept of performance-based funding and need-based assistance should be applied when it comes to financial allocation.

In light of the government's concern about TVE, several ministries have ready provided and embarked on TVE initiatives since 60 years after independence. Nowadays, there are six ministries that manage and take responsibility for TVE. Each ministry has its own training institutions and systems. They are the Ministry of Education, the Ministry of Higher Education, the Ministry of Human Resources, the Ministry of Youth and Sports, the Ministry of Rural Development, and the Ministry of Agriculture. The institutions of each ministry have been discussed above. In this model, TVE is provided mainly at the academic institution itself. There is on-the-job training such as in Vocational

Colleges whereby students will have their skills training after finishing their learning time in the institution as part of the requirement to get their Malaysian Vocational Diploma (DVM). The involvement of industry in this model is more focused on providing training as part of the final assessment of the students' skills. Other than that, in this model, the financial aid normally comes from the ministries themselves. Several ministries provide scholarships and allowances for their trainees. For instance, those in the ILP will receive an allowance from the Ministry of Human Resources of as much as RM100/month. Generally, TVE government finance comes from the Ministry of Education and the Ministry of Human Resources.

In addition, there is also a market model whereby industries manage TVE without government interference. In this model, the industries have developed their own training centers that train students with specific skills relevant to their industrial needs. An example of this model can be found in the training executed by one of the major fast-food chains in Malaysia, McDonalds Co-operation Malaysia. The company provides training for employees through a blended learning approach with four learning methods: (1) self-study that allows participants to work independently using the standard curriculum to learn important operational standards; (2) training tools to enable consistent messages to be delivered; (3) on-the-job coaching that gives participants the opportunity to work together with a coach on practical restaurant skills and concepts work in real life; and (4) classroom training with a planned, instructor-facilitated event, held either in or out of the restaurant. This approach includes a real restaurant experience (McDonalds, 2018). Next is the TNB Integrated Learning Solution Sdn Bhd that is based on Putrajaya, Malaysia. They specialize in Power Utility Engineering and provide training programs for the energy industry. The Telekom Malaysia Berhad (TM Learning experience centre) is also one of the training centers provided by companies in Malaysia. It focuses on digital advancements and provides digital solutions to various industries. These three are among several examples of TVE market models offered in

Malaysia.

The final model is the state-regulated model where the government manages the companies that provide the training. This usually involves companies that are owned by the government such as Malaysia Airlines, Keretapi Tanah Melayu, and Tenaga Nasional, or the better-known Government-Link Companies (GLC). The involvement of the GLCs in the government's skill training has been implemented through the National Dual Training System (SLDN) program. This program is monitored by the DSD, Ministry of Human Resources. There are four sectors of companies in the GLC, namely Economy, Land Transportation and Infrastructure, the Economy Sector, the Technology and Infrastructure Sector (Land Transportation), and the Social Sector. Research on perceptions of SLDN programs shows that the majority of respondents have good perceptions of the training concept which uses 70% hands-on-at-work and 30% theoretical training in the training institutions (Minghat, 2017).

The Status of TVE

TVE Student Enrolment

In general, the current population of school students from pre-primary to tertiary has reached up to 9,874,556 students as reported by the Institute of Statistics UNESCO (2021). Of the total number, 3,048,230 students are studying at secondary level, whereas 2,829,077 are pursuing tertiary education in various fields of study. As for TVE, the government aims to increase the enrolment in TVE institutions under the establishment of various ministries. For instance, based on the statistics in 2018, Vocational Colleges and Technical Schools under the Ministry of Education enrolled 57,808 and 4,828 respectively. Also, the TVE institutions, such as National Youth Skill Institute

(IKBN) and National Youth High-Skill Institute (IKTBN), under the Ministry of Youth and Sports enrolled 2,852 students. For the TVET institutions under the Ministry of Agriculture and Food Industry, the total enrolment in 2018 was 1,376. The total enrolment for the Industrial Training Institutes (ILP) and Advanced Technology Training Centres (ADTEC) under the Ministry of Human Resources was recorded as 15,910 in 2018 (Quick Fact JTM, 2019). Under the Ministry Of Higher Education Malaysia, the enrolment of the polytechnics and community colleges for 2018 was 96,370 and 26,069 respectively. For MTUN students, total enrolment for 2018 were 56,228 students (Ministry of Education, 2018). For the Ministry of Rural Development, there are three TVE institutions, namely MARA Skills Institute (IKM), MARA High Skills College (KKTM) and Malaysia Japan Industrial Institute (MJII), with 15,166 enrolments in 2018 (Bahagian Kemahiran dan Teknikal MARA, 2018).

Table 1 TVE Enrolment Figures: 2018-2020

Agency TVET Enrolment	2018	2019	2020
Ministry of Education Malaysia - Vocational Colleges	54,150	43,005	39,306
Ministry of Education Malaysia - Technical Schools	3957	4,305	4,195
Ministry of Youth and Sports - National Youth Skill Institute (IKBN) and National Youth High-Skill Institute (IKTBN)	2,852	N/A	TBA
Ministry of Agriculture and Food Industry	1376	604	TBA
Ministry of Human Resources Industrial Training Institute (ILP) and Advanced Technology Training Centre (ADTEC)	15,910	17,040	TBA
Ministry of Higher Education Malaysia - Polytechnic	96,370	93,362	TBA
Ministry of Higher Education Malaysia - Community Colleges	26,069	26,118	TBA
MTUN	56,228	58,201	TBA
Ministry of Rural Development- MARA Skills Institute (IKM), MARA High Skills College (KKTM) and Malaysia Japan Industrial Institute (MJII)	N/A	N/A	15,166

*TBA = To be announced

*N/A = not available

Key Strategies and Policies

Education in Malaysia is underpinned by the National Education Philosophy (NEP) formulated in 1988. The NEP stated that "Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, in order to produce individuals who are intellectually, spiritually, emotionally and physically, balanced and harmoniously, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving a high level of personal well-being to contribute to the betterment of the nation, family and society at large." Based on the underlying principles and goals, the school curricula have been designed to translate the essence of NEP into balanced, well-rounded, trained, and skilled individuals who cherish the national aspiration for unity (International Bureau of Education, 2006).

In alignment with NEP, TVE in Malaysia aims to produce graduates who are informed, knowledgeable, ethical, and competent to drive sustainable economic growth, foster inclusive social development, and contribute to national advancement. Based on the high demand in various industrial sectors, by 2025, Malaysia will require a 2.5-fold increase in TVE enrolment as identified under the Economic Transformation Programme (ETP) in order to cater for the demand from industry. To achieve this target, the Malaysian government has invested huge effort in TVE by formulating holistic policies and implementing relevant strategies. Some of the significant policies and strategies are introduced as follows:

1. Malaysia Education Blueprint 2015-2025 (Higher Education)

The Malaysia Education Blueprint 2013-2025 (Higher Education) introduced by the Ministry of Education has listed 10 shifts in the higher education blueprint that aim to improve the overall quality and excellence of higher education. Specifically, the fourth shift has put the focus on the quality of TVE graduates, which signifies the importance of training and producing competent manpower to meet the needs of industry (Ministry of Education Malaysia, 2015). Under this shift, three primary initiatives have been identified as follows:

(1) Enabling industry to lead curriculum design and delivery;
(2) Enhancing coordination across the Ministry's various TVE providers; and
(3) Coordinating with other ministries and agencies.

2. Education Act 1996 (Act 550)

The Education Act was implemented on July 15, 1999. This act covers all education levels ranging from pre-primary, primary, secondary until post-secondary education. In Chapter 7 (Technical Education and Polytechnics), the Act specifically spells out that secondary schools are allowed to implement technical education that emphasizes skill development related to occupational needs. In addition, polytechnics are also allowed to offer any study programs at level 3 or above (MQF) that have been approved by the relevant ministry. The Education Act also grants permission to polytechnics to collaborate with industry partners and other organizations in the field of TVE. (Education Act, 1996).

3. National Skills Development Act 2006 (Act 625)

The National Skills Development Act 2006 was enacted in 2006. This act was implemented to promote vocational skill and competency development and improvement of an individual through skill training programs. This act stipulates the establishment of the National Skills Development Council to play a vital role in skill development. In addition, the National Occupational Skills Standards (NOSS) have also been generated to ensure the standardization of competency and certification for various skill-based professions (National Skills Development Act, 2006).

4. Malaysia Qualifications Agency Act 2007

The Malaysia Qualification Act 2007 came into effect in 2007. Under this act, the Malaysian Qualification Agency (MQA) was established to develop and implement the Malaysian Qualifications Framework (MQF) (National Skills Development Act, 2006). The Malaysian Qualifications Framework is an instrument that develops and classifies qualifications based on a set of criteria that have been agreed upon nationally and benchmarked with international practices. Basically, MQF is composed of eight levels and three pillars of educational paths, namely academic, TVE, and lifelong learning (APEL- Accreditation of Prior Experiential Learning). Apart from that, MQA also serves as an accreditation agency that designs and develops the code of practice for TVE program accreditation to ensure the quality and requirement of TVET programs is fulfilled (Malaysian Qualification Agency, 2017).

5. Malaysia Board of Technologists (Act 768)

The Malaysia Board of Technologists Act is relatively new as it was enacted on May 28, 2015. One of the objectives of this act was to establish the Malaysia Board of Technologists (MBOT) which is a specialized and professional body to accredit TVE programs as well as to recognize and certify Professional Technologists and Technicians (Technologists and Technicians Act, 2015). Specifically, the major functions of MBOT include:

- To recognize and register Technologists and Technicians as Professionals based on technology and technical fields;
- To provide facilities for the promotion of education and training and to hold or cause to be held, professional development programs for registered persons to further enhance their knowledge relating to their professions;

- To conduct assessments or to cause assessments to be conducted by an institution approved by the Board for the purpose of admission to the profession;
- To determine and regulate the conduct and ethics of the technologists and technicians profession; and
- Generally, to carry out all such acts and do all such things as may appear to the Board necessary to carry out the provisions of this Act.

6. 11th Malaysia Plan 2016-2020

The implementation of the 11th Malaysia Plan commenced in 2016 and ended in 2020. The 11th Malaysia Plan consists of seven thrusts, one of which is focused on the transformation of TVE for human capital development towards developed countries. Four key areas were identified by the government to improve TVE:

(1) Focus area A: Improving the efficiency of the labor market to enhance economic growth;
(2) Focus area B: Transforming TVE to meet industry demand;
(3) Focus area C: Reinforcing lifelong learning for skills improvement; and
(4) Focus area D: Improving the quality of education to improve student outcomes and institutional excellence.

In short, this plan emphasizes the importance of industrial participation in the TVE system. The TVE system needs to be harmonized and streamlined to reduce its inconsistencies across public and private TVE institutions and the mismatch between TVE providers and industry. In addition, programs and interventions to promote industry-led TVE have been implemented to ensure that TVE programs are relevant to industry (Economic Plan Unit, 2015).

The 12th Malaysia Plan for the next 5 years (from 2021 – 2025) has not yet been released. Nevertheless, it has been postulated that TVE will be one of the main national agendas in the coming years.

TVE Programs and Employability

As stated in the Education Act 1996, technical education can be implemented based on four purposes, namely skill training, specialized training related to a specific job, training for the upgrading of existing skills, and other technical or vocational training approved by the ministry (Education Act, 1996). Based on this act, there are various types of TVE institutions that provide training programs to cater for students' needs and demands. The TVE institutions can deliver training through formal or non-formal settings. To date, a total of six ministries have set up skill training institutions with financial aid for potential students across the country. Examples of such institutions are the Industrial Training Institute – ILP (Ministry of Human Resources), the National Youth Skill Institute - IKBN (Ministry of Youth and Sport), the Training Institute of the Ministry of Health – ILKKM, and the MARA Skill Institute – IKM (Ministry of Rural Development).

The TVE programs offered to students are composed of multiple levels, ranging from Certificate Level to Professional Level. The majority of skill training institutions, such as ILP and IKM, offer certificate-level programs which can be accessed by those who have completed lower secondary education under the PAV program in secondary schools. On the other hand, the Diploma level and above programs are usually offered by skill training institutions (e.g., ILP, IKM, IKBN, etc.) as well as TVE institutions (e.g., Polytechnics, Community Colleges, Vocational Colleges, MTUN) to take in candidates who have completed their upper secondary education.

From the aspect of Special Education, there are several TVE programs at certificate level specially designed to train students with special needs in Polytechnics and Community Colleges, which are under the purview of the Ministry of Higher Education. Examples of training program certification offered to students with special needs are the Hotel and Catering Skills Certificate, the Construction Skills Certificate, the Basic Certificate in Culinary Arts, and the Basic Certificate in Landscaping. Likewise, the Ministry of Education also plays its part in providing TVE programs to students with special needs. There are several technical schools which offer training courses to students with special needs, such as Motorcycle Services and Maintenance, and Furniture Production Operation (Ministry of Education Malaysia, 2021a).

When it comes to gender equality in TVE accessibility, Malaysia does not have any gender biased policies and there is no restriction for any gender to register in TVE programs. Nonetheless, based on the statistics indicated by the Ministry of Higher Education Malaysia (2019b), the enrolment of female students in polytechnics and community colleges is lower than that of their male counterparts in all program levels. The total number of male students for polytechnic enrolment in 2019 was 18,808 students, while female students were recorded as 15,173. As for community colleges, the enrolment for male students was 5,081, whereas female students only numbered 4,352. This gap needs to be reduced in order to fulfil the government goals for gender equality and empowering all women and girls, especially in TVE (Economic Plan Unit, 2017). On the other hand, the International Labour Organization (ILO), together with UN Women and the OECD have formed a coalition known as the Equal Pay International Coalition (EPIC). This coalition aims to fight for equal pay for women and men and to reduce the gender pay gap at the global, regional, and national levels (EPIC, 2018). In the meantime, ILO urged policy formulation and identification of the barriers to equal access for women and men, particularly for disadvantaged groups (International Labour Organization, 2020).

Meanwhile, the employment of graduates in 2019 (4.25 million persons) recorded an increment of 6.9% from 2018 (3.97 million persons). Of this number, graduates are largely employed in the Services sector (79.6%), followed by Manufacturing (12.7%) and Construction (5.3%). The Skilled category recorded the highest percentage of employed (73.3%), followed by Professional occupations (45.1%) and Technicians and associate professionals at 18.6% (Department of Statistics Malaysia, 2021a). Based on these data, it can be generally concluded that skills or TVE pathways produced the highest number of employed graduates in Malaysia.

All TVE and skill training programs aim to produce competent graduates to fill the industry demand. Therefore, employability is of highest concern for all TVE providers. Based on a tracer study conducted by the Ministry of Higher Education Malaysia for 2020 graduates, the reported employability rate of TVE higher institutions was higher than 70% (84.4%), whereas the unemployment rate yielded 15.6%. To be precise, the percentage of employed TVE graduates was 60%, 17.8% were engaged in further study, 2.0% were upgrading their skills, and 4.6% were waiting for job placement (Ministry of Higher Education Malaysia, 2021a). In terms of Polytechnics and Community Colleges, the employment rates for polytechnics (91.4%) and community colleges (94.2%) are relatively higher than the national graduate employability average of 84.4%. Details of the employment rates for TVE higher education institutions in 2019 are as shown in Table 2.

Table 2 Employment Status According to TVE HEIs in 2020

Category of HEIs	Employed (%)	Further Study (%)	Upgrading skills (%)	Waiting for Jobs placement (%)	Unemployed (%)
Polytechnics	69.2	19.0	0.3	2.9	8.6
Community Colleges	74.4	19.0	0.1	0.7	25.8
Vocational Colleges	66.6	4.7	0.6	9.7	18.4
Public Skills Training Institutions, Ministry of Rural Development	61.7	19.4	0.7	1.8	16.4
Public Skills Training Institutions, Ministry of Human Resources	64.4	18.7	0.3	1.5	15.2

Table 2 Continued

Category of HEIs	Employed (%)	Further Study (%)	Upgrading skills (%)	Waiting for Jobs placement (%)	Unemployed (%)
Public Skills Training Institutions, Ministry of Youth and Sports	70.2	13.1	0.2	1.8	14.7
Public Skills Training Institutions, Ministry of Agriculture and Agro-Based Industry	47.6	12.3	0.4	3.5	36.3
Public Skills Training Institutions, Ministry of Tourism, Arts and Culture	45.9	6.6	8.2	6.6	32.8
Public Skills Training Institutions, Ministry of Works	57.6	7.2	-	3.2	32.0
Total	37.1	48.5	0.5	0.7	13.2

Source: Ministry of Higher Education Malaysia, 2021a

Similarly, MTUN has also recorded a high employability rate of 90.85%. Among the MTUN universities, Universiti Tun Hussein Onn Malaysia (UTHM) recorded the highest GE rate with 94.6%, followed by Universiti Malaysia Pahang (UMP) (92.8%), Universiti Teknikal Malaysia Melaka (UTeM) (88.1%), and Universiti Malaysia Perlis (UNiMAP) (86.7%). This high graduate employability rate indicates the success of TVET programs in terms of equipping graduates with relevant knowledge and skills, and allowing them to secure occupations in the job market, thereby improving the socioeconomic status of the graduates.

TVE Teachers' Qualifications, Pre-Service Training, and In-Service Professional Development

TVE Teacher's Education, or Training of Teachers for TVET (TT-TVET) in Malaysia is defined as teaching training that is conducted with the purpose of preparing the trainee teachers with technical knowledge, skills, attitudes, and competencies required to effectively perform teaching in the classroom (Ministry of Education Malaysia, 2012). The TT-TVET program is designed based on the National Education Philosophy and Teacher Education Philosophy which aims to produce technical teachers who are professional, competitive, presentable, honorable, ethical, creative, and technologically literate in the field of TVE.

TT-TVET is handled by both Teacher's Education Institutions (Technical Education Campus) and Public Universities. Teacher's Education Institutions are monitored by the Department of Teacher Education, Ministry of Education Malaysia, whereas Public Universities that offer the TT-TVET program work together with the Ministry of Higher Education Malaysia and Ministry of Education. TT-TVET programs need to be accredited by the Malaysian Qualification Agency and approved by the Ministry of Higher Education Malaysia, and meet the standards and requirements stipulated by the Teacher Education Unit of the Ministry of Higher Education Malaysia (UNESCO UNEVOC, 2019). Similar to general teachers' education programs, the TT-TVET program in Malaysia abides by the same teachers' education policy. It is noteworthy that there are only six Public Universities (e.g., Universiti Tun Hussein Onn Malaysia, Universiti Teknologi Malaysia, and Universiti Pendidikan Sultan Idris) that provide the TT-TVET program nationally. Among these six universities, the Faculty of Technical and Vocational Education (FPTV), UTHM is the only faculty under the MTUN that provides TT-TVET. This faculty also offers the Bachelor in Technology program that opens enrolment to students from the TVE pathway to further their study. Moreover, FPTV, UTHM has also been a UNEVOC Network member since 1999 with ongoing membership until 2023 (Faculty of Technical and Vocational Education, 2021).

Compared to Public Universities, Teacher's Education Institutions only offer bachelor degree programs and do not provide post-graduate TT-TVET programs (Master and PhD) for TVE teachers, while the Public Universities offer both undergraduate and postgraduate TT-TVET programs for students. There is only one Teacher's Education Institution (known as Institut Pendidikan Guru Kampus Pendidikan Teknik) that is specifically for training TVET teachers. Apart from that, under the Department of Skills Development, Ministry of Human Resources, there is also a TT-TVET center, known as the Centre for Instructor and Advanced Skill Training (CIAST). This training center was established in 1991 in collaboration with the Japanese Government. In CIAST, there are three courses offered to students for the long-term program, namely the Vocational Training Officer (VTO) certificate, the Advanced Diploma in Vocational Education, and the Malaysia Skills Diploma. Besides, CIAST also conducts a variety of short-term courses for TVET teachers/instructors using the modular training model (Department of Skills Development, 2021a).

TVE-Teacher Requirements

The Malaysian Teacher Standard is a set of professional competencies to be achieved by teachers (standard) and teachers' requirements that need to be prepared and performed by the agencies and teacher training institution. This standard was developed by the Department of Teacher Education, Ministry of Education Malaysia with the purpose of improving teachers' professional competency especially in the aspect of teaching practices, pedagogical knowledge, and learning skills. It also aims to ensure the level of preparation and implementation of the training needs provided by the training agencies and teacher training institutions are of high quality in order to make sure the level of teacher competency can be achieved. In short, the standard was developed to cater for two main objectives, namely the competencies standard for the teachers, and the training needs to be fulfilled by the agencies and teacher training institutions.

The requirement to become TVE teachers in Malaysia is relatively high compared to general teachers. For instance, to become a TVE instructor in polytechnics and community colleges, the candidate must possess at least a diploma in his/her teaching field and must also obtain an education qualification (at least a Diploma in Education, and it can be up to PhD level). Apart from that, the instructor must also attend various reskilling and upskilling training courses to ensure they keep abreast of the latest industry and technology developments (UNESCO UNEVOC, 2019). As of 2019, the number of instructors in polytechnics was 7,263. Of the total, 161 were PhD holders. In community colleges, the number of lecturers was 2,766, 18 of whom were PhD holders (Ministry of Higher Education Malaysia, 2020). However, since July 2016, the requirement for this position has changed as candidates are no longer required to obtain a Diploma/Degree in education. They can apply for the job with a Diploma/Degree qualification related to the fields of studies in polytechnics and community colleges without the education qualification requirement (Education Service Commission Malaysia, 2016). This change has affected the student enrolment to TT-TVET institutions such as UTHM since candidates are no longer required to have an education qualification to become a TVE teacher in TVE higher education institutions.

On the contrary, to be appointed as a TVE teacher in Vocational Colleges, candidates must have the Malaysian Skills Certificate in the related field. On top of that, those who do not have the Vocational Training Operation (VTO) certificate are not allowed to assess students' portfolios. Thus, to be a Vocational College educator, candidates must possess Malaysia Skills Certificate Level 3 and above, a VTO certificate and a Certificate of Induction (PP-PPD-PPB) in order to allow them to be teachers as well as assessing officers (Department of Skills Development, 2021b).

Basically, school leavers with a STPM/equivalent qualification are eligible to apply for the TT-TVET program. Those who already have a Bachelor Degree may also pursue a post-graduate Diploma in Education in order to allow them to become TVE teachers. In order to be selected to enroll in the TT-TVET program, all candidates must sit the Malaysia Educators Selection Inventory Test (MEdSI). This test is used to assess the intrinsic qualities of teacher candidates in terms of personality, career interests, values of integrity, and emotional intelligence. Candidates who meet the general and special requirements will be selected by the Department of Higher Education, Ministry of Higher Education Malaysia (JPT, KPTM) to sit the MEdSI test (Malaysian Examination Council, 2021). Those who pass the MEdSI test will be called for an interview. All the results from the assessment will be taken into account to decide whether or not a candidate is successfully selected to be enrolled in the TT-TVET program.

In-Service Teacher Professional Development

The Malaysian Education Blueprint (Ministry of Education Malaysia, 2013a) has mentioned that teacher's quality is one of the main factors that influence Malaysian students' performance. In addition, the Malaysian Teacher Standard has also put the focus on teachers' quality in aspects of knowledge, skill, attitude, and values. The basic required quality for a TVE teacher is to be able to produce students with a first class mind set, who are knowledgeable and skillful, highly competitive, appreciate national culture and values, and have a strong sense of patriotism. Apart from that, the Malaysian Education Blueprint (Ministry of Education Malaysia, 2013a) has listed several specific competencies that the TVE teacher must possess in order to sustain the quality of teaching and learning process, especially in the context of the 21st century. The specific competencies are related to content knowledge and skills, 21st century pedagogy, student guidance and supporting skills, education psychological skills, counselling skills, as well as ICT and technological skills.

In order to stay relevant with current developments and stakeholders' demands, in-service teachers have to ensure their professional development is always on the right path, and so they are monitored accordingly. There are various reskilling and upskilling training programs provided by Malaysian Public universities and other institutions for in-service TVE teachers to polish their skills and knowledge. The Malaysian government has put a great deal of effort into encouraging TVE teachers to engage in professional development programs. For instance, MOHE allocates funding and financial support annually to encourage more in-service TVE teacher participation in professional development programs. Similarly, the Public Service Department has also introduced several schemes for in-service TVE teachers to do further study. One of the examples is Hadiah Latihan Persekutuan (HLP), which is a sponsorship for all public servants, including TVE teachers, to pursue full-time postgraduate studies at local and foreign HEIs (Public Servant Department, 2021). Under this scheme, TVE teachers are eligible to further their education up to PhD level in a field related to their existing work.

In the meantime, there are several public and private training centers that provide training for in-service teachers to upskill and reskill, especially in fields related to IR4.0 and Digitalization. One of the examples is CIAST, which provides short-term courses for participants to gain new skills related to the latest technology. Furthermore, the Malaysian government is very supportive of improving the TVE system in Malaysia including TVE teachers' quality. Therefore, government has allocated RM20 million for upskilling programs through the HRDF under Budget 2020. The allocation was meant for 4,000 Malaysians to undergo professional training, certification, and examinations related to IR4.0 (Ministry of Finance Malaysia, 2019).

TVE Qualifications System and Quality Assurance

The Malaysia TVE qualification is a complex system due to too many TVE players and lack of harmonization in terms of qualification and certification. For instance, the Ministry of Higher Education Malaysia and the Ministry of Human Resources apply two different qualification and certification systems. Basically, the Malaysian Qualifications Framework (MQF) version 2.0, approved under the Malaysian Qualifications Agencies (MQA) Act, 2007, plays an important role as a principal reference for setting up qualification levels and standards for higher education. In contrast to MQA, the Department of Skill Development, MoHR, utilizes another form of qualification system which is mainly referred to as the Malaysian Skills Certificate (SKM).

Malaysian Qualifications Framework (MQF)

The Malaysian Qualification Agency was established under The Malaysian Qualification Agency Act 2007. Right after that, the Malaysian Qualifications Framework (MQF) was constructed and applied in higher education under the authority of the Act of Parliament (Act 679). The first version of the MQF was published in 2007, and it has been revised in order to ensure that the MQF is relevant to the current development. Thus, in December 2017, the MQF 2nd edition was approved by the MQA Council. The new version of MQF consists of several key features as follows:

1. It is a unified and single framework of qualifications which recognizes the qualifications progression routes, namely the academic and TVE sectors, and as an instrument to inform learners, employers and society of the learning acquired.
2. It maintains eight levels of learning with a single qualification title (nomenclature) for each level.
3. It sets generic learning outcome descriptors for each level which is applicable to academic and TVE-type qualifications described in the context of "study and/or work."
4. It provides flexibility and options for variation within specific qualifications, for example bachelor programs which may have general academic and professional orientations.
5. It provides a credit rating system that determines the quantitative minimum learning load at each level, and is supported by credit transfer/exemption policies.
6. It provides better coherency in the academic and TVE sectors, improves efficiency of articulation and learning pathways, and supports lifelong learning for learners to progress through clear linkages between qualifications and eight levels and with better collaboration between different institutions and sectors.

7. It supports initiatives toward widening access and progression in lifelong learning with flexible learning and Accreditation of Prior Experiential Learning (APEL) or recognition of prior learning for the workers with skill sets, and supports the provision of alternative credentialing for career and employment as well as further education; and provides equivalency assessment for professional and skills competency certifications.

8. It supports curricula transformations, which take into account global perspectives and labor market requirements.
9. It intends to improve the mobility of learners, the portability of qualifications and credits, to ensure comparability, and to promote recognition of Malaysian qualifications at national and international levels, and to be referenced and aligned to regional qualifications frameworks.
10. It continues to prove the basis for standards development, quality assurance, and accreditation systems to ensure quality learning, to build trust and confidence, and to support recognition.
11. It is imperative that MQF 2nd edition operates as a single comprehensive integrated framework for the different sectors and institutions, and applies it to all qualifications offered in Malaysia. It must remain as a dynamic instrument that develops according to priority and national changes for improvement in the higher education and training systems.

The scope of MQF refers to the qualifications from three sectors, namely the academic, TVE, and life-long learning (APEL) sectors. The MQF is a single and unified framework of all qualifications in Malaysia which is to be applied in both academic and TVE-type qualifications. The first edition of MQF was separated into three different sectors, namely Skills, Vocational and Training, and Higher Education. After being revised and approved in December 2017, the MQF 2nd Edition is now composed of academic, TVE and life-learning

learning sectors in which the Skills and Vocational and Technical sectors were integrated into a single TVE sector, whilst the Higher Education sector was renamed as the Academic sector (Ministry of Finance Malaysia, 2021).

In detail, the MQF describes the levels of education, generic learning outcomes, level descriptors, credits and single qualification titles for each education level (Malaysian Qualification Agency, 2017). As previously mentioned, the MQF 2nd edition retains eight levels of qualifications or educational achievement. Specifically, levels 1 to 3 belong to certificate levels, Level 4 is a Diploma, and Level 5 is an Advanced Diploma. Levels 6, 7, and 8 denote the levels of Bachelor, Master, and Doctorate respectively. Post-doctoral degrees are not included in the framework. Levels 1 to 5 in MQF provide learners with both TVE and academic (general) learning pathways with the same qualification titles, while level 6 focuses on preparation for learners to gain specialization (to become specialists) in careers/occupations as well as pursuing post-graduate education. In order to encourage the enrolment of TVE students at the higher education level, MTUN has introduced the Bachelor of Technology with Honours program in 10 fields. This program is offered to DVM, DKM, and DLKM graduates, who do not take the academic pathway. This type of program allows graduates with a Diploma qualification to further their studies in one of the MTUN universities. Among the fields of studies offered are Food Service, Industrial Electronic Automation, Refrigeration & Air Conditioning, Electrical Maintenance Systems, Building construction, Automation, Welding, Occupational Health & Safety, Oil & Gas Facility Maintenance, and Machining.

In the APEL pathway, learning outcomes or learning credits can be accumulated from previous qualifications and professional certifications obtained from short courses, micro learning, and MOOCs. These credits can be used for credit transfer to academic programs. The accreditation of prior experiential learning is applied to both the academic and TVE sectors. Some of the main criteria for APEL pathways are age and years of working experience. The MQF Levels and Qualifications are indicated in Table 3.

Table 3 Malaysian Qualifications Framework (MQF) 2nd Edition Level and Qualification

MQF Level	Minimum Graduating Credit	Academic Sector	TVE Sector	Lifelong Learning/APEL criteria for APEL (A)
8	No credit rating 80	PhD By Research Doctoral Degree By Mixed Mode & Coursework		Admission criteria: 35 years old Bachelor's degree in relevant field/equivalent 5 years' work experience Passed APEL assessment
7	No credit rating 40 30 20	Master's By Research Master's By Mixed Mode & Coursework Postgraduate Diploma Postgraduate Certificate		Admission criteria: 30 years old STPM/Diploma/equivalent Relevant work experience Passed APEL assessment
6	120 66* 36*	Bachelor's Degree Graduate Diploma Graduate Certificate		Admission criteria: 21 years old Relevant work experience Passed APEL assessment
5	40	Advanced Diploma	5	
4	90	Diploma	4	Admission criteria: 20 years old Relevant work experience Passed APEL assessment
3	60	Certificate	3	Admission criteria: 19 years old Relevant work experience Passed APEL assessment
2	30	Certificate	2	3R
1	15	Certificate	1	3R

*Including six credits from general studies subject

Since 2019, MQA has applied a single quality assurance system for all TVE programs regardless of the ministry that the programs belong to. In addition, a Code of Practice for TVE Programme Accreditation (COPTPA) has been developed and is to be used as the main reference for TVE program accreditation which aims to assure the quality of TVE programs. The TVE programs and NOSS-based training curricula have to be in compliance with COPTPA. All programs across all disciplines under the TVE sector will be required to comply with the seven areas of the standard. These seven areas are: 1. Programme Development and Delivery; 2. Assessment of Student Learning; 3. Student Selection and Support Services; 4. Teaching Staff; 5. Educational Resources; 6. Programme Management; and 7. Programme Monitoring, Review and Continual Quality Improvement. COPTPA will be used by a panel of assessors and MQA staff in the assessment of the accreditation of the TVE program. COPTPA should be read together with the MQF document as well as higher education quality assurance policies and regulations that will be introduced and updated from time to time (Malaysian Qualification Agency, 2019).

Malaysian Skills Certificates

The National Occupational Skills Standards (NOSS) is a document that outlines the competencies required by an employee based on the level of certification and occupation. NOSS is a skills standard that benefits all the stakeholders including the community, and can be used as a benchmark to evaluate the effectiveness of the joint effort among the stakeholders. With reference to the NOSS, the Malaysian Skills Certificate (SKM) was developed and was put under the jurisdiction of the Department of Skills Development (DSD). The benefits of the SKM include providing attractive career paths and personal growth opportunities for the certificate holders in order to allow them to compete in local and global job markets. There are three main channels to obtain SKM. Trainees can get SKM through participation in a full-time training program in an institution recognized by the DSD. Besides, trainees can also earn a SKM through industry-oriented training programs (National Dual Training

System – NDTS or SLDN) conducted by both industries and skills training institutes. Apart from that, trainees can also get SKM through Recognition of Prior Achievement (*Pengiktirafan Pencapaian Terdahulu* - PPT). PPT can be applied by submitting proof of skills competency, which will then be assessed by the Assessing Officer and approved by the external Verification Officer appointed by DSD (Department of Skills Development, 2021c). There are five levels of authentication in SKM (Department of Skills Development, 2020) as shown in Table 4.

Table 4 Levels of Malaysian Skills Certificates (SKM)

Level	Definition
Malaysian Advanced Skills Diploma (DLKM) Level 5	Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources feature strongly, as do personal accountabilities for analysis and diagnosis, design, planning, execution, and evaluation.
Malaysian Skills Diploma (DKM) Level 4	Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.
Malaysian Skills Certificate (SKM) Level 3	Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy, and control or guidance of others is often required.
Malaysian Skills Certificate (SKM) Level 2	Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and require individual responsibility and autonomy.
Malaysian Skills Certificate(SKM) Level 1	Competent in performing a range of varied work activities, most of which are routine and predictable.

Source: Department of Skills Development, 2020.

Current TVE and Policy Reforms

There are several TVE reformations which have taken place in this country during the past few years. The Strategic Plan for Vocational Education Transformation, for instance, has changed the Malaysia TVE demography significantly (Ministry of Education Malaysia, 2011). With five strategies, five initiatives and 10 actions listed in the Strategic Plan for Vocational Education Transformation, the TVE system under the jurisdiction of the Ministry of Education has experienced significant changes in five aspects including the curriculum, institutions, collaboration, assessment, and organization. TVE Transformation is imperative in order for the institution to survive the changes and challenges that are faced by global TVE. The important transformations have been listed and explained in the Malaysian Education Blueprint 2015-2025 (Higher Education). Several goals have been set under 10 shifts that focus on the quality TVE graduate and talent pool. One of the aims of transforming TVE is to ensure that the academic pathways and TVE pathways are equally valued and cultivated (Ministry of Education Malaysia, 2015).

From an international perspective, several recommendations have been outlined for the implementation of future ASEAN agendas in which TVE is one of the main focuses within the ASEAN context. In line with the ASEAN agenda, the TVE Empowerment Cabinet Committee (JKKPTVET) was established with nine ministries taking part as the committee members, which include the Ministry of Education, the Ministry of Human Resources, the Ministry of Youth and Sports, the Ministry of Works, the Ministry of Rural Development, the Ministry of Entrepreneur Development and Cooperatives, the Ministry of Agriculture and Agro-based Industry, the Ministry of Domestic Trade and Consumer Affairs, and the Ministry of Trade International and Industry. One of the efforts by JKKPTVET was to set the National TVET Councils co-chaired by the senior public and private sector representatives to drive coherent, future-oriented national TVE agendas. Moreover, JKKPTVET also suggested allocating a sufficient budget for TVE development, and proposed setting up a TVE fund for the benefit of Malaysians. The TVE fund may be implemented through the Human Resources Development Fund (HRDF), which has distributed grants and financial assistance worth USD 1.56 billion for skills development in the past 25 years (Seel & Phuong, 2020). Apart from that, JKKPTVET also proposed the public-private collaboration scheme, which will strengthen the business/industry and governmental agencies cooperation in TVE.

Trends and Issues in TVE

TVE in Malaysia is facing a number of changes and challenges due to the rapid development of the industries. The development of TVE in Malaysia started at the trade school that was established to train people to be mechanics and laborers to maintain transportation in the late 1890s. Later on, a committee was formed to review the requirements of TVE in Malaysia before 1920, and new training content was implemented to improve training. As a result, knowledge was infused into the training curriculum to enhance technical competency among workers (Mohd Sauffie, 2015). Nonetheless, due to the fast-changing technology in TVE, industry has demanded other skills and personality traits such as self-confidence, problem-solving skills, decision-making skills, and other core values (e.g., loyalty and commitment). This industrial demand is regarded as a call for review and change, especially in TVE curricula because the existing curricula are no longer able to fulfill the industrial needs. To cope with this circumstance, the Malaysian Government has reformed the TVE system by ensuring the needs of the stakeholders are fulfilled.

A detailed discussion of the TVE trends and issues within the Malaysian context is presented in the following sections. We first explain the TVE trends in the Malaysian context, and then the highlights of the five most prominent issues pertaining to TVE will be emphasized in the discussion.

Current Trends in Malaysian TVE

Fluctuating Number of Student Enrollments in TVE Institutions

In the recent development, school level has recorded a remarkable achievement in TVE. The number of vocational colleges has increased from 80 in 2017 to 87 in 2018 which provides greater opportunities and access for more students to enroll in vocational stream education (Ministry of Education Malaysia, 2019). It is surprising, however, to observe that student enrolment in vocational colleges significantly declined from 54,150 in 2018 to 47,514 in 2019, and to 39,306 in 2020 (27.4% of decrement from 2018-2020) due to unknown reasons (Ministry of Education Malaysia, 2021a). A similar trend has been observed in the student enrolment in Polytechnics. On the contrary, the student enrolments in Technical Schools and Community Colleges have fluctuated throughout the years. Meanwhile, the number of students enrolled in MTUN universities has increased, except for Universiti Malaysia Perlis. Generally, a fluctuating number of student enrolments has been observed by these two ministries in the TVE stream from 2017 to 2019, while data from other ministries are not complete for comparison of the three consecutive years. See Table 5.

Table 5 TVE Enrolment Figures: 2017-2020

Ministry	Institution	2017	2018	2019	2020
Ministry of Education Malaysia	Technical Schools	3,371	3,957	4,305	4,195
	Vocational Colleges	52, 033	54,150	43,005	39,306
	Community Colleges	20, 921	26,069	26,118	16, 324 (June 2020)
Ministry of Higher Education Malaysia	Polytechnics	99, 606	96, 370	93, 362	86, 466 (Sept 2020)
	Universiti Tun Hussein Onn Malaysia	17, 744	17, 862	18,031	TBA
	Universiti Teknikal Malaysia Melaka	12, 334	13, 857	14, 442	TBA

Table 5 Continued

Ministry	Institution	2017	2018	2019	2020
	Universiti Malaysia Pahang	11, 540	12,748	12, 987	TBA
	Universiti Malaysia Perlis	13, 798	13,266	12, 741	TBA
	Total	231, 347	238, 279	226, 991	N/A

Source: Ministry of Education Malaysia, 2021a, 2021b.

(N/A = not available; TBA=to be announced)

Increasing Number of TVE Programs in Higher Education Institutions

TVE at the higher education level is more concerned with graduate employability. One of the strategies to increase graduate employability is to create technological and industry-led degree programs (level 6) that aim to close the gaps of technology and technical services needed by industry and in line with current technological developments. For that reason, Malaysian higher education institutions have reviewed their existing study programs and offered new TVE programs that are focusing on the specific technology and occupation. For example, over the past 3 years, Malaysia Technical University Network (MTUN) has offered 10 new occupational-based programs since 2019, to provide an educational path for vocational college students to further their studies at bachelor degree level. Some examples of the offered programs are the Bachelor Degree of Technology in Welding with Honours, the Bachelor Degree of Technology in Industrial Machining with Honours, and the Bachelor Degree of Technology in Electrical Maintenance System with Honours (Faculty of Technical and Vocational Education, 2021a).

Increasing Private Sector Participation in the Digitalization of TVE

TVE in Malaysia is currently attracting a wider spectrum of entities within industry players, from Government Link Companies (GLCs) to private companies. The main reason for the industry involvement in TVE in Malaysia is attributed to the huge investment of public funds allocated by the government to human capital development, training infrastructure and infostructure, as well as a new policy for tax reduction and levy exemption. In recent years, the government's effort regarding TVE digitalization has also attracted a number of private companies to engage in digital educational business which focuses on the provision of training, reskilling, and upskilling for TVE practitioners. A total of one billion Ringgit has been allocated by the Ministry of Finance for this digitalization initiative (Ministry of Finance Malaysia, 2020) which has stimulated the growing number of private companies to embark on TVE digitalization, such as the National Digital TVET Innovation Centre (NDTIC), DIGITALTVET (https://www.digitaltvet.asia/index.aspx), and Ruang Cikgu Bhd (https://ruangcikgu.com/).

An Increasing Number of Professionals in the Technology Field

The Malaysia Board of Technologists (MBOT) has been given the authority to award any qualified personnel as professional technologists (Ts.) and technicians (Tc.). This is one of the purposes of the board establishment, which is to recognize the Professional Technologists and Certified Technicians as professionals and to recognize the Professional Technologists, Graduate Technologists, Certified Technicians, and Qualified Technicians (MBOT, 2020). The benefit of this award includes recognition and acceptance by peers and industry, talent mobility from every level of the technology field, lifelong learning as MBOT adopts Continuous Professional Development (CPD) hours that will encourage professional participation in the technology relevant courses and programs conducted by MBOT and Technology Expert Panels for each specific sector. According to the latest information, the data indicate a drastic increase in registered professional technologist (Ts.) holders from 346 in 2017 to 9,253 as of March 2021; Qualified technician (Tc.) 3,736; Graduate technologist 21,154, and more than 35,000 registrants. All these figures are registrants from 23 technology fields recognized by MBOT.

Increasing Skills Qualification Requirements for TVE Educators

Like any other teacher training institution in the world, TVE teacher training has experienced an improvement in terms of skills qualification and standards. The trends of TVE institutions are now to have teachers with specific licensing for teaching skills. Therefore, education institutions with TVE teacher training programs will embed additional skills certificates into the programs they offer, so that they will produce teachers who are qualified to be TVE instructors at TVE schools. As described earlier, one of the most important certifications for TVE educators is the Vocational Training Officer (VTO), issued by the Centre for Instructor and Advanced Skill Training (CIAST) under the Ministry of Human Resource. Trainees are required to have a basic competency for teaching skills besides having content-specific skills according to specific fields. In addition, specific skills in the respected field are also becoming a must for teacher trainees to have at least a level above. Universiti Tun Hussein Onn Malaysia (UTHM) for example, offers six trainee teacher bachelor degree programs in vocational education embedded with at least SKM level 3, which has become an exemplary model for other similar higher education institutions in Malaysia.

Malaysia TVE Issues

Among the issues and actions taken by the government in regard to Malaysia TVE are the following.

Unstandardized TVE Governance Through Multiple Entities

The TVE landscape in Malaysia is very unique because there are many TVE players involved, and every one of them has its own policy and strategies for the planning and implementation of TVE. At the moment, there are 11 ministries actively engaging in TVE, and a number of skills training institutions have been set up to meet different organizational needs and KPIs. This scenario has caused diverse strategies, different standards of performance, various qualification systems, and redundancy of training curricula. For instance, some training curricula refer to the NOSS provided by the Ministry of Human Resources, while other curricula are designed based on MQA requirements. The need for unified coordination among ministries and TVE institutions has brought about many shortcomings in the governance of TVE, such as the misuse and waste of financial allocation and training resources due to the redundancy of training programs. Also, the certification and program quality is problematic because there is no single agency to monitor and control the standard and quality of certification and programs offered by different ministries. For example, the certification for diploma programs can be divided into general Diploma (Polytechnics, University), Vocational Diploma (Vocational Colleges), Technology Diploma (ILKA) and Skill Diploma (ILKA). The lack of standardization in certification has created confusion among students and employers since various certifications are used and their differences are not obvious.

To deal with these issues, the TVE Empowerment Cabinet Committee (JK-KPTVET) was established with nine ministries taking part as committee members, including the Ministry of Education, Ministry of Human Resources, Ministry of Youth and Sports, Ministry of Works, Ministry of Rural Development, Ministry of Entrepreneur Development and Cooperatives, Ministry of Agriculture and Agro-based Industry, Ministry of Domestic Trade and Consumer Affairs, and Ministry of Trade International and Industry. The aims of JKKPTVET are to ensure the national TVE agendas are on the right track, the formulation of TVE policies must be applicable across the board, and the funding should be properly channeled to the right place for the purpose of TVE development.

Furthermore, in the effort of the Malaysian government moving towards a single governance of TVE, the ministries have announced the establishment of the National TVET Council (Majlis TVET Negara). Apart from industry figures and academic representatives who are also strategic partners in sharing data, expertise, technology, new knowledge, and significant research for the benefit of policy makers and TVE practitioners, the council is also composed of various other ministries and agencies (e.g., MQA, MIDA). In order to empower TVE as a national agenda, three strategic thrusts, namely integrated and coordinated governance, industry-driven TVE, and shaping the future, as well as 12 empowerment strategies, were outlined in 2020. Operationally, this council is chaired by the Prime Minister, while the MTVET Executive Committee is co-chaired by the Minister of Higher Education and the Minister of Human Resources. Meanwhile, the MTVET focus group will be chaired by the Secretary General of the Ministry of Higher Education (Bernama, 2021).

Slow Progress in Embracing Digital Transformation for TVE Teachers

Digitalization is a concept that is integrated and parallel to IR4.0. Digital transformation in TVE. It poses challenges in several aspects of TVE in Malaysia. Among them is the readiness of TVE teachers (Yunos et al., 2017) and the facilities of the faculties that support these technologies (Zulnaidi et al., 2020). It is reported that TVE teachers are working within their traditional comfort zone. Thus, moving to a digital platform requires much effort in terms of time and cost to attend retraining and upskilling programs, and self-initiative to explore new knowledge, so that they will be able to embrace the new way of innovative teaching using digital materials. This has become the reason for some TVE teachers to prefer more conventional training approaches. However, due to the Covid-19 pandemic and Movement Control Order (MCO) implemented by the Malaysian government, it is almost impossible to conduct conventional training approaches. Thus, the teaching and learning process has been embraced on online platforms in order to make sure the teaching and learning process is going on as usual. For this reason, it is suggested that the planning and governing of TVE must consider the new challenges faced by

TVE including capacity development of TVE teachers in handling pandemic situations, teachers' capacity to develop online education, ethical and moral values, as well as global citizenship (Majumdar et al., 2020).

Realizing the importance of digital education, the government has introduced the nine shifts in the Malaysia Education Blueprint (Higher Education) which specifically focus on the uses of technology in education, including Globalized online learning. The government has set a benchmark for teachers' digital literacy through the National Education Technology Standard (NETS), stressing facilitating and inspiring learning and creativity, designing and developing digital age learning experiences and assessments, model digital age work and learning, promoting and modeling digital citizenship and responsibility, and engaging in professional growth and leadership (Ministry of Education, 2013a).

Growing numbers of private organizations are participating in the TVE digitalization initiative such as the National Digital TVET Innovation Centre (NDTIC) and Ruang Cikgu Berhad, which provides training and assistance to the TVE system in handling the new technologies. The NDTIC for instance was established to provide services and technologies that will help implementation of digital TVE in the teaching and learning process (National Digital TVET Innovation Centre [NDTIC], 2021). With the facilities and accommodation available in the world of the web, the uses of technologies in TVE will be easier and plausible for every stakeholder.

An Inappropriate Ecosystem for TVE Institutions

Malaysian TVE institutions are faced with two major challenges; first, the lack of capacity and ability of TVE institutions to respond to the dynamic changes in technology and industry; and second, the lack of adaptability and flexibility of TVE institutions to readjust and restructure their standards, certification, and curricula to be in line with the national TVE directions. This problem can be attributed to the lack of coordination among ministries and TVE institutions. This situation has created an unstable ecosystem and unhealthy environment for TVE.

Recently, the National TVET Council was formed to improve coordination of the TVE ecosystem which focuses on the governance, industry linkage, and empowerment strategies (MOHE, 2021a). The National TVET council is chaired by the Malaysian Prime Minister and co-chaired by the Minister of Higher Education and the Minister of Human Resources. The initiatives taken by the National TVET council include the introduction of a sustainable financing model, developing policies for public-private partnership, a TVE branding plan, and developing TVE big data. Apart from that, the implementation of the Strategic Plan for Vocational Education Transformation by the Ministry of Education Malaysia has significantly changed the Malaysian TVE demography (Ministry of Education Malaysia, 2011). By carrying out five strategies, five initiatives and 10 actions under the strategic plan, the TVE system has experienced remarkable changes in the five aspects of curricula, institutions, collaboration, assessment, and organization. Due to local and global challenges, transformation in TVE is regarded as an imperative and essential strategy to be adopted in order to survive in this ever-changing and competitive environment.

Slow Progress of Public-Private Partnerships (PPP)

Public-private partnerships in TVE remain at a superficial level, and especially partnerships between TVE institutions and industry in promoting TVE (Yunos et al., 2017). As a consequence, the implementation of TVE is solely dependent on government funding, while the profit-oriented companies and industry are not greatly interested in cooperating with TVE institutions. In fact, there are only a small number of industries involved in the human capital development programs in Malaysia. In addition, initiatives and collaboration between industries and TVE institutions are not very encouraging, especially in the fields of research, innovation, and commercialization.

To foster PPP in Malaysia, several types of PPP model have been implemented by the Malaysian government, such as Build Operate Transfer (BOT), Build Lease Maintain & Transfer (BLMT), Build Own Operate (BOO), Build Lease & Transfer (BLT), and Land Swap (Ahmad, Ibrahim & Abu Bakar, 2018). In addition, the Malaysia Education Blueprint 2015-2025 (Higher Education) has also highlighted several strategies to enhance PPP in TVE (Ministry of Education, 2013a). For instance, the government has introduced the first wave of PPP initiative at school level through the introduction of PINTAR (Promoting Intelligence, Nurturing Talent and Advocating responsibility) which is an after-school program to encourage industrial involvement in introducing new technology, education clinics, and talks for students (Ministry of Education, 2013a). To date, the PPP initiative is in the third wave where the activities have been growing and have expanded into innovation-based events that aim at promoting students' creativity and innovation. More initiatives and incentives have been introduced to attract the private sector to be attached to TVE institutions, such as the double tax deduction (DTD) for the industry partners who engage in PPP with TVE institutions.

Inadequate Participation by Minority Groups

TVE institutions in Malaysia provide equal access to all, and similar enrolment requirements are basically applicable to all candidates regardless of their demographic backgrounds. In spite of this, inequality still exists in TVE. Student enrolment in some of the TVE institutions in Malaysia might be dominated by socio-economic status, gender, field of studies, cultural considerations and perceptions. The inequality in various demographic groups (e.g., gender; rural/urban areas) in some specific areas is a big concern to government as it has an impact on equity in education. For instance, based on the statistics provided by the Ministry of Higher Education Malaysia (2019b), the enrolment of female students in polytechnics and community colleges is lower than that of their male counterparts. The total number of male students for polytechnic enrolment in 2019 was 18,808 while the enrolment of female students was only 15,173. As for community colleges, the enrolment for male students was 5,081 but for female students it was only 4,352. This gap needs to be reduced in order to fulfil the government goals of gender equality and empowering all women for a balanced workforce (Economic Plan Unit, 2017).

Through the implementation of the Malaysia Education Blueprint 2013-2025, the gaps between rural and urban schools have been gradually narrowed over time. Performance in general is influenced by learning environment, but digitalization initiatives in education will help to reduce the disparities between rural and urban schools. Also, higher spending on educational resources and training infrastructure in rural areas has helped reduce the gaps in terms of content delivery, skill acquisition, and competency assessment in both general education and TVE.

Apart from that, some TVE institutions also offer skill training programs for students with special needs in order to allow them to secure a decent job after completion of their studies. However, the programs offered are not sufficient to cope with the demands of students with disabilities. In addition, access to TVE for other marginalized groups, such as high-risk youth, single mothers, and prisoners is still limited or inadequate to help them return to society. The lack of training programs offered for marginalized groups is generally due to lack of facilities (e.g., training facilities for learners with disabilities) and specialized instructors (e.g., instructors with experience and knowledge of training marginalized groups). This might be a great challenge for TVE institutions and the government to create an inclusive TVE ecosystem and to promote equality in TVE.

Conclusion

In conclusion, this chapter has provided some general insights into Malaysia's TVE ecosystem, from school to higher education that aims at preparing future skilled workers to ensure sustainable economic and social development in Malaysia. Additionally, several issues related to governance of TVE, digital transformation in TVE, to responsiveness, agility, and resilience of TVE institutions, public-private partnerships, as well as equality and inclusiveness in TVE contexts have been discussed.

Malaysia is moving on the right track towards a high-income country status. To achieve this noble goal, Malaysia's government has invested enormous effort and introduced several initiatives through new policies and funding in order to broaden the access to skills training for the young generation and at the same time to synergize the momentum to enhance the TVE standard and quality to cater for the demand of local and global industry. The agenda of good governance of TVE institutions supported by an implementation of TVE digital transformation should provide TVE graduates with more opportunities in the economy of the country.

References

Ahmad, U., Ibrahim, Y., & Abu Bakar, A. (2018). Malaysia public private Partnership. *Academy of Accounting and Financial Studies Journal, 22* (special issue 2018). https://www.abacademies.org/articles/Malaysian-Public-Private-Partnership-1528-2635-22-SI-155.pdf

Bahagian Kemahiran dan Teknikal MARA. (2018). *TVETMARA*. http://www.ekemahiran.edu.my/portales/

Bernama. (2021). *Majlis TVET Negara ditubuh bagi agenda pemerkasaan TVET*. https://www.astroawani.com/berita-malaysia/majlis-tvet-negara-ditubuh-bagi-agenda-pemerkasaan-tvet-noraini-282561

CIAST. (2020). *QFact Statistics*. https://www.ciast.gov.my/?page_id=986&lang=en

Department of Skills Development. (2020). *Standard Registry* (Issue November).

Department of Skills Development. (2021a). *Centre for Instructor and Advanced Skill Training*. https://www.ciast.gov.my/?page_id=549&lang=en

Department of Skills Development. (2021b). *Criteria for Vocational Teacher or Assessing Officer*.

Department of Skills Development. (2021c). *Malaysian SKills Certificate (SKM)*. https://www.dsd.gov.my/index.php/en/service/malaysian-skills-certificate

Department of Statistics Malaysia. (2021a). *Graduates Statistics 2019*. https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=476&bul_id=b3ROY1djSVROS2ZhclZaUWhLUVp5QT09&menu_id=Tm8zcnRjdVRNWWlpWjRlbmtlaDk1UT09

Department of Statistics Malaysia. (2021b). *Press Release Employment Statistics Fourth Quarter 2020* (Issue February). https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=MEhmU2p4cmFUZ0IzWlBsaXZQQkVJUT09

Department of Statistics Malaysia. (2021c). *Press Release Malaysia Economic*

Performance Fourth Quarter 2020 (Issue February). https://www.dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=100&bul_id=Y1MyV2tPOGNsVUtnRy9SZGdRQS84QT09&menu_id=TE5CRUZCblh4ZTZMODZIbmk2aWRRQT09

Economic Plan Unit. (2015). *Malaysia 11th National Plan 2016-2020*. Unit Perancang Ekonomi, Jabatan Perdana Menteri Malaysia.

Economic Plan Unit. (2017). *Malaysia Sustainable Development Goals Voluntary National Review 2017* (1st ed.). Economic Plan Unit.

Education Service Commiossion Malaysia. (2016). *Higher Education Officers of Grades Dh41 and DH29*.

EPIC. (2018). *Equal Pay International Coalition*. https://www.equalpayinternationalcoalition.org/

Faculty of Technical and Vocational Education. (2021). *UNEVOC Centre (Uni/Research) since 1999*. https://fptv.uthm.edu.my/en/affiliate-center/unevoc-network

International Bureau of Education. (2006). *World Data on Education: Malaysia* (6th ed., Issue September). UNESCO.

International Labour Organization. (2020). *The gender divide in skills development: Progress, challenges and policy options for empowering women*.

Jabatan Pendidikan Politeknik dan Kolej Komuniti. (2021). *Sijil Kemahiran Khas*. https://www.mypolycc.edu.my/index.php/program/sepenuh-masa/sijil-kemahiran-khas

Majlis Amanah Rakyat. (2021). *TVET Institution*. https://www.mara.gov.my/

Majumdar, S., Araiztegui, I., & Basque, T. (2020). *Technical vocational education & training – reflections on the issues facing TVET and its potential in the time of COVID-19. 2019*, 1–27.

Malaysian Examination Council. (2021). *Introduction to Malaysian Educators Simulator Inventory (MedSI)*. https://www.mpm.edu.my/en/resources/archive/medsi/introduction

Malaysian Qualification Agency. (2017). *Malaysian Qualifications Framework (MQF) 2nd edition*. Malaysian Qualification Agency.

Malaysian Qualification Agency. (2019). *Code of Practice for TVET Programme Accreditation* (2nd ed.). Malaysian Qualification Agency.

MBOT. (2020). *MBOT Registration*. https://www.mbot.org.my/registration/mbot-professional-member/

Minghat, A. D. (2017). Government-link companies in the National Dual Training System Programme: An analysis of perception , factors constraints , and resolution. *Advances in Social Science, Education and Humanities Research, 102*(Ictvt), 301–305.

Ministry of Agricultural and Food Industry. (2020). *Agricultural Skills Training Division*. https://www.mafi.gov.my/bahagian-latihan-kemahiran-pertanian-blkp

Ministry of Education Malaysia. (2011). *Strategic Plan for Vocational Education Transformation* (1st ed.). Kementerian Pelajaran Malaysia.

Ministry of Education Malaysia. (2012). Dasar Pendidikan Kebangsaan. In B. P. dan P. D. Pendidikan (Ed.), *Bahagian Perancangan dan Penyelidikan Dasar Pendidikan* (3rd ed.). Perpustakaan Negara Malaysia.

Ministry of Education Malaysia. (2013a). *Malaysian Education Blueprint 2013 - 2025*.

Ministry of Education Malaysia. (2013b). System Structure. In *Malaysia Education Blueprint 2013-2025*. Ministry of Education Malaysia.

Ministry of Education Malaysia. (2015). *Executive Summary Malaysia Education Blueprint 2015-2025 (Higher Education)*.

Ministry of Education Malaysia. (2020). *Kenyataan media: Penafian KPM: Pengendalian Peperiksaan Upsrx Dan Pt3x Secara Dalam Talian*. https://www.moe.gov.my/en/pemberitahuan/media-statement/kenyataan-media-penafian-kpm-pengendalian-peperiksaan-upsrx-dan-pt3x-secara-dalam-talian

Ministry of Education Malaysia. (2021a). *Special Education Schools List.* https://www.moe.gov.my/en/special-education/special-education-school/senarai-sekolah-pendidikan-khas

Ministry of Education Malaysia. (2021b). T*echnical and Vocational Educa-*

tion. https://www.moe.gov.my/en/orang-awam/pendidikan-teknik-dan-vokasional

Ministry of Finance Malaysia. (2019). *BUDGET 2020*. Ministry of Finance Malaysia.

Ministry of Finance Malaysia. (2020). *Budget 2021*.

Ministry of Finance Malaysia. (2021). *Economic Outlook*.

Ministry of Higher Education Malaysia. (2019). Macro Higher Education Institutions. In *Higher Education Statistics 2019* (pp. 1–8). Ministry of Higher Education Malaysia.

Ministry of Higher Education Malaysia. (2020). Chapter 7: Graduate Tracer Studies. In *Higher Education Statistics 2019* (pp. 152–163).

Ministry of Higher Education Malaysia. (2021). *Politeknik*. https://www.mohe.gov.my/en/institusi/politeknik

Ministry of Human Resources. (2021). *Manpower Department, Ministry of Human Resources*. https://www.trainingmalaysia.com/provider/display_prof.php?prov=JTM

MyRIVET. (2021). *Malaysia Research Institute for Vocational Education and Training*. https://myrivet.uthm.edu.my/index.php

National Digital TVET Innovation Centre (NDTIC). (2021). *Welcome to digital TVET*. http://www.ndtic.my/

Education Act, Pub. L. No. ACT 550. (1996). http://www.agc.gov.my/agcportal/uploads/files/Publications/LOM/EN/Act 550.pdf

National Skills Development Act. (2006). https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/95630/112654/F-998717512/MYS95630.pdf

Technologists and Technicians Act, Pub. L. No. 768 (2015). https://www.mbot.org.my/MBOT/files/4d/4d17e358-9dfe-40a3-974f-c74e3b8e840f.pdf

Public Servant Department. (2021). *Hadiah Latihan Persekutuan (HLP)*. https://www.jpa.gov.my/en/civil-servant/in-service-courses

Scott, L. A. (2017). *21st Century Learning For Early Childhood*. P21 Partnership for 21st Century Learning.

Seel, F., & Phuong, T. D. (2020). *Implementing the future asean agenda for TVET: A compendium of case studies*. (S. Reiff (ed.)). Deutsche Gesellschaft für Internationale.

UNESCO-UNEVOC. (2019). *TVET Country Profile: Malaysia* (Issue June).

World Bank Group. (2021). *The World Bank in Malaysia*. https://www.worldbank.org/en/country/malaysia/overview

Yunos, J. M., Sern, L. C., & Hamdan, N. H. (2017). Changes and challenges in sustainability of technical and vocational education and training-teacher education programme: A case study. *2016 IEEE 8th International Conference on Engineering Education: Enhancing Engineering Education Through Academia-Industry Collaboration, ICEED 2016, 80–85*. https://doi.org/10.1109/ICEED.2016.7856099

Zulnaidi, H., Abdul Rahim, S. S., & Mohd Salleh. U. K. (2020). The readiness of TVET lecturers in facing the intelligence age IR4.0, *Journal of Technical Education and Training, 12*(3), 89-96

Technical and Vocational Education Trends and Issues in Singapore

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Abstract

This chapter describes the current status and future developments in technical and vocational education (TVE) in Singapore. During the colonial period, Singapore was mainly a commercial and trading center with very little industry. Technical and vocational education developed only after independence in parallel with economic development and other social issues such as schooling, the economy, housing, and healthcare.

The structure and system of TVE in Singapore is now well-established with national qualifications and training institutes, all funded and operated by the government. There are three levels of institutions, namely vocational, technical, and professional. However, all of TVE is post-secondary, so that every entrant has 10 years of schooling and has a strong foundation before entering TVE institutions. This has served to bring the standard of even basic TVE to a high level of proficiency. It has also served to remove the stigma of vocational education as one for school dropouts.

Looking ahead, the main challenge for TVE in Singapore is to keep ahead of the technological and digital revolution that is impacting all of business and industry. A balance has to be calibrated between today's skill needs and tomorrow's requirements while preparing for the future. As a globally connected city-state, Singapore is more vulnerable to economic and technological pressures than most other countries.

Keywords: TVET, skills, employability, lifelong learning, polytechnic

Introduction

It is increasingly being recognized world-wide that a well-functioning TVE system is vital for building strong and sustainable economies. “It is precisely because VET sits at the intersection of the workings of the education system and the real economy that it could play such an important role in determining the fate of individuals and nations” (Tucker, 2019). Singapore is one of the four countries cited by Tucker as a “gold standard” for the provision of technical and vocational education and training. This current status has been achieved neither quickly nor easily. The history of TVE development, the early trials and failures, experiments and breakthroughs have been well documented (Chiang, 1998; Law, 2014; Varaprasad, 2015).

The development and evolution of Technical and Vocational Education (TVE) in Singapore may be said to have taken off in the post-colonial era starting in 1959 when Singapore was granted limited self-governing status which included responsibility for education, health, housing, and economic development. Until then, TVE was a reluctant fringe to the school system, comprising some trade schools, a couple of secondary technical schools, and a polytechnic which was established in 1954 but did not become operational in temporary premises until 1957. Education, and TVE in particular, was not a priority for the colonial government which delayed taking decisions despite several official reports and petitions, and even then, only half-heartedly (Varaprasad, 2016).

During the colonial period, the main economic activity in Singapore was commerce and trade, with little industry. The British civil service only trained for its own needs, primarily in book-keeping and secretarial work. Several commissions and committees were formed to study the need for vocational education; all were rejected by the authorities. The population then comprised immigrants from a multitude of nationalities, interested only in making a living in the city before returning to their country of origin. Citizenship was not important for them, although they organized themselves into clans and associations to help each other and the new immigrants who kept pouring into the island colony, attracted by its free port status and prospect of work, even menial.

Self-government for Singapore in 1959 created a new urgency for improving school education as well as technical and vocational education. The social and economic priorities of that period were to address the massive unemployment for the largely itinerant population through rapid industrialization, building primary and secondary schools to enable more youths to access schooling and TVE to meet the needs of new industries as well as building construction. Many in the migrant population eventually accepted citizenship and opted to stay permanently in Singapore. Many of them lived in squatter housing, had no education, and had little job security.

In the 50 years between 1960 and 2010, both the school system and the TVE system underwent many changes in tandem with the rapid development in the economic, social, and political spheres in Singapore. Merger with Malaysia in 1963, separation as a sovereign nation in 1965, the closure of the British military bases in the early 1970s, several financial crises, and economic restructuring exercises have each stimulated reform in education, including TVE. Many experiments were tried during the 1960s and ‘70s in response to changing demands of industrial development. Entities were created, merged, or disbanded, new types of technical education models were tried and frequently changed until the 1990s when the Institute of Technical Education (ITE) was established in 1992 as a post-secondary institution, and the role of the polytechnic system was clarified (Varaprasad, 2015).

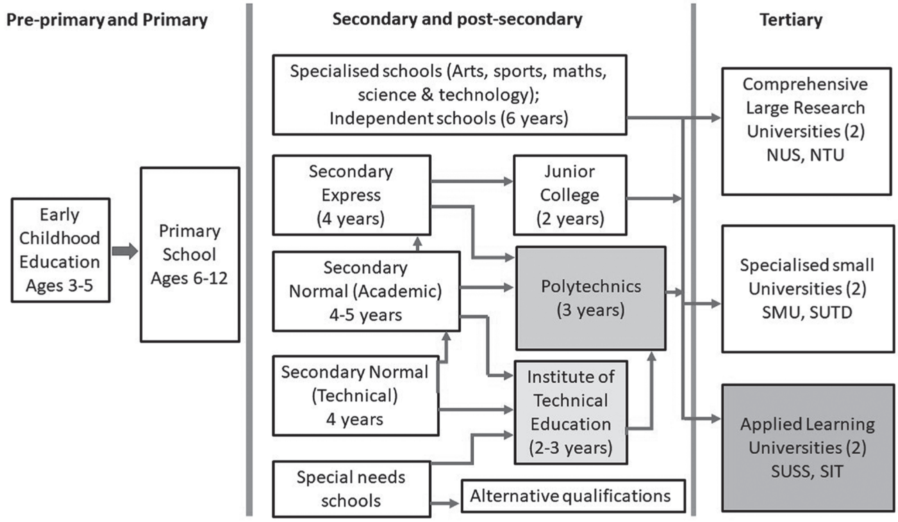
Although the education system continues to evolve and develop, structurally the system has been quite stable for 2 decades. The changes are now more focused within the entities rather than systemwide. Parents, students, and other stakeholders now better understand and would be able to describe the system with greater clarity than ever before. This is not to say that there are no changes underway. The government is keenly aware that the knowledge and skills that the workforce needs are rapidly evolving. Indeed, there are far-reaching changes in the relationship between TVE and higher education (HE), between HE and business and industry, as well as between TVE and industry.

The Singapore Education System and TVE

The structure of the Singapore education is quite easy to understand from a macro standpoint. After attending early childhood education in either private or government pre-schools, Singapore children who have reached the age of 6 are admitted to primary school for 6 years. This is the only stage of education which is mandatory by law, although home-schooling is allowed for exceptional cases and on application. There are only four subjects taught at this stage, namely English, Mathematics, Science, and mother-tongue. There are no examinations or tests in the first 2 years of primary school. Tests begin at the end of grade 3 to assess learning, identify learning effectiveness, as well as identify academically bright students for the Gifted Education Program (GEP) in Grade 4. At the end of Grade 6 (age 12), there is a common assessment, the Primary School Leaving Examination (PSLE), to determine placement at the next phase of education, namely secondary.

The Desired Outcomes of Education (Ministry of Education, 2021c) established by the Ministry of Education for each level of education provide the guiding principles for curriculum developers, textbook writers, school leaders, and teachers. These describe what qualities a student should have by the end of each stage of school education. The expectations are that school education will lead to a confident, self-aware, and resilient citizen, aware of his or her civic duties as a citizen of Singapore.

Figure 1 The Singapore Education System and TVE Institutions (highlighted)



Secondary Education

At the end of primary school, the PSLE guides students to several tracks in secondary school. At the top are independent, but still public, schools which have significant autonomy of operations, as well as specialized schools for arts, sports, mathematics and science, and science and technology. Most of these are "through-train" schools in which students do not need to sit for the O-level examinations at the end of Grade 10 which is mandated for all other students. Instead, students in these schools can proceed directly to Grade 11 in their schools and take their A-level or International Baccalaureate (IB) examinations at the end of Grade 12.

Most secondary students however will go to a 4-year secondary school program, which also has several sub-options within the school. The Express option takes 4 years to reach O-levels, while the Normal (Academic) path takes 5 years and the Normal (Technical) path ends after 4 years. The N(A) students who exit after 4 years end their secondary education with an N(A)-level certification while the rest proceed to their O-levels. The N(T) students end their pathway after 4 years with an N(T)-level certificate and do not normally go on to O-levels.

However, these pathways are permeable and can be bridged along the way in line with the student's progress and abilities. Students may even mix-and-match subjects in different pathways if they are found capable of doing so. Although the Singapore education system practices streaming of students by academic ability, this is mitigated by the individual customization options (known as subject-based banding) and transferability across streams. Streaming has been shown to reduce wastage and drop-out rates considerably (Driskell, 2016); it also assures that almost every student has at least 10 years of school education before ending their secondary schooling.

During their upper secondary years, N(T) students experience their first pre-vocational education subjects. In addition to their standard curricular offerings of Science, Computer Applications, and Design & Technology, they would also have the opportunity (in selected schools) of taking some applied subjects such as Smart Electrical Technology, Mobile Robotics, and Retail Operations (Ministry of Education, 2021a). Exposure to and experience of these topics at the school level helps to stimulate interest and motivation for the TVE pathways ahead of them in the post-secondary stage.

Post-Secondary TVE

After completion of their secondary education and having their O-level, N(A) or N(T) certificates respectively, students move to the next stage of their education, namely post-secondary. For the academically inclined, the route from O-levels would be to a 2-year program at a Junior College leading to the A-level examinations which opens opportunities for higher education. They will then join their peers from the "through-train" schools to enter university locally or overseas.

For those who want or are more suited by aptitude and interest to a more career-oriented education, the options in post-secondary are wide. The ITE and the polytechnics form the core of Singapore's TVE training infrastructure. There are more than 200 diploma programs at the five polytechnics and another 150 certificate, higher certificate, work-study, and technical diploma programs at the Institute of Technical Education (ITE) in a diverse range of areas from engineering and technology, health sciences, business and finance, info-communications technology, art and media, food sciences and catering, retail management, veterinary science, pharmaceutical and cosmetic technology, and many more. In every program, the pedagogy is founded on real-life problem-solving and solution-finding, innovation, and entrepreneurship.

Upon completion of their TVE programs, students may opt to seek employment, or continue their studies. This is when the system of "bridges and ladders" comes into play. Regardless of institution and time taken, graduates from any level of qualification can move to the next higher level institution and aspire to a degree at university. So from an ITE higher certificate, a student could go to the polytechnic for a diploma and then to university. The policy is to develop everyone to their highest potential at their own pace and with no terminal point except their own abilities. Even for those who go into employment, the doors to upgrading are now open through part-time courses or stackable modules of incremental steps leading to higher qualifications.

Those who have chosen to work after TVE would also be able to find the same opportunities to upgrade themselves through part-time programs, stackable modular curricula, or day-release programs. As shown in Table 1, there are several part-time training options available in all institutions, leading to higher qualifications.

Tertiary TVE

Based on the broad-based definition of TVE as career-oriented education with a strong skills orientation, certain tertiary institutions and programs could be considered as coming under this definition. This is particularly true of professional programs which are accredited by their respective professional bodies such as engineering, architecture, and accountancy. However, in this review, a more restrictive definition is applied, namely to those institutions and programs which provide access to polytechnic diploma holders in an integrated "through-train" approach. Rather than the student needing to fit into the academic programs of the university, in this approach the tertiary institution tailors its programs to the practical and industry-based learning styles of TVE graduates.

The two older comprehensive and large research universities (National University of Singapore and Nanyang Technological University), as well as the two smaller boutique universities (Singapore Management University and Singapore University of Technology and Design) have admitted polytechnic diploma holders into their programs, but in small numbers as their main source of students is the junior colleges and independent schools. More recently, two new universities have been established specifically to increase the opportunities for polytechnic upgraders and part-time learners. These are the Singapore University of Social Sciences (SUSS) and the Singapore Institute of Technology (SIT). Both are proponents of the Applied Learning pedagogy which has a strong work internship component, with projects which are drawn from industry. In the context of industry-driven training, these two institutions would comprise the tertiary leg of the TVE spectrum.

When the polytechnics realized that many of their graduates were going overseas for the degree programs at different universities in the United Kingdom and Australia at great cost, they arranged with some of these universities to provide their degree programs on-campus in Singapore. This led to a plethora of different arrangements with each university by each polytechnic. There was some concern also of the risk that these arrangements could be terminated by the overseas party, and the negative impact this could have on students and the government. Hence in 2009, the Singapore Institute of Technology (SIT) was established to bring the partner programs under one umbrella and be offered as joint programs. In 2014 SIT became a university in its own name with the authority to offer its own degrees. It now offers more than 40 different degree programs which are open to polytechnic diploma graduates as well as others with A-levels. The current enrolment is around 10,000 students.

SIT's unique applied learning pedagogy fits well with its ethos of being a university with close collaborations with industry in teaching and applied research. Its Integrated Work Study Program (IWSP) requires students to be immersed in companies for up to 12 months, allowing them to gain practical job skills and be readily employable. SIT's further strength is that it has maintained and built on the collaborations with leading overseas universities in Britain, Australasia, Europe, and the United States. Some of these are the DigiPen Institute of Technology, the Technical University of Munich, the Glasgow School of Art, the Culinary Institute of America, and Trinity College, Dublin, all of them well-known for their hands-on and practical approach to learning.

The Singapore University of Social Sciences (SUSS) started as a private university in 2005 as SIM University (UniSIM) and as a university of lifelong learning. It attracted students who preferred to continue working while studying for their degrees, and these were mainly polytechnic diploma holders. This was Singapore's first approved private degree-granting university, and students receive fee subsidies from the government to offset part of their fees, making their upgrading efforts more affordable.

In 2016, the government absorbed UniSIM and established it as Singapore's sixth autonomous public university. It was renamed the following year as the Singapore University of Social Sciences (SUSS). The name reflects its vision of being a leading university for social good through lifelong learning and applied social sciences. SUSS continues to be the destination for working adults, but it now also offers full-time degree programs in a wide range of disciplines. It is well established in the areas of Early Childhood Education, Languages, Public Safety, Counselling, Social Work, and Criminal and Family Law, all areas that focus on impacting society. There are now 11 full-time programs compared to 34 part-time undergraduate degree programs, with an enrolment of about 14,000 students, mostly part-time. SUSS also offers 35 stackable graduate programs, at the graduate certificate, graduate diploma, Master's and Doctoral levels, in a diverse range of disciplines catering to professionals seeking to enhance their skills and knowledge. Its objective of providing multiple education pathways is seen in the six full-time and two part-time Work-Study degree programs where study and work are interspersed during a typical week.

During the 2021 parliamentary budget debate session (Ministry of Education, 2021b), the Minister for Education announced the merger of two independent arts colleges to become a private University of the Arts, which no doubt will become a major tertiary destination for polytechnic graduates in design, film, and media on their upgrading path. This will add to the already wide choices available in the tertiary TVE sector.

While the other four public universities also admit eligible polytechnic diploma holders into their degree programs, for the purpose of this review, they are not considered as TVE equivalent courses. However, as will be seen in the later section on Issues and Trends, all the universities are moving towards greater collaboration with business and industry to keep aligned and at pace with the trends in the market.

Courses at Different Levels

The table below shows the different types of courses available at each of the institutions offering TVE.

Table 1 Level of TVE Qualifications by Type of Institution

Institution	TVE Qualifications	Areas
Institute of Technical Education	Certificate of Competency (PT) ITE Skills Certificate (FT) Nitec (FT and PT) Higher Nitec (FT and PT) Work-study diploma Technical diploma (FT)	Mechanical Technology Electronics Electrical Technology Infocomm and Digital Technology Manufacturing Aerospace Facilities Management Food and Beverage Health Science and Wellness Landscaping Hospitality Games Development Biotechnology Rail Transport Marine Engineering Retail management
Polytechnics	Diploma (FT) Specialist Diploma (PT) Advanced Diploma (PT)	Engineering Applied Sciences Informatics and IT Design and Media Humanities Law Health Sciences Business Tourism and Hospitality Culinary Arts Biotechnology Building Technology

Table 1 Continued

Institution	TVE Qualifications	Areas
Universities	Graduate Diploma Bachelors (FT) Bachelors (PT)	Engineering Science and Technology Infocomm Technology Food Technology Health Sciences Social Sciences Design Business Marine and Offshore Engineering Mechatronics and Robotics Infrastructure Development Law Medicine and Dentistry

Note. Nitec = National ITE Certificate.
FT = full-time program; PT = part-time program for working adults.
Non-TVE qualifications are omitted from University listings.

Role of Government

The government in Singapore is the major player in education in Singapore, including TVE. All the major TVE institutions are public institutions. The private sector is a small and fringe player in pre-employment training (PET). However, with the promotion of lifelong learning and the availability of grants for skills upgrading, the private sector has found niche areas in continuing education and training (CET). Here they are able to offer approved qualifications such as in human resource management, banking, coding, digital marketing, logistics, artificial intelligence and machine learning, security services and facilities management, to the working population and general public. The TVE institutions are also major players in CET, offering lifelong learning as short modules in a very wide range of subject areas. The government supports these training initiatives through accreditation, training provision, and certification of adult trainers, and a skills qualifications framework to develop their training programs. Most critically, the government has created a personal SkillsFuture credit account for every citizen to use for self-development.

In the PET space, the government of Singapore funds all of the infrastructural and facilities requirements of the ITE and the polytechnics, and it does this to a high standard. Each campus of the ITE and polytechnic would require about USD200M to 250M to construct and equip. Such expenditures are seen as necessary investments in human capital development, enabling economic growth and investment. It also meets between 80-90% of the institutions' operating costs, the rest being charged as fees payable by students. However, if any student has a financial need, there are several layers of financial assistance available to the student from the institution and the community. Government expenditure on education as a whole is approximately 20% of the total government budget, or 3% of GDP including capital expenditures.

The recurrent cost per student at the ITE is about USD11,000, USD12,000 per polytechnic student, and USD17,000 per university student (Singapore Department of Statistics, 2021). This excludes development expenditures. The cost per student at university varies widely depending on the faculty, the most expensive being medicine and the least being the humanities.

The ITE, polytechnics, and two universities which form the backbone of TVE in Singapore are funded by government and have boards of governance appointed by the Minister for Education. The Universities are registered and operate as corporate entities and are also funded by government to an agreed formula. They have Boards of Trustees appointed by the government, and have significant autonomy entrusted to them. Nevertheless, the six universities are firmly in the public education eco-system.

Although the government does not have day-to-day operational oversight over the ITE and the polytechnics (which is the responsibility of their Boards and respective committees), the model is most closely reflective of the French model where the government takes major responsibility for technical and vocational education. Government investment in TVE in Singapore is significant, and the government also meets between 80% and 90% of annual operating expenditures. Government initiatives have created an integrated model of TVE, that connects the school system, the ITE, and polytechnics and universities. Without government intervention, such a tight model would not have been possible.

Another important role of government is to engage deeply with all the institutions in economic policymaking and implementation. The investment promotion agencies of the government such as the Economic Development Board (EDB), the Infocomm and Media Development Agency (IMDA), and key ministries such as the Ministry of Trade and Industry (MTI) and the Ministry of Manpower (MOM) have regular dialogues with the TVE institutions on various investment and industry transformation initiatives being undertaken. The tight nexus between economic planning and development and education has been a characteristic, indeed beneficial aspect of the Singapore, Inc. model of governance.

The Status of TVE

In public discourse in Singapore, the term technical and vocational education is seldom used. Instead, terms such as "skills deepening," "future skills," and "employability" are used to discuss career-based education. This has changed the narrative to keeping up and ahead of the disruptive technologies that are changing the face of business and industry through rapid automation and digitalization of processes, and elimination of intermediaries or disintermediation.

The key policy documents that are relevant to the strategies for the development and future of TVE in Singapore are mostly not in the public domain. They may be found in speeches, media releases, or parliamentary statements.

Among the key developments in this sector are:

(a) Requiring a minimum of 10 years schooling before technical and vocational education (Yip, 1991),
(b) Creation of the Normal (Academic) and Normal (Technical) streams in secondary schools (Yip, 1991),
(c) Building of the 3-mega colleges of the Institute of Technical Education (Law, 2015),
(d) Expansion of polytechnic education (Varaprasad 2020),
(e) Opening up of upgrading paths to vocational and technical graduates of the ITE and Polytechnics (Ministry of Education, 2014a, 2014b),
(f) Establishment of SkillsFuture Singapore (SSG) to promote lifelong learning,
(g) Provision of a SkillsFuture credit account for every Singapore citizen,
(h) Establishment of the Singapore Institute of Technology (SIT) and the Singapore University of Social Sciences (SUSS) as upgrade paths for polytechnic graduates,
(i) Provision of work-study programs at ITE, polytechnics, and universities,
(j) Establishment of Workforce Singapore (WSG) to promote and regulate continuing education and training (CET) under SSG,
(k) Establishment of the Institute of Adult Learning (IAL) to provide courses in andragogy to meet demand of accredited trainers of adults,
(l) Establishment of the Employment and Employability Institute (E2I) by the National Trades Union Congress (NTUC) to promote worker reskilling and upgrading and to provide career advice and coaching,
(m) Establishment of the Lifelong Learning Institute, an adult learning hub under SSG.

These are the key policy initiatives undertaken by government in the area of technical and vocational education. The policy debates and ministerial statements for these may be found in the proceedings of Parliament (Parliament of

Singapore, n.d). Unless a White Paper is involved, policy and strategy directives are usually internal departmental documents and are usually discussed during the annual budget debate where the fiscal and spending policies of the government are debated. Once the budgets are approved (and budgets for education and training are usually easily passed), the policies are implemented. It is when researchers publish articles and books on the success or otherwise of the policies that a critical analysis of such policies will enter the public domain.

Access to TVE

In examining the status of TVE in Singapore, one can start with the school system. As seen previously, TVE in Singapore starts mainly at the post-secondary level. At this level, 65% of secondary school leavers enter some form of TVE institution, and 30% enter (or remain in) academic institutions. Based on an average annual cohort size of around 40,000 students, in round numbers about 10,000 a year would proceed to study at one of the three colleges of the Institute of Technical Education (ITE), about 16,000 at one of the five polytechnics, and 12,000 at one of the 13 Junior Colleges and eight through-train and special schools.

To make this structure work, TVE needs to be attractive and not positioned as a last resort option. The image of TVE, together with the facilities and the quality of teaching and learning, has to be on a par with universities. This the government achieved by establishing mega-campuses for TVE, with student capacities of between 10,000 and 13,000. The scale of these campuses, of both the ITE colleges and the polytechnics, enabled a campus-like environment and ancillary facilities for sports, arts, clubs, hobbies, shops, eateries, travel agencies, gyms, music, and dance studios, on a par or in some instances, even better than the universities.

An important outcome was that since all of TVE had become post-secondary, all entrants would have completed 10 years of basic education and were proficient in mathematics, science, and language to a good foundational level for TVE. This has avoided most of the stigma of vocational education as a last resort for dropouts and failing students, although realistically there is still this view, especially among middle-class parents. However, students in TVE are motivated and are able to experience a rich learning experience with modern and industry-oriented equipment, as well as extra-curricular clubs and facilities that are important for on campus socialization.

It also means that about 65% of each cohort, regardless of their education destination, have a strong skills-base and career orientation. This reduces greatly the risk of producing graduates in large numbers who may be underemployed or worse, unemployable. The establishment of the Singapore University of Social Sciences and Singapore Institute of Technology with a strong focus on applied learning pedagogy, was a great motivation for capable polytechnic graduates to further their studies in the same field. ITE graduates also found the polytechnics more open to admitting them, thus giving life to the idea of continuous upgrading, and reskilling through the "bridges and ladders" concept.

The ASPIRE Report (Ministry of Education, 2014a, 2014b) after a review of technical and vocational education in Singapore, recommended greater permeability between institutions to allow for the strong aspirations of Singaporeans for higher education. This is one of the key strengths of the TVE strategies in Singapore which is that regardless of where a student starts TVE, the route to a tertiary education is open, depending on ability alone.

Since almost all of each cohort progresses to secondary school, and more than 95% progress to the post-secondary stage, access to TVE is not limited by any socio-economic, ethnic, or gender factors. Selection is by merit, aptitude, and interest. Entry to popular programs of study now include interviews and portfolios, and these can be used to overcome weak academic results. If the student can demonstrate a high level of interest through his or her projects and hobbies, a weak academic result need not stand in the way of entry to a desired program of study.

National Qualifications

One outcome of the government's role over technical and vocational institutions is that the institutions' own awards also serve as the national skills qualifications for both PET and CET. The ITE's National ITE Certificate (Nitec) and Higher Nitec as well as Work-Study diplomas are accepted by employers as nationally accredited, even though in reality they are self-validated by the ITE. The polytechnics enjoy a similar status in that their diplomas are nationally accepted as are the degrees from the universities. External validation is not seen as necessary and there is no National Qualifications Framework (NQF) for PET as there are in many countries.

For continuing education and training (CET), the Workforce Skills Qualifications (WSQ) from the SkillsFuture Singapore (SSG) Office are used across the CET training industry. The Singapore WSQ are a national credential system that trains, develops, assesses, and certifies skills and competencies for the current workforce. As a continuing education and training (CET) system, WSQ promote recognition of skills and competencies to facilitate progression, mastery, and mobility. CET is driven both by the public TVE institutions as well as by the private sector. Every Singapore citizen has available a SkillsFuture account with cash credits which can be used at approved training centers for their own personal training needs. This has stimulated and boosted growth in the private training industry.

Employability

Graduates from ITE and the polytechnics have enjoyed high employment rates of around 80% within 3 months of graduation, with annually rising starting salaries. This can be attributed to the close nexus that these institutions have with business, industry, and the economic and manpower planning agencies of the government, an example of good alignment due to "joined up government." Each industry sector has representatives in course and curriculum advisory committees which are able to advise the curriculum developers of upcoming changes in business models and technological changes.

While being satisfied with the graduate employment surveys, institutions are now also concerned about how to calibrate the balance between training for immediate employability and preparing students for a future of dynamic change in the workplace and labor market structures. This is examined in a later section.

Funding and Accountability

The different TVE institutions such as the Institute of Technical Education and the Polytechnics are statutory boards of the government. This status provides them with the autonomy to select and hire their own teaching and non-teaching staff in accordance with their mission and development strategies. Managements are provided with a manpower budget annually from the Ministry of Finance, and this constitutes the control mechanism on the size of the staff and salaries. The Ministry of Education does not pre-determine the number of posts nor do they need to approve any appointment. This provides the ITE and polytechnic management with a high degree of operational autonomy to organize their institutions to deliver the desired outcomes. The Board of each institution provides the necessary oversight over the Principal and senior staff.

As the autonomous universities are established as corporate entities, the funding relationship is more formal. A funding formula is negotiated and agreed upon based on certain enrolment and graduate outcomes. This gives the university management complete autonomy over the whole budget. They can also raise funds from donors, alumni, and well-wishers and build a corpus of endowment funds for investment returns.

Accountability is established through an external validation process every 5 years when independent expert panels are invited to undertake a performance review of each of the 12 institutions in turn. These panels will report their findings to the Minister of Education and ministry officials. This arrangement places a great deal of trust in the Boards and management of the institutions to maintain academic standards, keep up with changing socio-economic developments, and proactively implement strategies for continuous improvement to ensure program relevance and graduate employability.

Professional Development of Trainers

For all TVE institutions, the main criterion for recruitment of trainers and lecturers is up-to-date industrial experience rather than pedagogical knowledge and skills. This usually means someone who has a Bachelor's or Master's degree with at least 5 years working experience in the specific industry. Once recruited, the incoming staff are usually required to undergo in-house pedagogical training to build their educational capabilities. All institutions have a staff development department staffed by qualified personnel who have developed the curriculum and training materials and methodologies to bring these new staff members up to speed on delivering training using the latest pedagogical tools and technologies. Senior staff members are also appointed as mentors to guide new staff through their initial period as trainers and to share their experiences with them.

For the ITE, this training leads to an Advanced Certificate in Technical Education Pedagogy (ACTEP) awarded on completion of training. For the polytechnics, this leads to a Certificate in Teaching and Learning for Polytechnic Educators (CTLPE). The areas covered in the training are: Design and Delivery of Curriculum, Learner-Centered Pedagogies, Classroom Engagement and Online Facilitation, Assessment of Learning, and Reflective Teaching for Professional Growth. Competency-based learning (CBL) and Problem-based learning (PBL) as well as Project Design are central to the pedagogies. Student Engagement and Counseling are also important facets of the trainers' repertoire.

During their service as trainers, teachers, and lecturers, professional development would continue to be available to them on campus or in the field. Part of this would be attachments to business and industry so that the faculty can remain updated on the latest practices in the field. The combination of technical skills and knowledge with pedagogical strength is a powerful one which requires investment in training, deployment monitoring, and coaching by experienced staff.

Trends and Issues in TVE

Singapore as an island city-state, without a hinterland or natural resources, depends overwhelmingly on trade and global connectivity for its economy and future. Reflecting this, it has the highest trade to GDP ratio in the world, ranging from 437% in 2008 to 319% in 2019 (World Bank, 2021). This indicates that new business models and new technologies can quickly disrupt Singapore's economic system and hence employment. For example, new supply chains, digitalization, automation, artificial intelligence, and machine learning can lead to loss of jobs through factory closures and business contractions. This vulnerability to the dual technological disruptions to employment as well as continuing changes to economic structures and models are two external forces that drive Singapore's skills strategies. Internally, low birthrates and a rapidly aging population create growth demands on the caring industry for the older citizens, putting a strain on healthcare costs and consequent fiscal and budgetary policies. These macro-trends drive the key trends and issues in technical and vocational education.

Trends in TVE

Broadening of TVE Curricula

Human capital development is paramount under the volatile conditions described above. In the sphere of TVE, graduates need to be prepared to contribute productively to their employers, but also to be ready to be reskilled quickly, and have the ability to be adaptable to move with confidence into different areas of competence. Furthermore, graduates may be required to work overseas in a multitude of locations, and interact with people of different cultures. Even if not working overseas, graduates would find themselves in project teams which could comprise members from different countries and time-zones working remotely. Such mixed and time-limited teams could be the new way of working in the future.

This is the challenge that education planners and policymakers, school leaders, and teachers need to address. There are numerous reports and publications on the future of work and the impact of automation and AI/machine learning on jobs (see for example OECD, 2021; Maniyika et al., 2019; and PWC, 2018).

In Singapore TVE institutions, these are being addressed in the following ways:

(a) Designing a core curriculum augmented with options and choices,
(b) Increased time on project-based learning, deconstructing and analyzing real and near-real problems, and finding and building solutions,
(c) More independent learning, for example through flipped classrooms,
(d) More group work and team-based assessments,
(e) Increase in communication skills in writing and presentation,
(f) More cross-disciplinary problem teams,
(g) Use of IT as natural tools to manage time and projects,

(h) Access to mobile devices for learning,
(i) Longer internships with business and industry,
(j) Opportunities for overseas work exposure,
(k) Strengthening values and ethics education,
(l) Strengthening community engagement and service,
(m) Exposure to entrepreneurship, self-employment, and business formation,
(n) Emphasis on student well-being and resilience,
(o) Promoting just-in-time learning,
(p) Introducing innovation and makerspaces,
(q) Providing space for start-up incubators.

Institutions and educators are applying a selection of these strategies at different levels to different programs as they think appropriate based on their understanding of their students. Such experimentation and variety are to be encouraged instead of a standardized approach. Students who are exposed to the process of learning new skills and acquiring knowledge, even in an imperfect manner, are more likely to be adaptable to a changing future. Discipline specialists have an inclination to add more content to the curriculum, but this needs to be resisted in favor of the process of self-learning and discovery.

Encouraging Entrepreneurship Development

One of the key areas of development and an ongoing trend is the promotion of entrepreneurship among TVE graduates. With the recognition that manufacturing employment is declining globally with process automation, students are being given more exposure to and new business formation through incubators, makerspaces, mentorships, and seed-funding. All of the TVE institutions have some form of startup launchpad on their campuses, and both students and alumni are able to have co-working spaces on campus. Staff act as mentors, and successful entrepreneurs are brought in to guide and motivate them and to serve as role models.

These co-working spaces, unlike those available commercially, also have access to design and prototyping facilities and workbenches, to provide a strong engineering and innovation emphasis for the new businesses and startups.

Increase in Online Learning for TVE

During the global Covid-19 pandemic of 2020, there was a rapid shift to home-based learning (HBL) in the interest of maintaining public health and containing the spread of the virus. This affected all levels of education from schools to universities. However technical and vocational institutions were greatly affected as much of the teaching time included practical skills in workshops and laboratories. The impact for learning was greater for the TVE sector than for the other sectors which were more readily able to pivot to online learning.

Looking ahead, hybrid and flexible learning modes could become more established as institutions prepare to be more resilient in the face of new disruptions. Some degree of home-based learning will become part of the "new normal" in education.

Diversification of Pedagogical Approaches

The trend towards a broader and more diversified TVE curriculum in response to rapid changes in the labor market is by necessity accompanied by different pedagogical approaches to teaching and learning. These include:

(a) Reduction in direct teaching time to allow for independent learning,
(b) Greater use of simulation to create and address different scenarios,
(c) Problem-based and project-based learning,
(d) Design thinking as a core learning platform,
(e) Development of online materials,
(f) Group and peer assessment.

These changes have given shape to new paradigms of teaching and learning, institutional organization, facilities planning, and campus planning. Staff development and retraining departments are being expanded (to develop and inculcate new capabilities), new departments are being established (to promote, implement and scale up new activities, for example internships and overseas placements), spaces are being reallocated and redesigned (for example for makerspaces, incubators, and student-run cafes), new kinds of staff are being recruited (for outward-facing outreach), and new kinds of laboratories and workshops (for example, simulation labs with AI and augmented reality) are being established. A greater business orientation and energy may be sensed among staff and students as these new developments manifest themselves in new buildings or as refashioned spaces with modern furniture and color schemes.

Renewed Emphasis on Workplace Attachments

As institutions are generally not resourced to renew their equipment, facilities, and software at the same pace as leading-edge industries and companies, students are best exposed to these through work attachments, internships, or paid apprenticeships. This will provide them with access and familiarity with new technologies of design, manufacturing, quality assurance, distribution, and marketing. This would also make the transition to work more seamless and less intimidating.

The challenge of futureproofing of graduates by reducing content and placing more emphasis on the process of learning has the consequential result of less mastery of skills which take time to acquire. To mitigate this, in-company apprenticeship schemes are being increased to build the necessary skills base. With the ongoing automation of many processes, such skills will in any case be transferred to machines over time.

Promotion of Lifelong Learning

A corollary to futureproofing of pre-employment curricula is to extend continual learning opportunities after graduation and during employment. It has been predicted (Taylor, 2019) using US Bureau of Labor statistics that given the rapid changes in company business models and employment structures, young people aged between 25-34 years are on average expected to stay only 2.8 years in any job. This rapid turnover of jobs early in a person's career requires different skillsets to be developed at frequent intervals.

Mid-career professionals who have been in job functions as intermediaries may find themselves retrenched and unable to switch to new kinds of jobs and opportunities if they are unable or unwilling to be retrained in growth technologies. The structural unemployment that results is a cause for concern, especially if it affects those in their 50s who have at least another 15 years of work ahead of them.

In both examples, the key is lifelong learning, in attitude as well as in actuality. TVE institutions in Singapore, together with the private training industry have tapped into this market aggressively. Government subsidies for retraining into growth sectors such as digital media, automation, coding, and AI have given the sector a boost. To maintain quality of training, the Institute of Adult Learning (IAL) was established in 2008 to provide training and certification in adult pedagogy ("andragogy"). In 2019, the IAL became an autonomous institute under SUSS, thus bringing training for and delivery of CET under one umbrella institution.

To promote lifelong learning as a national activity and habit, the Singapore government established the SkillsFuture Singapore (SSG) Agency in 2016 to drive skills upgrading awareness and opportunities. The agency provides the skills framework for different industries by compiling competency descriptions for different levels of skills needed in different jobs. It also accredits courses and training by providers. The SkillsFuture credit account for every citizen empowers every person to attend training at their own time and pace and helps to create a national culture of lifelong learning.

SSG is a critical component in the execution of the National CET 2020 Masterplan, which has the ambitious goal of preparing the Singapore workforce to be future-ready. The masterplan has three key areas of focus, namely, (a) building deep expertise in the Singapore workforce, with increased involvement by employers in building and valuing skills, (b) enabling individuals to make informed learning and career choices through the improved delivery of education, training, and career guidance, and (c) developing a vibrant CET ecosystem with a wide range of learning opportunities.

SSG has partnered with TVE institutions like the ITE, polytechnics, and universities as well as employers to establish joint CET centers to deliver training to the public as well as advisory and placement services. These centers cover a wide range of industries, specializing in areas such as aerospace, culinary skills, digital animation, finance, hospitality, process engineering, retail, security, tourism, as well as basic literacy, numeracy, and service skills.

This alignment between government, employers, and training providers is one of the key contributors to policy success.

Issues in TVE

The Necessity of Keeping Teachers Updated and Upskilled

The proposed changes in curriculum and pedagogy, together with the rapid changes in the industrial technologies highlight the need for intensive teacher training. Teachers who are entrenched in their traditional style of teaching would need greater opportunity and support to be comfortable with these new pedagogies. Parents, too, need to be advised regularly of the changes under way in the institution and why they are necessary, as assessment modes and measures of student success will change.

At the ITE, lecturers and trainers are encouraged to spend an extended period of up to six months of attachment to companies that are at the forefront of changes. During this period they are not only able to become familiar with the latest in processes and equipment, but also how these are changing the nature of business, company cost-structure, skill needs as well as future trends.

The Need to Reduce the Attrition Rate While Deepening Skills Acquisition

One of the key issues that TVE systems around the world are facing is high dropout rates (Sabtu et al., 2016; Zulu et al., 2020). Among the causes are low motivation among students and teachers, lack of parental support, poor facilities, and an insufficient academic foundation among students before entering TVE. This has the serious consequence of a vicious cycle of a poor image of TVE perpetuating itself.

At the same time, the labor force needs mastery of deep skills which can only come if students stay the course. Although attrition is not as serious an issue in Singapore as in other systems, it is still a concern given Singapore's limited human resources and the need to bring everyone to their highest potential. At the same time, given the advances in technology, the need for people with deep knowledge and skills suggests longer duration programs rather than short ones.

Singapore policymakers will need to address this conundrum in creative and innovative ways. One possibility is to establish a "through-train" in TVE so that training does not end at a lower qualification but continues to the next level. This would address both issues with a single policy change.

Developing New Tools for Online Learning for TVE

Post-pandemic, many countries including Singapore are moving towards blended learning to cope with future disruptions to education. For TVE, which has a higher degree of practical and hands-on content than other streams, new methods of instruction, involving simulation and active learning need to be developed. Computer-based instructional materials which simulate processes and machines are expensive to develop; however they have the advantage that they can be deployed widely to many students. Students can also practise at their own time and pace. Virtual learning environments are getting more sophisticated with the use of 3D visors and immersive reality. TVE institutions need to become more innovative in using such new technologies to overcome reduced access to physical equipment.

Rising Ambition of TVET Graduates to Achieve Tertiary Qualifications

A third trend and concern is the increasing demand for tertiary education. If uncontrolled, this would have several negative effects. Having a high tertiary cohort participation rate (TCPR) has several repercussions. For example in South Korea, there is graduate unemployment and underemployment given a TCPR of 90%. A second issue is that of declining quality of graduates, especially if the degrees are from unranked universities and are of a general nature with no specific skills attached to them. Although a knowledge economy requires a better educated population, the corollary is not necessarily true – that the more degree holders there are, the more likely it is that a knowledge economy is created with high value jobs.

Lastly, a high TCPR also leads to a devaluation of the value of a tertiary education, and many would then need to pursue post-graduate education to remain competitive in the job market.

Singapore has avoided the problem by determining the number of university places that are available each year at its universities to 30% of each cohort. This is set to rise with the establishment of SUSS and SIT to more than 40%, not including students going overseas for their higher studies, or locally through twinning arrangements with local providers. If these are added, the gross TCPR may well have exceeded 50%.

The ambition of many students and their parents for higher education has spawned a large number of twinning programs, whereby many foreign universities offer their degree programs through franchising arrangements with local partners. In addition, there is also an Australian university which operates a full branch campus in Singapore on its own. Therefore the risk of graduate underemployment is present and an issue of concern, especially in the context of a disrupted economy and emerging new work modalities.

The government's strategy appears to be that since the increase in tertiary places is achieved by upgrading diploma holders, it is building on an existing skills foundation. This will help mitigate the issue of a preponderance of "soft" degrees in the market. As the employment market shifts its requirements to deep skills rather than any degree, the upgraders would appear to have an advantage in job-finding.

Continuing Education and Training (CET) as an Integral Part of TVE

TVE institutions are having to grapple with the reality that their campuses cannot be shut down at the end of each day but have to remain open in the evening to accommodate CET classes. Although CET has always been part of institutional life, the pace and extent of this has accelerated and enlarged.

This is part of the Singapore government's aggressive push towards making lifelong learning and skills upgrading a national movement. The public educational institutions as well as private institutions are key training providers in this effort.

TVE institutions have to reallocate manpower, workshops, laboratories and classrooms to operate an evening or weekend campus. While space is not an issue, teaching loads now need to be distributed between pre-employment training (PET) and CET. The staff also need to become familiar with adult teaching pedagogy and be accredited by the Institute of Adult Learning (IAL).

Equipment wear and tear and depreciation are accelerated, and increases in utility, maintenance, and other variable costs of extended operating hours also need to be budgeted for and met from the fees collected. The government provides individual training subsidies to CET trainees through various SkillsFuture Singapore (SSG) grants, thus providing TVE institutions with a predictable flow of students. One issue is that most of the skills upgrading programs are concentrated on a small number of disciplines such as coding, data analytics, AI, e-commerce, digital marketing, logistics, and other areas of demand. This puts a heavy demand on a small group of trainers in these disciplines.

Unaligned PET and CET Skills Qualifications

As has been shown earlier, the national TVE qualifications from certificate, diploma to degree may be awarded by the respective institutions independently, as there is no national qualifications framework (NQF) for pre-employment training. These institutions, namely the ITE, polytechnic, and universities being public bodies are trusted to develop and issue their own qualifications and maintain their respective standards. Indeed, by any international benchmark, each public institution is considered to be of global standing and hence deserving of this trust.

In the case of Continuing Education and Training (CET), because of the huge funding support for such training by the government and the involvement of the private sector in CET provision, the government has established a separate competency framework for different industries, occupations, and levels of skill. These are the Singapore Workforce Skills Qualifications (WSQ). The WSQ is a complete system of skills credentialing that assesses and certifies the skills and competencies of the workforce. It is meant to benefit trainees, companies and training providers by providing a comprehensive stepwise progression of accredited and recognized competencies.

These skills are determined in close collaboration with employers, unions, and professional bodies, and are designed to promote the holistic development of the workforce to drive industry transformation, productivity, and innovation in the workplace. While the WSQ are extremely useful particularly to the private training provider in meeting standards and quality of training uniformly across each sector, they are not particularly useful for public institutions which have their own standards.

This dichotomy could, if not addressed, create a roadblock for the later integration of PET and CET as a seamless eco-system for learning. The distinction between PET and CET may over time be less sharply defined, and a need to align the qualifications frameworks into a common one may have to be addressed sooner rather than later.

Conclusion

The Singapore technical and vocational education system is considered the gold-class for school-based TVE (Tucker, 2019). However, it has not always been so. From its colonial legacy, through the era of rapid industrialization to services and a knowledge economy, to a creative, entrepreneurial innovation-led economy, TVE in Singapore has undergone rapid change and has adapted to the economic demands of the time.

Unlike some European TVE systems which had generations of guilds as the foundation of their skills training and education system, Singapore started with nought. With government commitment and investment together with a sharp focus on TVE as a pillar of economic development, the current status has evolved through countless iterations. Singapore examined what was and is available in the world of TVE and adapted the best practices that suited its context and needs best.

The challenge has been not to stand still, but to keep improving, steadfastly addressing issues of attrition, wastage, relevance of training, and employability, while meeting the aspirations of students and parents. What has been the end-product has been a clear system and structure of technical and vocational education. After 10 years of quality school education (which may include some pre-vocational subjects), students choose between three pathways: the Institute of Technical Education, the polytechnics, and junior colleges in the proportion of 25%, 40%, and 30% respectively. Thus 65% of each cohort starts with a technical foundation as they progress through the educational ladder towards a university degree. The system permeability allows graduates from one level to continue to the next, and to continue with state-subsidized education all the way. With the new "Learn and Earn" model, they can do this while in employment to minimize their opportunity costs of studying.

The institutions, though funded by the public purse, are autonomously managed by experienced staff, and faculty with a good grounding in industry and trained in TVE pedagogy internally within the institutions. Regular attachments to industry are mandated. The training institutions are generously funded both for development and upgrading of space and equipment, as well as for operating expenses. The links with business and industry are strong with many joint laboratories and collaborations. The "industry in a classroom" strategy brings real-life experience into the workshops and laboratories. Students are involved in managing and running campus-based businesses such as delis, restaurants, travel agencies, retail shops, optometrists, and so on, all under the “applied learning” approach.

The program choices are vast and diversified and can suit any interest and aptitude. Admission to these programs is being increasingly weighted for these factors, demonstrated in a variety of ways such as interviews and portfolios. This reduces dependence on pure academic results in mathematics and science and emphasizes that innovations depend as much on passion and grit as on academe.

The new upcoming challenges lie in a more holistic approach to student development, with time given to life skills, to interdisciplinary learning, to greater choice in building one’s own curriculum without diluting the rigor of the TVE. At the same time, TVE pedagogy is moving towards problem-solving and solution-finding and is using new technologies in the process. Such futureproofing of graduates in the process of learning and not the content will extend their useful lives.

This leads to the challenge of lifelong learning and upskilling the workforce itself. The TVE institutions in Singapore have been gearing up their resources to address this challenge boldly by establishing new training arms and allocating resources to this. In this they work closely with the Workforce Skills Qualifications (WSQ) of the SkillsFuture Office and the Institute of Adult Learning (IAL).

As nations emerge from the post-2020 pandemic disruptions to education and training, attention will shift to the challenges of the post-Covid economy and restructuring of supply chains and building of system resilience. The ability to change lanes and speed while in motion will characterize TVE institutions of the future. Being nimble and agile and the speedy reconfiguration of curricula, trainers, and facilities to achieve “just-in-time” TVE may well be the new goal.

The story of Singapore TVE continues to be written. Human ingenuity is the only resource available in Singapore and as long as this is optimized for human progress and sustainability, TVE will continue to have its place in the education landscape.

References

Chiang, M. (1998). *From economic debacle to economic miracle: The history and development of technical education in Singapore*. Times Editions.

Driskell, N. (2016, December 22). *Global perspectives: Streaming in singapore: It's not tracking, and it actually promotes equity*. https://ncee.org/2016/12/streaming-in-singapore/

Law, S. S. (2015). *A breakthrough in vocational and technical education: The Singapore story*. World Scientific.

Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., . . . Sanghvi, S. (2019). *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages.* https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages#

Ministry of Education. (2014a). https://www.moe.gov.sg/-/media/files/news/press/2014/annex-a-choices-skills-paths.pdf

Ministry of Education, Singapore. (2014b). *Report of the ASPIRE Committee.* https://www.moe.gov.sg/-/media/files/news/press/2014/annex-a-choices-skills-paths.pdf

Ministry of Education. (2021a). *Normal (technical) course for secondary school*. https://www.moe.gov.sg/secondary/courses/normal-technical

Ministry of Education. (2021b). *Committee of Supply Debate response by Minister for Education*. https://www.moe.gov.sg/news/speeches/20210303-moe-fy2021-committee-of-supply-debate-response-by-minister-for-education-lawrence-wong

Ministry of Education. (2021c). *Desired outcomes of education*. https://www.moe.gov.sg/education-in-sg/desired-outcomes

OECD. (2021). https://www.oecd.org/future-of-work/

Parliament of Singapore. (n.d.). *Official reports - Parliamentary debates (Hansard)*. Official Reports (Parl Debates). https://www.parliament.gov.sg/parliamentary-business/official-reports-(parl-debates)

PWC. (2018). *Workforce of the future: The competing forces shaping 2030*. https://www.pwc.com/gx/en/services/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf

Sabtu, H. H., Noor, W. S., & Isa, M. F. (2016). Student attrition at technical and vocational educational Training (tvet) institutions: The case OF XCel Technical college in Malaysia. *Asian Social Science, 12*(12), 197.

Singapore Department of Statistics. (2021). S*ingstat table builder - variables/ time period selection*. https://www.tablebuilder.singstat.gov.sg/publicfacing/createDataTable.action?refId=11200

Taylor, C. (2019). *The nomad economy briefing 38*. https://www.kornferry.com/insights/articles/the-nomad-economy

Tucker, M. S. (2019). *Vocational education and training for a global economy: Lessons from four countries*. Harvard Education Press.

Varaprasad, N. (2015). *50 years of technical education in Singapore: How to build a world class TVET system.* World Scientific.

Varaprasad, N. (2020). The polytechnic secret. In Tommy Koh (Ed.), *Fifty secrets of Singapore's Success* (pp. 150–155). Straits Times Press.

World Bank. (2021), Retrieved from https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS?locations=SG

Yip, J. (1991). (rep.). *Report of the Review Committee on Improving Primary Education*, Ministry of Education, Singapore

Zulu, W. V., & Mutereko, S. (2020). Exploring the causes of student attrition in South African TVET colleges: A case of one Kwazulu-natal technical and vocational education and training college. *Interchange, 51*(4), 385-407.

Technical and Vocational Education Trends and Issues in Taiwan

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Abstract

This study employed participatory observation and documentary research. It was found that the number of students in TVE is obviously less than that in general education, and the majority of TVE students are in private vocational education. This includes higher level TVE, where the number of schools and students is mainly in private technical and vocational colleges and universities. Six trends in Taiwan technical and vocational education are: making an effort to construct the legal basis of TVE, more career exploration with a focus on the value of TVE, increased focus on work-based learning to eliminate education-job mismatch for TVE students, more industry involvement in TVE to stimulate practical empowerment of TVE teachers, investment of more funding for upgrading teaching and practice environments of TVE institutions, and enhancement of TVE impact on a global scale. However, because of facing the challenges from society, technology, economic, environment, and global situations, it is suggested that there are six issues in Taiwan TVE that remain unsolved, namely (1) insufficient TVE regulation; (2) lack of industry and vocational guidance consultant involvement; (3) TVE is still the second choice; (4) the energizing mechanism of TVE teachers' practical expertise has not been implemented; (5) insufficient number of students for the operation of private TVE institutions; and (6) lack of a complementary scheme for the globalization of technical and vocational education.

Keywords: technical and vocational education, education-job mismatch, career exploration

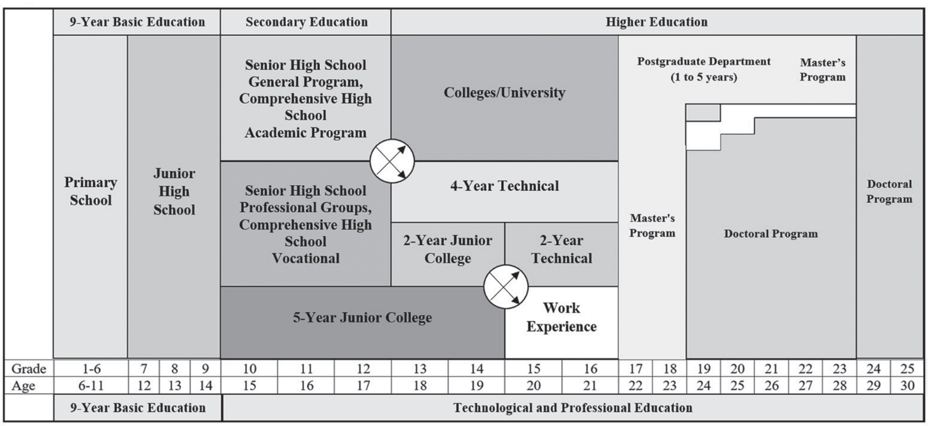
Introduction

Taiwan, officially the Republic of China (ROC), is located in Southeast Asia and is part of the East and Southeast Asia island arcs on the West Coast of the Pacific Ocean, south of the Japanese archipelago, and with the Ryukyu islands and Philippine Islands to the south. As of March 2021, the population of Taiwan was 23,525,623, with a population growth rate of -0.59%, and a population distribution of 12.52% for age 0 to 14, 71.19% for age 15 to 64, and 16.29% for age 65 and above (Ministry of the Interior, 2021).

The education system in Taiwan is 6 years of primary school for children aged 6 to 11, and 3 years of junior high school for ages 12 to 14. The original 9 years compulsory education included elementary school and junior high school. Taiwan's government implemented a 12-year national education program in 2014, which includes 3 years of senior high school (general, technical, comprehensive, and academic programs) for youth aged 15 to 17, in addition to the 9 years compulsory education. Furthermore, there are 5-year junior colleges for junior high school graduates aged 15 to 19, and 2-year junior colleges for vocational high school graduates aged 18 to 19. Universities offer 4-year bachelor degrees, 1 to 4 years for master's programs, and 2 to 7 years for doctoral programs. Also, schools can extend the period of study by taking into consideration on-the-job study or other special circumstances (Executive Yuan, 2021a; Ministry of Education, 2018a).

The technical and vocational education (TVE) in Taiwan is implemented by government-approved skills education programs in junior high schools, technical high schools, vocational education affiliated with general senior high schools, professional programs in comprehensive high schools, junior colleges, institutes of technology, and universities of science and technology to cultivate skilled talent. The promotion and management of TVE is the responsibility of the Ministry of Education at the central level and of municipal governments or county/city governments at the municipal/local level (Ministry of Education, 2018, 2021). The main separation starting point of TVE and general education is the students' decisions to choose TVE or general education when they graduate from junior high school. If students choose TVE, they will attend technical high school or 5-year junior college. Moreover, students who graduate from technical high school can choose to attend an institute of technology or 4-year university of science and technology or enroll in an institute of technology or 2-year technical university to complete their bachelor's degree after finishing 2-year junior college. Students who graduate from 5-year junior college will receive an associate degree, and can continue to study in a technical academy or 2-year technical university to get a bachelor's degree. The TVE students with a bachelor's degree can then pursue a master's or doctoral degree if they wish to continue studying (Ministry of Education, 2018). The road map of vocational education is shown in Figure 1.

Figure 1 The Road Map of Vocational Education



Source: Ministry of Education, 2018b.

Regarding the impact of the government on TVE, TVE in Taiwan is classified as a school model, because school is the main execution for the field of TVE, especially for the fields of initial TVE. The implementation of curriculum and graduation conditions of TVE in senior high school, which is the so-called secondary TVE, is regulated by the "Senior High School Education Act" and executed by the Curriculum Outlines for Senior High School set by the Ministry of Education. As in technical and vocational colleges and universities, senior TVE, according to the "University Act" and the "Junior College Act," curriculum planning is up to the school, and besides complying with statutory requirements, the graduation conditions are decided by the school as well. Although in practical operations, technical and vocational colleges and universities often seek cooperation with enterprises to provide internship opportunities, enterprises are not the main party in TVE implementation. Based on the author's protracted experience of assisting the government in drawing up and revising the related TVE Act, this study employed participatory observation and documentary research to present a comprehensive discourse on the recent developments, trends, and other related topics in TVE in Taiwan. Furthermore, given that the number of junior high school graduates is declining rapidly year by year, from 276,628 graduates in the 2014 school year to 204,470 graduates in the 2019 school year (Department of Statistics, Ministry of Education, 2021a), as detailed in Table 1, this chapter will focus on the content from 2014 to 2020.

Table 1 The Number of Junior High School Graduates

School Year	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
Number of Graduates	276,628	265,886	236,042	224,751	209,978	204,470

The Status of TVE

Overview of the Development of Secondary Technical and Vocational Education in Taiwan

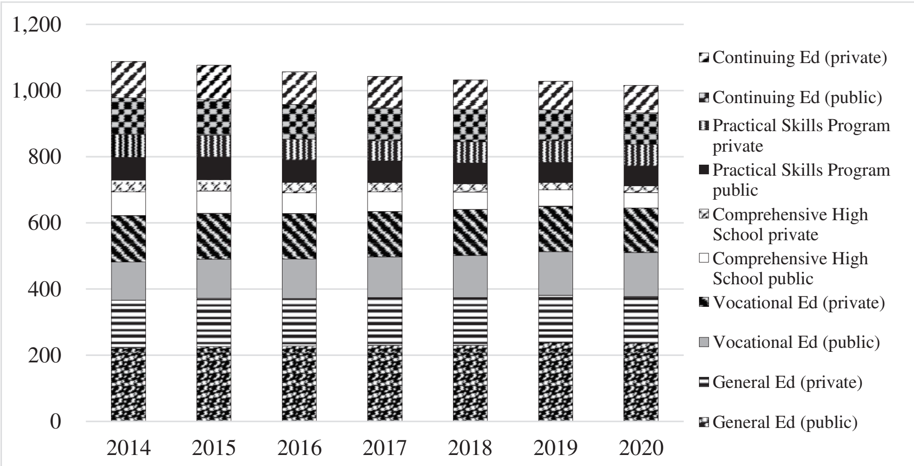
Secondary technical and vocational education is the TVE implemented in senior high schools. Schools can decide to set up general education, vocational education, practical skills programs, or continuing education. The data consolidated from the Department of Statistics, Ministry of Education shows that the number of senior high schools increased from 503 in 2014 to 513 in 2020, among which the number of senior high schools conducting general education increased from 366 in 2014 to 377 in 2020, and the number of senior high schools conducting vocational education also increased from 256 in 2014 to 268 in 2020. From this we can see that there are fewer senior high schools providing vocational education than general education. The number of comprehensive senior high schools was 107 in 2014 and 67 in 2020, the number of senior high schools conducting practical skills programs was 139 in 2014 and 126 in 2020, and the number of senior high schools with continuing education was 220 in 2014 and 178 in 2020. In addition to this, if we subdivide them into public and private schools, taking the year 2020 as an example, there were 237 public and 140 private senior high schools conducting general education, 133 public and 135 private senior high schools conducting vocational education, 47 public and 20 private senior high schools conducting comprehensive education, 61 public and 65 private senior high schools conducting practical skills programs, and 95 public and 83 private senior high schools conducting continuing education.

As mentioned above, there are more private than public senior high schools conducting secondary TVE, which are vocational education and practical skills programs, and more public than private senior high schools conducting general, comprehensive, and continuing education. The detailed numbers of senior high schools from 2014 to 2020 are listed in Table 2 and Figure 2, including the numbers of schools which conducted general, vocational, and comprehensive education, practical skills programs, and continuing education.

Table 2 The Numbers of Senior High Schools Conducting General, Vocational, Comprehensive Education, Practical Skills Programs, and Continuing Education from 2014 to 2020

Year		2014	2015	2016	2017	2018	2019	2020
Senior High schools		503	506	506	511	513	513	513
	public	292	295	295	298	299	300	301
	private	211	211	211	213	215	213	212
General Education		366	372	371	374	374	381	377
	public	223	227	228	230	230	239	237
	private	143	145	143	144	144	142	140
Vocational Education		256	257	257	261	267	269	268
	public	116	118	120	123	127	132	133
	private	140	139	137	138	140	137	135
Comprehensive High School		107	102	95	87	77	72	67
	public	72	67	63	59	52	50	47
	private	35	35	32	28	25	22	20
Practical Skills Program		139	134	130	126	127	126	126
	public	69	69	68	66	63	61	61
	private	70	65	62	60	64	65	65
Continuing Education		220	212	204	195	187	180	178
	public	111	108	105	100	99	95	95
	private	109	104	99	95	88	85	83

Figure 2 The Numbers of Senior High Schools Conducting General, Vocational, Comprehensive Education, Practical Skills Programs, and Continuing Education from 2014 to 2020



Moreover, according to the years from 2014 to 2020 of senior high school student data (Department of Statistics, Ministry of Education, 2021b), there were 818,886 senior high school students in 2014, but the number decreased to 609,745 in 2020, a decrease of 209,121 or 25.54%. Besides, there were 311,213 students in general education in 2014, which decreased to 284,363 in 2020, a decrease of 26,850 or 8.63%. The number of students in vocational education was 345,937 in 2014 and 244,492 in 2020, which was a decrease of 101,445 (29.32%). From the data we can learn that the decrease in students in vocational education is much more significant than in general education. Also, in the 2020 data, the number of students in general education was 39,871 more than in vocational education. There were 65,042 students in comprehensive high schools in 2014 and 27,441 in 2020, which was a decrease of 37,601 students or 57.81%; and the number of students in practical skills programs was 37,741 in 2014 and 27,441 in 2020, which was a decrease of 10,300 students or 27.29%; the number of students in continuing education was 58,933 in 2014 and 26,822 in 2020, which was a drop of 32,111 or 54.49%. Overall, we can see that general education is still the main priority for senior high school students.

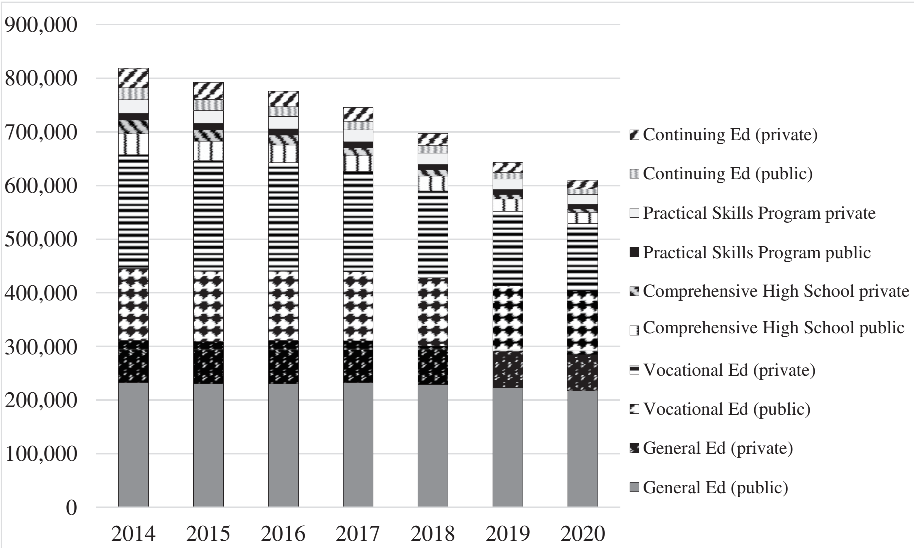
If we separate the number of students in public schools from those in private schools, there were 439,734 public school students and 379,132 private school students in 2014, a difference of 60,602. By 2020, there were 375,726 students in public schools and 234,019 in private schools, with a gap of 141,707. Taking 2020 data as an example,

there were 119,420 public school students and 125,072 private school students in vocational education, indicating that the number of students in private school was more than the number in public schools by 5,657; there were 216,969 public school students and 67,394 private school students in general education; that is, there were 149,757 fewer students in private than in public schools. Based on the above statistics, we can see that the number of students in public senior high schools was more than the number in private schools. Taking 2020 as an example, 61.62% of students were in public schools, of which 216,969 were in general education and 119,420 were in vocational education, a difference of 97,549 students. As in private schools, there were 67,394 students in general education and 125,072 in vocational education, so we can learn that there were more private school students choosing vocational education over general education. The details of the number of students attending general education, vocational education, comprehensive high schools, practical skills programs, and continuing education in senior high schools from 2014 to 2020 are listed in Table 3 and Figure 3.

Table 3 The Number of Students Attending General Education, Vocational Education, Comprehensive High Schools, Practical Skills Programs, and Continuing Education in Senior High Schools from 2014 to 2020

Year	2014	2015	2016	2017	2018	2019	2020
No. of Students in Senior High school	818,866	792,290	776,113	745,464	696,782	642,791	609,745
public	439,734	428,876	421,008	417,650	406,707	390,755	375,726
private	379,132	363,414	355,105	327,814	290,075	252,036	234,019
General Education	311,213	309,410	311,077	310,239	300,692	289,979	284,363
public	232,170	230,285	229,990	232,749	229,001	223,400	216,969
private	79,043	79,125	81,087	77,490	71,691	66,579	67,394
Vocational Education	345,937	337,354	332,184	315,649	290,769	262,054	244,492
public	133,855	130,717	129,068	128,586	127,401	123,568	119,420
private	212,082	206,637	203,116	187,063	163,368	138,486	125,072
Comprehensive High School	65,042	57,481	50,737	44,929	38,118	31,521	27,441
public	39,251	35,867	32,407	29,334	26,014	22,831	20,628
private	25,791	21,614	18,330	15,595	12,104	8,690	6,813
Practical Skills Program	37,741	35,696	34,794	33,041	31,079	28,451	26,627
public	12,118	11,619	11,330	10,746	9,979	8,793	7,991
private	25,623	24,077	23,464	22,295	21,100	19,658	18,636
Continuing Education	58,933	52,349	47,321	41,606	36,124	30,786	26,822
public	22,340	20,388	18,213	16,235	14,312	12,163	10,718
private	36,593	31,961	29,108	25,371	21,812	18,623	16,104

Figure 3 The Number of Students Attending General Education, Vocational Education, Comprehensive High Schools, Practical Skills Programs, and Continuing Education in Senior High Schools from 2014 to 2020



According to the data compiled by the Department of Statistics, Ministry of Education (2021c), more than 80% of senior high school graduates chose further studies in the period from the 2014 school year to the 2018 school year. As for secondary TVE, the enrolment rate of vocational education graduates was 80.1% in the 2014 school year, which was slightly adjusted to 79.5% in the 2018 school year; the enrolment rate of practical skills program graduates was 52.2% in the 2014 school year, but it decreased to 49.5% in the 2018 school year. Therefore, the secondary TVE graduates in Taiwan still choose further study as their main priority.

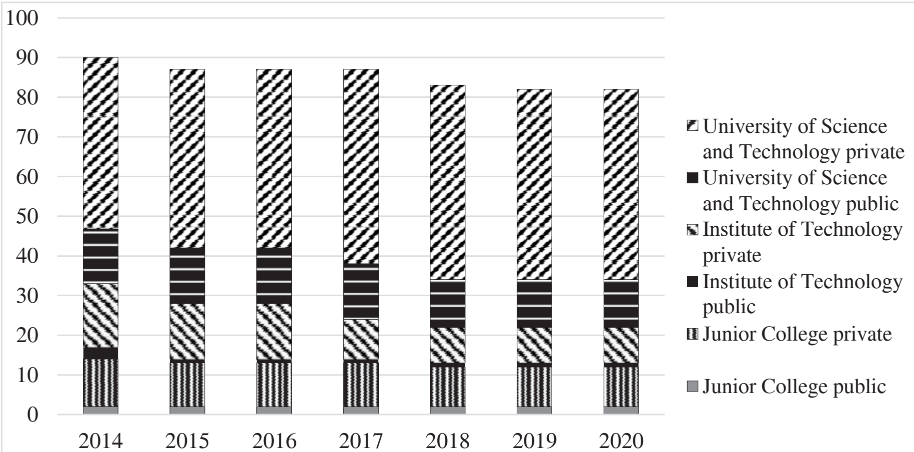
Overview of the Developments of Higher Technical and Vocational Education in Taiwan

The higher technical and vocational education in Taiwan is the TVE implemented by junior colleges, institutes of technology, and universities of science and technology. According to the data compiled by the Department of Statistics, Ministry of Education (2021d, 2021e, 2021f), there were 14 junior colleges in 2014 which decreased to 12 colleges in 2020; 19 institutes of technology in 2014 decreased to 10 in 2020; whereas 57 universities of science and technology in 2014 increased to 60 in 2020. Furthermore, if distinguished by public or private owned, there were two public and 10 private junior colleges, one public and nine private institutes of technology, and 12 public and 48 private universities of science and technology in 2020. As we can see, higher TVE is mainly operated by private schools. The details of the numbers of junior colleges, institutes of technology, and universities of science and technology are listed in Table 4 and Figure 4.

Table 4 The Number of Junior Colleges, Institutes of Technology, and Universities of Science and Technology from 2014 to 2020

Year	2014	2015	2016	2017	2018	2019	2020
No. of Junior Colleges, Institutes of Technology and Universities of Science and Technology	90	87	87	87	83	82	82
Junior College	14	13	13	13	12	12	12
public	2	2	2	2	2	2	2
private	12	11	11	11	10	10	10
Institute of Technology	19	15	15	11	10	10	10
public	3	1	1	1	1	1	1
private	16	14	14	10	9	9	9
University of Science and Technology	57	59	59	63	61	60	60
public	14	14	14	14	12	12	12
private	43	45	45	49	49	48	48

Figure 4 The Number of Junior Colleges, Institutes of Technology, and Universities of Science and Technology from 2014 to 2020



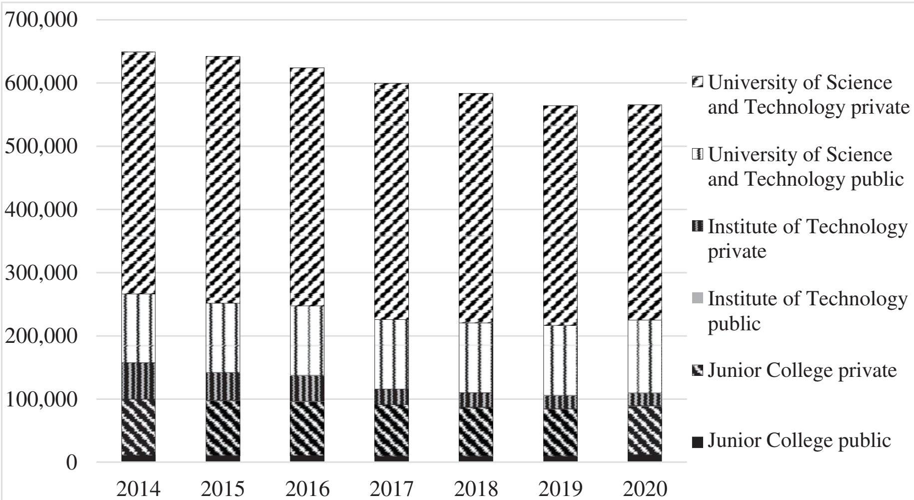
Moreover, according to the data compiled by the Department of Statistics, Ministry of Education (2021d, 2021e, 2021f), the number of students in junior college was 99,270 in 2014 and 88,734 in 2020, which was a decrease of 10,536 students (10.61%); the number of students in institutes of technology was 58,266 in 2014 and 20,698 in 2020, which was a significant decrease of 37,568 (64.48%); the number of students in universities of science and technology was 491,552 in 2014 and 456,142 in 2020, which was a decrease of 35,410 (7.2%). Also, the number of students in junior colleges, institutes of technology, and universities of science and technology was 649,048 in 2014 and 565,574 in 2020, which was a decrease of 83,474 students (12.86%).

Furthermore, if we take a closer look at public or private schools, taking the year of 2020 as an example, there were 12,286 students in public junior colleges and 76,488 students in private colleges, which was 64,162 students more than those in public schools, constituting 86.15% of all junior college students. There were 546 students in public institutes of technology and 20,152 in private institutes, which was 19,606 more in private than public institutes, constituting 97.36% of all institute of technology students. There were 115,382 students in public universities of science and technology, while there were 340,760 students in private universities, which was 225,378 students more than in public universities and 74.40% of all university of science and technology students. As we can see, private junior colleges, institutes of technology, and universities of science and technology have played an important role in the implementation of higher TVE in Taiwan. The details of the number of students in public or private junior colleges, institutes of technology, and universities of science and technology from 2014 to 2020 are listed in Table 5 and Figure 5.

Table 5 The Number of Students in Junior Colleges, Institutes of Technology, and Universities of Science and Technology from 2014 to 2020

Year	2014	2015	2016	2017	2018	2019	2020
No. of Students in Junior Colleges, Institutes of Technology and Universities of Science and Technology	649,048	642,002	623,946	599,779	583,518	564,272	565,574
Junior College	99,270	97,466	95,684	90,838	86,658	83,941	88,734
public	11,214	10,727	10,339	9,828	9,735	9,742	12,286
private	88,056	86,739	85,345	81,010	76,923	74,199	76,448
Institute of Technology	58,266	44,634	41,669	24,913	23,257	21,710	20,698
public	528	575	627	614	607	595	546
private	57,738	44,059	41,042	24,299	22,650	21,115	20,152
University of Science and Technology	491,552	499,902	486,593	484,027	473,603	458,621	456,142
public	108,947	109,551	109,987	110,185	110,381	110,916	115,382
private	382,605	390,351	376,606	373,842	363,222	347,705	340,760

Figure 5 The Number of Students in Junior Colleges, Institutes of Technology, and Universities of Science and Technology from 2014 to 2020



TVE Teacher Qualifications in Taiwan

People who intend to teach in secondary TVE must be qualified according to the requirements of the "Teacher Education Act" and the "Technical and Vocational Education Act." According to the "Teacher Education Act" revised on December 11, 2019, students in teacher education-related departments of universities must complete the pre-service teacher education courses and pass the teacher qualification assessment. They can then do practical education training in school for 6 months. After finishing practical education training with a qualifying score, they will receive the teacher's certificate, which is issued by the Ministry of Education. In addition, students will have to complete at least 18 hours of industry internship before taking pre-service teacher education courses according to the regulation of the "Technical and Vocational Education Act."

According to the "Act Governing the Appointment of Educators," teachers in higher level TVE are classified as professors, associate professors, assistant professors, and lecturers. As stated by the “Teachers’ Act” regulation, when a teacher passes the review of technical and vocational college and university, the school shall report it to the Ministry of Education for further review. The Ministry of Education shall issue a teacher’s certificate to the teacher who passes its review. The Ministry of Education may, however, issue a teacher’s certificate directly to a teacher who has passed the review by the educational institution, the review process of which has been approved by the Ministry of Education.

In view of the close relationship between TVE and industry, teachers should comprehend the trends of industry development, and therefore, according to the regulation of the “Technical and Vocational Education Act,” secondary or higher level TVE teachers shall have had at least 1 year of actual practical work experience in an industry sector related to the subject area in which they are appointed to teach. After every 6 years of teaching at technical and vocational colleges and universities, teachers shall undertake at least 6 months of study or research related to their professional or technical area of expertise with an organization that collaborates with their TVE institution, or with an industry related to the subject area in which they teach.

TVE Quality Assurance Mechanisms in Taiwan

According to the regulations of the “University Act,” the “Junior College Act,” and the “Senior High School Education Act,” the TVE quality assurance mechanism in Taiwan includes mainly school self-evaluation and external evaluation carried out by an assessment committee or professional accreditation bodies. In secondary TVE, there are school evaluations and vocational education evaluations, which will be carried out once every 5 years. School evaluations are a series of evaluations of curriculum teaching, academic counseling, and requirements of environment equipment and school development; vocational education evaluation is a series of evaluations of vocational education development and curriculum teaching, and a requirement of performance.

There are five levels of evaluation results: grade A (90 points or more), grade B (80 points or more, but less than 90 points), grade C (70 points or more, but less than 80 points), grade D (60 points or more, but less than 70 points), and grade E (less than 60 points). There will be a follow-up evaluation if the school has been classified as grade D or E in the overall evaluation.

As in higher level TVE, there are school evaluations and evaluations of colleges, departments, institutes, and degree programs, which shall be carried out once every 4 to 7 years. School evaluations are a series of evaluations of overall teaching, student affairs, general affairs, library, information, personnel, and accounting affairs in school. Evaluation of colleges, departments, institutes, and degree programs evaluates curriculum design, teaching, student studying, professional performance, equipment, administration management, and operation results. There are three kinds of evaluation results: approval, conditional approval, and not approved. There will be a follow-up evaluation and reevaluation if the school has been classified as conditionally approved or not approved.

Innovation of TVE in Taiwan

As a "Technical and Vocational Education Act" requirement, the Executive Yuan performs an overall review every 2 years and announced the "Guidelines for Technical and Vocational Education Policies, 3rd Edition" in February 2021, which state that the vision of TVE remains the cultivation of professional and technical talented individuals who possess practical and innovative abilities and are employable; the objectives of TVE are as follows: the first objective is still to establish a flexible education system that aligns with industrial trends and demonstrates the value of TVE; the second objective was revised to strengthen curricula and faculty structure, develop hands-on abilities, spark teachers' and students' innovative thinking and entrepreneurial spirit, and promote the passing down of skills and industrial innovativeness, which put emphasis on the importance of teaching structure; the third objective is revised as promoting collaboration between governmental, industrial, academic, and training organizations to cultivate high-level talented individuals, thereby raising society's awareness of the importance of professionalism. Because our society is gradually paying attention to TVE, there is no longer any need to emphasize it in the objective.

To achieve the vision and objectives above, the "Guidelines for Technical and Vocational Education Policies, 3rd Edition" propose seven means of promotion: (a) establish a flexible education system and admission channels for TVE, and offer continuing education to attract the public; (b) implement career introduction and exploration courses, career experiments and off-campus internships to foster students' value of professional skills; (c) establish practical, problem-oriented, and application learning styles to develop students' interdisciplinary and teamwork abilities; (d) build the TVE environment based on the industry to develop the innovation spirit and enhance TVE international impact energy; (e) improve teachers' ability to adjust their pedagogical thinking, teaching techniques, involvement in innovative practice teaching, and engagement in practical research that meet industrial development needs and will facilitate the passing down and innovation of skills; (f) design a career function-based curriculum, enrich relevant equipment, and cultivate vocational competencies in accordance with the various professional/occupational competency standards; and (g) reinforce alignment between learning and practice, enhance industry–academia collaboration, increase the social responsibilities of relevant organizations for cultivating talented individuals, and develop a cultivation method for vertical inheritance and interdisciplinary talents.

We can make the following conclusions by analyzing the number of schools and students in general education, vocational education, comprehensive high schools, practical skills programs, and continuing education:

1. The number of senior high schools which implement vocational education is less than those that offer general education.

2. There are more private than public senior high schools with vocational education and practical skills programs.
3. There are more public than private senior high schools which offer general education, comprehensive high schools, and continuing education.
4. The number of senior high school students decreased by 209,121 (25.54%) from 2014 to 2020.
5. The percentage decrease in the number of senior high school students is 8.63% in general education, 29.32% in vocational education, 57.81% in comprehensive high schools, 27.29% in practical skills programs, and 54.49% in continuing education.
6. There were more students enrolled in public than private senior high schools; taking 2020 as an example, 61.62% of senior high school students attended public school, among which 216,969 were in general education and 119,420 were in vocational education, which was 97,549 fewer students.
7. In private senior high schools, there were more students in vocational education, for example, the number of students in general education was 67,394 with 125,072 in vocational education, a difference of 57,678.
8. The secondary TVE graduates in Taiwan still chose further studies as their main priority.

We can also make the following conclusions by analyzing the number of schools and students in junior colleges, institutes of technology, and universities of science and technology:

1. Private schools play the main role in the implementation of higher TVE.
2. The number of students decreased by 10.61% in junior colleges, 64.48% in institutes of technology, and 12.86% in universities of science and technology from 2014 to 2020.
3. The percentage of students studying in private junior colleges was 86.15% of the total number of students in junior colleges in 2020.
4. The percentage of students studying in private institutes of technology was

97.36% of the total number of students in institutes of technology in 2020.

5. The percentage of students studying in private universities of science and technology was 74.40% of the total number of students in universities of science and technology in 2020.

The requirement of professional development is conducted regularly based on related regulation, and is supervised by administration parties in TVE teacher qualification and quality assurance mechanisms. For the following promotion of TVE, the vision of TVE in Taiwan is the cultivation of professional and technically talented individuals who possess practical and innovative abilities and who are employable.

Trends and Issues in TVE

The Ministry of Education promoted “Reshaping Technological-Vocational Education” with a funding requirement of NTD 23.4 billion (approximately USD 806.9 million) in 2009, followed by “The Second Phase of Reshaping Technological-Vocational Education” with a funding requirement of NTD 20.2 billion (approximately USD 721.43 million) in 2013. The scale of this funding demonstrates the government’s determination to innovate technical and vocational education (The Control Yuan, 2016). Three goals of The Second Phase of Reshaping Technological-Vocational Education are improving students’ employability, providing high-quality technical talents who match industry development needs, clarifying the position of TVE and changing social perspectives on TVE, then promoting the relevant policy in system adjustment, curriculum flexibility, and activation curricula (Hu, 2016; Ministry of Education, 2014; National Academy for Educational Research, 2016). Although the government has done everything it can regarding the actual situation and the investigation report of The Control Yuan, there is still room for improvement.

The development trends and related issues of TVE in Taiwan are elaborated as follows.

Trends in TVE

Viewing the "Guidelines for Technical and Vocational Education Policies" formulated by the Executive Yuan in 2017 and 2019, the TVE-related content of the "Education Yearbook of the Republic of China" in 2014 to 2018 written by the National Academy for Educational Research, and the policy objectives and priorities and policy plans of the Ministry of Education (Executive Yuan, 2017, 2019; Ministry of Education, 2014b, 2015, 2016, 2017, 2018c, 2019, 2020; National Academy for Educational Research, 2016, 2017a, 2017b, 2019, 2020), this study identified six TVE development trends in Taiwan from 2014 to 2020, introduced as follows.

Making an Effort to Construct the Legal Basis of Technical and Vocational Education

The legislation of Taiwan TVE started in 1985. The Draft of the "Technical and Vocational Education Act" was published in 1988, Drafts of the "Technical and Vocational Institution Act" were published in 1999, 2001, 2004, and 2009, and the Draft of the "Technical and Vocational Education Act" was published in 2013, taking almost 30 years (Hu, 2014) to complete the relevant legislative procedures. Based on the Draft of "Technical and Vocational Education Act" in 2013, the "Technical and Vocational Education Act" was announced and implemented on January 14, 2015. Article 1 states that this Act was formulated in order to put in place a technical and vocational education system for training skilled people, to foster people's proper understanding and appreciation of vocations and professions, to put in place TVE teaching of useful practical skills, and to train skilled people for all trades and industries, therefore establishing the criterion of the three following directions in the planning and management of technical & vocational education, the provision of technical & vocational education, and technical & vocational education teachers.

1. Planning and management of technical & vocational education: The Executive Yuan shall establish “Guidelines for Technical and Vocational Education Policies” at the national level, and these guidelines shall be comprehensively reviewed at least once every 2 years, and the review findings shall be made public. Local governments shall submit a TVE report to the Ministry of Education every 3 years, and the Ministry of Education will use these reports when formulating TVE development reports. The Ministry of Education shall build up a national level TVE Advisory Committee and each educational competent authority shall invite industry sector representatives to form a TVE Advisory Committee to advise on matters related to TVE.
2. Provision of technical & vocational education: Based on the idea of lifelong learning, the usage of career exploration education, basic vocational education, and vocational continuing education is the main content of Taiwan TVE. In the meantime, the aim is to strengthen the cooperation between TVE, industry, and vocational training institutes.
3. Technical & vocational education teachers: Pre-service teacher education programs to qualify people to teach in elementary, junior high, and senior secondary schools shall include subjects related to vocational education and training, so teachers will be able to acquire more understanding of TVE. People who attend the pre-service teacher education programs shall have at least 18 hours of training internship in a related industry that will be arranged by a university providing teacher education and training. After every 6 years of working at a technical and vocational education institution, teachers shall undertake a study or research related to their professional or technical area of expertise.

More Career Exploration, with a Focus on the Value of TVE

By the authorization of the “Primary and Junior High School Act” and the “Technical and Vocational Education Act,” in order to provide career exploration education, junior high schools may work with technical and vocational education institutions or with vocational training institutes to provide practical arts education, and the curriculum guidelines of elementary schools and junior high schools shall incorporate vocational knowledge and exploration content; junior high schools and senior secondary schools shall make arrangements for field trips to related businesses and industries for students.

In order to make young students’ understanding of different occupations, the K-12 Education Administration, Ministry of Education had worked with municipal and county/city governments to build up 45 local career exploration and experience demonstration centers, which provide two methods of career exploration courses inclusive of mid-semester and winter/summer camps for students studying in fifth to sixth grade of primary school and seventh to eighth grade of junior high school.

Moreover, the Ministry of Education also cooperated with other departments to promote the “Youth Education and Employment Savings Account Program” to encourage senior high school graduates to make decisions about continuing to pursue further education, obtaining employment, or starting their own businesses after exploring learning from the work place and international experience.

In addition, cooperating with national universities, and the Social and Education Center, the Ministry of Education has set up permanent exhibitions of themed career exploration experience in the industries of agriculture, forestry, fishing, and animal husbandry to provide opportunities for both parents and students to have further understanding of TVE, so that they can expand the possibilities of diversified development for students’ future careers. The Ministry of Education also set up "The Main Points of Selection and Recognition of Outstanding Technical and Vocational Performance," and issues competition excellence awards for teachers and students in TVE institutions who have excellent performance in international technical competitions, and vocational outstanding awards for great performance in global innovative inventions and areas of expertise. These awards aim to encourage teachers and students to acquire expertise in professional fields and to improve the society recognition of TVE.

Increased Focus on Work-Based Learning to Eliminate Education-Job Mismatch of TVE Students

In the secondary TVE, students can choose cooperative education, practical skills programs, industry-academia collaboration, or off-campus internships to cultivate their practical abilities in work place. In the Curriculum Outlines for Technical Senior High School, 2019 school year, skill areas were added to strengthen students' practical skills, and curriculum design focused on competency-based interdisciplinary learning, which can help students to adapt to the industry needs in the future. In addition, the Ministry of Education kept promoting the "Quality Subsidy Program for Senior High Schools" and the "Homogenization of Community Educational Resources Implantation Program for Adaptive Learning in Senior High School," in the expectation of creating fair, quality, and equal upper secondary education.

As for higher level TVE, there were several methods to be carried out, such as the "Higher Education Sprout Project" to assist technical and vocational colleges and universities to implement instructional innovations, improve the quality of teaching, focus on students' learning performance, and cultivate students' key competences and employability; the "University Social Responsibility (USR) Project" to strengthen cooperation between universities and local communities; the "Industry-Academia Collaboration Platform for Talent Cultivation" to match the talent needs for industry development, to increase the demand match between industry and academia, and to intensify their collaboration; and the "Industrial Innovation Research & Development Program" to cultivate professional technical talents.

More Industry Involvement in TVE to Stimulate Practical Empowerment of TVE Teachers

By subsidizing related projects, the Ministry of Education has required that TVE institutions shall invite industry professionals to assist students at school, encourage teachers to participate in related industrial study or domestic or overseas research by project funding, and support schools in establishing inter-school, inter-department, and inter-disciplinary professional teacher communities. As in technical and vocational colleges and universities, schools will have a Multi-track Faculty Promotion System to break through the tradition that teachers can only be promoted by publishing academic papers, and according to the "Technical and Vocational Education Act" requirements, after every 6 years of teaching at technical and vocational colleges and universities, teachers shall undertake at least 6 months of study or research related to their professional or technical area of expertise with an industry related to the subject area in which they teach, so that they can continue to enhance their practical experience.

The Ministry of Education established the "Guidelines for Nomination of National Award for Distinguished Contribution to Industry-Academia Collaboration" to reward full-time technical and vocational college and university teachers with practical professional technical ability for their professional practical application research and development or results, important impact on and contribution to industry, and remarkable contribution to the cultivation of national technical and vocational professional talents. This is expected to stimulate teachers' enthusiasm for industry-academia collaboration and technical talent cultivation.

Investment of More Funding in Upgrading Teaching and Practice Environments of Technical and Vocational Education Institutions

In secondary TVE, based on the “Standards of Equipment in Technical Senior High School,” the government has budgeted NTD 5 billion (approximately USD 178.57 million) to address the insufficiency in the basic teaching practice equipment year by year, to employ practical evaluation to estimate the need for supplementary equipment in technical senior high schools, to fix old equipment in school practice workshops or laboratories by using subsidy assistance to set up a quality practice environment, to add equipment needed for practical curricula, such as multi-elective subjects, interdisciplinary subjects, and multidisciplinary-integration, interdisciplinary-integration, or transdisciplinary-integration curriculum, and to bring in industry to contribute teaching resources. In addition, the Ministry of Education has subsidized six technical teaching centers and teaching equipment for local students to use, which can achieve the result of resource sharing; and 14 centers for study areas, which can be utilized by any technical competition.

As in higher level TVE, the government has budgeted NTD 3 billion (approximately USD 84 million) to establish an inter-college/department practice field, the Industry Elite Training Base, and an Industrial-like environment factory to program industrial environment curricula based on the actual industry environment, which can provide internship practice fields for technical and vocational college and university students, and provide the training of skill enhancement and matching industry needs for local teachers and students. In the meantime, the Ministry of Education cooperates with the Ministry of Economic to build the Industry Professional Assessment System, IPAS, to set up an IPAS examination room, and work with the Ministry of Labor to increase the number of Level B Technician certificates or licenses..

Enhanced TVE Impact on a Global Scale

Internationalization of Technical and Vocational Education has always been the key point of policy promotion, and in order to cooperate with the New Southbound Policy, at the secondary TVE level, the government has promoted senior high schools to visit Southeast Asia to conduct inter-school culture exchanges, has subsidized new immigrant children to visit their parents' homelands and experience international career activities, and for the new immigrant children who study in key industry areas, or work in overseas Taiwanese enterprises, and have language expertise of ASEAN or South Asian countries, the government will grant tuition and fee subsidies and assist them in finding jobs after graduation.

At the higher TVE level, the government has encouraged and subsidized technical and vocational college and university students to do their internships in Taiwanese companies or multinational corporations, has provided financial aid for teachers and students to participate in exchange programs with ASEAN or South Asian countries, and has set up special classes of industry-academia collaboration for New Southbound foreign students (with diplomas), short-term youth training classes (without diplomas), short-term training classes for new Southbound professional technical teachers (without diplomas), financial aid for domestic schools to set up advanced placement courses abroad (including language, basic discipline, and skills training), and special classes for senior management talent for the government or schools in ASEAN or South Asian countries.

Issues in TVE

Although the trends of TVE have been mentioned above, TVE in Taiwan has its own development features, including strengthening practical curricula to improve student internship and practice abilities, enhancing teachers' practical experience, inviting industrial experts in teaching, and constructing industry-like teaching environments, in the “Guidelines for Technical and Vocational Education Policies” revised and announced by The Executive Yuan in 2021. There are still several issues in TVE, such as: (a) flexibility of continuing TVE; (b) improving social participation in TVE; (c) enhancing the rolling correction for subject grouping of TVE curriculum design to match industry and international needs; (d) the motive and confidence of learning need to be improved; (e) the training of TVE teachers should be able to correspond to industry development; (f) school equipment should be up-to-date simultaneously with industry innovation, upgrades, or transformation, so it can be used in innovation teaching courses; and (g) industry should offer more training retention opportunities for TVE institution students and become more involved in the development of targeted skill benchmarks or certification (Executive Yuan, 2021b). Compiling the problems mentioned in the “Guidelines for Technical and Vocational Education Policies” and the author’s observation, the TVE issues in Taiwan that need to be conquered are introduced as follows.

Insufficient TVE Regulations

Although the “Technical and Vocational Education Act” has already set up regulations for the planning and management of TVE, provision of TVE, and TVE Teachers, the learning model, content, and development path should be able to involved as the impact of aging and low-birth- rate. Furthermore, life style is effected by new technology, cross-domain innovation and digital technology drive industry transformation development. Moreover, because of shortage of energy and resource, the government and business has accelerated the challenge of efficient recycling, and bring in industry resource effectively and regularly based on the regulations. Therefore, the Ministry of Education should have the foresight to proactively review and revise the “Technical and Vocational Education Act” and set up a rolling adjustment mechanism in the regulation system to lead TVE development.

In addition, there is a practical controversial issue related to TVE student identification when learning or interning in industry. For instance, when technical and vocational college and university students take internships in industry, they are classified as students because internships are an extension of the curriculum; therefore, during their internship, instead of applying the "Labor Standards Act" and related regulations, students will apply the internship contract which has been signed by the school and internship company. However, the students that attend the cooperative education class in senior high school, according to "The Act of the Cooperative Education Implementation in Senior High Schools and the Protection of Student Participants' Right," they will have the minimum guarantee of basic wage and training hours. These basic wage and training hours are no less than the regulation of "Labor Standards Act" when the students study vocational skills in workplace. As we can see, there will be an imbalance of protection of rights when TVE interns and cooperative education students are in the same workplace. It is the main priority to supplement the protection for technical and vocational college and university students when they take off-campus internships, as TVE policy actively promotes practical internships in the workplace.

Lack of Industry and Vocational Guidance Consultant Involvement

The recent career exploration education model is still focused on activities in school, and there is a lack of direct and recurring industrial participation. It is necessary to cooperate with related industry exhibitions that can allow TVE teachers and students to have direct contact with industry environments; in the meantime, The government and TVE institutions needs to cultivate vocational guidance consultants to assist students before higher level education with career-oriented exploration, and the Ministry of Education must review the current career exploration method and involve industry and society resources to plan and design related promotion strategies together.

Regarding the vocational guidance regulations, there is only active vocational guidance evaluation based on the "People with Disabilities Rights Protection Act," which is only for people with disabilities rather than for general students. The current method of career exploration for students before higher education mainly involves conducting activities and workplace tours. Although schools provide students with related guidance based on the "Student Guidance and Counselling Act," the guidance is focused on promoting and maintaining physical and mental health and the holistic development of students. Counselling teachers or professionals are only qualified in psychological counselling or social work, and are not suitable to provide vocational guidance. Therefore, it is necessary to cultivate and train vocational guidance professionals, and the government should also encourage universities to set up related departments or graduate schools for long-term professional cultivation.

Technical and Vocational Education is Still the Second Choice

TVE has always been the second choice of students due to the fact that the traditional concept puts academic value above all else. However, with the development of technology, new economic life orientations, and the rise of civic consciousness, TVE not only plays an important role in cultivating industry talents and fostering economic development, but also facilitates social integration. If TVE graduates can put their skills into good use and fully demonstrate what they have learned in their career, it can urge our community to pay more attention to TVE, changing the disadvantage of TVE, and can fulfill the choice of education category which matches students' personalities and interests.

With the strategy implementation and resource investment of "Reshaping Technological-Vocational Education" in 2009, "The Second Phase of Reshaping Technological-Vocational Education" in 2013, and the "Forward-looking Infrastructure Development Program" in 2017, technical and vocational education institutions have achieved building up an –industry-like and academic environment, practical talent selection, enhancing practice curriculum, internship, and implementation, promoting teachers' practical experience, and bringing in industry experts for practical teaching. Although TVE school achievements have gradually been valued and recognized, the data of the development of Taiwan secondary TVE show that the number of students in general education was 311,213 in 2014 and 284,363 in 2020, reducing by 26,850 or 8.63%, and the number of students in vocational education was 345,937 in 2014 and 244,492 in 2020, reducing by 101,445 or 29.32%. As we can see, the decrease in the number of students in vocational education was far more serious than it was in general education. The difference in the number of students in vocational and general education in 2020 was 39,871, with the number of students in vocational education obviously less than that in general education.

In conclusion, it is a continuing challenge for technical and vocational education institutions to stimulate the understanding and recognition of our community, junior high school students, their parents, and teachers of technical and vocational education.

An Energizing Mechanism of TVE Teachers' Practical Expertise has not been Implemented

The cultivation of secondary TVE teachers must be carried out in the light of the "Teacher Education Act," but there is no industry-related practical training and learning in pre-service teacher education courses. Because practical teaching and the cultivation of practical skills are the core value of technical and vocational education, in order to cohere with school education and workplace practice, the government announced the implementation of the "Technical and Vocational Education Act" on January 14, 2015. The second paragraph of Article 24 states that the pre-service teacher education programs to qualify people to teach subjects in vocational area programs in senior secondary schools shall include a training internship of at least 18 hours in a related industry; and the first paragraph of Article 25 states that teachers of vocational subjects and technical subjects at technical and vocational education institutions shall have had at least 1 year of actual practical work experience in an industry sector related to the subject area in which they are appointed to teach.

Even though the requirement has been mentioned above, the confirmation of teachers' practical experiences in related industry are provided by the industry in the secondary TVE period; as in the high TVE period, the confirmation is regulated and recognized by technical and vocational colleges and universities; hence, the authenticity of the practical work experience in the industry related to the teaching field remains in doubt. In order to promote the advancing professional capability of the teachers of professional or technical sections in technical and vocational education institutions, the first paragraph of Article 26 of the "Technical and Vocational Education Act" states that after every 6 years of working at a technical and vocational education institution, that is high school and technical and vocational colleges and universities, qualified teachers shall undertake at least 6 months of study with an industry related to the subject area in which they teach. However, this paragraph was revised to be only applicable to the teachers in technical and vocational colleges and universities. Moreover, there was no requirement for a study or research period for senior high school teachers. This revision indicated the difficulty of promoting industry study or research for TVE teachers, especially at the secondary TVE level. The innovation of TVE will focus on how to facilitate regular cooperation between TVE teachers and industry, and not just complete the hours for industry study or research nominally.

An Insufficient Number of Students for the Operation of Private Technical and Vocational Education Institutions

As mentioned above, the data of Taiwan's secondary and higher TVE development from 2014 to 2020 showed that the number of senior high schools with vocational education was fewer than the schools with general education, and there were more students in private than in public vocational education schools. As for higher level TVE in 2020, there were 67 private technical and vocational colleges and universities, which was 81.70% of all technical and vocational colleges and universities, and 77.33% of junior college, institute of technology, and university of science and technology students chose to study in private TVE schools. Private TVE institutes have played an important role in Taiwan TVE, but under the impact of low birthrate, which has caused the challenge of a decreasing number of graduates, private technical and vocational education institutions might be forced to close due to the fact that the number of students is insufficient. If so, the foundation of TVE will encounter huge damage. Therefore, the current urgent issues are how to enhance the quality of initial technical and vocational education and expand continuing technical and vocational education to enrich human resources in Taiwan.

When private high schools have to withdraw from the teaching system due to various reasons, there will be some issues in terms of the protection of the rights of faculty, staff, and students. To solve these issues, the Education and Culture Committee of the Legislative Yuan has completed a clause-by-clause review of the draft of “Withdraw Regulations of Private High School, Universities and Colleges,” which clarifies that private schools must assign additional faculty, staff, and student representatives as board members, and adds provisions of protection of students’ right to education. Only the key provision about whether a school can have a 3-year school properties processing transformation period remains to be negotiated (Legislative Yuan, 2021).

Lack of a Complementary Scheme for the Globalization of Technical and Vocational Education

Given that TVE is closely related to industrial variations, it would be helpful for professional technical talents to enter global economic and trade territory and supply systems by encouraging students to study professional skills abroad or to attract foreigners to have further TVE study in Taiwan. Besides the competent authority, the Ministry of Education, it would require inter-ministry cooperation of the Ministry of Foreign Affairs and the Ministry of Labor to assist TVE schools in selecting and sending students to intern in foreign companies, provide scholarships and bursaries to encourage students or young people to study professional skills abroad, and be equipped with enough incentives to attract foreigners to study or work-study. There should be a corresponding checking mechanism for the recruiting conditions, qualification review, and performance assessment of the foreign program in technical and vocational colleges and universities, which can allow us to avoid the dilemma of false recruitment or lack of attention, that would cost the right of foreign students and the reputation of schools and our country.

In addition, TVE focuses on the accumulation of practical skills by learning via formal, non-formal, and informal channels. Therefore, the connection of a qualifications framework can certify related knowledge, skills, and vocational ability of international learners, which will contribute to the international mobility of learners. Whereas many countries, such as the European Union and its members, the Association of Southeast Asian Nations, the United Kingdom, Ireland, Australia, and New Zealand have built up qualification frameworks, Taiwan is still in the discussion stage. Therefore, it is necessary to speed up building the qualification framework in Taiwan in order to enhance the influence level of Taiwan TVE on a global scale.

Conclusion

The system of TVE in Taiwan is implemented by government-approved skills education programs in junior high schools, technical high schools, vocational education affiliated with general senior high schools, professional programs in comprehensive high schools, junior colleges, institutes of technology, and universities of science and technology to cultivate skilled talent and TVE graduates who can receive their diploma and associate degree, bachelor's degree, master's, or doctoral degree.

The promotion and management of TVE is the responsibility of the Ministry of Education at the central level and of municipal governments or county/city governments at the municipal/local level. The main separation starting point of TVE and general education is the students' decisions to choose TVE or general education when they graduate from junior high school. TVE in Taiwan is classified as a school model and is led mainly by the government.

As compiled data of developments of secondary TVE from 2014 to 2020, the conclusion indicates that the number of students in secondary TVE is obviously less than that in general education. The majority of graduates still choose further study as their priority, and most of them are in private vocational education. As in the higher level TVE, the number of schools or students is mainly in private technical and vocational colleges and universities.

The requirement of professional development is conducted regularly based on related regulation and supervised by administration parties in TVE teacher qualification and quality assurance mechanisms, the core mission of promoting TVE policy is to achieve the visions and objectives announced in the "Guidelines for Technical and Vocational Education Policies" in February 2021.

Having viewed the "Guidelines for Technical and Vocational Education Policies" formulated by the Executive Yuan in 2017 and 2019, the TVE-related content of the "Education Yearbook of the Republic of China" in 2014 to 2018 published by the National Academy for Educational Research, and the policy objectives and priorities and policy plans of the Ministry of Education, this study concludes that the trends of TVE development in Taiwan are constructing the legal basis of TVE by finishing the legislation of the "Technical and Vocational Education Act"; conducting career exploration activities with students in primary and junior high schools, and providing opportunities of workplace internship and foreign experience exploration before making decisions about further study, employment, or starting their own business; actively eliminating education-job mismatch of TVE students and stimulating practical empowerment of TVE teachers; upgrading teaching and practice environments of TVE institutions; and enhancing TVE impact on a global scale.

Although the trends of TVE have been mentioned above, TVE in Taiwan has its own development features, including strengthening practical curricula to improve student internship and practice abilities, enhancing teachers' practical experience, inviting industrial experts in teaching, and constructing industry-like teaching environments, in the "Guidelines for Technical and Vocational Education Policies" revised and announced by The Executive Yuan in 2021. However, there are still several issues in TVE. Compiling the problems mentioned in the "Guidelines for Technical and Vocational Education Policies" and the author's observation, because of facing the challenges from society, technology, economic, environment, and global situations, it is suggested that there are six issues in Taiwan TVE that remain unsolved, namely: (1) insufficient TVE regulations; (2) a lack of industry and vocational guidance consultant involvement; (3) TVE is still the second choice; (4) an energizing mechanism of TVE teachers' practical expertise has not been implemented; (5) there is an insufficient number of students for operation of private technical and vocational education institutions; and (6) a lack of a complementary scheme for globalization of technical and vocational education.

References

Department of Statistics, Ministry of Education. (2021a). *Number of graduates at all levels*. https://depart.moe.edu.tw/ed4500/cp.aspx?n=1B58E0B736635285&s=D04C74553DB 60CAD

Department of Statistics, Ministry of Education. (2021b). *Main statistics table over the years*. https://depart.moe.edu.tw/ed4500/cp.aspx?n=1B58E0B736635285&s=D04C74553DB 60CAD

Department of Statistics, Ministry of Education. (2021c). *Survey on the employment situation of senior high school graduates*. https://www.edu.tw/News_Content.aspx?n=829446EED325AD02&sms=26FB481681F7B203&s=1547C271DEDAE960

Department of Statistics, Ministry of Education. (2021 d). *Important educational statistics information of the number of colleges and universities and the number of students*. https://depart.moe.edu.tw/ED4500/cp.aspx?n=002F646AFF7F5492

Department of Statistics, Ministry of Education. (2021e). *Basic statistics of schools*. https://depart.moe.edu.tw/ed4500/News_Content.aspx?n=5A930C32CC6C3818&sms=91B3AAE8C6388B96&s=596D9D77281BE257

Department of Statistics, Ministry of Education. (2021f). *Educational statistics inquiry platform* (colleges). https://stats.moe.gov.tw/

Executive Yuan (2017). *Guidelines for technical and vocational education policies*. https://shihthink.files.wordpress.com/2018/09/3 -2- e68a80e-8a193e58f8ae881b7e6a5ade69599e882b2e694bfe7ad96e7b6b1e9a098.pdf

Executive Yuan. (2019). *Guidelines for technical and vocational education policies (second edition)*. https://ws.moe.edu.tw/001/Upload/3/relfile/6315/52872/8e95fa4b-84a9-4656- 938b-1a8de94cf5e2.pdf

Executive Yuan. (2021a). *Education system*. https://www.ey.gov.tw/state/7F30E01184C37F0E/c533c870 -9854-4344-b325- 0239147484bd

Executive Yuan. (2021b). *Guidelines for technical and vocational education* *policies* (3rd edition). https://tvet.ie.ntnu.edu.tw/article/5098

Governing the Appointment of Educators Act. (2014, January 22). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0150017

Hu, R.P. (2014). Draft proposal for Technical and Vocational Education Law in Taiwan. *Taiwan Education Review, 685*, pp.8-20.

Hu, R.P. (2016). The innovation and transformation of European vocational education and training. In K.S. Yang & R.P. Hu (Eds.). *University development: innovation and transformation* (pp.130-147). Association Technological and Vocational Education in Republic of China.

Junior College Act. (May, 8, 2019). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0040001

Labor Standards Act. (2020, June 10). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=N0030001

Legislative Yuan. (2021). *The draft of "Withdraw Regulations of Private High School, Universities and Colleges"*. https://lis.ly.gov.tw/lylgmeetc/lgmeetkm?$$APIINTPRO!!XX%28%E9%AB%98%E7%B4%9A%E4%B8%AD%E7%AD%89%E4%BB%A5%E4%B8%8A%E5%AD%B8%E6%A0%A1%E9%80%80%E5%A 0%B4%E6%A2%9D%E4%BE%8B%29

Ministry of Education. (2014a). *"The Second Phase of Reshaping Technological-Vocational Education"*. http://www.wvs.hc.edu.tw/world/file/aa1031211.pdf

Ministry of Education. (2014b). *The policy objectives and priorities of the Ministry of Education, 2014*. https://ws.moe.edu.tw/001/Upload/1/relfile/6312/6880/1536cd1f-61ac-4a3a-9370- 666adab984c2.pdf

Ministry of Education. (2015). *The policy objectives and priorities of the Ministry of Education, 2015*. https://ws.moe.edu.tw/001/Upload/1/relfile/6312/6879/a1252723-2819-4dc3-a335- 3f449f98daeb.pdf

Ministry of Education. (2016). *The policy objectives and priorities of the Ministry of Education, 2016*. https://ws.moe.edu.tw/001/Upload/3/relfile/6312/45606/c4d5ca7d-e0d6-464e- aa6c-d5d60b88173f.pdf

Ministry of Education. (2017). *The policy objectives and priorities of the*

Ministry of Education, 2017. https://ws.moe.edu.tw/001/Upload/3/relfile/6312/49637/9753b7ac-359d-42d3- aac7-d3b4daff8abb.pdf

Ministry of Education. (2018a). *Technical and vocational education*. https://ws.moe.edu.tw/001/Upload/3/relfile/0/1151/221009a7 -56b9-4613-ae19-613b73c4cfc8.pdf

Ministry of Education. (2018b). *Lighting the way for Technical and Vocational Education*. https://ws.moe.edu.tw/001/Upload/5/relfile/7801/63239/8d5550ff- 707c-4f40-b2de-ed353afbfffa.pdf

Ministry of Education. (2018c). *The policy plans of the Ministry of Education, 2018.* https://ws.moe.edu.tw/001/Upload/3/relfile/6312/54767/50eace9b -3aac-477e-9ce0-9bc76e54061e.pdf

Ministry of Education. (2019). *The policy plans of the Ministry of Education, 2019*. https://depart.moe.edu.tw/ED2100/News.aspx?n=B32992AF2BCE C98B&sms=8E6F0C 08E17D8910

Ministry of Education. (2020). *The policy plans of the Ministry of Education, 2020*. https://ws.moe.edu.tw/001/Upload/3/relfile/6312/71895/feb6a6c9 -d8c4-4e5f-a5a1-01f33310828c.pdf

Ministry of the Interior. (2021). *The population, population growth rate, and the percentage of population in 3-age-group*. https://www.moi.gov.tw/cp.aspx?n=602&ChartID=S0101

National Academy for Educational Research. (2016). *The Republic of China Education Year Book 2014*. https://teric.naer.edu.tw/wSite/ct?ctNode=655&mp=teric_b&xItem=2048510&resCtNode=454&OWASP_CSRFTOKEN=6O7C-VM4N-DQAP-ZXRK-IAHY-AYKJ-X622-FQM6

National Academy for Educational Research. (2017a). *The Republic of China Education Year Book 2015*. https://teric.naer.edu.tw/wSite/ct?ctNode=655&mp=teric_b&xItem=2048509&resCtNode=454&OWASP_CSRFTOKEN=6O7C-VM4N-DQAP-ZXRK-IAHY-AYKJ-X622-FQM6

National Academy for Educational Research. (2017b). *The Repub-*

lic of China Education Year Book 2016. https://teric.naer.edu.tw/wSite/ct?ctNode=655&mp=teric_b&xItem=2048508&resCtNode=454&OWASP_CSRFTOKEN=6O7C-VM4N-DQAP-ZXRK-IAHY-AYKJ-X622-FQM6

National Academy for Educational Research. (2019). *The Republic of China Education Year Book 2017*. https://teric.naer.edu.tw/wSite/ct?ctNode=655&mp=teric_b&xItem=2048509&resCtNode=454&OWASP_CSRFTOKEN=6O7C-VM4N-DQAP-ZXRK-IAHY-AYKJ-X622-FQM6

National Academy for Educational Research. (2020). *The Republic of China Education Year Book 2018*. https://teric.naer.edu.tw/wSite/ct?ctNode=655&mp=teric_b&xItem=2048367&resCtNode=454&OWASP_CSRFTOKEN=6O7C-VM4N-DQAP-ZXRK-IAHY-AYKJ-X622-FQM6

People with Disabilities Rights Protection Act. (2021, January 20). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=D0050046

Senior High School Act. (2016, June 1). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0060043

Student Guidance and Counseling Act. (2014, November 12). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0070058

Teacher Education Act. (2019, December 11). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0050001

Teachers' Act. (2019, June 5). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0020040

Technical and Vocational Education Act. (2019, December 31). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0040028

The Act of the Cooperative Education Implementation in Senior High Schools and the Protection of Student Participants' Right. (2013, January 2). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0060042

The Control Yuan. (2016). *The Control Yuan has formally asked the Executive Yuan and the Ministry of Education to review and revise the budget* *plan on solving TVE challenges*. https://www.cy.gov.tw/News_Content.aspx?n=213&s=7668

University Act. (2019, December 11). https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=H0030001

Career and Technical Education Trends and Issues in the United States

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Abstract

The career and technical education system is a significant part of the overall United States educational system. Courses and programs are focused in the last 2 years of high school and the first 2 years of the postsecondary system, although some programming is found in earlier years within the secondary system, as well as in registered apprenticeship programs and in second-chance institutions. Interest in career and technical education is growing at all levels, as the need for skilled and well-trained individuals in the workplace continues to increase. In addition to increased interest in the field, a renewed focus on research in career and technical education, more employer involvement, more career counseling with a focus on career pathways, and increased implementation of work-based learning activities are all recent positive trends that have been identified. Several issues have also been identified that will need to be addressed in order for career and technical education to prosper, including a teacher shortage, a need for teacher professional development, equitable access to courses and programs, funding, and societal perceptions of the discipline. However, career and technical education is steadily overcoming the negative perceptions that have existed for many decades, and is currently playing a key role in the country's recovery from the pandemic and beyond.

Keywords: career and technical education, work-based learning, teacher education

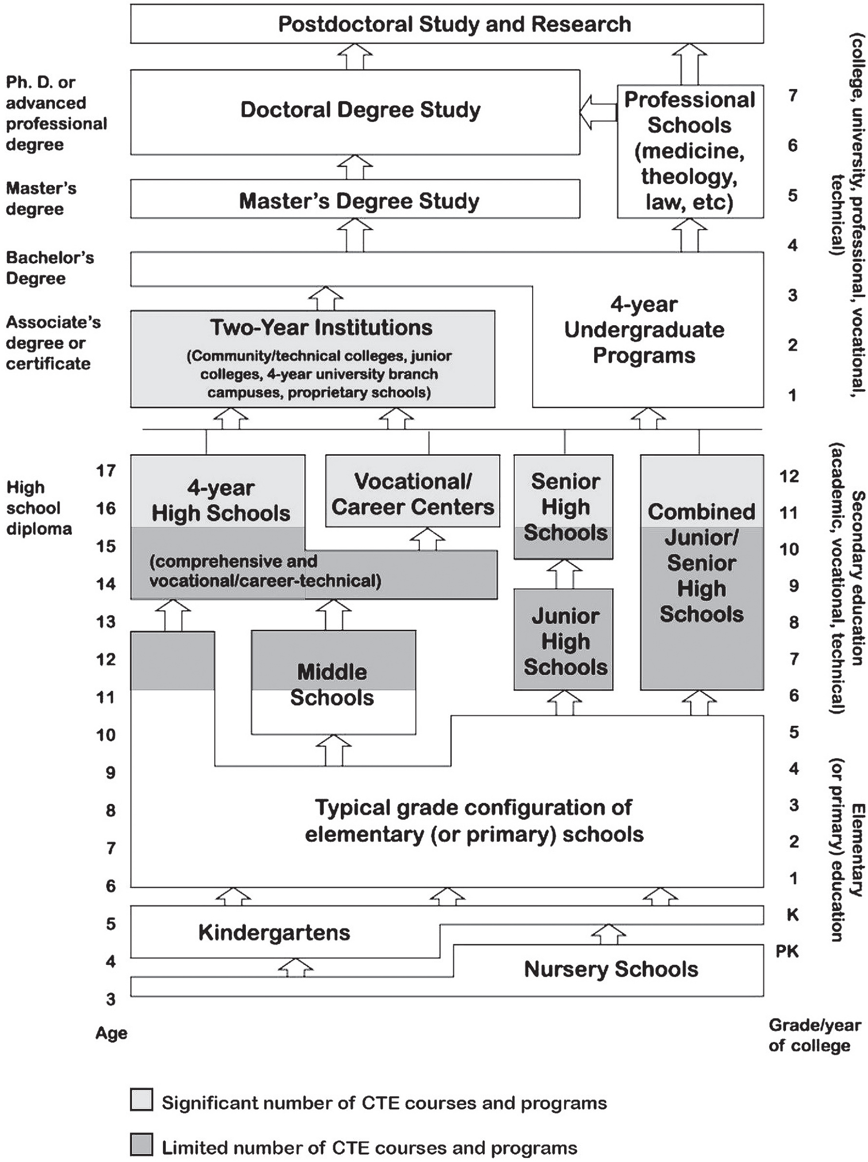
Author's note: For many decades, the term "vocational education" was used to denote technical vocational education and training in the United States. In 1998, due in part to the negative stereotypes associated with vocational education, "career and technical education" was chosen as the new terminology to denote the field. This chapter will use career and technical education to describe the present-day situation, although some references to vocational education may be found.

Introduction

School System Structure

The United States' compulsory educational system, from kindergarten through Grade 12, is largely decentralized, with each of the 50 states responsible for the education of its students. Education is primarily a state and local community responsibility. Each state develops its own policies regarding the education of its citizens and in some ways the United States can almost be viewed as 50 different countries. However, as illustrated in Figure 1, the basic structure of grade levels in the secondary education system is the same across the country, with minor variations.

Figure 1 School System Structure in the United States



Note. Adapted from United States Department of Education, National Center for Education Statistics, Annual Reports program, 2019.

The elementary and secondary school system generally begins with Kindergarten and ends with Grade 5. Middle grades education can generally be categorized as Grades 6 through 8, with high school beginning in Grade 9 and ending at Grade 12. This arrangement can vary from state to state, city to city and even within local school districts, as the physical placement of grade levels within buildings can depend on the individual philosophy of a school district with respect to age groupings, available resources (usually physical facilities), and curriculum needs.

The postsecondary system is also organized in similar ways across the United States. There is a highly developed two-year college structure, consisting of community and technical colleges. These institutions award Associate degrees or short-term certificates (many in technical content areas) and prepare students for transition into four-year colleges and universities, which issue bachelor's, master's and doctoral degrees. Larger universities may also award professional degrees (for example law, theology, or medicine).

In the United States, career and technical education is defined as education at less than the baccalaureate level (Zirkle, 2016a). Students may be introduced to some career and technical education-related courses in the middle grades, but most of the significant courses and programs within career and technical education begin in various forms with entrance into high school, which in most states is Grade 9. The most significant placement of career and technical education within the larger U.S. educational system is focused on the later grades in high school (Grades 11-12) and the first 2 years of postsecondary schooling, generally in two-year colleges. However, career and technical education courses and programs are also offered through a variety of other educational institutions not always associated with the formal K-12 and postsecondary education systems.

Institutions Offering Career and Technical Education

Career and technical education in the United States is a broad-based enterprise. Courses and programs occur at many of the levels outlined in the graphic, as well as through other institutions. The largest provider is the U.S. system of comprehensive high schools. A high school is considered "comprehensive" when it offers courses and programs for all types of students. For example, students who want to attend college/university are provided advanced placement (AP), International Baccalaureate (IB) and other college/university preparatory courses. Students with academic learning needs, such as those with intellectual or physical disabilities, are provided supports to ensure school success. Students wishing to engage with career and technical education courses will also find their needs met at a comprehensive high school. However, it is also possible that comprehensive high schools, because of their broad mission to serve all students, may have limited career and technical education courses and programs due to space and financial constraints. According to the latest data, there are over 19,000 public secondary schools, most of which are comprehensive high schools (National Center for Education Statistics, 2021).

There are approximately 1,500 high schools that are classified as vocational/career and technical education high schools in the United States (U.S. Department of Education, 2020). These schools are usually located in large urban areas, such as Boston, Cleveland, and New York City, and generally house students in Grades 9–12. They are likely to be part of a larger school district which includes many comprehensive high schools as well.

Area career centers are another institution that specifically offer career and technical education at the secondary level. These schools are designed to serve students from several area school districts in a specific geographic region in a type of partnership agreement. Students from the area high schools elect to attend a career center, usually in the last 2 or 3 years of high school, and because the schools focus on career and technical education and serve a large area, they can achieve economies of scale and are able to offer a wide variety of courses and programs to a large number of students. A single comprehensive high school would find the offering of these multiple courses and programs cost-prohibitive. Career and technical training is provided to these students for one-half the day, while the other half is spent in academic courses such as math, language arts, and natural sciences in order to meet high school graduation requirements.

As mentioned previously, the U.S. system of two-year community and technical colleges is highly developed and provides both career and technical education programming as well as preparation for transfer to a four-year college or university. However, the missions of the two types of two-year colleges are slightly different, and the degrees they award can also have some differences.

- Technical colleges are focused on workforce education, preparing students to directly enter the workforce in a high-demand field; these students are awarded an Associate of Applied Science (A.A.S.) degree. While students completing these degrees can later apply to a college/university that offers baccalaureate degrees, credits may not count toward a bachelor's degree depending on the school they hope to attend.
- Community colleges have a dual focus: workforce preparation and articulated transfer to a college/university for completion of a bachelor's degree. They generally award Associate of Arts (A.A.) and Associate of Science (A.S.) degrees. The degrees are similar except an A.S. degree emphasizes math, science, or technology.

Similar to many European countries, apprenticeship programs are another "institution" offering career and technical education programming. In 1937 the United States Congress enacted the National Apprenticeship Act (also known as the Fitzgerald Act), establishing the apprenticeship programs, although the first recognized apprenticeship programs had already begun, starting in Wisconsin in 1911 (U.S. Department of Labor, 2021a). U.S. registered apprenticeship programs are similar to those found in European countries and combine on-the-job training and related classroom instruction to provide workers with the practical and theoretical aspects of a highly skilled occupation. While perhaps not as widely recognized in the United States as in other countries, registered apprenticeship programs continue to grow, with more than 633,000 apprentices enrolled in training programs in 2019 (U.S. Department of Labor, 2020). The number of occupations and industries has also increased in recent years, expanding from a traditional focus on the building trades to include such industries as telecommunication, hospitality, health care, and advanced manufacturing.

Not always thought of as a provider of career and technical education, the United States military is another institution that provides courses and programs, many of which are available while individuals are on active duty. Upon completion of basic military training, individual skills and talents are evaluated, and military occupational specialties (In the Air Force, these are known as Specialty Codes) are assigned. A wide range of occupational specialties are available, including carpentry, nursing, automotive and aircraft mechanics, structural engineering, and transportation logistics (Military One Source, 2019). The military also offers other education-related benefits, such as tuition assistance, opportunities to attend college/university while serving, and further tuition assistance upon leaving the military through the United States GI Bill.

The United States has two primary institutions offering career and technical education as a "second-chance" for individuals who may have not completed high school (i.e., "dropped-out), or made poor choices and ended up in a correctional facility or prison.

- Job Corps is the largest nationwide residential career training program in the country and has been operating for more than 55 years (Job Corps, 2021). Job Corps offers career development and training services to young men and women aged 16 through 24 to prepare them for successful careers. They are given the opportunity to earn a General Equivalency Diploma (GED) or actual high school diploma, along with marketable technical skills. Job Corps centers offer academic courses and vocational training, and teach employability skills and social competencies (Zirkle, 2012).

- The U.S. correctional (prison) system is the other second-chance institution to offer career and technical education courses and programs. These programs are offered at prison and correctional facilities to both youth and adults as a way to reduce recidivism, or the tendency of inmates to relapse into a life of crime after release from prison. Numerous studies dating back to the 1970s have shown that inmates receiving education and training are more likely to find a job upon release and stay out of prison. Yet only a third of state and federal prisoners receive vocational training (Zoukis, 2015). When training is provided it is generally in technical trades such as automobile body repair, electronics, horticulture, masonry, and welding.

Governmental Influence on Career and Technical Education

As previously mentioned, the United States is perhaps not "united" regarding the overall education of its citizens in kindergarten through Grade 12 (the secondary system). This is also true with respect to career and technical education. While there is federal support and guidance from the United States Department of Education, much of the curriculum, instruction, and assessment decisions for career and technical education are made at the state level, and also at the local school district level, in consultation with local labor market needs, and the availability of further career and technical education and training opportunities. The United States career and technical education system is overseen by the federal government, the respective states, and local school districts, while much of the decision-making occurs at the local level as individual communities determine their needs. This has led to wide variability in the types of career and technical education courses and programs offered to students, as each of the 50 states invests different levels of resources. In general, states provide specific levels of funding, determine the competencies and assessments for their respective programs, and leave implementation to the local school districts. The amount of resources a local school district can put toward career and technical education can significantly affect the amount of programming offered, and can also impact facilities, equipment, and instructor quality (Keller et al., 2019). In this respect, career and technical education can perhaps be classified as a "school model" in which the government takes major responsibility for the courses and programs; yet governmental influence can vary from state to state and there is not one, completely unified model for career and technical education in the United States.

The postsecondary career and technical education system can be viewed somewhat similarly. Each state follows the lead of its state department of higher education and sets policies, reviews labor market needs, and approves career and technical education programs to meet those needs. Perhaps as much as any governmental influence, local community needs dictate courses and programs at community and technical colleges. For example, if one of these institutions is located in a rural area, career and technical education programs in agricultural or the technical trades are likely to be found, whereas in urban areas, more of a focus on career and technical education programming in the areas of business or the health sciences will be observed.

The Status of Career and Technical Education

Current Career and Technical Education in the United States

As previously mentioned, much of the programming occurs in the last 2 years of high school (Grades 11–12) and the first 2 years of postsecondary schooling typically at a community or technical college. Very recently there has been an emphasis on offering career and technical education in the middle grades (Grades 6-8), although courses and programs at this level do not follow a consistent pattern across the United States. The previous graphic of the U.S. education system highlights the levels (and degree of emphasis) where career and technical education can be found. The following discussion will focus primarily on those levels in the secondary and postsecondary system in order to describe the current state of career and technical education.

Key Statistics

Almost nine million students in the United States were enrolled in career and technical education courses and programs at the secondary level in the 2018-19 school year, the latest year data that are available (Perkins Web Portal, 2021). At the postsecondary level, about 3.5 million students are enrolled in career and technical education courses and programs. In both categories California and Texas have the most students enrolled in courses and programs.

At the secondary level, more students are male, while the postsecondary level has more female students (Perkins Web Portal, 2021). Over the past decade, the number of students enrolled in courses and programs at the postsecondary level has decreased only slightly, while enrollment at secondary level has increased significantly, from 7.5 million students in the 2007-08 school year to the almost nine million students in 2018-19. Additionally, recent data indicate over three-fourths of ninth-grade public school students will have participated in CTE by their senior year and will earn at least one credit in high school in a career and technical education subject (U.S. Department of Education, 2019).

Career and Technical Education Strategy and Policy

The first federal policy to mention career and technical education (then known as vocational education) was the Smith-Hughes Act of 1917. That legislation formed the basis for federal support and guidance for education and training programs focused on preparation for work. Over the past 100 years, the original act has been periodically revised and funds have been reallocated.

The current legislation that provides key strategy and policy for career and technical education is the Strengthening Career and Technical Education for the 21st Century Act, known as Perkins V, signed into law in July of 2018 (there were four previous versions of the legislation, passed in 1984, 1990, 1998, and 2006). Perkins funding is distributed to states based primarily on the number of students enrolled in career and technical education programs. The majority of the Perkins funds are focused on secondary career and technical education (approximately 65%) while about 35% is earmarked for postsecondary programs, although individual states do have some flexibility in how they distribute their share of the federal Perkins funding. This act allows states to focus their Perkins funding in such areas as purchasing laboratory equipment and supplies, recruiting teachers, providing professional development to school staff, developing mentoring and support programs for students, and providing career guidance and academic counseling.

Another significant piece of federal legislation is the Workforce Innovation and Opportunity Act (WIOA), authorized in 2014, and overseen by the United States Department of Labor. The act, while not focused specifically on career and technical education, is designed to help job seekers access employment, education, training, and support services to succeed in the labor market as well as match employers with the skilled workers they need to compete in the global economy. States can use funding from WIOA to provide technical training to individuals through community and technical colleges as well as other training and education providers. Summer youth programs can also be developed with WIOA funds, to provide high-school age students with employment opportunities and workplace experiences.

Career and Technical Education Students

As mentioned, the majority of career and technical education students are enrolled at the secondary level. Virtually all secondary students in the United States have access to career and technical education courses and programs. However, the accessibility levels vary depending on each individual state's emphasis on career and technical education. Additionally, special student populations such as learners with disabilities, learners from economically disadvantaged families, students in fields of study that are non-traditional for their gender, single parents and out-of-workforce individuals, as well as under-served populations such as learners of color (Advance CTE, 2021) have found it difficult to access courses and programs, and many states are taking action to expand access. Efforts are also being made to include middle school programming that provides exploratory options at an earlier age.

Historically, career and technical education courses and programs have been categorized into six broad areas (fields of study). These include agricultural education, business education, family and consumer sciences, health occupations, marketing education, and trade and industrial education. Access to these fields of study can further depend upon geographic location and access to jobs and further education opportunities. In most states, career and technical education is considered an "elective," meaning that students are not required to take a course or program to graduate from high school or a community or technical college, and since career and technical education can be cost-intensive, only programming that will be fully enrolled will be offered to students.

Career and technical education at the secondary level offers several advantages and benefits to students. A recent study showed that students who "concentrate" their studies within career and technical education (students who take two or more credits within a field of study, such as agriculture or the health sciences) were more likely to graduate from high school than non-concentrators (students who did not study within career and technical education or pursue a "college-preparatory" program of studies). These career and technical concentrators were also more likely to enroll in postsecondary education (U.S. Department of Education, 2019). The same study that found higher graduation rates and higher levels of postsecondary enrollment for career and technical education concentrators also found that these same concentrators were employed full-time at higher rates after graduation from high school than non-concentrators, and had a higher median income (U.S. Department of Education, 2019).

Unfortunately, with 50 separate states, one of the challenges with determining the full impact of career and technical education on student outcomes is the lack of unified high-quality data tracking systems. Many states do not have longitudinal data systems connected to workforce or other data systems. Thus, programs must rely on student surveys to learn about student outcomes after graduation (Soricone, 2020). Survey responses are typically low and much of the data is subjective, rather than aligned to state employment and wage data.

Moving forward the true impact of career and technical education on students is an area that must be more stringently analyzed. Without it, the value and worth of career and technical education in the United States cannot be truly determined.

Career and Technical Education Teachers

There are currently over 209,000 career and technical education teachers in the United States (U.S. Bureau of Labor Statistics, 2021a). Preparation of these teachers can vary, but at the secondary level, there are state requirements that must be met to obtain a teaching license or certificate. There are two basic pathways for teacher preparation at this level. The first pathway, a traditional college/university degree with a specialization in an area of career and technical education, consists of general education courses (math, natural sciences, English, etc.), pedagogy courses such as teaching methods, student assessment and classroom/laboratory management, and content courses in the area of specialization (agriculture, business, family/consumer sciences, marketing, etc.). Students in this pathway must also complete student teaching under the mentoring of a veteran teacher, and depending on the state, pass a number of exit tests to obtain the teaching license or certificate. This pathway is also known as the preservice teacher preparation pathway, as the students complete all requirements before seeking and finding a teaching position.

The second pathway is best described as "alternative," wherein teachers are recruited from business and industry, primarily based on their work experience in the field in which they will be teaching. These teachers are hired, then undergo whatever teacher preparation is required by the state department of education in which they are employed. This pathway is also known as in-service teacher preparation, as the teachers are completing initial teacher licensure and certification requirements while teaching at the same time. While the requirements for the preservice pathway are fairly standard, the requirements for a career and technical education in-service teacher can vary widely from state to state, ranging from a few clock-hours of teaching workshops to as many as 24-36 university semester hours.

Requirements and preparation for postsecondary career and technical instructors are primarily set internally by the employing institutions, as most states do not have requirements for these faculty to have teaching licenses or certifications. Two-year college faculty are generally expected to have a degree in their teaching field, with the expectation that they have a significant amount of work experience in business/industry. Once hired, these institutions provide varying levels of professional development related to teaching in the two-year college environment.

Career and Technical Education Qualification Systems

Career and technical education programs in high schools, career centers, and community and technical colleges, as part of the U.S. educational system, must first meet any programmatic requirements of the states in which they reside, either through a department of education for secondary education, or a department of higher education for postsecondary education. The names of these departments will vary from state to state, but in general there is one approval organization for secondary and one for postsecondary.

In addition to these state requirements, many career and technical education programs offer industry-recognized certificates or credentials. These are established by individual professional organizations or business and industry corporations, or by states or the federal government. Examples of these include Veterinary Technician and Certified Welding Inspector (Professional Organizations), AutoCAD User and Cisco Certified Network Associate (business and industry corporations), licensed practical nurse and state-tested nurse assistant (state level) and Occupational Safety and Health Administration (OSHA) 10-hour safety training certificate (federal level). All of these except for the state-level certificates are transportable nationwide, that is, employers in other states will recognize the legitimacy of the certificate if a person moves from one state to another.

With respect to qualifications systems for apprenticeship programs, registered apprenticeship programs generally must have approval from the United States Department of Labor or a state apprenticeship agency. In order to become a registered apprenticeship program, three criteria must be met:

1. A specific occupation for the apprenticeship program must be identified
2. A training plan for the apprenticeship program must be developed
3. A training provider to instruct the classroom/technical training component of the apprenticeship program must be identified (U.S. Department of Labor, 2021b).

Career and technical education teacher preparation programs must meet state teacher licensure/certification requirements, as established by each state. Some states require their teacher preparation programs to be accredited by the Council for the Accreditation of Educator Preparation (CAEP). The organization evaluates teacher preparation programs against a set of five standards which seek to assure that program graduates are competent and caring educators. The five standards are:

1. Content and pedagogical knowledge
2. Clinical partnerships and practice
3. Candidate quality, recruitment, and selectivity
4. Program impact
5. Provider quality assurance and continuous improvement (CAEP, 2021)

Current Career and Technical Education Reforms and Policy Discussions

Career and technical education in the United States is ever-evolving. Responding to the needs of students, schools, local communities, states, employers, and the nation is a significant challenge. While no major reforms are taking place at present, and policy decisions in most states are guided by the most recent federal legislation, the decentralized nature of education in the United States means there is always change happening somewhere in the country. Each year, the non-profit advocacy organization Advance CTE publishes a "Year in Review" in which the individual state policies impacting career and technical education enacted in a given year are highlighted. In the latest 2021 publication, Advance CTE listed the five areas of policies that received the most attention from the 50 states (number of states enacting policies in 2020 in parentheses):

1. Funding (28)
2. Industry partnerships and work-based learning (17)
3. Access and equity (16)
4. Dual/concurrent enrollment, articulation, and early college (16)

5. Data reporting and/or accountability (16)

Some of these enacted policies form the basis for the following sections on trends and issues.

Trends and Issues in Career and Technical Education

Trends

The five trends discussed in this section are interrelated and are essentially aligned with the first trend, an increased interest in career and technical education. For many decades, vocational education (the previous name for the discipline in the United States) had a reputation as a "dumping ground" for troubled students, and was characterized by low academic standards, outdated curricula and facilities, and poorly prepared teachers. Many of these issues have been rectified and in part because of the factors below, interest in career and technical education has never been greater.

Increased Interest in Career and Technical Education at the Federal, State, and Local Levels

One of the primary drivers for the increased interest is a shortage of skilled labor, particularly in the technical trade fields of welding, carpentry, automotive technology, and electrical trades. Prior to the worldwide pandemic, the United States had 7.6 million unfilled jobs (Chamberlain, 2019), many of which were in technical skill areas, as companies sought to expand in a growing economy. However, a shortage of skilled labor kept much of the growth at a slow pace. Policymakers have taken notice, and in the last 2 U.S. fiscal years, funding for career and technical education has increased, albeit marginally. However, in many states, the interest in career and technical education is very evident, as state departments have increased funding, encouraged new programs and courses, and developed marketing initiatives to tout the benefits of career and technical education to students, parents, and school personnel.

A second reason for the increased interest is the realization that many good jobs in the United States do not require a bachelor's degree. For many years, the baccalaureate degree was seen as the only avenue for young people to achieve middle-class status and financial security. That is not the case today, partly due to a "blurring of the lines" in the U.S. labor market. Many high-paying jobs do not require a bachelor's degree, only high school technical training, or perhaps an industry-recognized credential or an associate degree from a community or technical college. According to the Occupational Outlook Handbook (2021), there are many jobs with excellent wages that do not require a bachelor's degree, such as electrical powerline installers, dental hygienists, aircraft mechanics, construction supervisors, and medical lab technicians. Another indicator of the lack of need for a bachelor's degree, and also the shortage of skilled labor, is the number of four-year college graduates returning to two-year colleges to learn skilled trades (Marcus, 2020). While on average, bachelor's degree holders earn more over a lifetime, many occupations requiring less formal education can lead to a successful career. As a result, community and technical colleges in many states have seen enrollment increases.

A third reason for the increase is that some see career and technical education as a solution to the many students who do not do well in school, do not find value in education, and either graduate school with little preparation for the workplace or further education, or worse yet, drop out of school without completing the requirements for a diploma. In 1988, a report published by the William T. Grant Foundation titled the "The Forgotten Half," focused on nearly 50% of U.S. students who were not prepared for postsecondary education, and also graduated with few marketable skills. This report, now more than 30 years old, is still a major impetus for advocating for more career and technical education, as completion of a structured program can both prepare a student for postsecondary education or provide an individual with skills to enter the workplace.

The dropout issue has been a longstanding problem in American schools. This is especially true in urban areas, where the dropout rate can exceed 50% of enrolled students. Recent policy papers by the Association for Career and Technical Education (2007) and the National Dropout Prevention Center (2015) have both suggested that career and technical education can have a positive impact on reducing school dropouts; thus, the concept of making school more relevant for young people continues to generate interest.

Renewed Interest in Conducting Research in Career and Technical Education

In 1978, the U.S. Bureau of Occupational and Adult Education established a National Center for Research in Vocational Education. Six goals were established, including applied research and development in vocational education; leadership development; dissemination of information; national planning and policy development; and development of a clearinghouse for information exchange and evaluation services (Gordon et al., 1979). The center was originally housed at The Ohio State University and continued for many years at various universities. The center was responsible for several hundred studies, policy papers, and professional development activities, but funding for the national center was ended by the U.S. Department of Education in 2015.

Recently there has been a renewed focus on research in career and technical education. While there is presently not a national research center, the U.S. Department of Education, through its research and statistics division, known as the Institute of Education Sciences (IES), funded a research network in 2018 for a 5-year period. The network, composed of individuals from universities, professional organizations, and research organizations was formed to "encourage information sharing, build new knowledge, and assist policymakers and practitioners to strengthen education policies and programs and improve student education outcomes” (Institute of Education Sciences, 2018). Several research reports have been completed and have focused on such topics as the impact of career and technical education on student achievement, student career choices and academic performance, and career and technical education students’ transitions to college and the labor market.

In addition, the Institute of Education Sciences (IES) began for the first time in 2018, a special request for grant proposals focused solely on career and technical education. Previous IES grant requests focused on academic subjects and other education-related topics. The new focus on career and technical education represents a heightened level of interest on research and best practices in the field. The latest fiscal year grant requests funded research projects for up to 5 years and ranged in funding levels from \$1.7 million USD to \$3.8 million USD (Institute of Education Sciences, 2020).

There is also increased interest in the primary professional research association for scholars and others with research interests in the relationship between education and work. The Association for Career and Technical Education Research (ACTER) has four goals:

1. To stimulate research and development activities related to career and technical education
2. To stimulate the development of training programs designed to prepare persons for responsibilities in research in career and technical education
3. To foster cooperative effort in research and development activities within the total program of career and technical education
4. To facilitate the dissemination of research findings and the diffusion of knowledge (ACTER, 2021)

ACTER publishes the journal *Career and Technical Education Research* three times a year. There is also an annual research conference usually in November or December, held in conjunction with the national conference on career and technical education, hosted by the lead professional association in the field, the Association for Career and Technical Education.

More Employer Involvement in Career and Technical Education

Career and technical education has been criticized in the past for the lack of employer involvement in many areas, including financial support, offering advice regarding curriculum and facilities, and providing opportunities for work-based learning. As a result, career and technical programming has struggled to align curricula with industry needs, classrooms and laboratories were outdated, teachers' skill levels languished, and students did not have "real-world" work experiences as part of their education, and often left school with little knowledge of the world of work.

The recent skilled labor shortage has prompted many employers to adopt a different approach. One recent study noted that 70% of employers reported talent shortages (Cox, 2020) as many individuals in the skilled trades are getting older, and there are not sufficient numbers of new workers with the requisite skills to take their place (Dowell, 2020). As a result, more employers are taking a keen interest in career and technical education. Across the country, there have been numerous examples of individual companies and industry trade organizations working to provide students, parents, and school personnel information on the benefits of employment in career and technical education-related fields.

One such example of this employer involvement is a collaboration between Honda Motor Company and Columbus State Community College in Columbus, Ohio. As the U.S. manufacturing sector began to grow in the late 2010s, a need for more young workers to have the foundational electrical and mechanical skills to work in manufacturing occupations became apparent. The two groups came together and developed a joint associate-degree program that combines classroom instruction with hands-on learning as well as placement in a work-study program in one of Honda's manufacturing facilities. As well as providing the work-study opportunity, Honda provided guidance in developing both the academic and technical coursework needed to prepare students for manufacturing careers. In a short time, more than 20 other companies signed on to become partners in the program (Burrow, 2018).

While the Honda and Columbus State Community College example is a significant effort to involve business and industry with education, many other smaller collaborative efforts are taking place in the United States that illustrate the increased involvement of employers. Advance CTE, a national advocacy group for career and technical education developed a "cheat sheet" (Advance CTE, 2019) to assist employers. Such activities include providing a guest speaker for classes, hosting a career fair, providing job shadowing opportunities for students, judging skill-based competitions, and donating equipment. All of these activities are increasing in number as more employers get involved with career and technical education.

More Career Counseling, with a Focus on Career Pathways

A relatively new curricular approach which is receiving significant attention is career pathways. As defined by the Workforce Innovation and Opportunity Act (WIOA) in 2014, a career pathway is a combination of rigorous and high-quality education, training, and other services that:

- aligns with the skill needs of industries in the economy of the State or regional economy involved;
- prepares an individual to be successful in any of a full range of secondary or postsecondary education options, including registered apprenticeships;

- includes counseling to support an individual in achieving the individual's education and career goals;
- includes, as appropriate, education offered concurrently with and in the same context as workforce preparation activities and training for a specific occupation or occupational cluster;
- organizes education, training, and other services to meet the particular needs of an individual in a manner that accelerates the educational and career advancement of the individual to the extent practicable;
- enables an individual to attain a secondary school diploma or its recognized equivalent, and at least one recognized postsecondary credential; and
- helps an individual enter or advance within a specific occupation or occupational cluster. [Section 3(7) of WIOA]

Career pathways seek to align secondary and postsecondary education to create a seamless journey for students to earn industry-recognized credentials and to gain technical skills and other educational credentials such as associate and bachelor's degrees.

As part of the Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV), the United States Department of Education developed 16 different career clusters in order to categorize the different occupational pathways. See Figure 2.

Figure 2 16 Career Clusters

16 Career Clusters

- Agriculture, Food, and Natural Resources
- Architecture and Construction
- Arts, A/V and Communications
- Business, Management, and Administration
- Education and Training
- Finance
- Government and Public Administration
- Health Science
- Hospitality and Tourism
- Human Services
- Information Technology
- Law, Public Safety, Corrections, and Security
- Manufacturing
- Marketing, Sales, and Service
- Science, Technology, Engineering, and Mathematics
- Transportation, Distribution and Logistics

Note. United States Department of Education, Office of Career, Technical and Adult Education.

As part of the career pathways initiative, the need to provide career counseling has increased. Successful career pathways provide a clear sequence of education courses and credentials that meet the skill needs of high-demand industries. Students must be given competent guidance as they navigate through their chosen pathway. Career counseling and clear communication of educational options are critical as the workplace and the needs of employers become more complex. As an illustration of this significant focus on career pathways, major employers are providing support. In 2020, JP Morgan Chase, a leading global financial services firm, committed $35 million USD. These funds will be divided among five major U.S. cities as part of Chase's global career readiness initiative, in an effort to develop equitable pathways and policy recommendations that give underserved students access to higher education and real-world work experiences that could lead to high-wage, in-demand jobs (JP Morgan Chase, 2020).

Increased Focus on Work-Based Learning

The United States Department of Education defines work-based learning as "An instructional strategy that enhances classroom learning by connecting it to the workplace." (United States Department of Education, 2021). This strategy has been on the increase in recent years, as more business-education partnerships are formed across the country. In the past, one of the criticisms surrounding career and technical education was the lack of business and industry as a key partner with educational institutions to provide "real-world" work experiences for students, particularly at the secondary level (Zirkle, 2012). However, as the need for skilled and technologically adept workers has increased, companies and organizations have become more willing partners in providing these opportunities.

The United States has a long history of providing similar types of experiences, mostly at the college/university level through "cooperative education." The first programs of this type were instituted at the University of Cincinnati in 1906 (Zirkle, 2016b). Many other universities developed postsecondary cooperative education programs and in 1957 the National Commission on Cooperative Education was developed. In 1994, President Clinton signed the School-to-Work-Opportunities Act, which was the first federal legislation designed to bring business, industry, and secondary education programs together in collaborative ways. Soon after President Clinton left office, the legislation (and funding) was discontinued, and many of the partnerships achieved through the School-to-Work Opportunities Act were minimized due to a lack of resources. However, this situation has now changed, as more employers are willing to support these activities by providing more opportunities for students in the workplace.

Work-based learning contains three components: the alignment of classroom and workplace learning; application of academic, technical, and employability skills in a work setting; and support from classroom or workplace mentors (United States Department of Education, 2021). This instructional strategy provides many benefits, including providing relevant learning opportunities for students by aligning the school curriculum with the worksite, connecting students with workplace professionals, and creating realistic experiences to assist students in making informed decisions about education options (Association for Career and Technical Education, 2020a).

In 2020, 12 states passed policies related to work-based learning and improving the industry partnerships needed for these learning activities to occur. For example, West Virginia created a summer youth intern pilot program to provide high school students with internship opportunities. These opportunities will provide programming that will allow them to explore and prepare for in-demand careers, gain work experience, and develop skills for occupations and entrepreneurship (Advance CTE, 2021). The state of Vermont established a work-based learning collaborative to help business and industry provide work-based opportunities with a space to network and build school-employer relationships. The state is also working to establish policies that would permit these experiences to translate into college credit that could be earned while students are still in high school (College and Career Readiness Center, 2019). Other states are providing grants for schools and employers to develop joint programs or to offset training costs.

Other efforts include developing training materials to support work-based learning activities, and improving interagency alignments between states' departments of education, labor, and other departments to better coordinate work-based learning activities with related federal legislation. Specific legislation such as the Individuals with Disabilities Education Act (IDEA), the Workforce Innovation and Opportunities Act (WIOA), and the Every Student Succeeds Act (ESSA), as well as the primary career and technical education legislation, the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) all contain language that encourages schools and business and industry to partner together for work-based learning.

Issues

Teacher quality and the ability of schools to hire and retain effective teachers has long been a struggle for many schools, and the funding shortages that have existed have not been rectified. Quality career and technical education requires high levels of funding, and increasing access to more students will only require more financial resources. Until these issues are completely resolved, the societal perceptions that have pervaded career and technical education will continue.

Teacher Shortages

Across the United States, there is a shortage of qualified teachers for the elementary and secondary (K-12) system, with recent estimates at more than 100,000 teachers needed nationwide (Garcia & Weiss, 2019). Career and technical education is an area in which the teacher shortage is evident; the need for teachers is a result of a number of factors, including a reduction in the number of career and technical education teacher preparation programs at colleges and universities, an aging teaching workforce, teacher retention concerns, and a growing interest in career and technical education courses and programs nationwide. Recent labor projections from the United States Bureau of Labor Statistics (2021b) found that 3,400 expected new openings for career and technical education teachers will need to be filled through the year of 2029.

Many students entering postsecondary education do not see teaching as an attractive option. Since 2010, enrollment in teacher preparation programs in U.S. colleges and universities has dropped by more than one-third (Partelow, 2019). This lack of interest has been attributed to low pay, school budget cuts, and a perception that teaching today is a much more demanding occupation than in decades past.

Adding to the concern of dwindling enrollment in teacher preparation programs, many colleges and universities, especially large land-grant universities which historically produced many new career and technical education teachers, have dropped their career and technical education teacher preparation programs or reduced their programs significantly in recent years due in part to budget cuts and specific focus on academic subject areas of teacher education. Some notable examples are the University of Minnesota, Oklahoma State University, Virginia Tech, and the University of Georgia.

The teacher population in the United States is aging. Several major studies, the most recent by Ingersoll et al. (2018), show a continuing trend of an aging teacher workforce. As previously mentioned, there are insufficient numbers of newly prepared teachers to take their place. The issue of teacher age is particularly concerning in career and technical education, where many teachers enter teaching later in life, through alternative teacher licensure pathways from industry, and tend to be older to begin with.

Echoing the lack of interest in becoming a teacher is a parallel challenge of teacher retention. The research conducted by Ingersoll and colleagues (2018) showed that over 40% of new teachers leave the profession after teaching 5 years or less. This leads to a "revolving door" of new teachers on a yearly basis and results in a lack of experienced teachers. Specific studies examining reasons why career and technical education teachers leave the profession have been sparse, but job stress and a lack of planning time and resources were cited by Ruhland (2001), while Elliot et al. (2017) found that teacher preparation, institutional support, and the teacher's commitment to the teaching profession all influenced retention. A more recent study by Zirkle et al. (2019) found that changes in licensure requirements affected retention, as did education levels. As career and technical education teachers obtained more education, such as graduate degrees, they were more likely to leave teaching, presumably for improved opportunities in the private sector.

With the increased interest across the United States for new career and technical education programs and courses, the teacher shortage has become an even more significant issue. In early 2020, the Association for Career and Technical Education held a national summit to examine the career and technical education teacher shortage and develop an action plan to address it. Some of the strategies suggested were the development of a national coalition of partners to discuss priority issues and related actions, conducting research to determine best practices in teacher preparation, and the development of a career and technical education "Teach Campaign" to promote general awareness about teacher recruitment and retention.

Hindered Opportunities for Teacher Professional Development (Particularly in a Pandemic)

Once a career and technical education teacher enters the profession, the issue of ongoing professional learning becomes increasingly important. To support the complex skills and knowledge students need to learn in preparation for further education and work in the 21st century, career and technical education teachers must not only become masters of the art and science of teaching but must also keep up their technical knowledge and skills. Defined as structured professional learning that results in changes in teacher practices and improvements in student learning outcomes (Darling-Hammond et al., 2017), teacher professional development is a key variable in ensuring that high-quality career and technical education courses and programs are accessible to all students.

Maintaining a high level of technical knowledge and skill throughout one's teaching career is an ongoing challenge for career and technical education teachers. Once removed from industry, teachers may not have access to continued training in their field. Technical updates are critical in many career and technical education teaching areas, such as automotive technology, nursing, information technology and other occupations in which technological change is constant. Career and technical education teachers are with their students on a daily basis, and release time to go to industry-sponsored workshops or training may not be practical. In cases where suitable substitute teachers may be found, there are financial costs involved, both for the cost of the substitute personnel and the actual workshop or training cost. Some teachers and schools attempt to address this issue through summer employment in industry, but this solution has limitations.

Professional development has become significantly more important at the present time due to the worldwide COVID-19 pandemic. Teachers have struggled to move classes online and deliver content in electronic formats. For career and technical education teachers, it can be extremely challenging, as the teaching of hands-on, skills-based material is more complex than academic content. Professional development topics have been focused on such topics as effectively using the district or institution's learning management system (LMS), accessible course design, virtual assessment, and student engagement in online environments (Association for Career and Technical Education, 2020b). During the pandemic many schools have adopted hybrid or blended learning approaches consisting of some in-person instruction on selected days and online instruction on other days. This approach also has implications as well for professional development, and career and technical education teachers have needed additional training on topics such as social distancing, blending online and face-to-face instruction, time management, and student accommodations.

Fortunately, there are many resources available to support all types of professional development. Many professional organizations, such as the National Education Association and the Association for Career and Technical Education, have many online resources related to topics such as learner characteristics, student development, teaching methods, assessment, and classroom management. From a technical perspective, many private companies and educational institutions offer online professional development for upgrading technical skills, such as the National Restaurant Association, the American Welding Society, Ford Motor Company, and John Deere (an agricultural manufacturing company).

Unequal Access to Career and Technical Education Courses and Programs

With the increased interest in career and technical education across the United States, one of the newest challenges is ensuring access to courses and programs, particularly for specific groups of students. This issue is of particular concern in the secondary education system, where wide variation in both the types of career and technical education programming available and student demographics illustrate the challenges of improving access to high-quality career and technical education.

Recent data show that more than 75% of all U.S. high school students take at least one career and technical education course credit in high school, and one-third take two or more course credits (U.S. Department of Education, 2019). However, within certain parts of the country, there are stark differences in career and technical education course-taking, not only in terms of the amount of career and technical education course credit earned, but also in the subject area. For example, in Indiana, the percentage of students taking two or more credits (known as a career and technical education “concentrator”) in a health sciences field was 26%, while in Colorado it was 3%. Thirty-three percent of the career and technical education concentrators in Louisiana were in a business-related area, while in Pennsylvania, it was 2% (U.S. Department of Education, 2019).

Perhaps the most significant concerns surrounding access to career and technical education courses and programs are those focused on specific student demographics. Learners with disabilities, economically disadvantaged students, students in single parent homes, and learners of color are just some of the special student populations who have issues with access to career and technical education courses and programs. While historically these groups were disproportionately tracked into low-quality career and technical training programs, the focus has now turned to ways to make high-quality career and technical education programming available to these groups of students. The National Alliance for Partnerships in Equity (2019) recently published a resource document designed to assist education professionals with addressing equity gaps for students in career and technical education. The comprehensive document provided common strategies applicable to all special populations, including partnering with community-based organizations with expertise in working with special populations, providing teachers and administrators with targeted professional development focused on special populations, and examining how school policies, technology, and administrative structures can contribute to unequal access (National Alliance for Partnerships in Equity, 2019). The document gave further guidance for improving access for specific special populations, such as students with disabilities, low-income individuals, learners with English as a second language, and students preparing to work in nontraditional fields.

Recent additional focus has centered on earlier exposure to career and technical education in schools. Several states, including Colorado, New York, and Ohio, have begun implementing introductory career and technical education courses as early as sixth grade. Some of the benefits of this type of early access are awareness of and exposure to a wide variety of careers and the development of employable skills, such as problem solving, time management, self-advocacy, and the development of foundational technical skills (Poiner, 2020). Earlier exposure to career and technical education is also seen as a drop-out prevention measure, as the later middle-grades is where many students begin to lose interest in school and see no relevance in their academic education. Introducing career and technical education at these grades may assist with a student's transition to high school.

Shortage of Funding for Career and Technical Education

Career and technical education in the United States is an expensive undertaking (Zirkle, 2016a). Equipment, supplies, and materials to appropriately structure courses and programs can be significant expenditures. It is estimated that career and technical education costs may be between 20-40% higher than those for general academic instruction (Foster et al., 2014). Funding for career and technical education comes from a combination of federal, individual state, and local (tax) sources.

At the federal level, funds from the Strengthening Career and Technical Education for the 21st Century Act (known as Perkins V) provide about 8–10% of the operational costs associated with a local school offering career and technical education courses and programs, totaling about $1.31 billion USD per year in the latest fiscal year 2021 funding (U.S. Department of Education, 2020). While this amount represents a small increase from the previous fiscal year, it only restores the funding level to approximately the same level as fiscal year 2004, when federal support was also $1.3 billion USD. So, in essence, federal support for career and technical education funding has remained flat for the past 17 years, while operational costs have increased significantly.

There are additional federal funding streams to support career and technical education. However, the funding amounts are much smaller when compared to Perkins V. Some of these include:

- Career Pathways for Youth Grant program, funded at $10 million for fiscal year 2021 and focused on expanding job training and workforce pathways for at-risk youth aged 14-21

- Strengthening Community College Training Grant, funded at $45 million for fiscal year 2021
- Apprenticeship Grant Program (funded through the U.S. Department of Labor), funded at $185 million USD, to support registered apprenticeships in a variety of career and technical education-related occupational areas.

Each state funds career and technical education at different levels through various state revenues. To make up for the lack of increases in federal funding, many states have implemented funding initiatives of their own. Twenty-three states enacted 28 policies in 2020 that affected career and technical education funding, making funding the most common policy category for the eighth year in a row (Advance CTE, 2021). Fourteen states increased their state level funding for career and technical education-related programs and initiatives, while eight states decreased funding. These uneven levels of financial support highlight the challenges in providing access to high-quality career and technical education. Some states provide more financial resources for career and technical education programming than others, and that directly impacts important educational variables such as curricula, instructor preparation, facilities, equipment, and program oversight.

In addition, funding for schools relies significantly on local tax revenues, which in the present economic climate can be difficult to increase. This reliance on local tax revenues can also produce disparities in resources, as wealthier communities can generate higher tax revenues, which translate to higher quality schools with better equipped classrooms and laboratories.

Negative Societal Perceptions of Career and Technical Education

Despite the growing interest in career and technical education across the United States, the field still struggles with lingering perceptions that it is seen as second-rate and as a dumping ground for students who are unmotivated, have behavior problems, or who struggle academically (Zirkle, 2016a). In addition, there is a competing perception in U.S. society that the only way for students to make a satisfactory income and achieve middle-class status is through attainment of a four-year college or university degree.

The first federal funding for career and technical education, the Smith-Hughes Act of 1917, provided funding to states for high-school level training programs in agriculture, home economics, and industrial trades. While this is seen through a historical lens as a significant initial indicator of government support for career and technical education, Smith-Hughes actually produced unintended effects in splitting the secondary-education curriculum in ways that often reinforced existing class- and race-based inequalities. Particularly for minority students, tracking into career and technical training programs of limited quality, with limited future opportunities for good jobs or additional education became the norm for many, and this persisted for many decades. While this tracking has largely disappeared, the erroneous perception still exists that career and technical education is for those individuals with limited academic abilities.

Career and technical education also has an extremely broad mission and serves a very diverse population of learners, many with widely varying goals. For many, career and technical education in high school or two-year college programs is a direct pathway to employment and entrance into the workforce. For some, it is preparation for a four-year college or university or entrance into the military. For still others, such as incarcerated individuals, career and technical education offers a second-chance to turn their lives around. Finally, for people gainfully employed, career and technical education offers the opportunity for further education and training leading to additional job responsibilities, promotions, and salary increases. Yet many people in U.S. society only think of career and technical education as very specific education and training provided in the last 2 to 3 years of high school, while the reality is that the field is much larger.

The worldwide pandemic has actually produced a positive effect on U.S. society's perception of career and technical education. More interest is being seen across the country in career and technical education programs focused on careers in the health occupations (Sparks, 2021). More notice is also being paid to occupations related to "essential workers" who are educated and trained in the career and technical education system, such as chefs, maintenance workers, carpenters, and lab technicians. So, despite the negative perceptions that still exist to a degree, career and technical education has evolved from a career and technical school model focused solely on "education for work" (Zirkle, 2011) to one that provides academics and skill development for higher education and careers in skilled trades, technology, and the applied sciences, and will be a key education partner as the country returns to normal from the pandemic.

Conclusion

In 1984, a report entitled *The Unfinished Agenda* was published by the National Commission on Secondary Vocational Education. The report was highly critical of the vocational education system in the United States, pointing out many areas in which it fell short of expectations, including preparation of teachers, access to quality courses and programs, and a lack of involvement on the part of business and industry. Since that time, many improvements have been made to curricula, classroom and laboratory spaces, teacher preparation, and to the methods used to evaluate the effectiveness of courses and programs. As noted in this chapter, even the name was changed, to career and technical education, to reflect a more contemporary view of the purpose and goals of the field. Zirkle (2016a) noted many of these improvements, and also described many of the challenges still facing career and technical education. Some of the challenges, such as funding and the teacher shortages, are still present and have been discussed in this chapter. However, as this chapter also points out, there are many positive trends which point to career and technical education finally being seen as a "first-choice" for many students instead of the historical "second-class" status it has suffered for many decades. While the agenda is far from finished, career and technical education is being recognized and utilized as a critical part of the education system in the United States and an even more significant part of the success of the nation's economy and workforce.

References

Advance CTE. (2019). *Cheat sheet: Opportunities for employer involvement in CTE*. Advance CTE.

Advance CTE. (2021). *State policies impacting CTE: 2020 year in review*. Advance CTE.

Association for Career and Technical Education. (2007). *Career and technical education's role in dropout prevention and recovery*. Association for Career and Technical Education.

Association for Career and Technical Education. (2020a). *Why is work-based learning important?* Association for Career and Technical Education.

Association for Career and Technical Education. (2020b). *High quality career and technical education: Planning for a COVID-19-impacted school year.* Association for Career and Technical Education.

Association for Career and Technical Education Research. (2021). *What we do*. https://www.acteronline.org/what-we-do

Burrow, G. (2018, February 22). *Columbus State Community College partners with Honda to create engineering technology program*. Economic Modeling, LLC. https://www.economicmodeling.com/2018/02/22/columbus-state-community-college-partners-honda-create-engineering-technology-program/

College and Career Readiness and Success Center. (2019). *Learning from the field: WBL practices from states*. American Institutes for Research.

Council for the Accreditation of Educator Preparation (CAEP). (2021). The 2013 standards. Council for the Accreditation of Educator Preparation.

Cox, J. (2020, February 19). *It's never been this hard for companies to find qualified workers*. https://www.cnbc.com/2020/02/19/its-never-been-this-hard-for-companies-to-find-qualified-workers.html

Darling-Hammond, L., Hyler, M., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.

Dowell, E. (2020, November). *Manufacturing faces a labor shortage as work-*

force ages. United States Census Bureau. https://www.census.gov/library/stories/2020/11/manufacturing-faces-labor-shortage-as-workforce-ages.html

Elliot, K., Dainty, J., & Jones, J. (2017). A descriptive study of factors influencing the retention of secondary agriculture teachers. *Career and Technical Education Research, 42(1), p. 3-19.DOI: 10.5328/career and technicalr42.1.3*

Foster, L., Klein, S., & Elliott, B. (2014). *State strategies for financing career and technical education*. U.S. Department of Education.

Garcia, E., & Weiss, E. (2019). *The teacher shortage is real, large and growing, and worse than we thought*. The Economic Policy Institute. https://www.epi.org/publication/the-teacher-shortage-is-real-large-and-growing-and-worse-than-we-thought-the-first-report-in-the-perfect-storm-in-the-teacher-labor-market-series/

Gordon, R., Leeke, B., & Shook, D. (1979). *Projects in progress – FY 1978: A report for the coordinating committee on Research in Vocational Education*. The National Center for Research in Vocational Education.

Ingersoll, R., Merrill, E., Stuckey, D., & Collins, G. (2018). *Seven trends – the transformation of the teaching force*. University of Pennsylvania Consortium for Policy Research in Education.

Job Corps. (2021). *What is Job Corps?* https://www.dol.gov/agencies/eta/jobcorps

JP Morgan Chase. (2020, October 20). *JP Morgan Chase committing $35 million in five U.S. cities to prepare young people for future of work*. https://www.jpmorganchase.com/news-stories/jpmc-committing-35-mm-in-five-us-cities-to-prepare-young-people-for-future-of-work

Keller, A., Zirkle, C., & Barabasch, A. (2019). Focal points of VET teacher training: A comparison of VET teacher education in the USA and Switzerland. *Compare: A Journal of Comparative and International Education*. https://doi.org/10.1080/03057925.2019.1682519

Marcus, J. (2020). *More people with bachelor's degrees go back to school to* *learn skilled trades*. The Hechinger Report. https://hechingerreport.org/more-people-with-bachelors-degrees-go-back-to-school-to-learn-skilled-trades/

Military One Source. (2019, April 22). *Military jobs: Your future career in the armed forces*. https://www.militaryonesource.mil/military-life-cycle/new-to-the-military/getting-settled/your-future-career-in-the-armed-forces/

National Alliance for Partnerships in Equity. (2019). *Strategies for special population success: Practical tools and tips for educators*. National Alliance for Partnerships in Equity.

National Center for Education Statistics (2021). *Digest of educational statistics*. National Center for Education Statistics.

National Commission on Secondary Vocational Education. (1984). *The unfinished agenda: The role of vocational education in the high school*. National Center for Research in Vocational Education.

National Dropout Prevention Center. (2015). 15 effective strategies for dropout prevention. National Dropout Prevention Center.

Partelow, L. (2019). *What to make of declining enrollment in teacher preparation programs*. Center for American Progress. https://www.americanprogress.org/issues/education-k-12/reports/2019/12/03/477311/make-declining-enrollment-teacher-preparation-programs/

Perkins Web Portal. (2021). *Perkins data explorer*. https://perkins.ed.gov/pims/DataExplorer/CTEParticipant

Poiner, J. (2020). *Broadening career and technical education to include middle grades*. Thomas B. Fordham Institute.

Ruhland, S. (2001). *Factors influencing the turnover and retention of Minnesota's secondary career and technical education teachers*. Paper presented at the Annual Meeting of the Association for Career and Technical Education, New Orleans, Louisiana, 2001.

Soricone, L. (2020). *Breaking ground: A first look at American high school skilled trades education*. Jobs for the Future.

Sparks, S. (2021, March 2). *Student interest in health-care careers takes off*

during pandemic. Education Week, https://www.edweek.org/teaching-learning/student-interest-in-health-care-careers-takes-off-during-pandemic/2021/03
United States Bureau of Labor Statistics. (2021a). *Career and technical education teachers*. https://www.bls.gov/ooh/Education-Training-and-Library/Career-and-technical-education-teachers.htm
United States Bureau of Labor Statistics. (2021b). *Occupational outlook handbook*. https://www.bls.gov/ooh/
United States Department of Education. (2019). *Bridging the skills gap: Career and technical education in high school*. United States Department of Education.
United States Department of Education. (2020). *Perkins state allocations*. United States Department of Education.
United States Department of Education. (2021). *Work-based learning toolkit*. United States Department of Education.
United States Department of Education, Institute of Education Sciences. (2018). *Expanding the evidence base for career and technical education (CTE) – Research Network Lead*. United States Department of Education, Institute of Education Sciences. https://ies.ed.gov/funding/grantsearch/details.asp?ID=2226
United States Department of Education, Institute of Education Sciences. (2020). *Education research grant program FY 21*. United States Department of Education, Institute of Education Sciences.
United States Department of Labor. (2020). *Registered apprenticeship national results fiscal year 2019*. https://www.dol.gov/agencies/eta/apprenticeship/about/statistics
United States Department of Labor. (2021a). *History and Fitzgerald Act*. https://www.dol.gov/agencies/eta/apprenticeship/policy/national-apprenticeship-act
United States Department of Labor. (2021b). *Register your program*. https://www.apprenticeship.gov/employers/registered-apprenticeship-program/

register
W. T. Grant Foundation. Commission on Work, Family, and Citizenship (1988). *The forgotten half: Non-college youth in America. An interim report on the School-to-Work transition*. W. T. Grant Foundation.
Workforce Innovation and Opportunity Act of 2014, Public Law 113-128.
Zirkle, C. (2011). The multi-tiered career and technical education/VET system in the United States – from high school to four-year colleges. In F. Rauner & A. Barabasch (Eds.), *Work and education in America: The art of integration* (pp.33-51). Springer.
Zirkle, C. (2016a). A qualitative analysis of high school level career and technical education in the United States: Three decades of positive change. In M. Pilz (Ed.), *Youth in transition: Career and technical education and training in times of economic crisis*. Springer.
Zirkle, C. (2016b). *The use of work-based learning experiences in U.S. colleges and universities: A discussion and case study*. Paper presented at International Conference on Work-Based Learning, Okayama, Japan, Okayama University.
Zirkle, C. (2018). Career and technical teacher preparation in the United States. In: McGrath S., Mulder M., Papier J., Suart R. (Eds.), *Handbook of career and technical education and training: Developments in the changing world of work. Cham, Switzerland: Springer. doi*:https://doi.org/10.1007/978-3-319-49789-1_31-1
Zirkle, C., Jeffery, J., & Schrewe, L. (2019). A longitudinal study of alternatively licensed career-technical teachers. *Career and technical Education Research, 44 (1), 23-47*. https://doi.org/10.5328/career and technicalr44.1.1
Zirkle, C., & Martin, L. (2012). Challenges and opportunities for career and technical education and training (TVET) in the United States. In M.Pilz (Ed.), *The future of career and technical education and training in a changing world*, (pp. 9-24). Springer.
Zoukis, C. (2015). *Vocational training in prison*. Zoukis Consulting Group.

Appendix

List of Organizations and Agencies in the United States with a Focus on Career and Technical Education

Organization/Agency	Website URL	Description
Advance CTE	https://careertech.org/	National non-profit that represents state career and technical education directors responsible for secondary, postsecondary and programs across all 50 states, the District of Columbia, and U.S. territories.
American Association of Community Colleges	https://www.aacc.nche.edu/	The primary advocacy organization for the nation's community colleges. The association represents nearly 1,200 2-year, associate degree-granting institutions.
American Technical Education Association	https://www.ateaonline.org/	Professional association focused on the purposes of postsecondary technical education. Dedicated to excellence in the quality of postsecondary technical education with emphasis on professional development for instructors and teachers.
Association for Career and Technical Education (ACTE)	https://www.acteonline.org/	Largest national education association focused on career and technical education. Has more than 25,000 members.

Organization/Agency	Website URL	Description
Association for Career and Technical Education (ACTER)	https://www.acteronline.org/	Professional association for scholars with research interests in the relationship between education and work.
Career and Technical Education Research Network	https://cteresearchnetwork.org/	Conducts and promotes high quality studies examining the impact of career and technical education.
Center on Education and the Workforce	https://cew.georgetown.edu/	An independent nonprofit research policy institute housed at Georgetown University that studies the link between education, career qualifications and workforce demands.
Center on Education and Training for Employment	https://cete.osu.edu/	A translational research center housed at The Ohio State University that bridges research and practice through work in assessment, equity, engagement and evaluation, corrections education, curriculum and training, professional learning for educators, and family engagement.
Council for the Accreditation of Educator Preparation (CAEP)	http://caepnet.org/	Professional association that evaluates and provides accreditation for teacher preparation programs.

Organization/Agency	Website URL	Description
Job Corps	https://www.jobcorps.gov/	Largest nationwide residential career training program in the country. Helps eligible young people aged 16-24 complete their high school education and trains them for meaningful careers.
National Coordinating Council for Career and Technical Student Organizations	https://www.ctsos.org/about-us/	Provides communications and coordination of efforts for eight Career and Technical Student Organizations (CTSO).
Perkins Collaborative Resource Network	https://cte.ed.gov/	Provides educators, secondary and postsecondary administrators, and industry stakeholders with current information and resources about the Perkins Act.
United States Bureau of Labor Statistics (BLS)	https://stats.bls.gov/	A unit of the United States Department of Labor. The BLS is the principal fact-finding agency for the U.S. government in the broad field of labor economics and statistics.
United States Department of Education, Office of Career, Technical, and Adult Education (OCTAE)	https://www2.ed.gov/about/offices/list/ovae/index.html	United States government office that administers and coordinates programs that are related to adult education and literacy, career and technical education, and community colleges.

Organization/Agency	Website URL	Description
United States Department of Labor, Apprenticeships	https://www.apprenticeship.gov/	United States government office that administers and coordinates registered apprenticeship programs.
University Council for Workforce and Human Resource Education	http://www.theuniversitycouncil.org	Nonprofit organization representing the nation's leading universities. Provides leadership for teaching, research, and service initiatives in career and technical education and human resource development.

Technical and Vocational Education Trends and Issues in Viet Nam

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Abstract

Over the past decade, the training and preparation of skilled human resources has been paid due attention to by the Vietnamese Communist Party and State, and has experienced many positive changes in social awareness, number of enrolments, and quality and effectiveness of training. The system of legal regulations on technical and vocational education (TVE) has been gradually improved. The government's strategic orientation to TVE and skills development will be followed by a coming TVE Development Strategy period from 2021-2030. Thus, the main trends include the digitization of TVE, high quality, autonomy and accountability, more open TVE for inclusive and sustainable development, financing for TVE, workplace-based training, mutual recognition of skills and qualifications, and development of both teachers and in-company instructors. However, the number, structure, and quality of skilled workers have not yet met the requirements of socio-economic development, especially in the context of the impact of the COVID-19 pandemic, automation, digitization, as well as the Fourth Industrial Revolution (IR4.0) with technological disruptions, and international competitiveness and integration. Gaps and issues of the TVE system can be listed as governance weakness, limited national occupational skills standards (NOSS) and certification, lack of financing source for TVE, low and ineffective quality assurance, reluctant involvement of the business community, lack of standardized monitoring and evaluation, limited readiness of TVE for the ASEAN Economy Community (AEC), and last but not least, the image of TVE in society. The purpose of this chapter is to identify the recent TVE trends in Viet Nam, systematic issues, and discourses on TVE development policy for the next decade. The term TVE used in this chapter is synonymous with Vocational Education and Training (VET) or Technical and Vocational Education and Training (TVET) that is more common in Viet Nam and the ASEAN.

Keywords: TVE, skills, trends, issues, Viet Nam

Introduction

The Vietnamese Government is strongly committed to enhancing human resources as part of its strategy for economic development. The Government recognizes the challenges of aligning the workforce development system to the needs of a rapidly growing economy, and has articulated an explicit set of policies and strategies, with specific targets and operational plans, to strengthen the system. There are three pillars for sustainable economic development: (i) application of new technology; (ii) infrastructure development; and (iii) increasing quality of human resources, including those with skills development and technical and vocational education (TVE) qualifications. The XIII Vietnamese Communist Party Congress approved the Socio-Economic Development Strategy for the period 2021-2030, shaping the national development model towards modern industry (in 2030) and as a developed country (in 2045), and once again emphasizing the development of human resources, especially high-quality human resources, as one of the three strategic breakthroughs, and clearly stating the orientation of building an open and flexible TVE system. Developing and raising the quality of TVE is, therefore, a requirement set forth by the country for the purpose of contributing to the enhanced quality of human resources and competitiveness of the overall economy. This is the basis and a very important premise for the development of TVE in the coming time.

Over the past 10 years, the training, retraining, and preparation of skilled human resources has been paid great attention to by the Government which has made many positive changes in awareness, enrollment scale, training quality, and effectiveness. The system of legal regulations for TVE has been gradually improved; the network of TVE institutions has developed widely and varies in the types and qualifications; quality has been enhanced; and a growing number of high-quality training models have appeared. Training in association with the needs of businesses has been provided, making an important contribution to improving the quality of the human resources and socio-economic development of the country.

The policy of streaming secondary school graduates is institutionalized by the provisions of laws and bylaws. The regulations for enrollment in TVE were changed and adjusted to suit the new conditions; the autonomy of TVE institutions has been strengthened; the number of enrolments continues to increase compared to previous years; and the number of enterprises cooperating with TVE institutions has increased significantly (NIVT, 2020).

However, the scale, structure, and quality of skilled human resources still do not meet the requirements of socio-economic development, especially in the context of automation trends, digitalization, the impact of the Fourth Industrial Revolution, and international integration.

In the Global Competitiveness Report 2019 of the World Economic Forum (WEF), Viet Nam ranked 93rd and 102nd out of 141 economies in terms of Skills Pillar and vocational training quality (Table 1). In ASEAN countries, it falls far behind Singapore, Malaysia, Indonesia, and Thailand. Although the Skills pillar has risen four ranks, it still ranks below the overall ranking in terms of the country's competitiveness (93 vs. 67). Outstanding in ASEAN with the quality of its vocational training, Viet Nam has jumped 13 ranks compared with 2018, followed by Cambodia (six ranks) and Brunei (five ranks). It is worth noting that with the ranked top-4 ASEAN economies, only Singapore was promoted (two levels), while Malaysia, the Philippines and Indonesia were relegated in terms of vocational training quality from three to four levels compared with 2018.

Although the ranking in the ASEAN region in the quality of Vocational Training did not change, the 13th jump of Viet Nam from 2018 - 2019 in the GCI Training Indicator 6.03 is still considered an optimistic thing for improving the quality of TVE in the coming years. This proves clear changes in enterprises' perceptions of the quality of the vocationally trained workers.[1]

Table 1 Competitiveness Index by Skills Pillar and Vocational Training Quality Indicator of ASEAN Countries in 2019 (out of 141 economies)

No	Economy	Skill Pillar	Quality of TVE
1	Singapore	19	6
2	Malaysia	30	12
3	Philippines	67	29
4	Indonesia	65	37
5	Brunei	59	49
6	Thailand	73	74
7	Laos	104	97
8	Viet Nam	93	102
9	Cambodia	120	112
10	Myanmar	NA	NA

Source: Counted on Global Competitiveness Index - GCI 4.0, World Economic Forum, 2019.

Current ASEAN Economic Community (AEC) policies for managing migration are confined to high-skill professions. The main tools for achieving labor mobility under the AEC are likely to be the mutual recognition arrangements (MRAs). These establish the skills or experience relevant professionals need in order to gain certification in another country, and ultimately to work abroad. There have been MRAs in eight occupational categories: engineering services, nursing services, architectural services, surveying qualifications, medical practitioners, dental practitioners, accountancy services, and tourism professionals.

In support of the MRAs, ASEAN endorsed the ASEAN Qualifications Reference Framework (AQRF) that will enable qualifications to be compared across member states while providing a coherent benchmark for current national qualifications frameworks. The referencing process is an autonomous national process where the relevant national stakeholders and authorities agree

1. World Economic Forum (2020), The Global Competitiveness Index GCI4.0

on a link between each national qualification level and a level in the AQRF. This link between the national qualifications level and the AQRF level is the outcome of the referencing process and enables further linkage, through the AQRF, to the qualification levels in other ASEAN member states (AMS).

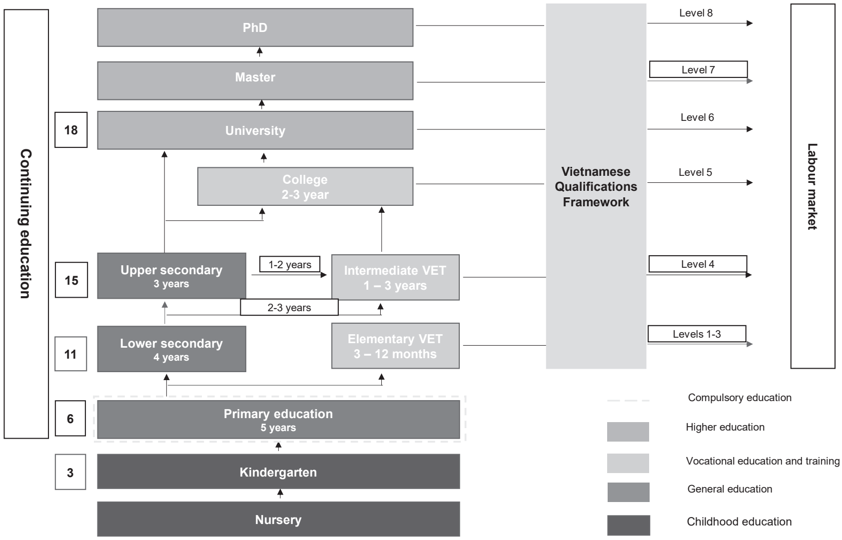
TVE Law 2014 Emerging Sub-Qualifications Systems

Before July 2015, TVE institutions could be divided into two parts in Viet Nam. One part was vocational training, which was run under the administration of the Ministry of Labor, Invalids and Social Affairs (MOLISA). According to the Education Law (2005) and the Vocational Training Act (2006), vocational training institutions could be classified into three types according to the credentials they offered: namely, vocational training centers, middle vocational schools, and higher vocational colleges.

The other part was intermediate professional education which was run under the state supervision of the Ministry of Education and Training (MOET) according to the Education Law and other Decrees of the Government. Another institution type was colleges that belonged to higher education.

According to the TVE Law 2014, Viet Nam has had only a single type of TVE at college level as well as intermediate level since July 2015. There are no longer colleges at the higher education level. Every TVE institution must be autonomous in its learning outcomes based on curricular development with credit or modular modality.

Figure 1 TVE in the Vietnamese Education System



Source: Drawn from Prime Minister's Decision 1981/QD-TTg (2016) and Decision 1982/QD-TTg (2016).

Viet Nam TVE has been basically a school-based system that heavily relies on the state budget, although the company's level of investment in their staff training and development reached 49.4 points percentage, ranked 73/141 in 2019, an increase of eight levels compared to 2018 (WEF, 2020). Within 5 years (2014 - 2018), the number of public TVE institutes decreased by 79, while non-public TVE institutes increased by 27 and foreign-invested TVE institutes rose from one to seven. Private sector participation in TVE is notable as non-public TVE institutes increased by 17 in 2019.

The Status of TVE

TVE Key Statistics

The results of the National Institute for Vocational Education and Training

(NIVT)'s "Survey of TVE needs with employment to meet the labor market demand in 2019" showed that the total number of key vocational trained workers with new recruitment needs in 2021 is about 815,000 people, and by 2022 is projected to be around 817,000 people, of which the demand for recruiting new workers with college level is the highest (44.1% and 43.9% respectively), followed by intermediate level (36.0% and 35.5%) and elementary level (19.9% and 20.6%).[2] There have been 669 qualifications at college level (VQF 5) and 897 at intermediate level (VQF 4). However, elementary level qualifications have not been reported for national data availability, although its proportion is over 70% every year in the TVE system.

In 2019, the country's total enrollment was 2,338,000 individuals, of which about 236,000 college students accounted for 10%; about 332,000 intermediate level students accounted for 14.2%; and about 1,770,000 trainees enrolled in elementary level and other vocational training programs accounted for 75.8%[3].

In the same year, there were about 2,200,000 people graduating from TVE institutions, of which 202,000 graduated from colleges, accounting for 9.2%; the intermediate level is 294,000, accounting for 13.4%; elementary level and other vocational training programs are 1,704,000, accounting for 77.4%.

The rate of college and intermediate graduates having a job right after graduation is over 80%, of which the rate of college graduates having jobs is 85%, and the intermediate level is 80%.

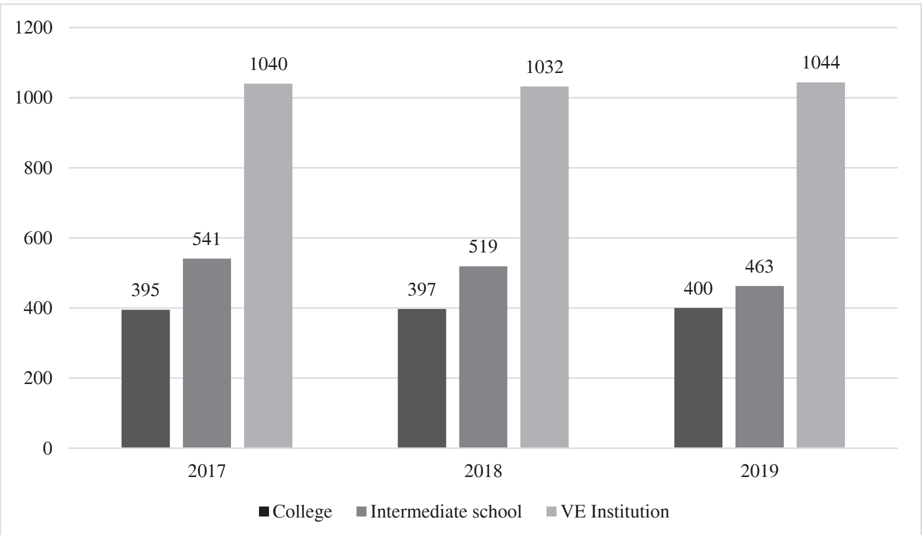
By December 2019, the total number of TVE institutions was 1,907, 41 fewer establishments compared to 2018 and 73 fewer compared to 2017 (Figure 2). The Party Resolution No. 19-NQ/TW dated 25/10/2017 specifies the continu-

2. National Institute for Vocational Education and Training (NIVT, 2020), Viet Nam Vocational Education and Training Report 2019.

3. *Id.*

ing reform of the organization and management system, and improvement of the operational quality and effectiveness of public service institutions. It defines a fundamental and comprehensive reform of public service institutions to ensure a light and reasonable organizational structure, capability of autonomy and good governance, effective and efficient operation that can help these institutions play a key role in the public service market. As a result, it should merge public secondary TVE schools with colleges and dissolve inefficient public TVE institutes. At the district level, centers of continuing education, centers of career guidance, and vocational training centers should be merged into a single entity named TVE-Continuing Education Centers.

Figure 2 Number of TVE Institutions by Type for the Period 2017 – 2019



Source: Directorate of Vocational Education and Training, 2020.

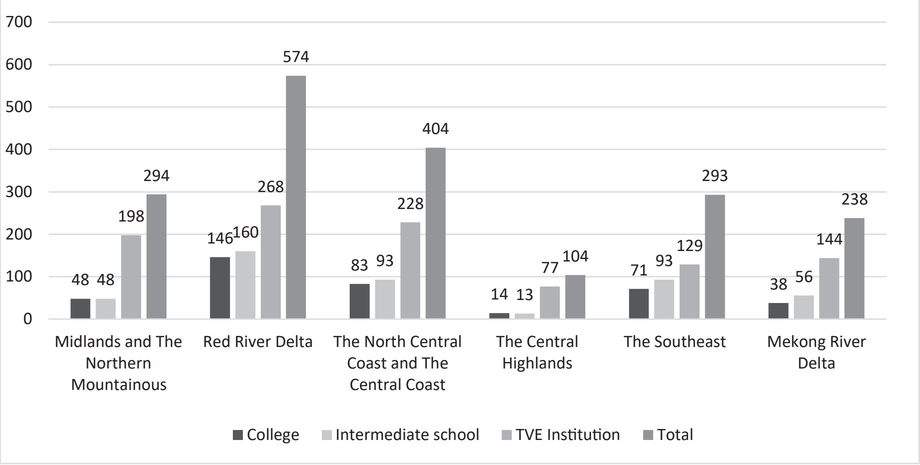
In three years, there was an opposite increase and decrease among different types of TVE institutions. The number of colleges has increased but not significantly, with just five schools, whereas the number of TVE intermediate schools has decreased significantly to 78 (in 2018, it decreased by 22 schools, in 2019, by 56 schools).

TVE Institutions by Socio-Economic Region

The network of TVE institutions exists nationwide, and it is diverse in types, training levels, and operating models. The government has planned a network of high-quality vocational schools, and key national, regional, and international occupations for each vocational training institution, and for each region, locality and training level. It has also formed and built a number of specific vocational schools to train people with disabilities, ethnic minorities, schools for gifted industries (culture, arts, sports), and political schools. However, if the system of TVE institutions is unreasonably distributed among regions, it will affect the training and provision of local human resources for labor markets in socio-economic regions. In fact, vocational training institutions are concentrated mainly in the Red River Delta with 574 establishments, accounting for 30.09%, while the North and South-Central region has 404 institutions, accounting for 21.18%. The number of vocational training institutions is less than 20%, on average: The Midlands and Northern Mountains have 294 establishments, accounting for 15.41%, the Southeast has 293 institutions, accounting for 15.36%, while the Central Highlands and Mekong River Delta has 342 institutions, accounting for 17.93% (see Figure 3).

Figure 3 TVE Institution by Socio-Economic Region

Unit: Institution



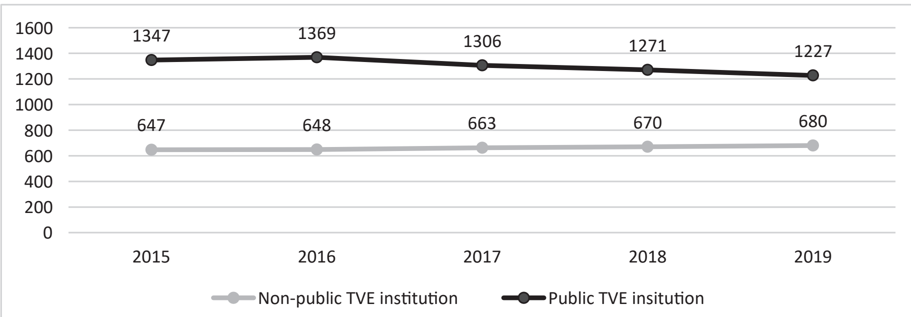
Source: Directorate of Vocational Education and Training, 2020.

TVE Institutions by Type

According to the 5-year statistics for the 2015-2019 period, public TVE institutions decreased annually; in 2015 there were 1,347 institutions, but by 2019 it had decreased to 1,227 establishments (a decrease of 120 establishments). Non-public foreign-owned TVE institutions have gradually increased over the years. There were 647 institutions in 2015, and 680 (an increase of 33), of which foreign-invested TVE institutions did not increase (there are seven establishments including four colleges, one TVE secondary school and two training centers) in 2019 (Figure 4).

Figure 4 The Trend of Changing Numbers of TVE Institutions by Ownership From 2015-2019

Unit: Institution



Source: Directorate of Vocational Education and Training, 2020.

Legal Framework for TVE

There are 38 legal documents (decrees, decisions, and circulars) which have been enforced to guide the application of the new TVE legislation, including processes and policies for classes of learners, trainers, and managers, TVE institutions' autonomy and accountability, quality standards and accreditation, and tuition exemptions for vulnerable groups and others.

First and foremost, in 2014, the Law on Vocational Education was enacted by the National Assembly. It established a greatly strengthened legal basis for fundamental enhancements of Viet Nam's complex TVE system. Under Article 1, this Law covers the regulation about the TVE system, the administration and functioning of TVE institutions, as well as the rights and responsibilities of associations and persons participating in TVE[4]. The Government has assigned the MOLISA to perform the task of state management of TVE[5]. MOLISA has released a number of legislative documents directing the enforcement of the Law on Vocational Education and Training in order to address the lack of cooperation in administering the state management of TVE. Under the Law on Vocational Education and Training (2014), it has regulated in detail the aim of TVE, and state policies on TVE development. It also clearly stated that the budget for TVE is given priority in total state budget expenditure on education and training under Section 3, Chapter II of the Law.

On the other hand, in 2019, the Education Law was adopted, which creates an open path to build more learning opportunities for lower secondary graduates following the policy of streaming students after graduating from secondary school and transferability among different education levels[6]. Accordingly, pursuant to the Minister of Education and Training's regulations, the new provisions of the Education Law 2019 enable lower secondary graduates to study upper secondary subjects at TVE institutions, which is an open path for TVE to introduce a strategy of streaming students after secondary school.

Additionally, Circular No. 07/2019/TT-BLDTBXH dated 7/3/2019 has created more favorable conditions for colleges and intermediate schools on enrollment

4. Law on Vocational Education and Training, November 27, 2014, Art 1.
5. Ministry of Labor, Invalids and Social Affairs (MOLISA), Transfer of vocational education and training management from the Ministry of Education and Training to the Ministry of Labor, Invalids and Social Affairs, http://www.molisa.gov.vn/Pages/tintuc/chitiet.aspx?tintucID=26075.
6. *Supra* note 1.

regulations, and identifies enrollment quotas at intermediate and college levels. In particular, the application form for admission to TVE is consistent, has basic information, is sufficient for the admission of the schools, and is suitable for both direct registration and online registration. Nowadays, learners can register for TVE in many forms including by direct registration and online on the website or on mobile devices.

TVE Students

According to the report “Assessment of enrollment, training and job creation in 2019 and tasks and solutions in 2020” of the Directorate of Vocational Education and Training, the number of enrollments in 2019 for the whole country was 2,338,000, of which the enrollment in intermediate and college degrees was around 568,000, accounting for 24.7% of the total enrollment in TVE in 2019 (Figure 5), particularly:

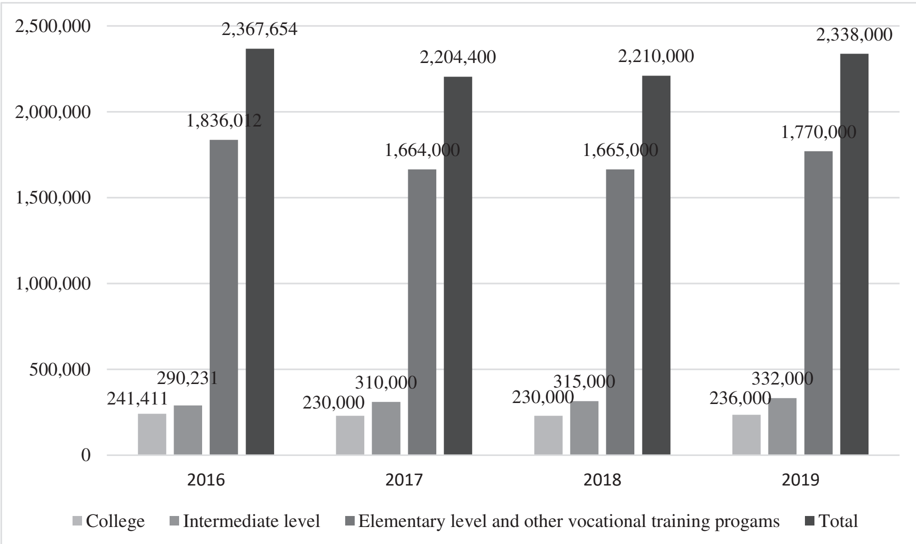
College level was about 236,000, accounting for 10% of the total enrollment in TVE in 2019.

Intermediate level was about 332,000, accounting for 14.2% of the total enrollment in TVE in 2019.

Elementary level and other vocational training programs were still the main ones with about 1,770,000, accounting for 75.8% of the total enrollment.

Figure 5 Enrollment Figures for the Period 2016 – 2019

Unit: Persons



Source: Directorate of Vocational Education and Training, 2020.

Enrollment Figures by Socio-Economic Region

The Red River Delta enrolled 675,483 students, accounting for 29% of the total enrollment in TVE in 2019, of which colleges accounted for 61,247, intermediate level, 109,418, and elementary level and other vocational training programs, 504,818.

The Midlands and Northern mountainous recruited 231,078 students, accounting for 10% of the total enrollment in TVE in 2019. Specifically, colleges accounted for 16,967, intermediate level, 44,283, and elementary level and other vocational training programs, 169,828.

The North Central Coast and Central Coast recruited 467,835 students, accounting for 20% of the total enrollment in TVE in 2019, of which colleges enrolled 52,336, intermediate level, 63,230, and elementary level and other vocational training programs, 352,269.

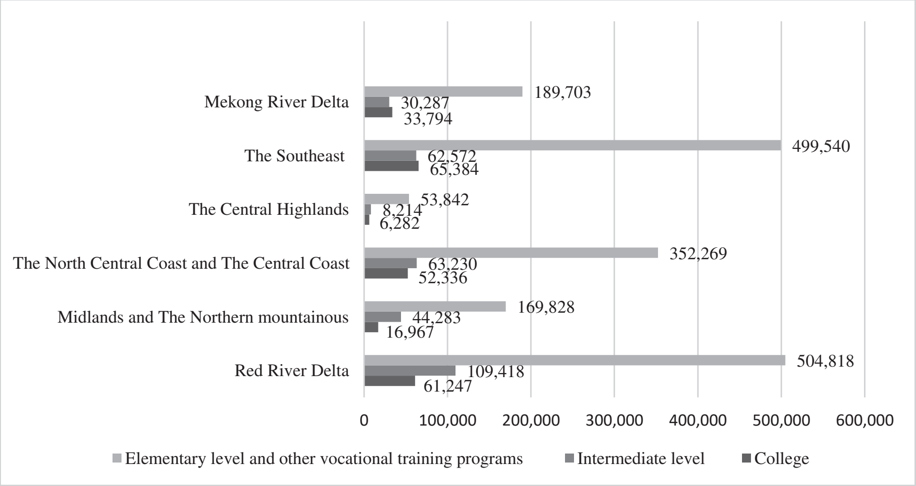
The Central Highlands enrolled 68,338 students, accounting for 3% of the total enrollment in TVE in 2019 of which colleges accounted for 6,282, intermediate level, 8,214, and elementary level and other vocational training programs, 53,824.

The Southeast recruited 627,496 students, accounting for 27% of the total enrollment in TVE in 2019 of which colleges accounted for 65,384, intermediate level, 62,572 people, and elementary level and other vocational training programs, 499,540.

The Mekong Delta River enrolled 253,784 students, accounting for 11% of the total enrollment in TVE in 2019, of which colleges enrolled 33,794, intermediate level, 30,287, and elementary level and other vocational training programs, 189,703.

Figure 6 Enrollments by Socio-Economic Region in 2019

Unit: Person



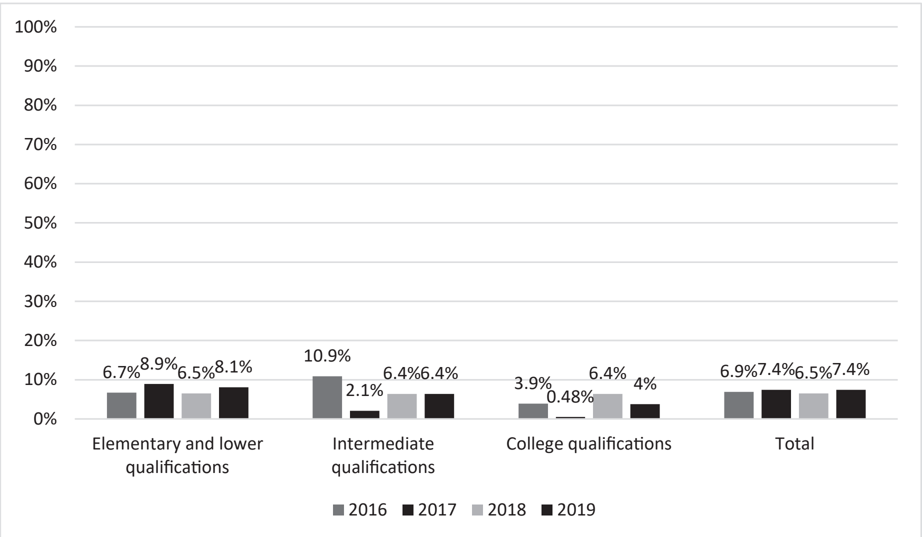
Source: Directorate of Vocational Education and Training, 2020.

Enrollments by Ethnic Minority Group

The Kinh ethnic group showed a remarkable increase in the number of students during the period of 2016 – 2019; in particular, 1,748,913 trainees in 2016 increased to 2,164,597 in 2019. Other ethnic groups have also shown an increase in the number of enrollments in TVE, with 173,403 trainees in 2020 from 129,131 in 2016. This shows that access to TVE in ethnic minority areas is improving. However, most only participate in the elementary and lower qualifications as can be seen in Figure 7 and Figure 8.

Figure 7 Other Ethnic Minority Groups Enrollments by Qualification for the Period 2016 - 2019

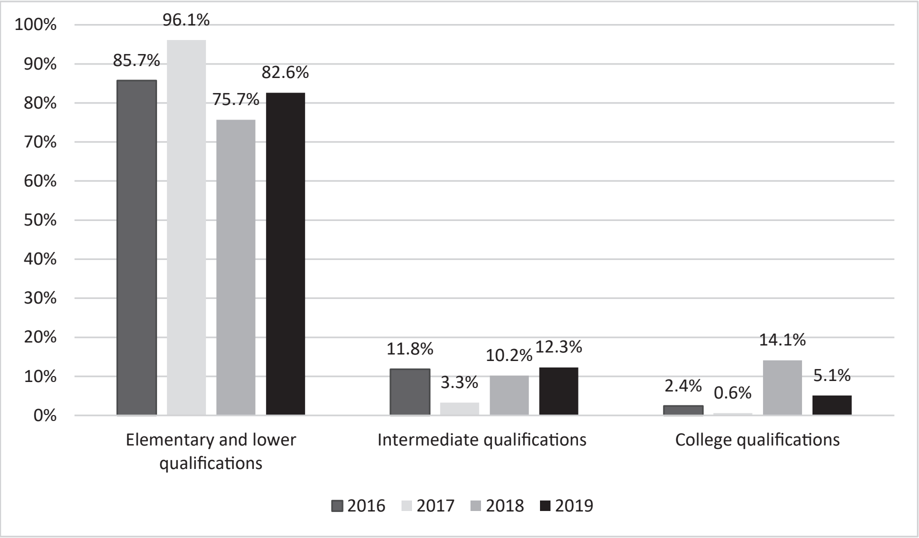
Unit: %



Source: Planning and Finance Department, DVET, 2020.

Figure 8 Other Ethnic Minority Groups Enrollments by Qualification Over the Total Engaged in TVE for the Period 2016 – 2019

Unit: %



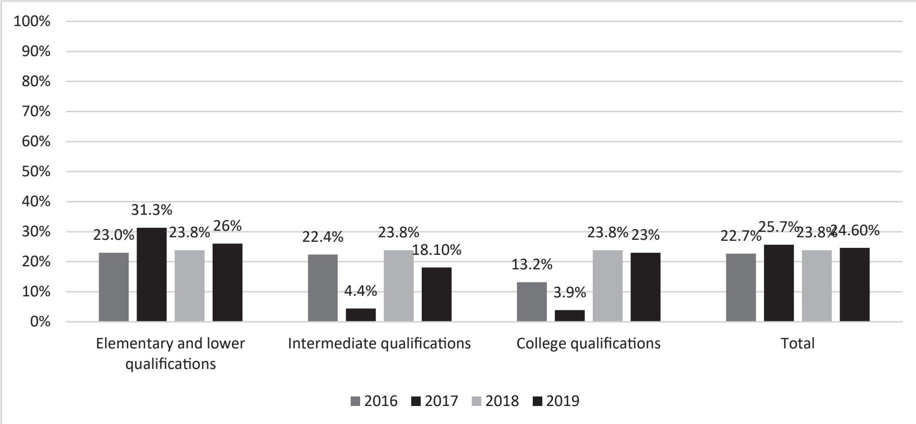
Source: Planning and Finance Department, DVET, 2020.

Enrollments by Gender

The number of males enrolled in TVE has not increased much. It increased slightly in 2019 with 1,762,105 students compared to 2018 (1,684,101 student). The number of females engaged in TVE also increased slightly with 575,895 students in 2019, which is higher than in 2018 (525,899). However, most females choose elementary and lower qualifications rather than higher ones, as is shown in Figure 9 and Figure 10.

Figure 9 Female Trainee Enrollments by Qualification for the Period 2016 - 2019

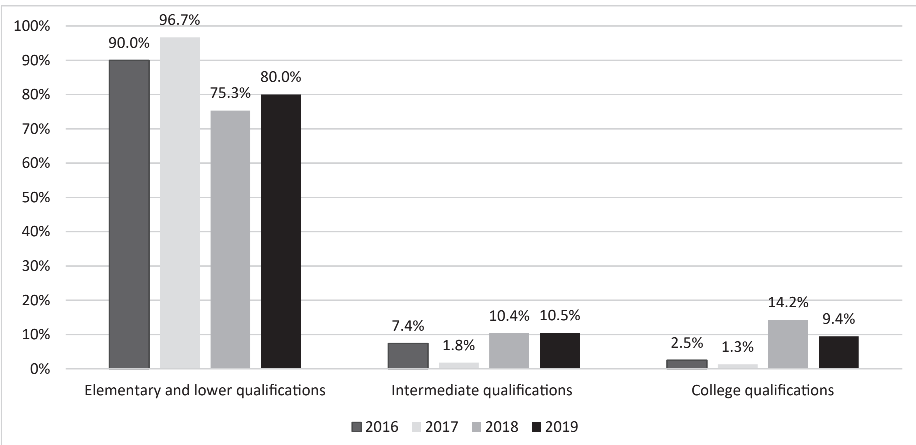
Unit: %



Source: Planning and Finance Department, DVET, 2020.

Figure 10 Female Trainee Enrollments by Qualification Over the Total Females Engaged in TVE for the Period 2016 – 2019

Unit: %



Source: Planning and Finance Department, DVET, 2020.

Employment Status After Graduation

According to the report "Evaluation of enrollment, training and job creation in 2019 and tasks and solutions in 2020" of the Dinectorate of Education and Training, on average, in 2019, the rate of graduates with college or intermediate qualifications having jobs right after graduation was over 80%, of which the percentage of college graduates having jobs was 85%.

According to the results of an NIVT's survey of training needs for TVE associated with employment to meet the labor market in 2019, 3,009 enterprises were employing key vocational trained workers, and the average monthly income of workers with college degrees was 7,285 thousand VND (approximately US$317), which was an increase of 4.4% compared to 2018.

Jobs with the highest average income after graduating at elementary level were in the fields of electronic technology and communication (nearly 9.2 million VND/month, approximately US$400), followed by construction engineering (8.1 million VND/month, approximately US$352), and electronic equipment technology (8.06 million VND/month, approximately US$350). The average income of employees at the elementary level is about 5.7 million VND/month (approximately US$248).

The Contingent of Trainers and Managers

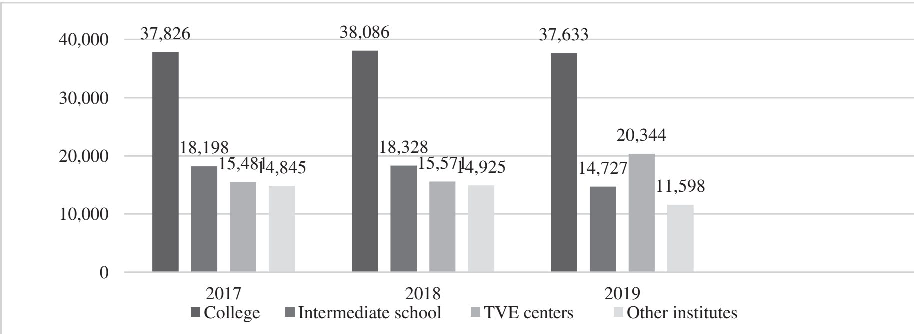
The contingent of trainers and managers is a critical factor in determining the standard of training provided by TVE institutions. In 2019, legal documents on career development for TVE trainers were completed. The quality of teachers and managers of TVE continues to be standardized, trained, and fostered to improve professional qualifications and skills.

As of December 2019, the number of trainers in TVE institutions was 84,302 (a decrease of 2,048 compared to 2017 and a decrease of 2,608 compared to the number in 2018). Specifically, the number of trainers at colleges was

37,633 (accounting for 44.64%), at intermediate school, 14,727 (accounting for 17.47%), at TVE centers, 20,344 (accounting for 24.13 %), and at other institutes having TVE activities, 11,598 (accounting for 13.76%) (see Figure 11).

Figure 11 The Contingent of Trainers at TVE Institutions, 2017 - 2019

Unit: Person

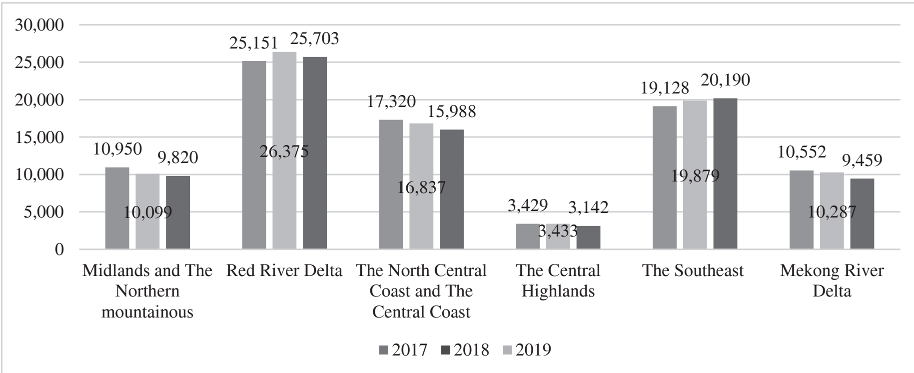


Source: Planning and Finance Department, DVET, 2020.

By socio-economic region and compared to 2018, the number of teachers in 2019 in regions has not greatly changed. In particular, the Red River Delta is still the place with the highest concentration of teachers, 25,703, accounting for 30.49%, followed by the Southeast with 20,190, accounting for 23.95%. There are 15,988 teachers in the North Central Coast and the Central Coast, accounting for 18.96%. The Central Highlands is the region with the least number of teachers in the country with 3,142, accounting for 3.73% (see Figure 12).

Figure 12 The Contingent of Teachers by Socio-Economic Region, 2017 - 2019

Unit: Persons



Source: Financial Planning Department, DVET, 2020.

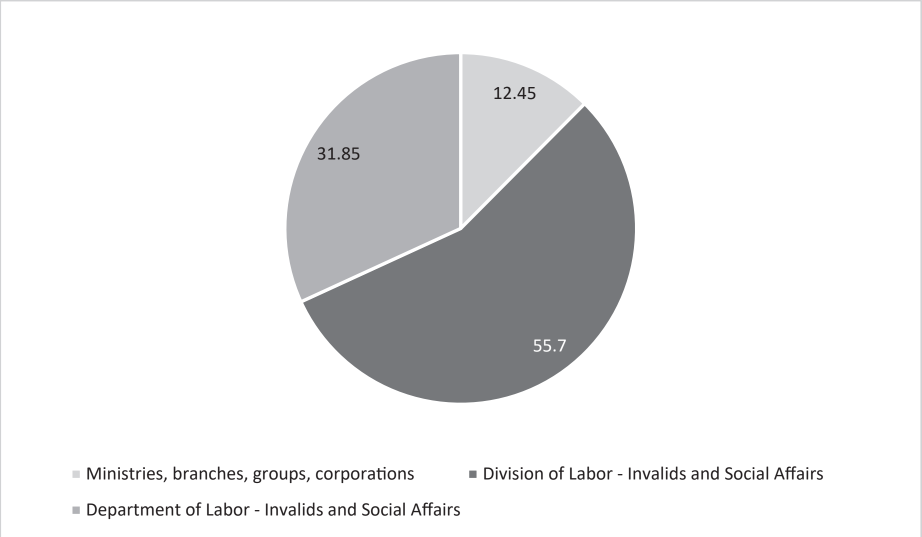
According to statistics of the Department of Organization and Personnel of DVET, as of June 1, 2019, there were 20,627 TVE managers nationwide, of which 1,438 were state management officials (accounting for 6.97%) and 19,189 (accounting for 93.03%) were managers at TVE institutions:

- Among 1,438 state management officials, there were 179 managers (12.45%) of ministries, branches, groups, corporations, and associations; 458 managers (31.85%) of the Division of Vocational Education and Training under the Department of Labor, Invalids and Social Affairs (DOLISA), and 801 managers (55.7%) of the Division of Labor, Invalids and Social Affairs (see Figure 13).

- Among 19,189 managers at TVE institutions, there were 10,312 managers at colleges (53.74%), 5,169 managers at intermediate schools (26.93%) and 3,708 managers at TVE centers (19.33%).

Figure 13 The Contingent of TVE State Management Staff in 2019

Unit: %



Source: Department of Organization and Personnel, DVET, 2020.

Trainers in public TVE institutes comprised 50,681 people (accounting for 60.12%), and there were 33,621 non-public trainers (accounting for 39.88%). Trainers in the TVE institutions managed by the central bodies amounted to 19,047 (accounting for 22.59%). The number of female trainers was 21,317 (accounting for 25.29%), and there were 1,669 trainers from ethnic minorities (accounting for 1.98%).

Pursuant to Article 55 of the Law on Vocational Education and Training (2014), vocational teachers must *"reserve time to take a probation at the enterprise to update and improve practice skills and access new technology as prescribed"*[7].

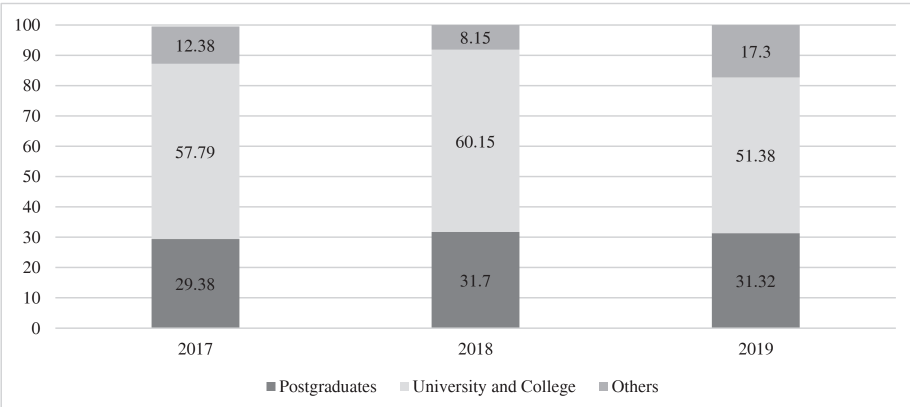
As of December 2019, the number of trainers with a master's degree or higher

7. *Supra* note 4, Art 55.

was 26,402 (accounting for 31.3%); trainers with university and college degrees numbered 43,319 (accounting for 51.4%); and there were 14,581 trainers with intermediate and other qualifications (accounting for 17.3%). Compared to 2018, the corresponding rates are: 31.70%, 60.15%, and 8.15% (see Figure 14).

Figure 14 Professional Qualifications of TVE Trainers, 2017 – 2019

Unit: %



Source: Financial Planning Department, DVET, 2020.

The DVET in 2019 organized training and further for 2,281 domestic and foreign vocational teachers, of which 600 were fostered in the TVE pedagogy profession (rate 26.3%), 450 received vocational skills training (19.73%), and 580 received specialized English training (25.43%), while 387 were fostered to improve their scientific research capacity and scientific research management for trainers and managers at TVE institutes (16.97%). The number of teachers being trained in foreign countries was 264, accounting for 11.57%. (Table 2)

Table 2 Number of Vocational Teachers Participating in Training and Further Training Programs Organized by the DVET in 2019

Unit: Times

No	Fostering programs	Total	Domestic	Foreign
1	TVE pedagogy	600	600	
2	Vocational skills	450	450	
3	Improving scientific research capacity, scientific management for trainers and managers at TVE institutes	387	387	
4	Improving specialized English for trainers teaching key occupations	580	580	
5	Training and further training of trainers in 22 international key occupations in Germany	264		264
	Total	2,281	2,017	264

Source: NIVT, 2020.

Preservice Training for Teachers

There are four technical universities, one vocational teacher training college, and 45 training divisions for TVE pedagogy at universities and colleges around the country. The majority of these facilities offer both pre-service and in-service vocational training. Most students studying in the four universities' preservice programs are alumni of general upper secondary schools (about 75%). Graduates from vocational and professional secondary schools account for only about 10%–25%, and only a few graduates from vocational or technical colleges upgrade their diplomas into a bachelor's degree through a special bridging program[8].

The MOLISA has issued guidelines for evaluating the quality accreditation standards of TVE institutions, and instructed the evaluation of training program accreditation standards at all levels of TVE, while at the same time

8. *Id.*

instructing the TVE institutions to perform their annual quality assessment. In 2019, generally, only 25.85% of the total number of TVE institutions nationwide conducted a self-assessment of the quality of TVE. In addition, there were 139 TVE institutions conducting self-assessment of the quality of the training programs (666 programs). In addition, there is deeper participation of enterprises in the accreditation of TVE quality. In 2019, two vocational training quality accreditation organizations were licensed to operate (of which one is a company). These organizations operate independently in evaluating and recognizing TVE institutions and training programs that meet the TVE quality accreditation standards.

TVE Qualifications System and Quality Assurance

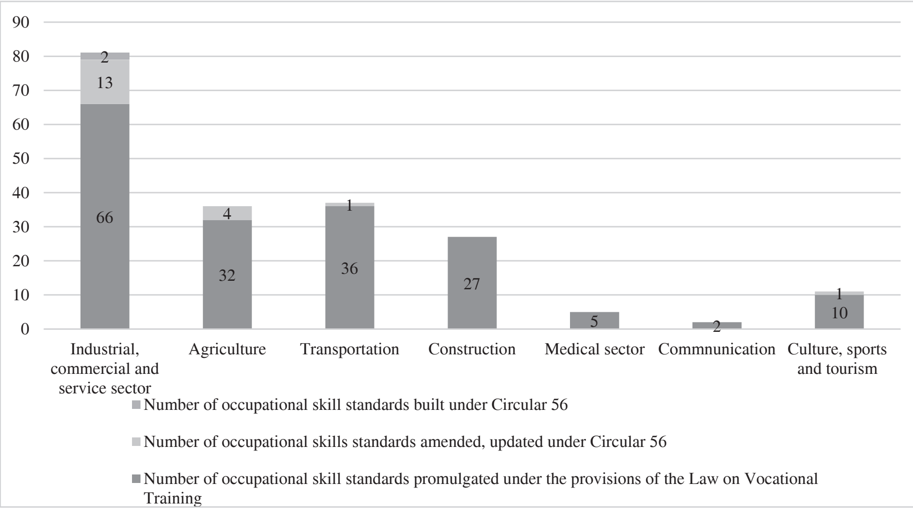
The National Occupational Skill Standards (NOSS) play a critical role in the development of training programs based on output standards and labor market demands. The National Occupational Skills Certificate is assessed and issued with the aim of recognizing employees' occupational skills and assisting them in enhancing their qualifications in order to fulfill work requirements. To standardize the contingent of trainers' teaching practice and incorporation into TVE institutions, national occupational skills evaluation and certification are also required.

According to regulations from 2015, the development of NOSS is built with capacity structure and job roles to match with reality and create favorable conditions for the comparison, agreement, and recognition of the skills level of workers in Viet Nam and other countries in the ASEAN region and around the world. Regulations related to standards and assessment of national occupational skills are specified in the Law on Employment.

By December 2019, there were 193 occupations built and issued with NOSS, two of which were newly built, and 19 were revised and updated (see Figure 15).

Figure 15 Number of National Occupational Skills Standards Issued and Updated Until 2019 by Sector

Unit: Standard



Source: NIVT, 2020.

Qualification Standards of TVE Teachers

According to the Law on Vocational Education and Training, a trainer in TVE institutions shall meet four requirements: Has a virtuous character; achieves the qualifications in professional competence and proficiency; has good health as required by his/her job; and has a clear criminal record[9]. In addition, the Law also provides qualifications of a trainer at each level. For instance, for teaching theory classes, trainers at TVE intermediate schools and colleges must have a bachelor's degree and a certificate in TVE pedagogy, while trainers providing practical sessions in these institutions only require a TVE pedagogy certificate and certificates of technical qualifications in specific oc-

9. *Supra* note 4, Art 53(4).

cupational fields[10]. At the secondary and college levels, all newly hired TVE teachers and lecturers must serve a 12-month probationary period, while at the elementary level, they must serve a 6-month probationary period[11].

Current TVE Reforms and Policy Discussions

The document of the 13th National Party Congress clearly states the development orientation of the country in the next 10 years and beyond: "Viet Nam aims to be a developing country with modern-oriented industry, surpassing the low-middle income level by 2025; a developing country with modern-oriented industry and high middle income by 2030; and a developed, high-income country by 2045." The Party affirms that human resource development, especially high-quality manpower, is one of the three strategic breakthroughs. The purposes will be achieved by:

- Speeding up the implementation of fundamental and comprehensive renovation and enhancement of education and training quality, with a focus on modernizing and changing TVE methods;

- Renovating and strengthening the quality of TVE as an open and flexible system;

- Rapidly shifting the labor structure, especially in rural areas, and reducing the prevalence of workers in the informal sector;

- Reskilling and continuing training of the labor force to establish a skilled workforce, contributing to improving national competitiveness;

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10. *Id,* Art 54 (2), (3).
11. Asian Development Bank (ADB), VIET NAM Technical and Vocational Education and Training Sector Assessment, January 2020, p34, https://www.adb.org/sites/default/files/institutional-document/551001/viet-nam-tvet-sector-assessment.pdf.

- Preparing human resources for digital transformation, development of a digital economy and digital society;
- Strengthening the work of career guidance, TVE streaming and pathways in association with the needs of society.

For the first time, in 2020, the Prime Minister decided to mark October 4 every year as Vietnam's labor skills day, and issued a separate Directive on strengthening the development of occupationally skilled human resources, especially those with high skills, to take advantage of the opportunity that the demographic dividend offers, raising the level of Vietnamese labor skills, contributing to improving labor productivity, and increasing national competitiveness in the new situation. The Directive assigned the Ministry of Labor, Invalids and Social Affairs (MOLISA) to develop and submit to the Prime Minister for promulgation of the Vocational Education and Training Development Strategy for the new period of 2021-2030.

Trends and Issues in TVE

Trends in TVE

Government's Strategic Orientation on TVE and Skills Development

Directive No. 24/CT-TTg dated May 28, 2020 of the Prime Minister stated that, "Promoting the development of skilled human resources, contributing to improving labor productivity and increasing national competitiveness in new context shows the role of TVE in order to improve the skills of Vietnamese workers." The Directive specifies the content and the strategic directions for 2030 and 2045. The National TVE Development Strategy for the period 2021-2030 is being developed to improve the quality and efficiency of TVE, to form a workforce with high professional skills, capable of adapting to the rapid change in technology and the labor market under the impact of the 4th Industrial Revolution. Development orientation focuses on:

- High-quality training to meet the needs of the modern industrial economy, and at the same time inclusive development towards sustainability, ensuring access to TVE services for all subjects.

- On the basis of absorbing the world's modern models, forming a vocational training system for Viet Nam in an open, flexible direction, suitable to the context and conditions of the country in the coming years.

- Implementation of the Vietnamese Qualifications Framework (VQF) with a governance structure that ensures quality and qualification linkage in both education and employment systems, between TVE and general education (new program) and higher education, mutual reference and recognition of other national and regional qualifications.

- Improvement of modern training management capacity, applying information technology and digital technology in teaching and learning.

- Promotion of digital transformation in the whole system; building and developing digital transformation infrastructure, TVE data sources and professional fields, and developing data science.

- Formation of a quality management system in the entire TVE system, approaching quality standards of advanced countries, especially Europe with strong IT applications.

- Expansion of public-private partnerships (PPP) in TVE, where the state plays a key role in investment and development of TVE, and at the same time mobilizes the private sector including enterprises to invest in TVE development; developing and improving the quality of the network of TVE institutions in the enterprise with the function of training and retraining workers in the enterprise in order to cope with the technological change under the impact of the fourth industrial revolution.

- Development of high-quality training centers in association with technology transfer in a number of large corporations and industrial parks in key economic regions.

- Improvement of state governance capacity of TVE human resources at central and local levels; consolidating the system of state management organizations in local TVE.

- Active integration into the world, cooperation of TVE with developed countries and the region, and cooperation to form a vocational training network in the ASEAN community. Conducting exchanges of TVE experts, lecturers, and managers among ASEAN countries.

In order to achieve the goal of renewing and improving the quality of TVE, to meet the requirements of quality human resources, the MOLISA has proactively implemented eight groups of specific solutions in order to increase efficiency in implementing the Party's and State's guidelines on fundamentally renovating state management in the field of TVE, including: Renovating and improving the effectiveness and efficiency of the management of state TVE; giving full autonomy to TVE institutions; completing the plan for the TVE institution network; standardizing quality assurance conditions; strengthening TVE quality management; linking TVE with the labor market, employment, and social security; developing a system of assessment and certification of national occupational skills for employees; and enhancing communication and research science and international cooperation.

A system of high-quality colleges, approaching regional and international levels, has been formed under the scheme approved by the Government[12]. The network of TVE institutions is being continuously reviewed and arranged in the spirit of Resolution No.19-NQ/TW dated October 25, 2017.

Reforming the operational mechanism of some vocational colleges has been piloted, which serves as a basis for perfecting autonomy mechanisms and policies in TVE institutions. The pilot shows that autonomy is the driving force for the TVE institution to innovate, and adapt to the labor market and employment.

Applying Digitization to TVE for Easier Accessibility

The National Digital Transformation Programme by 2025 with Orientations toward 2030 identifies education as a priority sector. Action plans include developing platforms to support distance learning and teaching, thoroughly applying digital technology in management, teaching, and learning; digitizing documents and textbooks; building a platform for sharing teaching and learning resources in both face-to-face and online forms; developing technology for education toward individualized training; testing training programs that allow students to study at least 20% of the program content online; and applying digital technology to deliver homework and test students' preparedness for class. The Directorate of Vocational Education and Training has upgraded the Application of Job Selection - School Selection. This is aimed at facilitating potential trainees to apply for TVE. In the Fourth Industrial Revolution, with a smartphone, workers can easily register to learn about careers and training providers, then apply for a course. The application provides users with main career information, video clips (news, reports, employment opportunities, job descriptions), and so on. This application could be seen as a useful channel for providing convenient access to enrollment information and registration, espe-

12. Decision No.761/QD-TTg dated May 23, 2014, No.1363/QD-TTg dated October 11, 2019 of the Prime Minister.

cially in the Covid-19 pandemic (Viet & Hung, 2020).

The MOLISA has issued Decision No.980/QD-LDTBXH dated 11/08/2020 to implement the Plan for Implementing Directive 24 of the Prime Minister. The plan includes four groups of content: Development and completion of policies on TVE development; Strengthening communication in TVE; Improving the quality and efficiency of TVE, and Developing plans, programs, and projects on the development of TVE in the period of 2021-2030. In addition, the Directorate of Education and Training issued Decision 607 on September 21, 2020 on the implementation of the Plan to implement Decision 980/QD-LDTBXH. Accordingly, the Directorate of Vocational Education and Training has deployed four groups of content into 24 specific tasks, and assigned them to its departments and units to implement. Along with the above specific action plans, many ministries, branches, and localities also issued detailed plans to implement this Directive. This shows the uniformed integration of all levels and branches, from central to local. The strategic Digital Transformation agenda of TVE would include the following:

- Strengthening the information technology management infrastructure for state management agencies on TVE at the central and local levels and vocational training institutions. Developing and perfecting information technology applications in the field of TVE, ensuring connectivity and linkage with units under the Ministry, with the Government, and relevant ministries and branches.

- Building a labor market information database related to TVE.

- Developing training programs for digital transformation for the contingent of state cadres, managers of TVE institutions, and training human resources for the digital transformation of the economy.

- Promoting the digitization of documents, programs, and textbooks for TVE. Performing a number of conversions in management, teaching, and learning. Digitalizing simulated training activities in TVE institutions, in school administration, from enrollment, organizing training, simulating equipment and lectures, assessing learning outcomes, managing diplomas, certificates, and digitizing diplomas so as to adapt to the Fourth Industrial Revolution.

- Modernizing information technology infrastructure and intelligent application software in management and training activities. Formulating an online training system in a number of fields.

TVE System Towards High Quality, Autonomy, and Accountability

The merger of TVE institutes will create a consolidated network, but will also create a challenge for the TVE system, especially since investment from the state budget for vocational training has increased slowly, commensurate with the need to scale up and improve the quality of TVE. On average the state budget spent on TVE in the total state budget expenditure for education and training is only about 9%, much lower than the planned target of 11%. The source of government bonds and lottery receipts has not been invested in vocational training. This underlines the need to have a master plan for the network with the aim of enhancing the quality and efficiency of the TVE institutes.

In this context, the 45 TVE institutes under Decision No.761/QD-TTg were selected for special investment to become high quality TVE institutes, and Decree No. 16/2015/ND-CP on autonomy was promulgated. In 2015, some TVE institutes developed and registered the application for participating in the "Project on piloting the reform of operational mechanism in the period 2016 – 2019" with the aim of further developing and becoming high-quality TVE institutes with autonomous and self-responsible operations. Accordingly, Ho Chi Minh Vocational College of Technology (HVCT), Quy Nhon Vocational College, and LILAMA2 Technical and Technology College were chosen to pilot autonomous operations as of 2016. However, although decrees have been drafted and some of the above cases have been piloted, it has not clarified the concept of autonomy and accountability of TVE institutions. The readiness of teaching staff and managers is an issue if the TVE system is to be of higher quality and autonomous. Standards and criteria of high-quality colleges are being developed and enacted by the MOLISA.

TVE is Open for Inclusive and Sustainable Development

The open nature of TVE emphasizes the flexibility of the system, removing barriers for learners (in terms of location, geographical distance, time, economy, age, physical and mental health, content, and methods) for everyone to have the opportunity to learn, and to learn to prepare for employment in the labor market or transition to another level. The flexible TVE system provides adaptive access to skill needs and offers continuous training solutions, improving the skills of the workers. Open TVE, in this case, does not only implicate the technological aspect, but also covers institutional, ethical, cultural, and pedagogical issues, evaluation, and management. According to Neal (2011), open and flexible vocational education adds value to the system in many ways, such as:

- Increasing the choice of learners and employers about when, where, and how much they will learn;
- Increasing employer engagement through timely work-based and workplace-based training, consistent with the module's theoretical content;
- Increasing consistency, ensuring quality, and reducing dependence on the number of available teachers or subject experts through the use of well-designed materials that incorporate pedagogical theories and methods, and online automated feedback;
- Increased accessibility for people with geographically limited or required lengths of study;

- Reduced reliance on tools and equipment through the use of video demonstrations or simulations;

- Increased productivity through resource-based learning if the number of learners is large enough. Well-designed learning resources in open and flexible vocational education can increase consistency and quality assurance, fill teachers' knowledge gaps, and increase accessibility by reducing or losing demand for face-to-face teaching.

Increased Focus on Training the Contingent of Trainers and Managers

The contingent of managers at the vocational training institutions has also gradually met the standards. Managers are annually trained and fostered in new management knowledge and management and leadership skills, while some teachers and administrators have been trained and fostered abroad.

Vocational training for rural workers has been promoted according to Decision 1956/QD-TTg dated 27 November 2009. Their training is associated with new rural construction, and job creation for rural workers, which contributes to shifting the labor structure towards industry and services. This has contributed to an increase in labor productivity in rural areas of 2.7 times.

Priority Investment in Financing for TVE

The State budget gives priority to a gradual increase in investment in disadvantaged, mountainous, island, and remote areas (from 2017 to the time of writing, the norms of allocation of expenditure for TVE, depending on each region that is adjusted, increased 1.76 times on average compared to the period 2011 - 2016[13]).

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13. Decision No.59/2010/QD-TTg dated September 30, 2010 of the Prime Minister and Decision No.46/2016/QD-TTg dated October 19, 2016 promulgating the supplementary State budget recurrent expenditure estimates in 2017

Issues in TVE

Despite the government's considerable efforts during the last decade to improve the quality and relevance of Viet Nam's TVE system, a number of issues remain to be addressed.

System Governance Remains Weak

The awareness of many levels of committees, authorities, TVE institutions, businesses and communities on the position, role, and importance of TVE is inadequate and inconsistent. Degree psychology is also common in society. Propaganda, counseling, and career guidance has been improved but still has many limitations.

State management of vocational training/vocational education has long been overlapping in the management of TVE between the Ministry of Education and Training and the MOLISA, and has significantly affected the system. There is no synchronization between the Law on Vocational Education and Training and the Law on Employment between the legal system and its implementation, or between the Law on Vocational Education and Training and the Education Law (DVET, 2021).

The contingent of state management staff in TVE, especially at the local state management advisory level, is insufficient and weak, concurrently holding many tasks, and specialized capacities in the management of TVE are limited.

Ineffective National Occupational Skills Standards and Certification

NOSS are the basis for developing learning outcomes-based curricula in accordance with the requirements of industry and trade, enabling the TVE institutions to develop programs in accordance with the requirements of employers, and to improve the quality of training to meet the labor market demand. The assessment and certification of national occupational skills are aimed at recognizing the skills of workers, thereby helping them strive to improve their knowledge and skills to meet job requirements. The assessment and granting of certificates of national occupational skills are also prescribed to standardize the contingent of TVE trainers.

However, the development of NOSS was 10 years ago, but in reality, it has not attracted large and quality participation from enterprises. The revision and update of the issued NOSS are still slow (by the end of 2018, only 13/193 sets of standards had been updated and revised).

The current national occupational skills assessment and certification system is small and weak in capacity (human, equipment, finance), especially the application of information technology to the management and operation of the system. There are still limitations so the actual conditions cannot be met. The assessment and certification of national occupational skills have been carried out for 8 years, but the number of participants in the assessment is not much, focusing only on certain occupations (especially in the field of underground mining and public mining, the automotive industry, and industrial electricity) because the parties have not really seen their benefits and there are no clear incentives or compulsory sanctions (NIVT 2019).

The above issues show that, to date, the NOSS have only really affected a few technical professions with high requirements of occupational safety, occupational health, and working environment regulated by the document under the Employment Law. The system of standards and assessment for certification of occupational skills has had almost no impact on other sectors of services or high technology, especially the informal economic sector which comprises a large proportion of Vietnamese workers. Basically, there is no system of qualifications that is considered as a tool for handling employment and working relations. Currently, important terms are very entangled when expressing and applying them: vocational skills standards, competency standards, skill qualification framework, and skills. This is not only difficult to understand for training institutions where the concept of competency is familiar, but it is also difficult to distinguish for the business community and workers. Part of the evidence for this is how to define basic competencies, generic competencies, and professional competencies in the recently revised NOSS set. Like many other countries and regions, basic competencies should be applied to all occupations. It is advisable to clearly define the basic units of competency that employees must have when looking for jobs in the labor market, such as: communication ability at work (not quite the ability to communicate with customers as in tourism professions), and information technology application capacity. These competencies should be developed by the MOLISA for general application in the NOSS of all professions. Competencies should be renamed as specialized competencies associated with qualifications and job positions, while the general nature of competencies is also the “expertise” of a particular industry field.

Currently, there is no formula to define job scopes, and Viet Nam does not have a list of occupations under the Law on Statistics, so the NOSS are mostly too broad to correlate with only one certificate for one level of a profession, especially grades 1-3. The design of non-rigid qualifications characterizes the national qualifications framework in the context of the rapidly changing career world, lifelong learning needs, and the learning society.

Finance Sources for TVE are Limited

The state budget from the Central budget source is still the main source of funding, while ministries, branches, and localities have not allocated enough funds and ensured commitments compared to the plan, and other sources have not been integrated or mobilized to any great degree.

Expenditure for the targeted program from the Central government’s public capital in the 2016-2018 period is still focusing heavily on the investment in facilities, training equipment, and program development, and pilot training under the program transferred from in foreign countries, to develop a list of equipment, standards of facilities and economic-technical norms in TVE. The factors that ensure the quality of training (standardization and development of teachers and managers; quality accreditation; national assessment system, certification of vocational skills) have not yet received appropriate funding arrangements.

In the 2011-2019 period, the bilateral and multilateral donors' capital in TVE was mainly borrowed capital, and the aid capital was very little. The disbursed amount of aid capital was only 3.1% of the total of committed capital.

The mobilization of investment resources for TVE has not met the development requirements. State budget investment in TVE in recent years has increased, but has not met the requirements and is not adequate for the objectives and tasks set out. Many localities have not prioritized investment resources for the development of TVE.

The knowledge base about costs and expenditure in TVE is extremely weak in Viet Nam, and by no means a sufficient base for future planning exercises. There is no aggregate overview either of state funding or private resources available for TVE delivery.

The actual public budget allocation for TVE institutions is done through the sponsoring umbrella organizations, that is, line ministries, central agencies, and provincial and district level authorities. Consequently, allocations to TVE institutions are part of the budget of their parent organizations. There is no requirement of umbrella organizations to report to DVET about actual spending on their TVE institutions.

Against the background of limited public financial resources, increasing financial requirements for expanding the quantity and improving the quality of TVE based on demand make securing sustainable finance a major challenge and key issue in TVE-related development efforts. In this regard, dealing with financial requirements for demand-oriented TVE is an important factor. It includes information on actual costs and major cost drivers as well as containing costs as far as is feasible. Another main issue is mobilizing funding sources in addition to public funding, with the main focus on financial contributions from companies and trainees (respectively their parents) as TVE stakeholders and beneficiaries.

On the other hand, TVE institutes' income comes from a variety of sources, including production operations, the sale of students' practice products, research and technology services, and earnings from joint ventures. The income from TVE institute services accounts for a very small percentage of total financial resources (1.2%). Much of TVE institutions' underdeveloped infrastructure has hampered the growth of their services and products for the market[14].

TVE Quality Assurance Remains Low and Ineffective

Quality assurance conditions at TVE institutes are weak and do not contribute effectively to improving the quality of training. The Asian Development Bank's vocational education assessment report points out these shortcomings, including: the training program is not suitable to the reality of production, business, and service conditions; the number of teachers is inadequate and most teachers lack professional skills; there are teacher training universities in only a few occupations/disciplines; the vocational teacher training capacity in a number of colleges has not yet met the requirements of improving pedagogy and career skills; and training facilities and equipment do not meet the requirements for training programs and are often outdated compared with industry technology (ADB, 2020).

14. Wise Consulting Finland Oy (WCF), Technical and Vocational Education and Training in Viet Nam: Assessment of priority needs in the development of Technical and Vocational Education in Viet Nam, 2018, p16.

Industry-relevant occupational skills as well as fundamental soft skills such as industrial working style, teamwork, and problem solving are lacking among TVE graduates. The main reasons for this are the TVE system's continued focus on school-based training delivery, which seldom involves enterprises, as well as a slew of system-wide issues such as poor performance and output standards, a scarcity of instructors with industry experience and practical skills, a lack of independent graduate assessments, and inefficient resource management.

Many businesses find that the number of workers and technicians they require is insufficiently supplied by TVE institutions. Alternatively, even if the quantity satisfies them, the quality of the graduates is frequently inadequate. The most needed workers are in manufacturing, mechatronics, electronics, transportation/logistics, telecommunications, information technology, chemicals, ceramics, fertilizers, food processing, health care, shipbuilding, waste treatment, and aviation.

In addition, outdated or insufficient training facilities and poor resource management appear to constrain Viet Nam's TVE system. Reports from TVE institutions indicate that technical facilities and the means of teaching and learning do not meet the requirements of high-quality training or have insufficient scope to conduct appropriate hands-on training activities for all students enrolled in a course. By inviting experts from enterprises to join in academic committees in charge of training programs at institutions, the quality shall be improved. Enterprises can also donate equipment to workshops of institutions which can improve the collaboration between enterprises and institutions.

There are large gaps by gender and geographic area (urban/rural) in the share of the population with technical and professional training at all training levels, with no apparent trend of narrowing these gaps. TVE institutions with boarding facilities, most of which are located in the provincial capital cities, are generally the only option for people in remote areas.

Reluctant Business Community Involvement

The engagement of employers in TVE appears to be rather low in Viet Nam, and is concentrated on large and foreign companies. This appears to contradict the general perception that companies in Viet Nam lack experience and skills. Cooperation with the business community – comprising individuals, public and private companies, and their representative bodies – includes several fields and has multiple positive effects. The numerous challenges related to achieving ambitious TVE reform and development goals can no longer be successfully tackled by the state alone. Therefore, the active involvement of other stakeholders, particularly the business community, is vital and is receiving growing attention. Perhaps the greatest weakness in Viet Nam skills development is the lack of enterprise-based training. The policy framework does not place adequate stress on the importance of workplace training. Apprenticeship training is recognized in the TVE Law, but is not actively practiced in many firms. The Government has no organized programs to support apprenticeship training. It does allow the deduction of training expenses from gross operating profits before taxes, but it gives few other incentives for enterprise-based training.

On the other hand, the Government of Viet Nam has endorsed the introduction of the NOSS-based approach in order to improve the quality of TVE. MOLISA, in accordance with its specified obligations under the Employment Law, has developed the operational machinery to enable the implementation of NOSSs and an associated certification system through which skills and competencies can be formally recognized. Development of NOSSs is governed by ministries and sectors in collaboration with relevant occupational agencies and associations. The occupations of different fields are assigned to ministries and industries which are affiliated to these fields. The participation of enterprises' representative is a prerequisite condition to ensure the quality of NOSS.

However, at present active participation is mostly by training institutions, whereas the role of enterprises is passive and dim. This results in the fact that the qualification of NOSSs is limited in terms of relevance to the labor market. In fact, there have been no legal documents stipulating tasks and responsibilities of enterprises with regard to content related to occupational standards. At the same time, the NOSS has yet to be enforced in order to deal with employment and working relationships. The reasons for enterprises not participating in NOSS development include not only occupied field experts, but also excessively low incentives that cannot attract the participation of these experts.

The key issue with regard to a working results-oriented collaboration is how to get the business community to engage actively in TVE. Approaches that have proved successful in this regard focus on equal partnership and persuasion based on mutual interests and benefits. This includes involving the business sectors appropriately in TVE policy and strategy development as well.

Monitoring and Evaluation of TVE Need to be Standardized and Institutionalized

Basically, there is a general lack of publicly available and reliable data on the TVE system. First, Viet Nam is a large country with a population of almost 97 million people, many of whom receive training in the national TVE system that is accountable to different stakeholders. The Viet Nam TVE system is difficult to monitor due to its size and diversity of modalities and qualifications. Traditionally, many different institutions have gathered TVE-related information, but this information is not always made accessible to other institutions. Therefore, gaining access to primary data is a general challenge. Extracting relevant and meaningful information for the TVE sector from available data and bringing the different information sources together in order to subsequently draw an accurate picture of the whole TVE system is a very difficult task.

Viet Nam needs a greatly improved information base regarding the performance of the TVE system. Good data on enrollments, course outputs, and outcomes could be used as a tool to drive system innovations and improvements in performance, but these basic data are lacking.

This situation can only be addressed by systematic TVE monitoring and reporting. Such a structure needs to be developed based on institutionalized and standardized instruments. This includes a responsible institution, legally tasked with implementing TVE monitoring and reporting, provided with adequate institutional capacities and competencies to comprehensively gather, analyze, aggregate, and report TVE data. Such a structure finally also needs a key performance indicators based reporting instrument, which is also its final output: as annual national TVE Report.

Limited Readiness of TVE for the ASEAN Economic Community

The ASEAN member states have a combined population of about 670 million people. There are considerable differences in the population levels, size of economies, and levels of per capita income across countries. Most migrant workers are low- and medium-skilled, and the main drivers are economic and demographic disparities among the member states. Current AEC policies for managing migration are confined to high-skill occupations. The main tools for achieving labor mobility under the AEC are likely to be the MRAs. These establish the skills or experience relevant professionals need to gain certification in another country and ultimately to work abroad. There have been MRAs in eight occupational categories: engineering services, nursing services, architectural services, surveying qualifications, medical practitioners, dental practitioners, accountancy services, and tourism professionals.

The AQRF was endorsed by ASEAN Ministers of Economy, Education, and Labor. The AQRF addresses education and training sectors with the wider objective of promoting lifelong learning. In the AQRF, education sectors are defined in a broad sense as incorporating informal, non-formal, and formal learning. Formal learning includes but is not limited to post compulsory schooling, adult and community education, TVE, and higher education. The AQRF serves as a translation device that aims to broaden the understanding of national qualifications systems of AMS for people from other ASEAN countries and from outside the ASEAN region.

The referencing process is expected to include consulting stakeholders on the proposed links between NQF levels and AQRF levels in each Member State, reporting national referencing outcomes to the proposed AQRF Committee, engaging in peer review with the Committee, and finally reporting a single official linkage of a NQF with the AQRF. This is a potentially complex process and involves technical work with a significant socio-political and cultural dimension.

The National AQRF Committee is the body that is the interface between the national policymaking bodies and national qualifications agencies and the AQRF Committee. The Committee considers information and issues from the AQRF Committee and is the single source of national information and AQRF implementation progress coming to the AQRF Committee. The Committee represents the main stakeholders in qualifications in the country (within the constraints of keeping membership to a manageable level). The discussions in the Committee can be considered to be well informed, expert and cognizant of policy positions in the country. The Committee will be responsible for the Referencing report, but it may not be directly engaged in writing the report or conducting the referencing process.

Requirement of both qualified human and financial resources in the qualifications framework is a challenge for Viet Nam in the implementation and referencing, particularly those to be tasked by MOET and MOLISA at the same time. To date, the country has not yet established a national AQRF committee. The coordination mechanism between the ministries and stakeholders may be an obstacle.

Image of TVE in the Society Needs to be Improved

In Viet Nam, TVE is the second or third choice career path, as parents usually do their utmost to send their children to university, even though it is known that there is an increase in the unemployed group of bachelor degree holders compared with TVE graduates, and the economy needs well-qualified skilled workers. Although the Government has set itself a major target of increasing the number of skilled workers from 32.2% to 55% by 2020, TVE institutions have met challenges attracting young people. Improvements in the quality and image of TVE need to be strategic agendas at the macro policy level by MOLISA and social partners through mass media. In this case, the roles of business would be very important to improve TVE images through billboards (German speaking countries such as Germany, Austria, and Switzerland), or a tagline "real skills for real careers" in the case of Australia. The voice of career ambassadors should be considered as successful stories for inspiring young people in TVE and skills development.

Authors' Suggestions

For State Management Agency on Labor and TVE

- Reviewing, formulating, and perfecting policies and mechanisms to support TVE in general. Promoting and diversifying forms of communication for students in skills development, career guidance, career counseling, and employment.

- Implementing effective monitoring and evaluation of the application of policies on labor and employment and skills development in informal sector production, trade, and service establishments.

- Establishing activities and necessary guidance for TVE providers to develop flexible training programs that are adapted to specific groups.

- Considering and guiding the assessment and granting of certificates of national occupational skills according to the provisions of the Law on Employment.

- Conducting research on the quality assurance system of formal training, distance learning, self-study, guided self-study, and other forms of learning according to learners' needs (the Amended Education Law). The time of the COVID-19 pandemic has shown the limitations of the current training programs in providing online courses without a quality assurance framework of qualifications.

- The Application of Career selection - School selection should extend to cover skills and elementary qualifications

For TVE Institutions

- TVE institutions should change their thinking about training, enrollment, and teaching, to be more closely associated with the job and labor market.

- Renewing training programs toward flexibility and integration, in line with the changing technology of enterprises. Deploying a number of foreign advanced training programs for a number of high-tech occupations.

- Building a contingent of teachers who meet the standards of qualifications, skills, and professions.

- Actively cooperating with businesses in signing training-order-contracts for setting learning outcomes, curricular development, delivering courses, assessment, and recruiting graduates./.[15]

15. Nguyen Quang Viet, Hung Nguyen Quang (2020), Best Practices in TVET Policies Coping with COVID-19 Crisis: UNESCO-UNEVOC East and Southeast Asia Cluster Countries, Part 06.

Conclusion

Vietnamese TVE development is becoming one of top priorities to contribute to improving the quality of human resources, improving labor productivity and national competitiveness. Over the past ten years, the training and preparation of skilled human resources has been paid due attention to by the Vietnamese Communist Party and State. TVE system has been experienced many positive changes in social awareness, number of enrolments, and quality and effectiveness of training. The strategic orientation to TVE and skills development for the next decade in sync with the fundamental reform of education. These may be to

- develop a modern TVE system in association with decent work and inclusive development. Various training models, modes, and levels aim to meet the lifelong learning needs, up-skilling, re-skilling for labor force, particularly promoting TVE in enterprises as well as workplace-based training;
- improve the quality of TVE step by step to meet regional and international quality standards to not only meet the needs of domestic human resources but also skilled worker mobility in the international labor markets. Responsive TVE will be promoted by digital transformation and information technology at both system and provider levels;
- TVE is an essential public service that needs prioritizing for public investment in which focusing on high-quality schools, specialized institutions in extremely difficult areas, areas of ethnic minorities, borders, islands, remote areas; key and specific industries and occupations and policy beneficiaries. At the same time, it is necessary to mobilize other resources for the development of the TVE system.

The main trends include the digitization of TVE, high quality, autonomy and accountability, more open TVE for inclusive and sustainable development, financing for TVE, workplace-based training, mutual recognition of skills and qualifications among ASEAN and other frameworks, and development of both teachers and in-company instructors.

However, TVE status has remained issues such as the number, quality, and qualifications and professions structure of skilled workers have not yet met the requirements of socio-economic development, especially in the context of the impact of the COVID-19 pandemic, automation, digitization, as well as the Fourth Industrial Revolution (IR4.0) with technological disruptions, and international competitiveness and integration. Gaps and issues of the TVE system can be listed as governance, NOSS and skills certification; lack of financing source for TVE, low and ineffective quality assurance, reluctant involvement of industry and business community, lack of standardized monitoring and evaluation, and last but not least, the image of TVE in society.

In order to achieve goals of TVE development in the next decade, some measures and solutions would be considered as follows:

- improving the efficiency of the state management of TVE and skills development;
- enhancing effectiveness linkage between TVE with the labor market;
- capacity building TVE staff and managers, in-company trainers, and workplace instructors;
- operating the VQF for TVE according to international standards and referencing towards mutual recognitions of qualifications and mobility of skilled labor;
- accelerating digital transformation for TVE to response the Fourth Industrial Revolution;
- increasing mobilization of financial investment for TVE in both public-private partnership and international cooperation;
- Communicating, enhancing the TVE image, brand and social values.

Reference

Asian Development Bank (ADB). (2020). *VIET NAM Technical and Vocational Education and Training Sector Assessment.* https://www.adb.org/sites/default/files/institutional-document/551001/viet-nam-tvet-sector-assessment.pdf.

Decision No.1363/QD-TTg dated October 11, 2019 of Prime Minister on Approving Modification Of The Scheme For Development Of High-Quality Colleges By 2025.

Decision No.46/2016/QD-TTg dated October 19, 2016 of Prime Minister on Promulgating Norms For Allocation Of Recurrent Expenditure Estimates Of The State Budget In 2017.

Decision No.59/2010/QD-TTg dated September 30, 2010 of Prime Minister on Promulgating Norms For Allocation Of Recurrent Expenditure Estimates Of The State Budget In 2011.

Decision No.761/QD-TTg dated May 23, 2014 of Prime Minister on Approving "The High-Quality Vocational School Development Project By 2020".

Directive No.24/CT-TTg dated May 28, 2020 of Prime Minister on Promoting Skilled Workforce Development To Contribute To Improvement Of Productivity And National Competitiveness In New Situation.

Directorate of Vocational Education and Training. (April 2021). *Draft Strategy Project on Vocational Education and Training Development period 2021-2030.*

Law on Vocational Education and Training, 2014.

Ministry of Labor, Invalids and Social Affairs. (2017). *Transfer of vocational education management from the Ministry of Education and Training to the Ministry of Labor, Invalids and Social Affairs*, http://www.molisa.gov.vn/Pages/tintuc/chitiet.aspx?tintucID=26075.

National Institute for Vocational Education and Training. (2020). Youth Publishing House, *Viet Nam Vocational Education Report 2019*. Youth Publishing House.

Nguyen Quang Viet, & Hung Nguyen Quang. (2020). *Open Vocational Education and Training for Migration Women Workers*. In Jihee Choi, Hanbyul Lee, Kun Joo Lim, Hyunsik Choi, & Jong Taek Han (Eds.) (2020), *Best Practices in TVET Policies Coping with COVID-19 Crisis: UNESCO-UNEVOC East and Southeast Asia Cluster Countries* (1st ed., pp.113-138), Korea Research Institute for Vocational Education and Training (KRIVET)., https://unevoc.unesco.org/up/Best_Practices_in_TVET_Policies_Coping_with_COVID-19_Crisis.pdf.

Wise Consulting Finland Oy (WCF). (2018). *Technical and Vocational Education and Training in Viet Nam: Assessment of priority needs in the development of Technical and Vocational Education in Viet Nam., 2018,* https://static1.squarespace.com/static/593903ebe4fcb5a7cf6d81ff/t/5cc1a1b0e5e5f03ae0dc13da/1556193729142/TVET+VIETNAM_optimized_2.pdf.

World Economic Forum. (2020). *The Global Competitiveness Report 2019.* http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

ABBREVIATIONS

ADB	Asian Development Bank
AEC	ASEAN Economic Community
AMS	ASEAN Member State
AQRF	ASEAN Qualifications Reference Framework
ASEAN	Association of South East Asian Nations
DVET	Directorate of Vocational education and Training
MOET	Ministry of Education and Training
MOLISA	Ministry of Labor, Invalids and Social Affairs
MRAs	Mutual recognition arrangements
NIVT	National Institute for Vocational Education and Training
NOSS	National Occupational Skill Standards
NQF	National Qualifications Framework
PPP	Public-Private Partnership
TVE	Technical and vocational education
TVET	Technical and Vocational Education and Training
VQF	Vietnamese Qualifications Framework
WEF	World Economic Forum

A Comparison of Technical and Vocational Education Trends and Issues in the Indo-Pacific Region

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Abstract

This chapter summarizes the findings of the technical and vocational education (TVE) from the 10 countries presented in the previous chapters. A cross-country comparison is made concerning the aspects of TVE profile, the status of TVE, as well as the trends and issues. Several conclusions and similarities were identified as follows: (1) Most of the countries provide TVE programs from upper secondary education to post-secondary/tertiary education and there are various types of institutes offering initial and further TVE programs. (2) Among the three models of the influence government exerts on TVE—the school model, the market model, and the state-regulated market model, the school model is most prevalent in this region. (3) The percentages of student enrollment at TVE institutions vary greatly across these countries depending on their policies, TVE capacities, etc. (4) Most countries keep revising their TVE policies or have adopted innovative strategies to strengthen the TVE system in recent years. The major concerns are about the establishment of a sound TVE system, improvement of TVE students' skill learning outcomes and training quality, and the enhancement of an industry-academia-government collaboration. (5) TVE accessibilities are quite open for students, while the accessibility levels vary by area and student demographic factors. (6) Common qualifications required for being a secondary TVE teacher are a bachelor or higher degree in the subject-related discipline, pre-service teacher education courses, and teacher certificate, etc. (7) A majority of the 10 countries have established their own national qualifications framework (NQF) and quality assurance system (QAS), but continuous improvement is needed. (8) There are some common focuses of TVE reform across countries, such as strengthening the industry-academic link, and increasing the employment rate of TVE graduates. (9) Major TVE trends in this region include training students with the skills needed to adapt to advanced technology and to cope with rapid changes in the industrial 4.0 era, increasing technology application and digital transformation in TVE, and promoting the use of employment-based learning models and apprenticeship. (10) These countries have encountered several salient challenges or issues, such as negative societal perceptions of TVE, a shortage of qualified TVE teachers, the fragmentation of TVET management, and so on.

Keywords: technical and vocational education (TVE), comparative analysis, Indo-Pacific region

Introduction

This book compiles country-specific articles focused on the trends and issues in technical and vocational education (TVE) from 10 countries in the Indo-Pacific region, namely Australia (AU), India (IN), Indonesia (ID), Japan (JP), Korea (KR), Malaysia (MY), Singapore (SG), Taiwan (TW), the United States (US), and Viet Nam (VN). A summary of the TVE profiles, status of TVE, as well as trends and issues of TVE in these countries is presented in this chapter. TVE here refers to the formal education in which the learners are assisted to develop their skills for exploring, entering, and succeeding in a wide range of occupational fields. As part of lifelong learning, TVE can take place at secondary, post-secondary, and tertiary levels, which may lead to qualifications or certificates.

Several of the following synonyms are commonly used in specific geographic areas: Vocational Education (VE), Technical Education (VE), Vocational and Technical Education (VTE), Technical and Vocational Education (TVE), Technological and Vocational Education and Training (TVET), Occupational Education (OE), Vocational Education and Training (VET), Career and Technical Education (CTE), Workforce Education (WE), Workplace Education (WE), and so on. For cross-country comparison purposes, the term "TVE" is used to represent this concept in the following discussion.

A Comparison of the TVE Profiles

This section summarizes the overall TVE profile of the 10 countries. Table 1 provides a summary of three comparative points: the schooling system in which TVE is placed, types of institutes offering TVE programs, and the influence government exerts on TVE in the 10 countries.

Point 1. TVE Schooling System

For the TVE schooling system, most of the countries provide TVE programs from upper secondary education to post-secondary/higher education, while IN and MY start earlier, from lower secondary education. In particular, all of TVE in SG is at the post-secondary level whereby every entrant has a strong foundation through 10 years of schooling. Similarly, the majority of TVE in AU takes place post school for all working-age people over 19 years old, although it can be undertaken as part of secondary education. In addition, the education system in countries such as KR, MY, and TW has a dual-track feature as it has separate schools and colleges/universities dedicated to TVE.

Point 2. Types of Institutes Offering TVE Programs

Regarding the types of institutes offering initial and further TVE programs, they are quite diverse and complex in each country in order to meet the workforce needs. The types of institutions at the secondary education level include vocational schools, technical schools, trade schools, comprehensive high schools, career centers, apprenticeship programs, etc. At the post-secondary/tertiary level, several types of institutes are common, such as community colleges, junior colleges, specialized training colleges, polytechnics, universities of science and technology, and technical universities. Some of them are mainly provided by the private sector, such as in the Australian TVE system which is a significantly privately financed training market. In addition, most countries have TVE programs in their formal education and further education, while in India, the informal vocational education constitutes 93% of the work-force who receive their skills training through informal channels, such as family occupations, on-the-job training (OJT), self-learning, or under the guidance of master craftsmen.

Point 3. Influence of Government on TVE

In terms of the influence that government exerts on TVE, three classifications of model are found in these countries: the school model, the market model, and the state-regulated market model. Among them, the school model in which the government takes major responsibility for TVE is most prevalent. For example, in the US, even though there is no completely unified model from state to state, the career and technical education (CTE) could be classified in general as a school model where the federal government provides support and guidance, states provide funding, determine the competencies and assessments for programs, and leave implementation to the local school districts. It is worth noting that TVE in many countries is governed by multiple ministries and departments; Malaysia is an example where TVE is overseen by the Ministry of Education, the Ministry of Higher Education, the Ministry of Human Resources, the Ministry of Youth and Sports, the Ministry of Rural Development, and the Ministry of Agriculture. On the other hand, in a few countries, TVE governance majorly relies on a single ministry (mostly education), such as JP and TW. In addition to the school model, Malaysia has a market model and state-regulated market model simultaneously. Some industries (e.g., McDonalds Cooperation Malaysia, etc.) have developed their own training centers without government influence (market model) and some government-owned companies (e.g., Malaysia Airlines, etc.) operate the state-regulated market model in which the government manages companies' involvement in training.

Table 1 A Summary of the Schooling System, Institute Types, and Influence of Government Regarding TVE

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
Schooling system (place of TVE)	1. Schooling system: kindergarten, primary school, secondary school, senior secondary school, tertiary education 2. Place of VET: secondary and post-secondary education	1. Schooling system: 8-2-2-3 (+) years for elementary education, secondary education (SE), higher SE, higher education. 2. Place of TVE: SE, higher SE, & higher education	1. Schooling system: pre-school, basic education (elementary/ junior secondary), senior secondary education (SE), higher education (HE) 2. Place of VET: senior SE, HE (diploma programs, master applied science, doctor applied science)	1. Schooling system: 6-3-3-4 (6) years for primary education, lower secondary education (SE), upper SE & higher education (HE) 2. Place of TVE: SE & HE	1. Schooling system is based on a 6-3-3-4 single-track which is further divided into a school for academic education and a school for vocational education (VE), a double-line system. 2. Place of TVE: secondary VE, post-secondary VE & higher VE.	1. Schooling system: preschool (1 year), primary (6/ compulsory), lower secondary (3), upper secondary (1-2), and post-secondary/ tertiary (1-6). 2. Place of TVE: lower SE, upper SE, post-secondary/ tertiary education	1. Schooling system: pre-primary, primary, secondary, post-secondary, & tertiary 2. Place of TVE: post-secondary TVE (polytechnics, Institute of Technical Education); Tertiary TVE (applied learning universities)	1. Schooling system: 12 years national education - primary school (6), junior high school (3) and senior high school (3), the first 9 years are compulsory; & higher education 2. Place of TVE: senior high school (HS) & higher education	1. Decentralized compulsory educational system, from kindergarten through grade 12. 2. Place of career and technical education (CTE): high school (grades 11-12), postsecondary schooling (two-year colleges); other educational institutions not associated with the formal education system	1. Schooling system: childhood education (nursery/ kindergarten), general education (primary, lower secondary, upper secondary), higher education 2. Place of TVE: elementary TVE in lower SE, intermediate VET in upper SE, & colleges

Table 1 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
Types of institutes offering TVE programs	1. Course type: training package and accredited qualifications; training package skill sets; accredited courses; subjects not delivered as part of a nationally recognized program 2. Institutes: private training providers; TAFE institutes; community education providers; enterprise providers; schools; universities	1. The formal structure includes: vocational education (VE) in schools at the post-secondary stage; higher technical education imparted through professional colleges; technical training in specialized institutions; & apprenticeship training. 2. Informal VE: family occupations, on the job training, self-learning or under the guidance of master craftsmen.	1. Secondary VE institutions (secondary vocational schools or vocational high schools) 2. Community colleges 3. Polytechnics 4. Vocational schools at higher education institutions (universities, institutes, sekolah tinggi, academies or UNISTA)	1. Secondary VE: specialized high schools (HS), specialized training colleges 2. Higher VE: universities, junior colleges, specialized training colleges, college of technology, polytechnic universities	1. Secondary VE: meister high schools, specialized vocational high schools, comprehensive high schools, apprenticeship schools, trade high school, entrusted VE institutions. 2. Post-secondary VE institutes: junior colleges, polytechnics 3. Tertiary VE: industrial university, meister colleges, national open university, technical college, industrial complex campus, cyber university, academic credit banking system, college in the company, specialized college	1. Lower SE: junior VE; upper SE: vocational colleges, public/ private skills training institutes; post-secondary: MTUN, polytechnic, community colleges, private skills training institutes 2. Governed by Ministry of Education (ME), Ministry of Higher Education (MHE), Ministry of Human Resources (MHR), Ministry of Youth and Sports (MYS), Ministry of Rural Development (MRD), & Ministry of Agriculture(MA)	1. Institute of Technical Education (ITE) 2. Polytechnics 3. Universities	1. Technical HS 2. Junior college (JC) 3. Institute of technology (IT) 4. University of science and technology (UST) 5. Technical university (TU)	1. Comprehensive high school 2. Vocational/ career & technical education high schools 3. Career center 4. Community & technical college 5. Apprenticeship programs 6. United States military 7. Job Corps 8. The U.S. correctional (prison) system	1. VET centers 2. VET intermediate schools 3. VET colleges

Table 1 Continued

Comparative Point	Countries									
	Australia (AU)	**India (IN)**	**Indonesia (ID)**	**Japan (JP)**	**Korea (KR)**	**Malaysia (MY)**	**Singapore (SG)**	**Taiwan (TW)**	**United States (US)**	**Viet Nam (VN)**
Influence of government on TVE	The Australian federal government and eight state and territory governments are collectively responsible for the governance, regulation, and support of the VET system.	School model: 1.The Ministry of Skill Development and Entrepreneurship at the Centre is responsible for coordinating all skill development efforts, while at the State level, it is the state skill ministries. 2. In the skills sector, there is a mix of central schemes designed and funded centrally, with front-line support from the states.	1. The Ministry of Education and Culture (MoEC) is responsible for planning and implementing educational services at the primary, secondary, and tertiary levels. 2. The Ministry of Manpower and Transmigration (MoMT) is responsible for skills training centers or Balai Latihan Kerja (BLK) that prepare citizens (school leavers) for employment.	School model: 1. Vocational education is under the jurisdiction of MEXT. 2. The vocational ability development colleges and polytechnic colleges are under the jurisdiction of the Labor Administration. 3. Non-university educational institutions at the tertiary level are under the jurisdiction of the prefectural government.	School model: 1. Government (Ministry of Education, ME & Ministry of Employment and Labor, MEL) is responsible for guiding the establishment, funding and management of secondary vocational institutes. 2. Post-secondary VE institutions directly managed by the ME and Korea polytechnics, a subsidiary of the MEL. 3. The ME gives financial supports to junior colleges and partner universities.	1. School model: driven by the ministries through financial investment. They have their own training institutions and systems. 2. Market model: the industries have developed their own training centers (e.g., McDonalds Cooperation Malaysia). 3. State-regulated model: including companies owned by the government (Malaysia Airlines, etc.).	1. Public sector: - TVE institutes are funded & have boards of governance appointed by government. - government created an integrated TVE model connecting school system, ITE, polytechnics and universities. - government engages with all the institutions in economic policymaking & implementation 2. Private sector: government supports accreditation, training provision, certification of adult trainers, & a skill qualification framework.	School model: 1. The government approved skills education program in junior HS, technical HS, VE affiliated in general senior HS, professional program in comprehensive HS, JC, IT, and UST to cultivate skilled talent. 2. The promotion and management of TVE is the responsibility of the Ministry of Education (ME) at the central level and of the municipal government or county/city government at the municipal/local level.	1. School model: federal government provides support and guidance; states provide funding, determine the competencies and assessments for CTE programs, and leave implementation to the local school districts. 2. Governmental influence varies by state, no completely unified model in the US	1. TVE Law 2014, TVE system is run under the administration of the Ministry of Labour, War Invalids and Social Affairs (MOLISA). 2. Viet Nam TVE is a basically school - based system that heavily relies on state budget.

A Comparison of the Status of Technical and Vocational Education

This section presents a comparison of the status of TVE for the 10 countries in the Indo-Pacific region. Table 2 shows the summarized information as six points, namely: TVE key statistics, TVE key strategies and policy documents, TVE students/trainees, TVE teachers and faculty qualifications and professional development, TVE qualifications system and quality assurance, and current TVE reforms and policy discussions.

Point 4. TVE Key Statistics

The current enrollment of TVE students of 10 countries is discussed in this part. The numbers vary greatly across countries. In Australia, about 23.4% of the resident population aged 15 to 64 participated in nationally recognized VET, and most of them (72%) were enrolled with private training providers, while the remainder were at TAFE institutes, community education providers, etc. However, TVE participation is relatively low in India. Only about 8% of the population aged 15 to 59 has received formal or informal vocational training, with a higher percentage of males compared to females receiving vocational/technical training. In Taiwan, the ratio of TVE students to general education students is close to 1:1 at the secondary education level, while it used to be 7:3 in the past, indicating that the involvement of TVE students is declining. Similarly, the ratio in Indonesia during the academic year of 2019/2020 was 49:51, but the government aims at increasing it to 70:30.

Point 5. TVE Key Strategies and Policy Documents

The key strategies and policy documents which guide the current and future TVE practices in the 10 countries are discussed in this part. It is evident that TVE has attracted increasing attention and interest in this region because every country keeps revising its TVE policies or has adopted innovative strategies to strengthen the TVE system in recent years. Some countries have enacted a specific Law or Act to guide the development of the TVE system and skill/workforce training, such as the “Act on the Development of Vocational Skills of Workers” in Korea, the “National Skills Development Act” in Malaysia, the “Technical and Vocational Education Act” in Taiwan, the “Strengthening Career and Technical Education for the 21st Century Act,” known as Perkins V in the United States, and the “Law on Vocational Education” in Viet Nam. Furthermore, many countries have issued national TVE strategies/ policies/plans to fulfill the missions of TVET, for example, the “National Agreement for Skills and Workforce Development” in Australia, the “National Policy for Skill Development and Entrepreneurship” in India, the “Strategic Plan for 2020-2024 of Directorate General for Vocational Education” in Indonesia. In general, these strategies and policies concern the establishment of a sound TVE system, the improvement of TVE students’ skill learning outcomes and training quality, and the enhancement of an industry-academia-government collaboration.

Point 6. TVE Students/Trainees

This part focuses on TVE accessibility, programs available for students or trainees, and their TVE learning achievements (graduates’ employment rates and socioeconomic status, etc.) For TVE accessibility, in countries such as ID, KR, and TW, students can access senior vocational high schools after finishing lower secondary education. After that, they could pursue a bachelor/master/ doctoral degree at a higher TVE institute. The admission might consider students’ interests, school performance, career priority, comprehensive assessment scores, and so on. A tendency is observed that students prefer to keep studying after graduating from high school, especially in Korea and Taiwan. In Viet Nam, TVE programs are available for junior high school students. In the US, all secondary students have access to CTE courses and programs, while the accessibility levels vary depending on each state. In Australia, the TVE system was set up for all Australians and caters for all age groups with the majority of TVE taking place post school education. It especially pays attention to the demands of equity groups, such as students with disabilities, indigenous status, or living in remote/disadvantaged areas.

As for the programs available for students or trainees, they are diverse and vary across countries. Several categories/broad areas of TVE programs are provided in this region, such as agriculture, business, family and consumer sciences (home economics), health occupations (nursing), marketing education, trade and industrial education, tourism and hospitality, building technology, art and design, fisheries, information, etc. Take ITE in Singapore as an example; it has offered courses in 17 areas, such as mechanical technology, electronics, manufacturing, food and beverage, games development, etc. Taiwan has 15 study areas in vocational high schools. In addition, each country has some programs that are more popular than others; for example, in Indonesia, programs in the fields of technology & engineering, information technology & communication, and business & management attract a great amount of interest from students and trainees.

In terms of TVE graduates' employment rate, the values in countries such as IN, ID, and MY are in the range of 40% to 60%. For some countries (e.g., KR, SG, and VN), a higher employment rate of TVE graduates is reported, from 70% to 87%. Moreover, the employment rate of post-secondary/tertiary education graduates in Japan is over 97%. In Australia, 56% of VET students report that their employment status has been improved after completing a qualification training program, and in general, the training received is very satisfactory.

Point 7. TVE Teachers/Faculty Qualifications and Professional Development

There are some common qualifications for being a TVE teacher in this region, and a few specific conditions required by individual countries. TVE teachers at the secondary education level usually need to possess a bachelor or higher degree in the subject-related discipline, have completed pre-service teacher education courses, and have passed the teacher qualification assessment for a teacher certificate or license. Possessing a skill certificate in the training field is a preference in countries such as Australia and Viet Nam. In the pre-service stage, the teacher education courses usually include general education courses, pedagogy courses, etc. As for teacher recruitment, it often undergoes a number of stages, including written examinations, class demonstrations, practical examinations, and interviews. Besides, in some countries (e.g., AU, TW, VN), TVE teachers need to have work experience or have completed internships in the specific industry related to the teaching subject. In terms of teacher/faculty qualifications at the post-secondary/tertiary education level, a master or doctoral degree is often required (like JP and TW), and additional conditions, such as research achievements, recognition of outstanding practical skills, and a teacher certificate, are recommended in countries like JP and SG.

Some differences in the teacher status or preparation are observed in this region. In Australia, the TVE teaching workforce is diverse, and most TVE teachers instruct within a specific industry and may teach part-time in TVE or work as casual employees across multiple registered training organizations (RTOs). The situation is quite different from other countries where most TVE teachers have full-time positions in schools. Another example is the "alternative" pathway of teacher preparation in the United States, whereby teachers are recruited from business and industry, then undergo teacher preparation required by the state Department of Education in which they are employed. That is, they complete teacher licensure and certification requirements while teaching at the same time.

Regarding the professional development of in-service TVE teachers, all countries encourage teachers to continue improving their professional knowledge and skills in their specific area. For example, in Malaysia, there are various reskilling and upskilling training programs offered by universities and institutions for in-service TVET teachers. In addition, Taiwanese TVE teachers in post-secondary/tertiary education are required to undertake at least 6 months of study or research on their professional area in an organization or an industry that collaborates with their institution every 6 years after obtaining a teaching position. Similarly, vocational teachers in Viet Nam have to reserve time to take spend a probation period at an enterprise to update and practice skills and to access new technology by law. It is worth noting that in Australia, although almost all of the trainers and assessors hold Certificate IV, there is no national body driving professional development in the TVE area, raising the concern of inadequate opportunities for personal development beyond Certificate IV.

Point 8. TVE Qualifications System and Quality Assurance

TVE qualifications and their application in a national qualification framework (NQF), as well as TVE institutional and program accreditation across the 10 countries are discussed in this part. Except for the United States, Singapore, and Taiwan, all of the selected countries in this book have established their own national qualifications framework (NQF) to classify qualifications based on individual learning outcomes from the education and training system together. Within the framework, the defined and nationally accredited qualifications are awarded at defined levels to express the competencies of its workers. As for the TVE qualifications system, they are a part of NQF and are distributed across different levels according to the training standards that have been achieved in each country. For example, the Australian Qualifications Framework (AQF) has 10 levels, ranging from AQF 1 (Certificate I) to AQF 10 (Doctoral Degrees). Australian VET is included in AQF levels 1 to 6, covering Certificates I to IV, Diploma, Advanced Diploma, and Associate Degree levels.

As for the United States, even though there is no national/federal qualification framework, many CTE programs offer industry-organized certificates or credentials which are established by individual professional organizations, or business and industry corporations, or by states or the federal government. Except for the state-level certificates, all of these are transportable nationwide. In

Singapore, the TVE institutions' own awards could serve as the national skill qualifications. Therefore, the ITE certificates and polytechnic diplomas are accepted by employers as nationally accredited, even though in reality they are self-validated by the institutions. External validation is not seen as necessary and there is the Workforce Skills Qualifications (WSQ), a national credentialing system, but no NQF in Singapore, either.

In terms of the quality assurance mechanisms, most countries in this region have set up their own quality assurance system (QAS), adopting either an accreditation or evaluation approach, to approve both the initial and ongoing offerings of TVE programs or institutions meeting the standards established by recognized accrediting organizations. For example, in Indonesia, the accreditation of secondary vocational schools is carried out by the National Accreditation Body for Secondary Education. The criteria generally refer to national standards of education and specifically focus on the standard of content and process, graduates' competencies, personnel, infrastructure, management, finance, and assessment. The accreditation results are classified into four levels: Grades A (extraordinary), B (good), C (ordinary), and Non-accredited schools for those below Grade C. In addition to the accreditation or evaluation, some countries have their unique approaches to enhance the quality of TVE. Japan is an example where the Job Card System, a competency evaluation with a three-stage assessment of job performance, is set up by the Ministry of Health, Labor and Welfare to promote employment, retraining, and continuing education. Likewise, the Workforce Skills Qualifications from the SkillsFuture Singapore Office are used across the training industries to train, develop, assess, and certify skills and competencies for the current workforce.

Point 9. Current TVE Reforms and Policies

TVE in all of the 10 countries is ever-evolving in order to respond to the needs of students, schools, local communities, employers, and nations. Numerous reforms and policies are implemented in this region to enhance the quality of secondary and post-secondary TVE. Each country has its unique reform focuses, while some points receive more attention from these countries, such as strengthening the industry-academic link, promoting collaboration between governmental, industrial, academic, and training organizations, increasing the employment rate of TVE graduates, providing practice-oriented/hands-on courses, ensuring the TVE equity and access, refining the TVE courses/programs to cultivate the workforce for the changing society, and allocating a sufficient budget for TVE development.

Australia is an example where substantial changes have occurred in the vocational education and training sectors over the past 2 decades to make the VET sector have greater appeal and to improve responsiveness to the labor market. Some of the major recent policy reforms include “Delivering Skills for Today and Tomorrow” in 2019, “ASQA Regulatory Practices Review” in 2020, and creation of the National Skills Commission, National Careers Institute and Skills Organizations. Overall, the constant process of VET reform and evolution has been partially driven by changes in the labor market as well as the training markets which are moving towards a contestable market.

Some specific TVE reforms in individual countries are observed in this region. In India, to overcome the social status hierarchy associated with vocational education, reform related to integrating VE with mainstream education has been proposed. The “National Education Policy 2020: Reimagination of Vocational Education for Building Competencies” requires all educational institutions to integrate vocational education into their offerings in order to pave the way for the transformational growth of vocational education. In Korea, the Ministry of Education plans to promote the Innovation Sharing University project in 2021 to cultivate new digital technology talents. In Singapore, the government has established the SkillsFuture Singapore Agency in 2016 to drive skills upgrading awareness and opportunities. The skills framework that compiled competency descriptions for different levels of skills in different industries are provided. In addition, the SkillsFuture credit account was created to empower every citizen to attend training at their own time and pace with the aim of helping to create a national culture of lifelong learning.

Table 2 A Summary of the Status of TVE

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
TVE key statistics	In 2019, 4.2 million students (23.4% of the Australian resident population aged 15-64) were enrolled in nationally recognized VET.	Number of institutes/students in vocational system: 1. Vocational secondary: 108/- 2. Vocational higher secondary: 7400/472,000 3. Industrial training at ITIs: 13,550/ 1,200,000 4. Bachelor's of VE: 162/10,200 5. Community colleges: 157/- 6. Advanced training: 28/350,000	1.Secondary VE: 3,615 public schools with 2,248,283 students (44%) and 10,637 private schools with 2,849,490 students (56%). 2.Postsecondary VE (number of institutes/students) -Polytechnics: public: 43/148,138 private: 170/89,615 -Community colleges: public: 4/527 private: 30/1,056 3.Sekolah vokasi/UNISTA: 2,249/538,841	1. Secondary VE (number of schools/students) -specialized HS: 1,972/555,000 -specialized training college: 404/34,075 2.Higher VE -university: 765/2,623,572; -junior college: 323/104,871; -specialized training college: 2,779/604,415 -college of technology: 57/56,974 -polytechnic univ.: 34/2,555	1.Secondary VE in 2020: 17.8% of the total HS students, 24.6% of the total HS schools 2.Post-secondary VE (institutes/ students) - junior college: 9/621,772 3.Tertiary VE: -industrial univ.:2/15,384 -cyber univ.: 19/130,311 -Specialized colleges: 3/15,267	The total enrolment of each ministry in 2018: ME: 57,808 MYS: 2,852 MA: 1,376 MHR: 15,910 MHE: 122,439 MTUN: 56,228 MRD: 15,166	A quarter of students (about 10,000) a year would proceed to study at one of the three colleges of the ITE, about 16,000 at one of the 5 polytechnics, and 12,000 at one of the 13 junior colleges and eight through-train and special schools.	1.Secondary TVE in 2019: 244,492 students in total; 49% in public schools & 51% in private schools 2.Higher TVE: 565,574 students in total. (number of public/private institutes/ % of students) JC: 2/10/15.7% IT: 1/9/3.7% UST: 12/48/80.7%	1.Secondary level: 9 million students enrolled in career and technical education courses and programs, the number of males is higher than that of females. 2.Postsecondary level: 3.5 million enrolled students, the number of females is higher than that of males.	1.The total number of TVE institutes are 1,907 (400 colleges, 463 intermediate schools, 1044 VE institutes) in 2019 2.In 2019, the total enrollment is 2,338,000 individuals: 10% in colleges, 14.2% in intermediate level, 75.8% in elementary level of TVE and other vocational training programs.

Table 2 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
TVE key strategies and policies	1.National Agreement for Skills and Workforce Development (2012) 2.Heads of Agreement for Skills Reform (2020) 3.National Agreement for Skills and Workforce Development Review- Productivity Commission Study Report (2020) 4.Strengthening Skills: Expert Review of Australia's VET System (2019) 5.VET Reform Roadmap (2020) 6. Review of Senior Secondary Pathways into Work, Further Education and Training (2019) 7.All eyes on quality: review of the National VET Regulator Act 2011 report	1.The National Skill Development Mission: make India the skill capital of the world. 2.State Skill Missions/Nodal Agency for Skill Development: to manage the activities of the state skill mission. 3.National Policy for Skill Development & Entrepreneurship (2015): create an ecosystem of empowerment by skilling on a large scale at speed with high standards and to promote a culture of innovation.	1. The 2021 Workplan of the Directorate General for Vocational Education: form quality and competitive human resources. 2.The Strategic Plan for 2020-2024 of the Directorate General for Vocational Education: (1) improve learning quality and relevance of vocational education at all levels, (2) enhance the quality of TVET personnel at the level of VE. 3.The National Strategic Plan 4.The Ministry of Education and Culture's Strategic Plan 2020-2024	1.In HS: Reinforcement of vocational education in general courses. 2.In professional/specialized departments: (1) combining classroom learning and practical skills, (2) systematizing quality assurance & improvement, (3) cultivating human resources in developmental potentials. 3.In HE: (1) developing practical/applied abilities, and strengthening the relationship with continuing, life-long learning; (2) reorganization of departments; (3) faculty development by partnership with each college, & preparation of evaluation systems; (4) legislation of a framework specified for VE	1.The revised 2010 Elementary and Secondary Education Act 2.The Education Act 3.The Higher Education Act 4.The Act on the Development of Vocational Skills of Workers 5.The Lifelong Education Act	1.Malaysia Education Blueprint 2015-2025 (Higher Education) 2.Education Act 1996 3.National Skills Development Act 2006 4.Malaysia Qualifications Agency 5.Malaysia Board of Technologists 6.11th Malaysia Plan 2016-2020	1.Requiring a minimum of 10 years schooling before TVE 2.Creation of the Normal (Academic) and Normal (Technical) streams in secondary schools 3.Building of the 3-mega colleges of the ITE 4.Expansion of polytechnic education 5.Opening up of upgrading paths to vocational and technical graduates of the ITE and Polytechnics	1.Technical and Vocational Education Act 2.Guidelines for Technical and Vocational Education Policies: (1) establish a flexible education system and admission channels for TVE; (2) implement career introduction and exploration courses; (3) establish practical, hands-on, problem-oriented learning styles; (4) promote collaboration between governmental, industrial, academic and training organizations 3.Teacher Education Act 4.Act Governing the Appointment of Educators	1.The Smith-Hughes Act of 1917. 2.The Strengthening Career and Technical Education for the 21st Century Act/ Perkins V (2018): funding distributed to states for CTE enhancement. 3.The Workforce Innovation and Opportunity Act (WIOA) (2014): help job seekers access employment, education, training, and support services.	1.The Law on Vocational Education (2014): covering the regulation of the TVE system 2.The Education Law 2019 enables secondary graduates to study culture at TVE institutions. 3.The Circular No. 07/2019/TT-BLDTBXH has created more favorable conditions for colleges and intermediate schools on enrollment regulations and identifies enrollment quotas at intermediate and college levels.

Table 2 Continued

Comparative Point	Countries: Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
TVE students or trainees	1.Australian VET caters for all age groups with the majority of VET taking place post school education. It also caters for students of equity groups (disability, indigenous, students living in remote/ disadvantaged areas). 2.56% of VET students who completed a qualification report that their employment status has been improved after training. 3.50.9% of employers use the VET system to meet training needs. 4.Student's satisfaction with training is high.	1.There are a total of 14,323 ITIs providing skill education to more than 2.3 million students. 2.Nearly 2% of persons of age 15-59 years had received formal vocational training and 6% had received non-formal vocational/technical training. 3.More than 50% of formally trained persons are in salaried jobs; and more than 50% of informally trained are self-employed.	1.Upon completing junior high school (HS), graduates can enroll in senior vocational HS (SMK). 2.Numerous TVE programs at secondary and postsecondary institutions. The most popular: technology & engineering, IT & communication, business & management. 3.42% of SMK graduates and 46.60% of post-secondary TVE were employed/ entrepreneurs. 64.28% of them received a salary as much as or above the minimum wage. 53.90% of them completing short courses/ training had a job or were entrepreneurs.	Employment rates: 1.Specialized vocational HS: manufacturing (68.2%); commercial (43.1%), home economics (37.4%) & information (24.0%) in 2020. 2.Universities (98%), college of technology (100%), Specialized training college (96.8%) in 2019.	1.After graduating from middle school, students are provided with a variety of options for senior VE. 2.There are many types of post-secondary and higher VE. 3.Most graduates from Meister high schools go into top companies, military service with special skills, or go to college. The employment rates were 87.3% in 2019. 4.The average employment rate for college graduates in the last 5 years is 70%.	1.The TVE institutions deliver training through formal or non-formal settings. 2.Programs offered to students range from certificate to professional level. 3.Skills/TVE pathways produced the highest number of employed graduates. 4.The percentage of employed TVET graduates (2021) was 60%, 17.8% in further study, 2.0% were upgrading their skills, and 4.6% were waiting for job placement.	1.All TVE entrants have completed 10 years of basic education. 2.Regardless of where a student starts TVE, the route to a tertiary education is open, depending on ability alone. 3.Graduates from ITE and the polytechnics have high employment rates (around 80% within 3 months of graduation), with annually rising starting salaries.	1.Junior HS graduated students can attend technical HS or 5 years JC. 2.Technical HS graduates can attend IT/ 4 years UST. 3 After finishing 2 years JC, students can enroll in IT/ 2 years technical university. 4.Students graduated from 5 years JC can keep studying in technical academy or 2 years technical university. 5.TVE students with bachelor's degree can keep further study to pursue master/ doctoral degrees 6.Secondary TVE graduates tend to keep further study.	1.All secondary students have access to CTE courses with various levels depending on each state. 2.CTE courses & programs' areas: agricultural education, business education, family and consumer sciences, health occupations, marketing education & trade, & industrial education. 3.The rates of graduation/ postsecondary enrollment/ employment & median income of CTE concentrated students are higher than those of non-concentrators.	1.In 2019, there were about 2.2 million students graduating from VE. 85% of college graduates and 80% of intermediate level graduates had jobs. 3.The average monthly income of workers with college degrees in 2019 increased 4.4% compared to 2018. Jobs with the highest average income after trained at elementary level are related to electronic technology, communication, construction engineering, electronic equipment technology.

Table 2 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
TVE teachers and faculty	1.In 2019, 71,379 were employed as trainers and assessors, where 52.6% were employed full-time and 47.4% were part-time; 53.5% had permanent employment, 13.9% were on a contract or in temporary positions, & 32.6% were on a casual basis. 2.Trainers and assessors must hold a Certificate IV in training and assessment, or a diploma, or higher-level qualification in adult education. 3.There was no national body driving professional development in the VET sector, the opportunities for personal development beyond Certificate IV were inadequate.	1.The ITI teachers are recruited through a selection process with written examinations and interviews. 2.Training of trainers/crafts instructor training for the potential and existing instructors of training institutes in 27 trades is offered at 5 advanced training institutes and 1 central instructor training institute. 3.To train instructors who have completed more than 5 years of services, a 3-month module covering the pedagogic aspect has been introduced in 11 institutes under DGE&T. 4. There is an incremental requirement for about 5.8 million teachers and trainers till 2022.	1.Pre-service teachers: completing a 4-year university degree, obtaining a teacher certificate, and demonstrating professional, pedagogical, personal, and social competencies. 2.In-service program for teachers: the teacher certification process is conducted through (1) the direct provision of the certificate, (2) portfolio assessment, (3) education and training of the teacher, and (4) teacher professional education.	1.VE HS teachers: (1) a master's degree or a bachelor's degree from a teacher training course at a 4-year university; (2) passing the prefectural employment exam 2.Specialized training college instructors: the teaching qualifications stipulated in the standards for establishment of specialized training colleges. 3.Junior college instructors: a doctoral degree, research achievements, or recognition of outstanding practical skills. 4.College of technology instructors: a master or doctoral degree in engineering, research activities, & research guidance to 5th-year students. 5.Polytechnic college faculty members: a doctoral/master degree, & instructor license.	1.Vocational teachers are trained through the teacher education department and college of education, teaching courses, and graduate school of education. 2.3 stages for teacher recruitment: written exam, class demonstrations/ practical exam, interviews. 3.University teachers: when hiring, teaching methods and pedagogy are importantly reflected in the screening process.	1.Polytechnic/ community college instructors: a diploma in the teaching field & an education qualification. 2.Vocational college teachers: degree in education/ engineering + Malaysia Skills Certificate Level 3 and above, a VTO certificate and a certificate of induction. 3.Various reskilling and upskilling training programs provided by universities & institutions for in-service TVET teachers.	1.The main criterion for recruitment of trainers and lecturers is having a bachelor's or master's degree with at least 5 years working experience in the specific industry. 2.Professional development: - Pre-service training: recruited staff are required to undergo in-house pedagogical training to build their educational capabilities. (e.g. advanced certificate in technical education, pedagogy, certificate in teaching and learning for polytechnic educators). - In-service training: professional development would continue to be available to them on campus or in the field.	1.Requirements for secondary TVE teachers: complete pre-service teacher education courses, pass the teacher qualification assessment, 6 months practical education training in school, receive the teacher's certificate, & complete at least 18 hours of industry internship. 2.Requirements for higher TVE teachers: pass the review of TVE college, teacher certificate 3.Secondary/ higher TVE teachers shall have 1 year of actual practical work experience in an industry sector related to their teaching subjects. 4.Higher TVE in-service teachers shall undertake 6 months of study/ research related to their professional/ technical area of expertise after every 6 years of teaching.	1.Secondary teachers must meet state requirements on teaching license or certificate. -Preservice teacher preparation pathway: traditional college/ university degree with a specialization in an area of CTE (general education, pedagogy & content courses) -In-service teacher preparation (alternative) pathway: recruited from business & industry; requirement varies widely by state. 2.Postsecondary teachers meet requirements & preparation of each employing institution.	1.In 2019, the number of trainers in TVE institutions was 84,302 people. 2.There are 4 technical universities, 1 vocational teacher training college, and 45 training divisions for TVE pedagogy at universities and colleges offering both pre- and in-service vocational training. 3.According to VET Law, a TVE trainer shall meet 4 requirements: virtuous character, qualifications in professional competence and proficiency, good health & a clear criminal record. 4.Vocational teachers must reserve time to spend a probation at the enterprise to update practice skills and access new technology (VET Law, 2014).

Table 2 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
TVE qualifications system and quality assurance	Australian VET is included in AQF levels 1 to 6, which cover Certificates I to IV, Diploma, and Advanced Diploma and Associate Degree levels.	1.National Skills Qualifications Framework (NSQF) 2.Skill Assessment Matrix for Vocational Advancement of Youth 3.Quality Assurance System in Skilling 4.Current Structure of Quality Assurance for Skill Education 5.National Quality Assurance Framework (NQAF)	1.Indonesian TVET is included in Indonesia Qualification Framework levels 2 to 9. 2.Accreditation of secondary vocational schools is carried out by the national accreditation body for secondary education. 3.Accreditation for higher level TVE programs is performed by BAN-PT (the national accreditation bureau for HE institutions).	1.National qualifications 2.National skill test 3.Job card system 4.Systematization of vocational skills in each field 5.Job grading system in companies 6.Inventory of common educational outcomes 7.Quality assurance and improvement system	1.The national technical qualification system 2.National competency standards 3.The Korean National Qualification Framework 4.Junior college accreditation: the Korea accreditation board for vocational HE. 5.University and program accreditation: for engineering education	1.The Malaysian Qualifications Framework (MQF): a principal reference for setting up qualification levels and standards for HE 2.The Malaysian skills certificates: National Occupational Skills Standards that outlines the competencies required by an employee based on the level of certification and occupation.	1.The institutions' own awards also serve as the national skill qualifications. Thus, the ITE's National ITE Certificate (Nitec), Higher Nitec, Work-Study diplomas, & polytechnic diplomas are accepted by employers as nationally accredited. 2.For continuing education and training (CET), the Workforce Skills Qualifications (WSQ) from the SkillsFuture Singapore (SSG) Office are used across the CET training industry. 3.External validation is not seen as necessary and there is no NQF.	1.TVE quality assurance mechanism: school self- evaluation & external evaluation 2.Secondary TVE: school evaluation (curriculum teaching, academic counseling, environment/ equipment, and school development) & VE evaluation (development, curriculum & teaching, requirement of performance). 3.Higher TVE: school evaluation (teaching, student affairs, general affairs, library, information, personnel, & accounting affairs), & evaluation of colleges, departments, institutes, and degree programs.	1.CTE programs must have approval from states. 2.CTE programs offer industry-recognized certificates/ credentials established by individual professional organizations/ business & industry corporations/ states/federal government. 3.Qualifications systems for apprenticeship programs & registered apprenticeship programs must have approval from the US Department of Labor or a state apprenticeship agency. 4.CTE teacher preparation programs must meet state teacher licensure and certification requirements.	1.National occupational skill standards (NOSS) play a critical role in the development of training programs based on output standards and labour market demands. 2.The MOLISA has issued guidelines for evaluating the quality accreditation standards of VE institutions & instructed the evaluation of training program accreditation standards at all levels of VE, & instructed the TVE institutions to perform their annual quality assessment.

Table 2 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
Current TVE reforms and policy	1. Delivering Skills for Today and Tomorrow 2. ASQA Regulatory Practices Review 3. Creation of the National Skills Commission (NSC), National Careers Institute (NCI) and Skills Organizations (Pilots)	The National Education Policy (NEP) 2020 - Reimagination of Vocational Education for building competencies - paves the way for the transformational growth of VE by requiring all educational institutions to integrate vocational education into their offerings. The aim is to increase the gross enrollment ratio in HE including VE from 26.3% (2018) to 50% by 2035.	1.Revitalization of TVET, including TVET at the secondary and postsecondary levels (2016): aim to improve the quality and competitiveness of Indonesian human resources. 2.Creating a new Directorate General for Vocational Education (2019): to strengthen TVET and the link between secondary, postsecondary level, and industry, & to address high unemployment among secondary vocational school graduates. 3.A gradual extension of secondary vocational schools from 3 years to 4 years to improve the graduate readiness for employment (2020).	1.Expanding and advancing specialized knowledge and skills, improving and ensuring the quality of VE, and promoting specialized technical HS into colleges of technology. 2.Enhancing colleges of technology. 3. Establishing practical vocational courses in specialized training colleges 4. Refining and strengthening junior college or specialized training courses and applied courses.	1.Secondary VE policy (2019): emphasis on innovation in secondary VE and activation of HS graduate employment. 2.The Junior College Innovation Plan: to strengthen junior colleges' competency. 3.ME (2021) will select five junior colleges to promote a pilot operation of Meister university. 4.All junior colleges will be verified for basic university competencies. 5.Promote projects to support industry-academic cooperation. 6.The Career Exploration Credit System for Employment Support: a recruitment link between graduates and small/medium-sized companies. 7.Promote the Innovation Sharing University project (2021) to cultivate new digital technology talents.	1.The Strategic Plan for VE Transformation: changes in 5 VE aspects - curriculum, institutions, collaboration, assessment, & organization. 2.The TVE Empowerment Cabinet Committee was established: (1) to set the National TVET Councils to drive coherent, future-oriented national TVE agendas; (2) to allocate a sufficient budget for TVET development; to strengthen the business/industry & governmental agencies cooperation in TVET.	1. Establishment of SSG to promote lifelong learning 2.Provision of a SkillsFuture credit account for every citizen 3.Establishment of the Singapore Institute of Technology and the Singapore University of Social Sciences as upgrade paths for polytechnic graduates 4.Provision of work-study programs at ITE, polytechnics, and universities 5.Establishment of workforce Singapore to promote and regulate CET 6.Establishment of the Institute of Adult Learning to provide courses in andragogy to meet the demand for accredited trainers of adults 7.Establishment of the Employment & Employability Institute to promote worker reskilling and upgrading, and to provide career advice and coaching 8.Establishment of the Lifelong Learning Institute	1.Establish a flexible education system that aligns with industrial trends & demonstrates the value of TVE 2.Strengthen curricula and faculty structure, develop hands-on abilities, spark teachers' and students' innovative thinking and entrepreneurial spirit, and promote the passing down of skills and industrial innovativeness. 3.Promote collaboration between governmental, industrial, academic, and training organizations to cultivate high-level talented individuals.	Five areas of policies that received the most attention from the 50 states: funding, industry partnerships and work-based learning, access and equity, dual/concurrent enrollment, articulation, and early college, & data reporting and/or accountability.	1.A National TVE Development Strategy for the period 2021-2030 is being developed to improve the quality and efficiency of TVE. 2.Implement the VQF. 3.A system of high-quality colleges, approaching regional and international levels, has been formed under the scheme approved by the government. 4.Reforming operational mechanism of some vocational colleges has been piloted which serves as a basis for perfecting autonomy mechanisms and policies in TVE institutions.

A Comparison of Trends and Issues in Technical and Vocational Education

The major TVE trends and issues in terms of the above aspects such as TVE key statistics, TVE programs, and policies across the 10 countries are discussed in this section. The term "trend" is defined as a general direction in which something is developing or changing. The term "issue" refers to an important topic or problem for debate or discussion. Table 3 shows a summary of the TVE trends and issues in the Indo-Pacific region.

Point 10. Major Trends in TVE

The trends in TVE indicate the current concerns and interests related to the development of TVE in each country. To some extent, they also reflect where the resources have been mostly allocated in recent years. In the Indo-Pacific region, the trends in TVE are quite country-specific, while a number of trends are observed in two or more countries. First, training students or workers with skills needed to adapt to advanced technology in the workplace and to cope with rapid changes in the era of industrial 4.0 (e.g., AU, JP). Second, increasing technology application and digital transformation in TVE, such as building a labor market information database, using "big data" to inform policy, or increasing the use of online learning approaches during the COVID-19 pandemic (AU, IN, SG, VN). Third, improving or diversifying TVE accessibility and increasing the enrollment rate (IN, ID, MY, VN, SG). Fourth, enhancing alignment between the TVE and higher education sectors (AU, ID, JP, MY). Fifth, promoting the use of employment-based, work-based, or competency-oriented learning models and apprenticeship (AU, IN, JP, TW, US). Sixth, strengthening skills ability, industrial working experience, or qualification requirements for TVE educators or trainers (MY, TW, VN). Seventh, promoting lifelong learning to provide workers with different and up-to-date skillsets to adapt to the rapid changes in industries (KR, SG). Eighth, encouraging employer or industry involvement in TVE through providing financial support, curriculum advice, internships, and practical empowerment of TVE school teachers (US, TW). Ninth, enhancing quality assurance and autonomy in the TVE system (IN, JP, VN). Tenth, providing more career counseling or career exploration to support students in achieving their education and career goals (TW, US).

Point 11. Major Issues in TVE

In terms of the major issues in TVE, each country in this region has encountered a number of challenges that require effort to resolve. Again, many issues are quite country-specific, while some common challenges are observed from two or more countries' reports. First, there are negative societal perceptions of TVE in some countries (AU, IN, TW, SG, US, VN). TVE is not considered as a potential pathway as compared to academic education. Unfortunately, such a traditional concept of academic value still makes TVE the second choice for students and their parents.

Second, insufficiency of qualified trainers/teachers is a major issue affecting the quality of TVE in many countries (e.g., AU, IN, ID, KR, SG, TW, US). For example, a shortage of qualified teachers in the United States is evident. It may result from a reduction in the number of CTE teacher preparation programs, an aging teaching workforce, teacher retention concerns, unattached conditions and images of the teacher position, and so on. In Indonesia, the quality of TVE teachers is questionable as many TVET teachers do not meet the required qualifications as indicated by law. Moreover, many general subject teachers are assigned to teach technical and vocational subjects with limited training.

In addition, limited opportunities for teacher professional development is another problem in this region. Maintaining a high level of technical knowledge and up-to-date skills throughout a TVE instructor's teaching career is an apparent challenge. Once teachers are removed from industry, they generally do not have access to regularly practice their skills in the field, leading to the problem of skill mismatch, particularly for skill obsolescence where education and training are not providing the up-to-date skills demanded in the labor market. More recently, due to the COVID-19 pandemic, TVE teachers have encountered extreme challenges when moving classes online and delivering content in electronic formats, especially for hands-on and skills-based material. The point is particularly highlighted in the chapters of the US, SG, MY, and JP. Responding to such a challenge, several innovative strategies are proposed. For example, the recent professional development for TVE teachers in the United States has been focused on topics such as effectively using the district or institution's learning system, accessible course design, virtual assessment, hybrid or blended learning approach, and student engagement in the online environment. Developing new tools for online learning for TVE and providing online resources to support all types of teachers' professional development are encouraged.

Fourth, there is an ongoing challenge with TVE remaining relevant to both industry and students (e.g., AU, IN, ID, JP, KR, MY, TW, VN). Industry-academia collaboration is considered as the key to developing a balance in demand and supply of skill development. However, most companies lack the driving force to work on VET with schools (JP, TW). The passive participation of industries and related ministries is reported in Korea. In addition, in India, the limited participation of the private TVE sector results in the inadequate size of the formally skilled workforce. Similarly, the issue of slow progress of public-private partnerships is highlighted in Malaysia, where TVE is solely dependent on government funding, while the profit-oriented companies and industries are reluctant to join in students' or trainees' skill training. In addition, initiatives and collaboration between industries and TVE institutions are not being encouraged, especially in the fields of research, innovation, and commercialization.

Fifth, the fragmentation of TVET management is another significant issue in this region. It often occurs in countries where there are multiple ministries or departments taking charge of TVE management (IN, ID, MY, VN). For example, the skill development structure in India is spread across more than 20 ministries and departments, but there is no strong monitoring mechanism to ensure convergence. In Indonesia, there are several ministries in charge of TVET, including the Ministry of Education and Culture, the Ministry of Industry, the Ministry of Manpower, and the Coordinator Ministry of Human Resource Development and Culture. Coordination was undertaken through signing a MoU, but policy and program synchronization would take time to take place. Moreover, even within one ministry, the link between departments or divisions is still absent.

Sixth, the qualification framework and quality assurance system have not been well-constructed yet in countries like Japan, India and Viet Nam. For example, in Viet Nam, there is a lack of publicly available and reliable data on TVE to systematically monitor the performance of the TVE system. Its quality assurance system has not been well established yet and cannot effectively improve the training quality. There is an urgent need to standardize and institutionalize the monitoring system and evaluation mechanism for TVE institutions. Likewise, India reported that the assessment and certification systems are not harmonized and standardized, which makes the systems less acceptable to employers. In addition, building a framework for vocational qualification in Japan is still limited because of the influences of the internal labor market, including promotion by seniority, lifelong employment, and a trade union for each company. Under such circumstances, the standardization of qualification systems and quality standards designed for cross-sectional development of labor markets rightly lead to conflicts with traditional employment practices in Japan.

Besides, the unequal access to TVE is a problem reported by Malaysia and the United States. Student enrolment in Malaysian TVE institutions might be dominated by socio-economic status, cultural considerations, and perceptions. The inequality in various demographic groups (e.g., gender, rural/urban) in some specific areas is a concern to government as it has an impact on equity in education. Similarly, in the United States, concerns of access to career and technical education (CTE) courses and programs are raised with a focus on specific student demographics, such as learners with disabilities, economically disadvantaged students, students in single parent homes, and learners of color. It is of particular concern in the secondary education system, where wide variation in the types of CTE programming available and student demographics illustrate the challenges of improving access to high-quality CTE.

The aforementioned issues are somewhat prevalent among the 10 countries. Apart from that, there are a number of unique issues raised by individual countries. Here are some examples. Taiwan reported insufficient TVE regulations and the lack of a rolling adjustment mechanism in the regulation system leading to TVE development. In Korea, the TVE policy changes usually occur when the president or superintendent is replaced. The new government tends to propose new policies, some of which are inconsistent with or contrary to the original plans. As confusion and objections to the policies grow, original plans may be abandoned or changed within a short period of time, leading to low performance or ending in failure. Another unique issue is in Australia where the complexity of the VET system makes it difficult for students to navigate and to make informed choices about where and what to study.

To sum up, despite challenges encountered in each country, a number of strategies and reforms have been continuously implemented to resolve the issues and to enhance the quality and effectiveness of the TVE system. Apparently, TVE is being recognized as an important part of the education system in the 10 countries and an even more critical part of the success of each country’s workforce and economic growth.

Table 3 A Summary of Trends and Issues in TVE

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
Major trends in TVE	1.Infusing Industry 4.0 and Implications for the VET Sector 2.Broadening the Use of Employment-Based Training and Apprenticeship-Like Training Models 3.Stronger Alignment and Integration Between the VET and Higher Education Sectors 4.The Rise of Micro-Credentials 5.The Rise of Big Data in VET	1.Skilling is a continuous demand: lifeline for economic growth of the country 2.Government strongly intends to improve VE 3.VE is tightly guided by employment and employability Trends 4.VE faces the emergence of a skill gap due to COVID-19 5.VE is expected to contribute to the economic growth projections	1.Shifting the vocational education paradigm 2.Emphasizing practical skills over knowledge only 3.Prioritizing skills development in economically vibrant industry sectors and occupations 4.Increasing the ratio between the enrollment in vocational education and in general education 5.Increasing popularity of TVE at the HE level	1.Corresponding to the 4th or 5th industrialization 2.Promoting basic competency-oriented education and quality assurance 3.Moving from VE in HS to connection to higher education 4.Increasing focus on practice-oriented and dual-oriented education 5.Being challenged by part-time work after graduation and job-oriented employment	1.Changing roles of central and local governments and decentralization of education 2.Continuous reorganization and reformation of the school system 3.Periodic revision of the curriculum to reflect industrial demands 4.Increased emphasis on field-oriented lifelong learning 5.Diversification of student composition and career paths	1.Fluctuating number of student enrollments in TVE institutions 2.Increasing number of TVE programs in HE institutions 3.Increasing private sector participation in TVE digitalization 4.Increasing number of professionals in the technology field 5.Increasing skills qualification requirements for TVET educators	1.Broadening of TVE curricula 2.Encouraging entrepreneurship development 3.Increase in online learning for TVE 4.Diversification of pedagogical approaches 5.Renewed emphasis on workplace attachments 6.Promotion of lifelong learning	1.Making an effort to construct the legal basis of TVE 2.More career exploration, with a focus on the value of TVE 3.Increased focus on work-based learning to eliminate education-job mismatch 4.More industry involvement in TVE to stimulate practical empowerment of TVE teachers 5.Investment of more funding for upgrading teaching/ practice environments of TVE Institutions 6.Enhancement of TVE impact on a global scale	1.Increased interest in CTE at the federal, state and local levels. 2.Renewed interest in conducting research in CTE. 3.More employer involvement in CTE. 4.More career counseling, with a focus on career pathways. 5.Increased focus on work-based learning	1.Government's strategic orientation on TVE and skills development 2.Applying digitization to TVE for easier accessibility 3.TVE system towards high quality, autonomy, and accountability 4.TVE is open for inclusive and sustainable development 5.Increased focus on training the contingent of trainers and managers 6.Priority investment in financing for TVE

Table 3 Continued

Comparative Point	Countries									
	Australia (AU)	India (IN)	Indonesia (ID)	Japan (JP)	Korea (KR)	Malaysia (MY)	Singapore (SG)	Taiwan (TW)	United States (US)	Viet Nam (VN)
Major issues in TVE	1.Questions about the consistency of the quality of the Australian VET system 2.Continuing perceptions of the lower status of VET compared to higher education 3.The complexity of the VET system makes it difficult for students to make informed choices. 4.VET funding models are very complicated, creating tensions in the system. 5.There are ongoing challenges with VET remaining relevant to both industry and students.	1.Limited participation of the private sector 2.Some challenges that defy VET 3.Inadequate availability of qualified trainers 4.Less enrollment of students in VE 5.Lower VE status 6.The ITIs failed to achieve near-complete admissions to various trades 7.Free vertical/horizontal movement 8.The skill development structure is quite fragmented 9.The assessment and certification systems are not harmonized/standardized 10.Aspirational development among the prospective trainees and employers is missing.	1.Quality gaps of TVE institutions 2.High unemployment of TVE graduates 3.Fragmentation of TVET management 4.The quality of TVET graduates is low and does not meet the industry demands and competences 5.The quality of TVET teachers is a major challenge affecting the quality of TVET graduates. 6.Learning infrastructure & facilities are inadequate, obsolete, and not in line with the new & changing requirements of TVET institutions. 7.There is a need for better coordination among TVE providers.	1.Conflict between basic competency-oriented education and specialization of VE 2.The qualification framework and quality assurance system have not been well constructed yet 3.Internal market for job-type based employment has negatively affected job-training programs 4.Most companies lack the driving force to work on VET with schools 5.The potential of universities of applied sciences has not been well integrated 6.Specialized training colleges have not been included as "Article 1" Schools 7.Challenges related to COVID-19	1.Changes and confusion due to new policies and institutions 2.Insufficient staffing and increased workload 3.Decreasing quality of vocational instruction due to skill mismatch and the pandemic 4.Passive participation of industries and related ministries 5.Reduced employment opportunities and job retention	1.Unstandardized TVET governance through multiple entities 2.Slow progress in embracing digital transformation for TVE teachers 3.An unstable ecosystem for TVE institutions 4.Slow progress of public-private partnerships 5.Inadequate participation by minority groups	1.The necessity of keeping teachers updated and upskilled 2.The need to reduce the attrition rate while deepening skills acquisition 3.Developing new tools for online learning for TVE 4. Rising ambition of TVET graduates to achieve tertiary qualifications 5.Continuing education and training (CET) as an integral part of TVE 6.Unaligned PET and CET skills qualifications	1.Insufficient TVE regulations 2.Lack of industry and vocational guidance consultant involvement 3.TVE is still the second choice 4.The energizing mechanism of TVE teachers' practical expertise has not been implemented 5.Insufficient number of students for the operation of private TVE institutions 6.Lack of complementary-scheme for the globalization of TVE	1.Teacher shortages 2.Hindered opportunities for teacher professional development (particularly in a pandemic). 3.Unequal access to CTE courses and programs. 4.Shortage of funding for CTE 5.Negative societal perceptions of CTE	1.System governance remains weak 2.Ineffective national occupational skills standards and certification 3.Finance sources for TVE are limited 4.TVE quality assurance remains low and ineffective 5.Reluctant business community involvement 6.Monitoring and evaluation of TVE need to be standardized and institutionalized 7. Limited readiness of TVE for the ASEAN economic community 8.Image of TVE in the society needs to be Improved