TECHNOLOGICAL & VOCATIONAL EDUCATION IN TAIWAN, ROC

MINISTRY OF EDUCATION

AUGUST, 2012

Technological and Vocational Education in Taiwan, Republic of China

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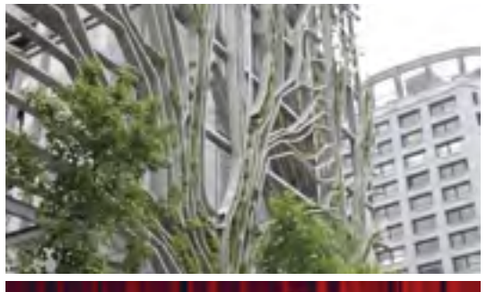

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Foreword from the Minister

In the last several decades, Taiwan's Technological and Vocational Education (TVE) has cultivated numerous professional talents in various disciplines. Many of the TVE graduates are today famous and outstanding public figures who are highly regarded in their respective fields, and their contributions have made them the pillars of the society in Taiwan -- owning a skill is like owning a golden key to their career development. The recent Jeremy Lin phenomenon has also influenced many parents to re-evaluate the immense possibilities of allowing their children to seek personal development according to each child's own aptitude.

Education policies that operate in accordance to economic growth are the real driving force behind Taiwan's economic development, and that is where Taiwan's competitive advantages will ultimately reside. TVE has cultivated skilled workers of all fields according to Taiwan's social development and the industry's expansion and upgrading; it has played an indispensable role in preparing the workforce for the construction of our nation's fundamental facilities, and it has facilitated the economic development. TVE's contribution to Taiwan's economic miracle in the past has to be recognized.

The importance of TVE emphasizes "Teaching Practical Skills and Applicable Knowledge." To cultivate quality professionals, improve the teaching/learning environment for TVE teachers/students, and elevate TVE's overall quality, the Ministry of Education started the Reengineering Project of Technological and Vocational Education in 2009, in which ten strategies were proposed. In the following year, additional tangible strategies were proposed during the National Forum on Education, focusing on cultivating human resources and industry development for the knowledge economy. In 2011, President Ma announced in his Centennial Address to the Nation that "Starting from this year, we will begin a phased implementation of twelve-year compulsory education, starting with vocational high schools. The tentative plan is that, by 2014, attending high school and vocational high school will be tuition-free and in most cases require no entrance examination." Thus, after reviewing and discussing in length on twelve-year compulsory education, the National Forum on Education has recommended that TVE becomes more open and expansive and helps junior-high students and their parents make choices that are appropriate to student's capabilities and aptitude. In 2012, Plan for Developing Technological University Paradigms were selected to lead TVE higher education institutions to generate practical features that differ from non-TVE universities; in so doing they can better adapt to the needs of industries and the availability of resources, and to build mechanisms for human resource cultivation and industry-academic R&D that are based on the resource integration of the entire university – all in all, moving towards the direction of "cultivating human resources for the industry and academia, as well as focusing on teaching practical skills."

TVE today, with persistent endeavors of our predecessors, has seen bountiful results, and we cherish that. In order for the general public to have a clear and comprehensive view of TVE's development in Taiwan, the Ministry of Education publishes this booklet, hoping to lead even more students who are technologically inclined or have preference in practical applications to choose TVE. In so doing, these students may advance in accordance to their personal interest, aptitude, and capabilities. Choose TVE, put efforts in it, a bright future is reachable. Meanwhile, we also urge our TVE educators to continue to innovate, excel, and bring TVE in Taiwan to another new plateau.

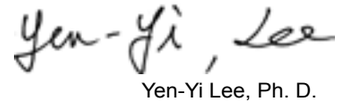
Wei-ling Chiang, Ph. D.
Minister, MOE

Foreword from the Director General

For a long time, humans passed down professional skills through mentor-apprentice relationships or family systems. After the Industrial Revolution, the complexity of professional skills increased drastically, and the seed of "vocational education" began to sprout, but structured education systems for skills and professions did not appear until the early 20th century. The development of Technological and Vocational Education (TVE) in Taiwan was even further behind: the centralized planning did not start until the government relocated to Taiwan. However, during these past decades TVE has contributed tremendous quality human resources to the economic progress and prosperity, and has been an inseparable part of Taiwan's economic development.

Because TVE has not been in existence that long, its concepts, structures, and systems still need improvment for the best. With the rapid social changes beyond imagination, TVE on the one hand, needs to keep up with the times in terms of both content and methodologies in order to achieve the goal of practical applications. On the other hand, TVE needs to continuously review the environment it is in, so perfect comprehension between the ideals of education and technical training can be found. Thus, while we acknowledge TVE's achievements, we need to continue to contemplate and explore, to bravely experiment and innovate; only by doing so we may pave an even better path to TVE's improvement and development.

This booklet is an effort of describing the current status of TVE's development in a forthright fashion. It covers the current status, distinctive features, major goals, and outlook of TVE, thus providing useful information to readers, and hopefully readers would appreciate the efforts and attentions put forth by our TVE colleagues. I believe that the general public's care and attention to TVE will be the greatest source of encouragement for us to continue to work hard to elevate the quality of TVE. We have many colleagues with great talent in all types and levels of economic development who have devoted greatly to Technological and Vocational Education. Let us applaud their efforts here together.



Yen-Yi Lee, Ph. D.
Director General,
Department of Technological and Vocational Education

An Overview of Technological and Vocational Education

Our government has placed great emphasis on Technological and Vocational Education (TVE), especially in strengthening the ties between TVE and economic development. As a result, TVE has contributed greatly to Taiwan's economic prosperity over the years.

Cultivating Workforce for Promoting Economic Development

Taiwan's economic development has been tightly interwoven with the TVE development (Table 1). The government began to press forward with economic development plans around the 1950s, starting with advancing sweeping changes in agricultural production technologies while actively developing labor-intensive essential goods industries. TVE's primary domain at that time was agriculture- and business-related programs in senior vocational schools, focusing on providing the budding economy with sufficient direly needed entry-level workforces.

In the 1960s Taiwan moved into an expansion period of import-export businesses, witnessing a rapid growth in the number of small and medium enterprises that were, in the industry and business alike, all thirsting for skilled labors. In 1968, Taiwan started the nine-year compulsory education, abolished

Table 1: Economic Development and TVE Development

Year	Focus of Economic Development	TVE Development	Student Ratio, TVE High vs. Traditional High
1950s	■ Successful Land Reform ■ Increased agricultural productivity ■ Developing labor-intensive essential goods industries	■ Education in agriculture and commerce ■ Attention to senior-level vocational schools	4:6
1960s	■ Expanding import-export businesses	■ Developing industrial and commercial vocational education ■ Launching nine-year compulsory education ■ Expanding the vocational education program and the number of schools and students ■ Starting the 5-year and 2-year junior college systems	4:6
1970s	■ Initiating the Ten Major Constructions ■ Expanding into capital- and technology-intensive industries	■ Improving industrial vocational education and junior college education ■ Establishing technological institutes	6:4
1980s	■ Developing high-tech industries ■ Developing petrochemical industries	■ Overall upgrading the quantity and quality in industrial vocational education and junior college education	7:3
1990s	■ Developing knowledge economy ■ Planning Asia-Pacific Regional Operations Center	■ Establishing comprehensive high schools ■ Increasing colleges of technology ■ Upgrade meritorious junior colleges to colleges of technology ■ Upgrade meritorious colleges of technology to universities of science & technology	5:5
2000s	■ Developing the Two Trillion & Twin Star Industries	■ Maximizing the overall TVE ■ Internationalizing the TVE	5:5
2010s	■ Developing Six Emerging Industries, Ten Major Services Industries, and Four Major Intelligent Industries	■ Focusing on matching the industries' workforce demand and student aptitude	5.5:4.5

the junior vocational schools and instead rapidly expanded the senior vocational schools and junior colleges. Also, to meet the needs of advancing scale and quality of industries, the Ministry of Education encouraged private sectors to participate and establish their own schools in these areas to provide even more middle-level labor force.

After the 1970s, Taiwan's traditional industries began the transition into capital- and technology-intensive industries, and the demand for labor, while continue to emphasize on quantity, also started to look into quality. In order to elevate the quality of higher-level technological and vocational education, the Ministry of Education established the first technological college (Taiwan Institute of Technology) which is the forerunner of a now comprehensive TVE system that consists of vocational high schools, junior colleges, and colleges/universities of technology.

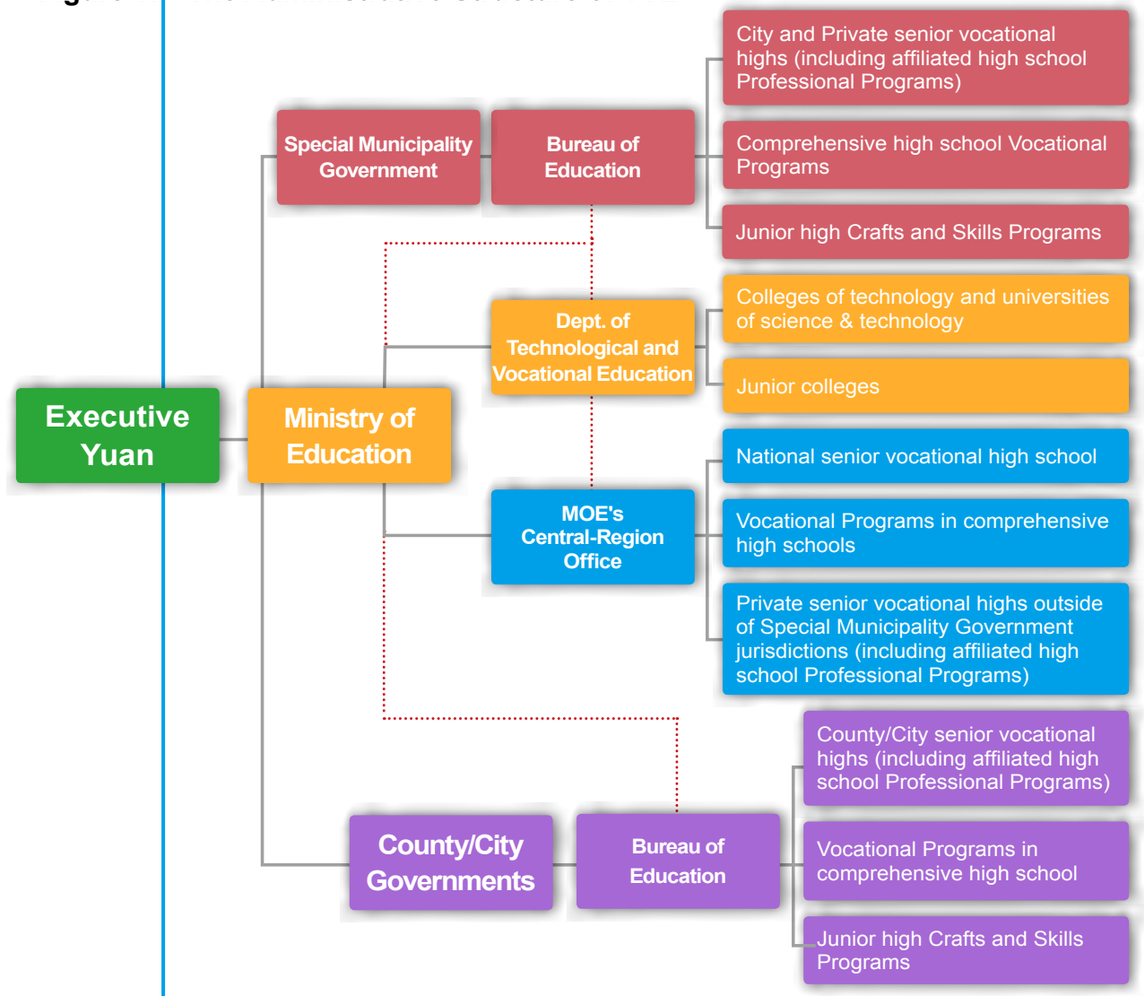
At the beginning of the 1980s, the government gradually increased the ratio between senior vocational schools and general high schools, finally reaching the goal of 7:3. The vast amount of graduates from these senior vocational schools spplied the labor requirements of the thirsting industry and allowed Taiwan's economy to quickly expand. By mid-1980s Taiwan faced tremendous pressure from internationalization and open market, and the demand for higher level of technological and business personnel also increased tremendously. The government thus encouraged quality Junior colleges to upgrade to colleges of technology, and those quality colleges of technology were upgraded to universities of technology. Comprehensive high schools (i.e., consisted of curricula for both TVE and general high schools) were added, and the ratio between the number of students in senior vocational high schools (including comprehensive high school TVE programs and the first three years of five-year junior college program) and that of general high schools (including the general part of comprehensive high school programs). By year 2010, this ratio reached 5.5:4.5, which mirrored more closely to the needs of market and time, reflecting a more effective education system.

After 2009, the government began to push the Six Emerging Industries (healthcare, bio-technology, sophisticated agriculture, leisure and tourism, cultural innovation, and green energy), Four Major Smart Industries (cloud computing, intelligent electric cars, intelligent green buildings, and inventions and patents), and Ten Major Services Industries (Cuisine Internationalization, Healthcare Internationalization, Pop Music and Digital Contents, Convention Industry, International Logistics, Innovation and Venture Capital, Urban Renewal, WIMAX, Chinese Electronic Business, and Higher Education Export) – in order to induce R&D innovation, increase the value of industries, and strengthen the competiveness of services sectors. TVE joined these efforts with all its resources to cultivate practical professionals according to their aptitudes and capabilities, so that once again TVE can contribute to the next wave of Taiwan Miracle.

The Educational Administrative Structures

The administrative structure for Taiwan's education can be seen in Figure 1. The highest level of the structure is the Executive Yuan; the Ministry of Education is directly beneath it and is responsible for all education-related matters in Taiwan. The Department of Technological and Vocational Education (DTVE) is under the Ministry of Education and is responsible for all TVE matters nationally. DTVE is also directly in charge of -- and supervises – all universities of science & technology, colleges of technology, and Junior colleges. Each of the five Special Municipality Governments in Taiwan has its own Bureau of Education which is in charge of the middle-level TVE within its jurisdiction. The Central-Region Office of the Ministry of Education is in charge of supervising the national senior vocational schools as well as those private vocational high schools that are not within the jurisdiction of Special Municipality Governments. Every county (and city) government has its own Bureau of Education to be in charge of the senior vocational schools as well as the Technical Skills programs within its county (or city) junior high schools within its jurisdiction.

Figure 1: The Administrative Structure of TVE



The Current Education System

The current education system (Figure 2) above junior high school level diverts into two major pathways: general education system and TVE system. The TVE system consists of middle-level TVE and higher-level TVE. The middle-level TVE includes the Technical Skills programs in junior high school, senior vocational high schools, Professional Programs in general high schools and/or the vocational programs in comprehensive high schools; the higher-level TVE includes Junior colleges, colleges of technology, and universities of science & technology.

A Brief View of TVE schools

With the government's proactive attention to TVE's development, currently there are 155 senior vocational high schools, 14 junior colleges, and 77 universities/colleges of science & technology, totaling 246. Details are shown in Figure 3.

Figure 3: Numbers and Distribution of TVE Schools

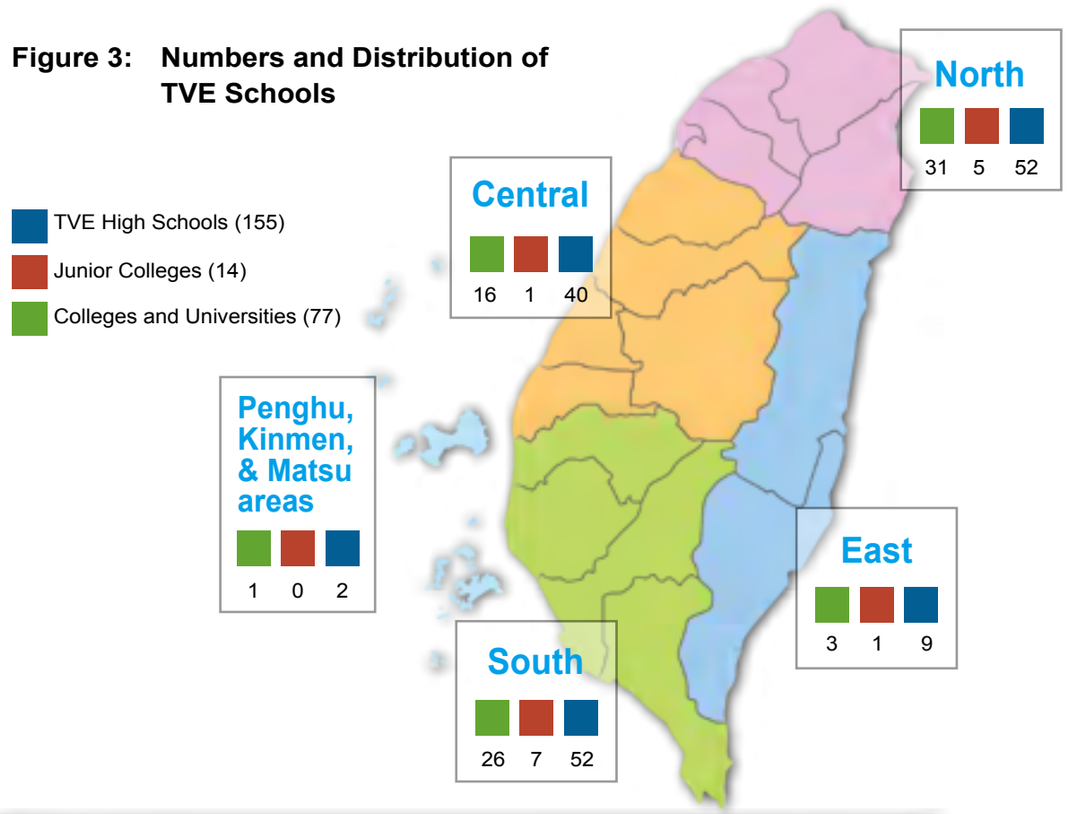
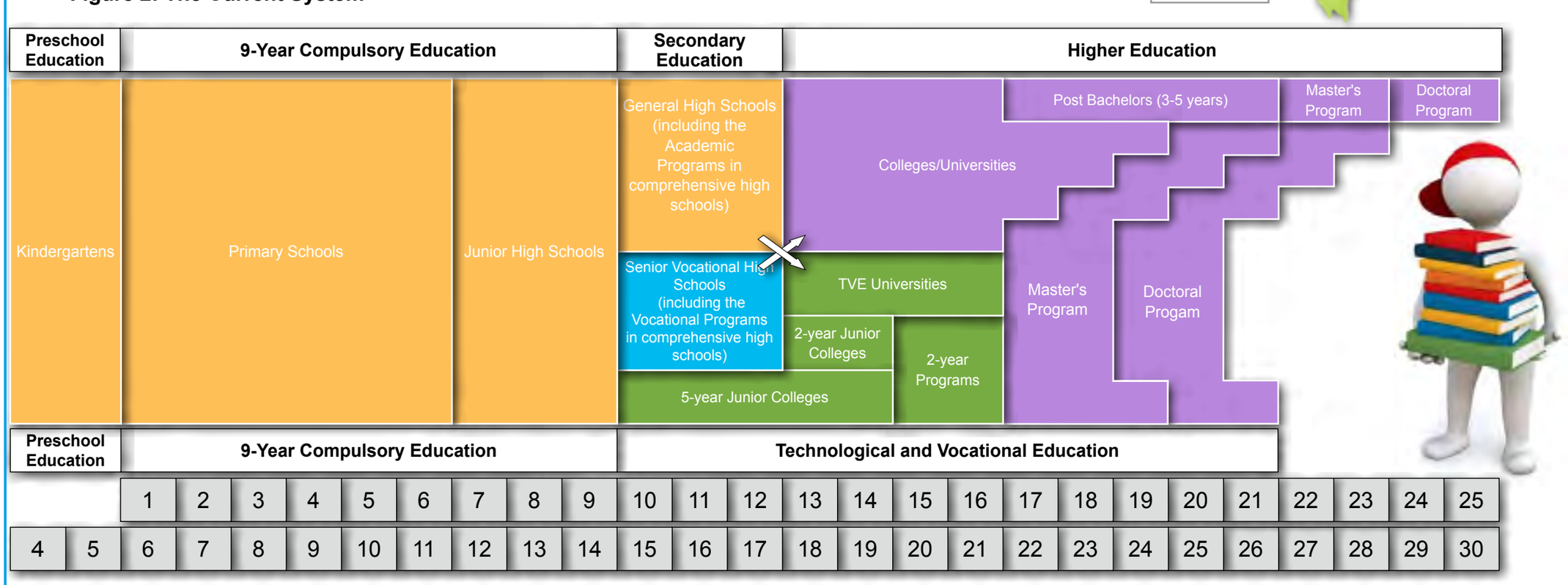


Figure 2: The Current System



Technological and Vocational Education Today

The current status of the two major levels of TVE (Middle TVE and Higher TVE) is described below.

Middle-Level TVE

The middle-level TVE consists of crafts and skills programs in junior highs, senior vocational schools, the professional programs offered in general high schools, and the vocational programs offered in comprehensive high schools.

Crafts and Skills Programs in Junior High Schools

Crafts and skills programs are career path courses offered to ninth graders who have aptitude and inclination in learning crafts, designed to enhance their career exploration. A student may select 14 hours of career exploration courses each week, in principle confined to one or two career types each semester. Students who selected crafts and skills program will be allowed priority-entry to practical skills programs at senior vocational schools; they may also enter – through the multiple education paths -- senior vocational high schools, the professional programs in general high schools, or the vocational programs in comprehensive high schools.

Senior Vocational High Schools and Professional Programs in General High Schools

Senior vocational high schools and professional programs in general high schools are three-year diploma programs and admit students with junior high school diploma or equivalency. To meet the diverse needs of students, additional programs for continuing education, cooperative work experience education, special education experiment classes, and Practical Skills education are also offered. Among these programs, practical skills education takes a student-centered approach and is concerned with diverse aptitude and appropriate development for each student; this program is designed especially for those students who show interest in learning technical skills and seeking a job in which these skills can be applied. The ultimate goal of the practical skills program is to allow all economically

disadvantaged students to have a comfortable environment to learn specialized technical skills, as it provides the students with a major skill for life, and the society a stable source of technical labor force.

Senior vocational high schools can be categorized into agricultural, industrial, business/commercial, marine/fishery, domestic science, and art. Beginning in 2006, the curricula of 85 departments have been merged according to the professional attributes and job clustering into 15 career clusters. The program uses credit system by semester, and students are required to complete 160 credit hours. The program is a school-based program that places emphasis on providing students with core competence through practical learning to meet the rapid changing needs of the industries. The graduates from senior vocational schools or general high schools' professional programs may choose to either continue on to higher education, to get a job, or to start their own business. If a student chooses to attend college, he or she may apply either to two-year junior colleges, colleges of technology, or universities of science & technology.

Comprehensive High Schools (Vocational Programs)

Through career consultation and vocational experiment process to assist students postponing their tracking choices and finding the most suitable direction for their personal development, the Comprehensive High Schools were initiated in 1996, and it was incorporated to become part of the formal education system in 1999.

Comprehensive high schools admit students with junior high school diploma or equivalency. In order for students to fully understand their personal interest, aptitude, and the features in curriculum, and to be able to have an opportunity in career exploration and to make better career plans, both academic curricula (for college-bound students) and vocational programs (for job-bound students and those who prefer TVE higher education) are available in their junior years. The program uses credit system by semester. To highlight the schools' specialties, about two-thirds of the credit hours are planned by the schools themselves.

Students from comprehensive high schools have a broader path selection upon their graduation. According to their own interest and/or personal situations, they may choose to take the regular entrance examinations to enter general colleges, to take TVE entrance examination to enter two-year colleges, colleges of technology, or universities of science and technology; they may also participate in short intensive training offered by vocational training agencies before stepping into the job market.

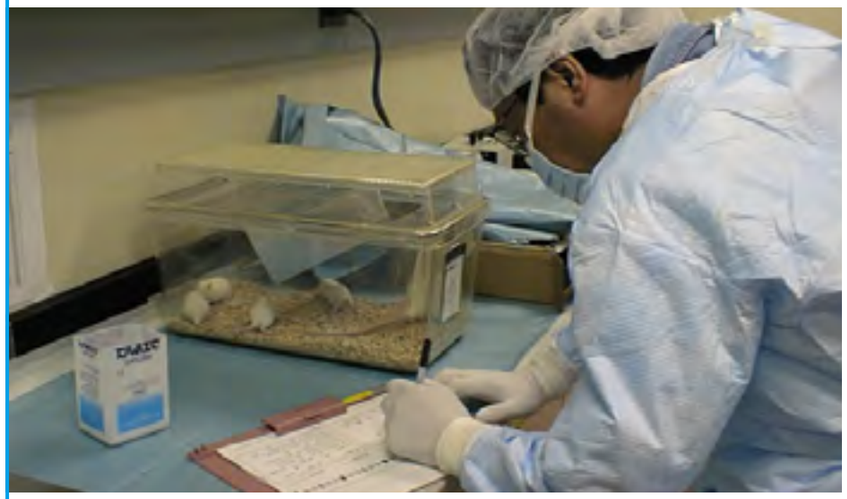
Higher-Level TVE

The higher-level TVE can be classified into two strata of junior colleges and colleges of technology/universities of science & technology.

Junior Colleges

The junior colleges are consisted of two-year and five-year junior colleges. The two-year junior colleges have regular day-time programs and evening (continuing education) programs. Five-year junior colleges, on the other hand, are day programs only. Two-year junior colleges admit students who have diploma (or equivalency) from senior vocational high schools and comprehensive high schools; the five-year junior colleges, on the other hand, admit students with diploma (or equivalency) from junior high schools. In either case, students from junior colleges receive an Associate Degree upon graduation. The currently available 16 departments include industrial work, business, healthcare, marine, language, domestic science, tourism, culinary, etc. The programs use credit system by semester; each school may create its own curriculum according to its special features and directions. The five-year junior college students are required to complete 220 credit hours to graduate, while students in two-year junior colleges are required to complete 80 credit hours. Instructors in these schools are appointed following the same process as universities, but experienced internship practice from the industries may also be recruited as instructors through Regulations Regarding the Selection and Appointment of Specialized Technical Personnel at Junior Colleges.

Junior college graduates may choose to start their own business, seek employment, or to continue education through two-year or four-year programs at universities/colleges of technology, or to take test to become transfer students to regular, non-TVE universities/colleges. Graduates also have the option of obtaining employment for a period of time and then return to higher education as In-Service Education students.



Colleges of Technology and Universities of Science & Technology

Colleges of technology and universities of science & technology are both established according to University Act which was legislated primarily for cultivating highly professional and practical talents. Colleges of technology and universities of technology are both allowed to offer associate, bachelor's, and master's degrees; and universities of technology may offer Ph.D. degrees. The academic requirements for associate degree as well as the sources of students are the same as that of Special Skill schools. Bachelor's degrees are offered through four-year and two-year programs at universities/colleges of technology, both in turn are segmented into day program, continuing education program, and through Colleges of Continuing and Extension Education program (two-year). Each school may set own admission requirements in terms of work experience and seniority at work, etc. for its In-Service Education student programs. In terms of student sources, the four-year programs and two-year junior colleges admit students from senior vocational high schools, comprehensive high schools (or equivalency), the two-year programs admit students from two-year or five-year junior colleges (or equivalency). Students who finish two-year or five-year programs would be granted bachelor degrees.

In terms of curriculum, both two-year and five-year programs use credit system by semester. Four-year programs require student to complete 128 credit hours to graduate while the requirement for two-year programs is 72 credit hours. For graduation, the master's degree program students are required to complete 24 credit hours and a thesis, and the Ph.D. students must complete at least 18 credit hours and a dissertation. Instructors in these schools are recruited following the same process as universities, but professionals with enterprise and practical experiences may also be recruited as instructors through Employment Guidelines for Professional Technicians Teaching at Universities.

Statistics on TVE Schools

As of the 2011 academic year, overall there are 246 schools in the TVE system, totaling 1,039,368 students. The statistics on the number of students and schools is shown in Figures 4-6.

Figure 4: Numerical Comparison of Public and Private Institutions (2011 Academic Year)

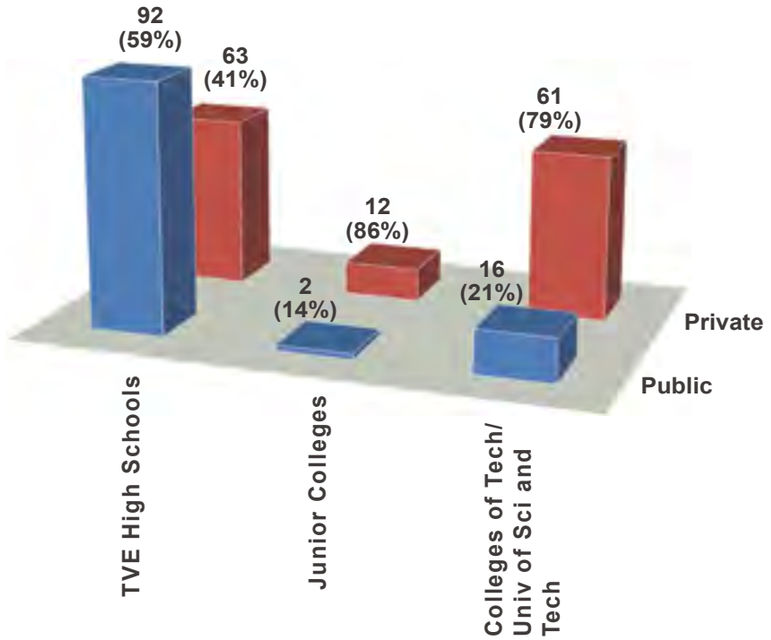


Figure 5: Numbers of Students Attending TVE Institutions (2011 Academic Year)

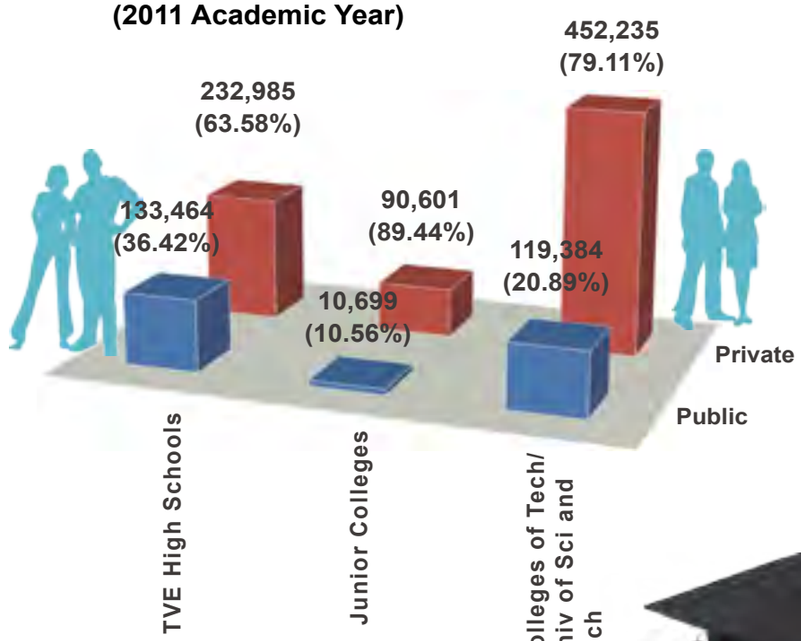


Figure 6: Numbers of Students Graduated from TVE Institutions (2010 Academic Year)

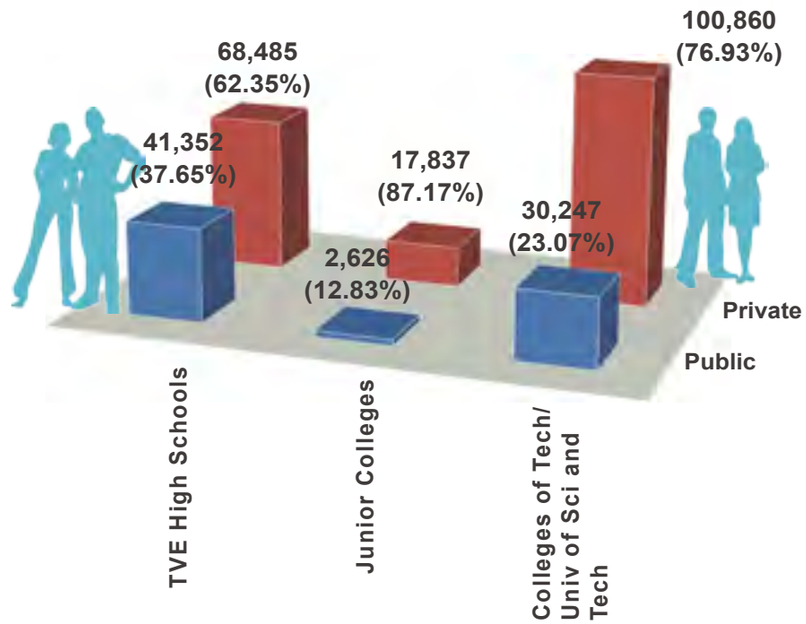
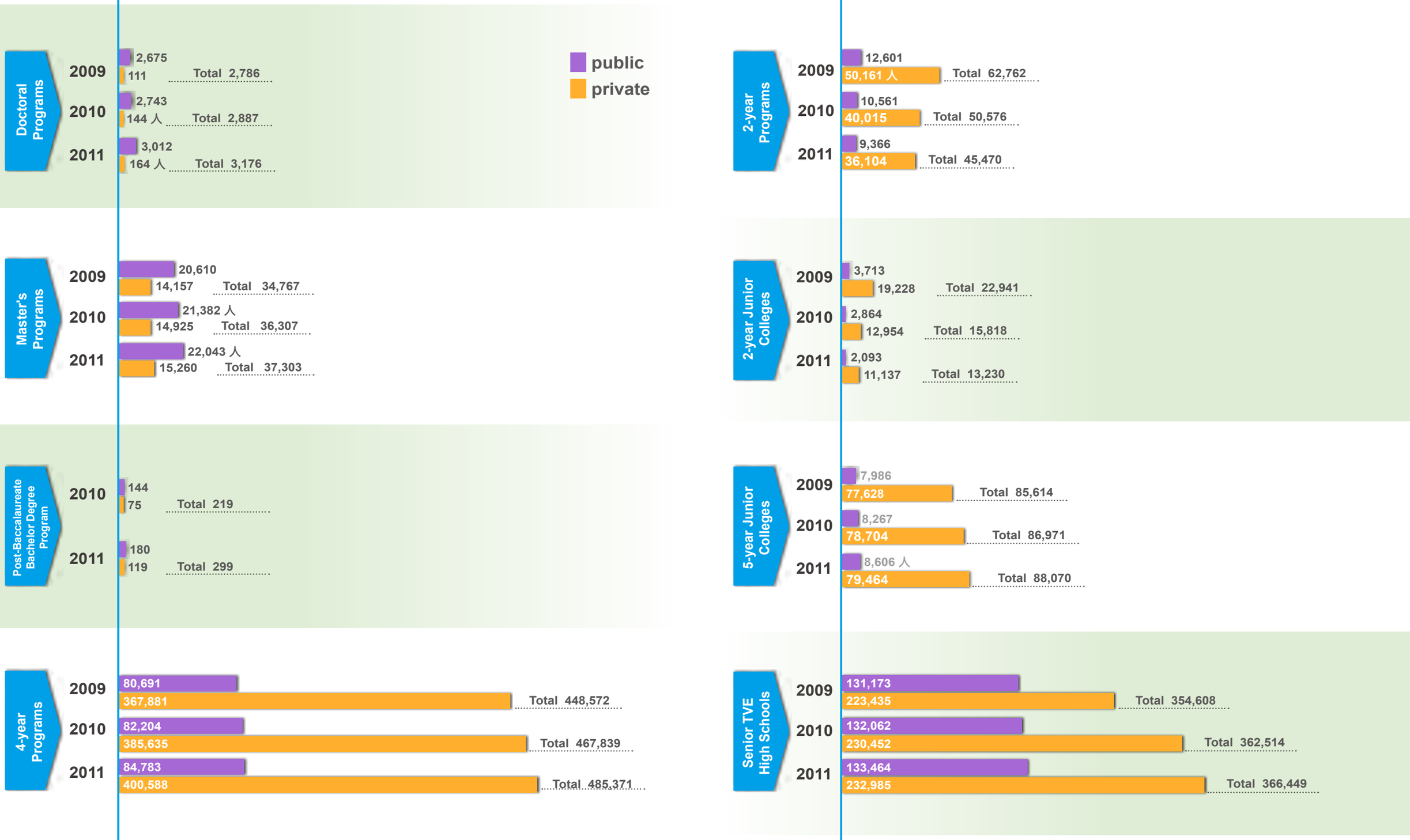
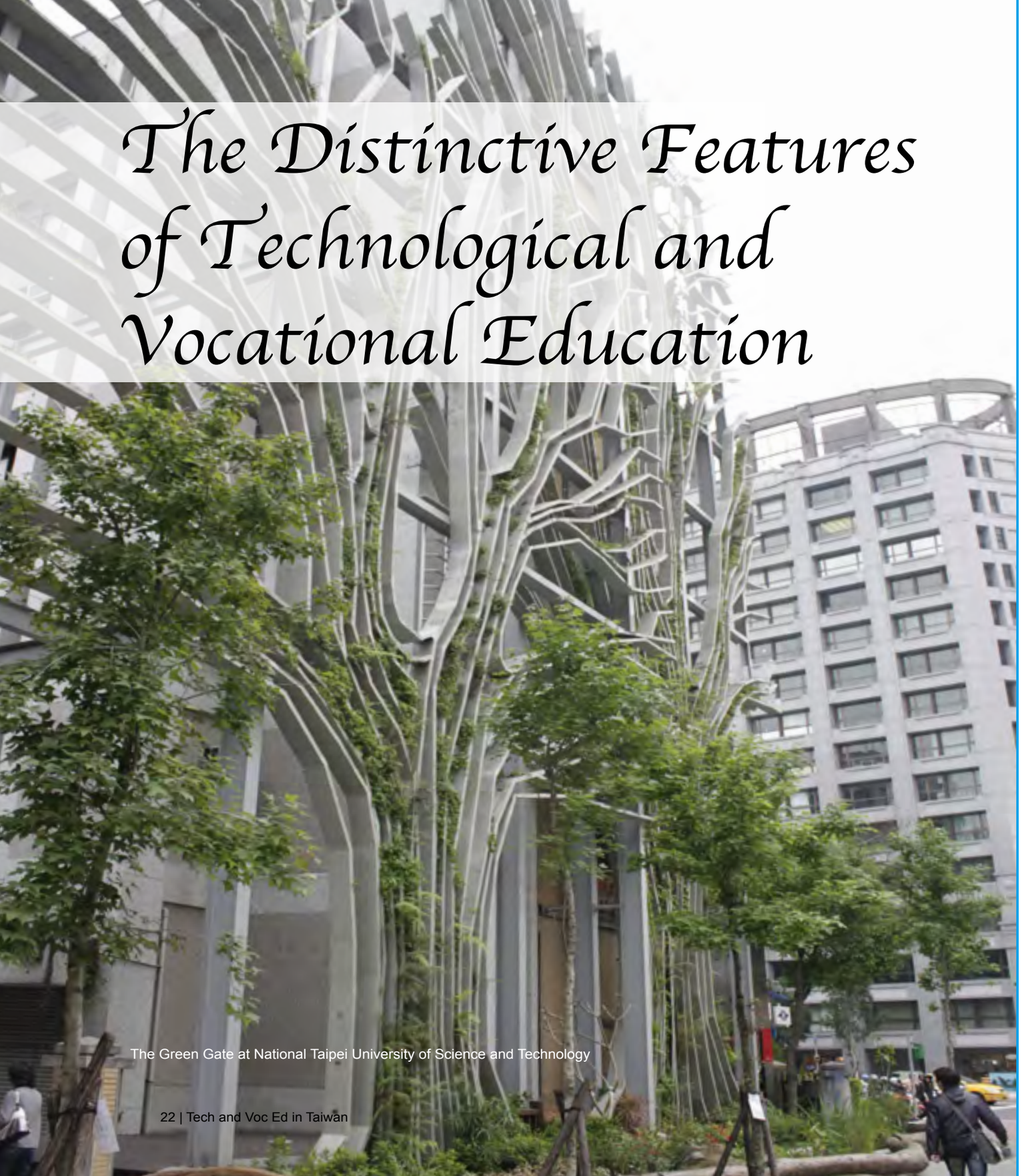


Figure 7: Numerical Comparison of Students Graduated from TVE Institutions (2009-2011)



The Distinctive Features of Technological and Vocational Education



The Green Gate at National Taipei University of Science and Technology

Compared with other nations around the world, Taiwan's technological and vocational education has the following distinctive features.

Programs and Systems: Comprehensive and Well Rounded

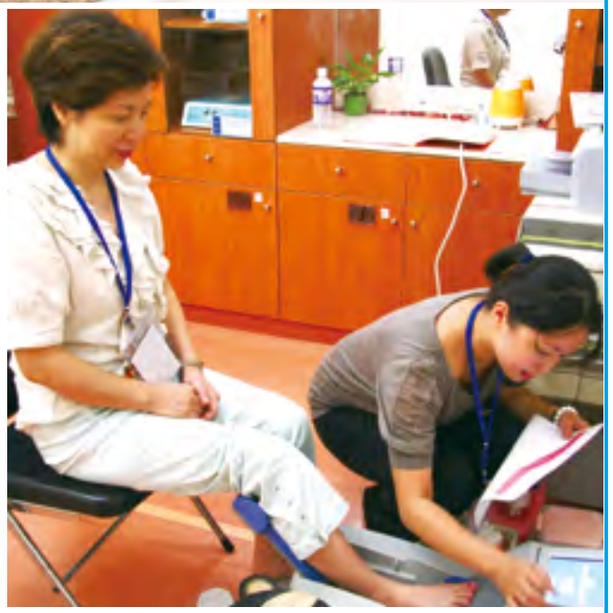
TVE in Taiwan is now a comprehensive system consists of schools ranging from junior highs in compulsory education, senior vocational high schools, Junior colleges, universities/colleges of technology, to graduate schools with master's and Ph.D. programs. The different tracks within the system have been designed with vertical continuity and horizontal flexibility of switching tracks in mind, and the pipelines for recurrent education are also in place, so students and the general public alike may find suitable education opportunities at any stage of their lives. As a result, the number of students who choose to enroll in the TVE system is roughly 49.02% of overall total student enrollment (above junior high level). This separates Taiwan's TVE from the rest of the world.

Private Institutions: Proactive and Excellent

Private institutions are an important force in Taiwan's TVE development, and their presence exceeds that of public institutions. In terms of student enrollment, in 2011 academic year 63.58% of senior vocational school students were private institutions; and the same statistics for Junior colleges was a staggering 80.67%. Private institutions have close connections with industries and enterprises, and their connections allow close match between TVE and market needs.

Table 2: Numerical Comparison of Students Attending TVE Institutions (2011 Academic Year)

	TVE High Schools	Junior Colleges	Colleges of Tech & Univ of Sci & Tech
Public	133,464 (36.42%)	10,699 (10.56%)	119,384 (20.89%)
Private	232,985 (63.58%)	90,601 (89.44%)	452,235 (79.11%)
Total	366,449	101,300	571,639



Programs Diversified and Adaptive

TVE responds the various industry needs and student aptitudes with a diversified academic structure that seeks to provide students with programs that suit their inclinations and abilities but simultaneously meet the demand of the job markets. In addition to senior vocational high schools, Professional programs in general high schools, vocational programs in comprehensive high schools, Junior colleges, and colleges/universities of technology (including graduate programs), the system also includes Technical Skills program in junior highs, Practical Skills programs and cooperative work experience education in senior vocational high schools. There are also continuing education programs in the higher education institutions, In-Service programs, and continuing education schools to meet the needs of non-traditional students. The entire academic structure is flexible and diverse. Besides the traditional agriculture, factory works, and business categories, this academic structure also offer curricula to match the needs of Six Emerging Industries, Ten Major Services Industries, and Four Major Smart Industries which provide students with wide employment opportunities.

Performance Excellence in Industrial-Academic Cooperation

Another emphasis on Taiwan's TVE is on industrial-academic cooperation, trying to match education programs with the needs of industries. The current projects such as The Last Mile, Dual System of Vocational Training Project, and Industrial-Academic Cooperation Plan are aimed to provide students with immediate employment upon graduation and the matching credential to excel at work. The government is also active in pushing industrial-academic cooperation projects in Taiwan's Industrial Parks, encouraging teachers and firms working together to find and work on R&D opportunities, such that a win-win situation can be achieved in practical teaching and increasing firms' competitive advantages. Currently 6 Centers for Regional Industry Academia Cooperation and 12 Joint Technology Development Centers to comprehensively pushing forward industrial-academic cooperation and intellectual property management; their R&D results will then be used in teaching our current and next generation of students.

Practical and Applicable Outcome and Achievements

The fundamental rationale of TVE emphasized teaching practical skills and applicable knowledge. To encourage those who are already excellent in their own crafts to continue their education; students can enter TVE higher education through multiple channels such as by excellent performance in skills or by referrals. Upon admission, the curricula are designed to emphasize projects and learning by doing; and students are strongly encouraged to obtain essential professional certifications. The same strong emphasis is evident in instructor recruitment and retentions. The instructors are required to have practical experiences and professional certificates before been recruited and are assigned to Professional Expert according to their specialties. Teachers may also be promoted by means of their technical reports instead of academic papers. All these examples strongly highlight TVE's focus on practical and applicable contents.

Competitions

"Learning by Doing" is the core feature of TVE schools since practical projects can increase learning effectiveness and help accumulate real-life experiences. Students in all TVE schools have been encouraged to enter international technical skills competitions since 2005, and began in 2010 students are subsided for their airfare for attending competitions abroad to encourage them to participate in international competitions. Recent performance in these competitions by TVE students has been very outstanding, and the design talent of Taiwan's youngsters has received international attention. Furthermore, beginning in 2005, the most exceptional teachers and students in all areas each year are selected and to be presented with Pride of TVE Award – the highest honor awarded in TVE. The finalists of this award are selected from evaluating the honors they received and listed on each school's TVE Showcase website (http://me.moe.edu.tw/award), an award committee then decide the final winners.

The Focuses of Technological and Vocational Education

Taiwan's TVE, under the direction of government's policy and efforts put forth by individual institutions, has seen excellent advancement and development over the years. Some of the main goals are listed below.

Committed Caring for the Economically Disadvantaged Students

Senior TVE High School Tuition Waiver (Including the First Three Years of the Five-Year Junior Colleges)

To support the incoming 12-year compulsory education and to alleviate the family's financial burden, the Tuition Waiver Program for Senior TVE High Schools (including the first three years in the five-year Junior Colleges) became effected in 2011. All students from families with annual income less than NT$1,140,000 and enroll in Senior TVE High Schools or in the first three years of Five Year Junior Colleges, their tuitions will be paid by the government.

Financial Assistance for Economically Disadvantaged College Students

To help financially disadvantaged students attending colleges, the government implemented Common Financial Assistance Programs for Colleges in 2005; this plan was expanded and amended to become Financial Assistance Programs for Economically Disadvantaged College Students in 2007. The provisions include academic financial assistance, living expenses financial assistance, emergency relief assistance, and preferential dormitory program. Table 3 is the details of the programs.

Table 3: Financial Assistance Programs for Disadvantaged College Students

Program	Description
Financial Aid	For students whose family income is below NT$700,000. The aid will be granted by the private or public institutions according to the income level to reduce the tuition burden.
Living Expenses Financial Assistance	The institutions provide stipends to financially disadvantaged students through service learning opportunities. The amount of stipend should be reasonably fitting for individual student's monthly living expenses.
Emergency Relief Assistance	For low and very low-income families, or families with financial crisis or problems, schools should provide financial assistance according to the actual situation.
Preferential Dormitory	Provide students of low-income families with free dormitory; the middle- and low-income family students will be given priority for dorm assignment.

Other Assistance Programs

To help financially disadvantaged students attend schools, there are also provisions in reduction/ exemption programs on tuitions and/or fees (e.g., for children from low-income families and/or special situation families, for people with disabilities and their children, indigenous students), work study stipend, student loans, etc. Help Achieving Dreams is the portal where students may find information and help in finding suitable assistance program and completing the application process. The program has been very effective in providing a stable learning environment for economically disadvantaged students in pursuing their dreams.
URL: http://helpdreams.moe.edu.tw/

Adopting a Multichannel School Admission System

Enrollment Control Quotas

In order to achieve both the development of the entire nation, local economic development of own features, and for TVE institutions' development, an enrollment control quota is given to each school, but with increased flexibility of allocating the enrollment quota to school's colleges, institutions, departments, and curriculum programs – according to its circumstances.

Examination and Recruitment Separation Program

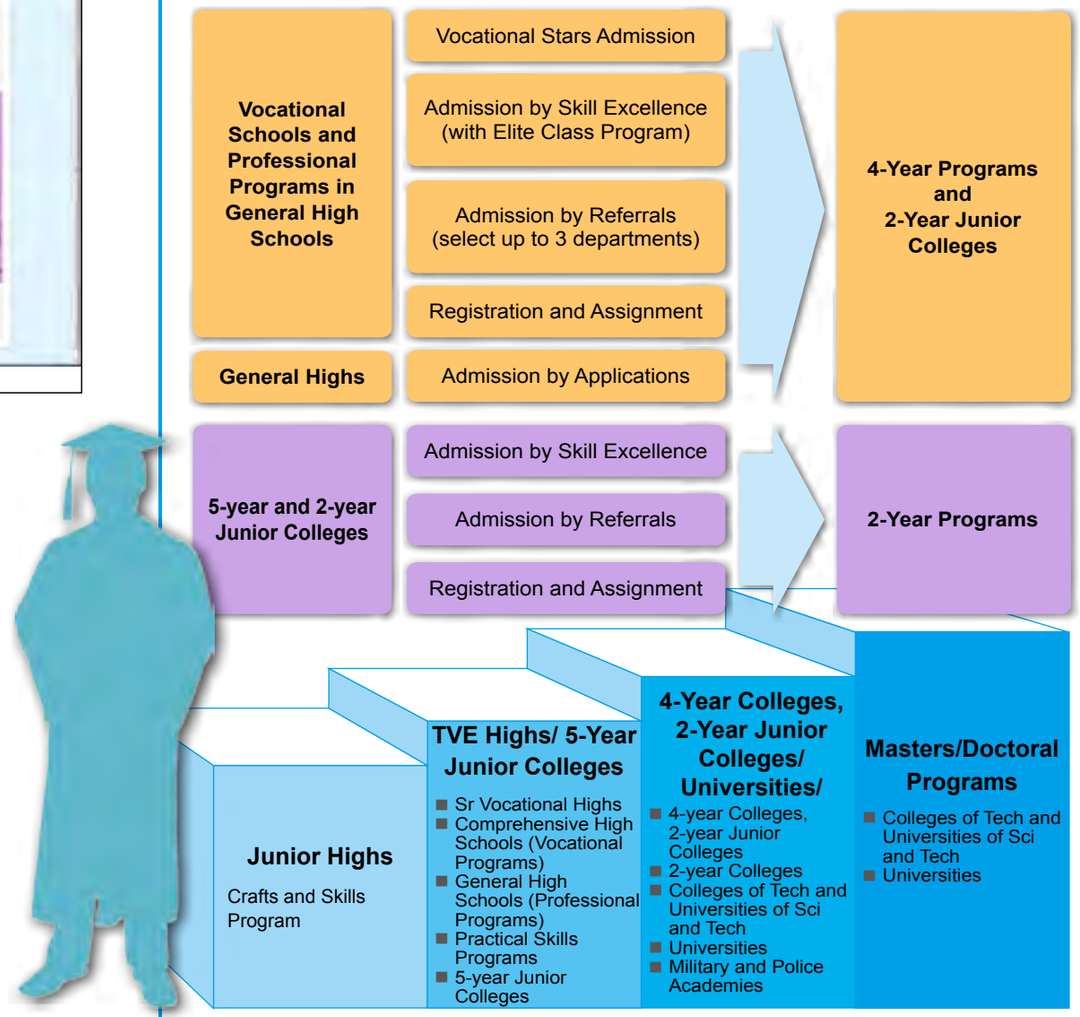
The academic structure and the disciplines taught in TVE institutions are extremely diversified. The recruitment process is separate from that of entrance examination in order to integrate recruitment channels. This approach also simplifies the recruitment process and increase the quality of testing process, since now the two processes are handled by specialized units. The generation of entrance examinations is handled by the Testing Center for Technological and Vocational Education, and all students are required to take test only once. The results are used by all multi-channel admission concerns, thus alleviate students from the burden of taking different examinations for different subjects/schools. The major process in multi-channel admission system for TVE institutions is outlined in Figure 8.

Admission through Multiple Channels

a. Senior vocational high schools and professional programs in general high schools (including vocational programs in comprehensive high schools)

These schools basically take graduates from junior highs. The admission channels include direct advancement, admission by application, admission by referral, and admission

Figure 8: Multi-Channel Admission System for TVE Students



by registration and assignment. The direct advancement takes academic grades from five semesters as the decision criterion; however, how these grades are used to reach the final decisions depends on the rules and regulations at each recruitment region. Admission by application and admission by referral take into consideration the results from the first Basic Competence Test for Junior High School Students or Taipei-New Taipei-Keelung Joint Entrance Examination as well as students' school performance in all areas. Admission by registration and assignment takes both the first and second Basic Competence Test for Junior High School Students as the primary screening process, without considering students' school performance.

b. Five-Year Junior Colleges

Five-year junior colleges primarily admit junior high school graduates. The entrance channels include direct advancement, admission by Application Lottery, and admission by Registration and Assignment. Direct advancement takes three-semester grades – that is, the percentile rank (PR) in school in seven learning areas and eight subjects in three semesters (first and second semesters in 8th grade and first semester in 9th grade) -- as the decision measure. Admission by application lottery uses either the three-semester grades or the Basic Competence Test for Junior High School Students PR scores as the screening measure. Admission by registration and assignment uses Basic Competence Test for Junior High School Students scores as the basis of assignment.

c. Four-Year Programs and Two-Year Junior Colleges

These institutions have two major channels: one considers entrance examination scores and the other one without. The channel that does not take entrance examination scores as the basis also has several possibilities: (1) Admission by Skill Excellence, which recognizes student performances in competitions and student capabilities through obtaining certifications; and (2) the Vocational Stars Admission, for balancing the resources-divide between urban and remote area to provide equal entrance opportunities for remote-area disadvantaged students. The channel that does take entrance examination scores into account also has several possibilities: (1) admission by referral, to highlight TVE's valuing practical, applicable knowledge; uses both TVE Joint College Entrance Examination as well as certificates received and competition performance as admission criteria; (2) admission by registration and assignment, based on TVE Joint College Entrance Examination scores and student self-selected school choice priorities; and (3) admission by individual school recruitment. Furthermore, in order to give general high school students a chance to switch course, graduates from general high schools may also apply to four-year programs, using their General Scholastic Ability Test results and other related documents.

d. Two-Year Programs

The primary sources of admissions are graduates from two-year junior colleges and five-year junior colleges. Other than taking the TVE Joint College Entrance Examination and to be admitted by registration and assignment, these graduates may also evaluate their own special abilities, interests, and practical capabilities and select "admission by referrals and admission by skill excellence" which focuses on the school project grades, competition performance, and certification received. Students may also enter through institution's individual and independent recruitment process.

Proactively Improving Teaching Quality

Implementing "Program for Adaptive Learning for Senior Vocational School Students and Fair Distribution of Community Education Resources"

To obtain a fair distribution of senior vocational school education resources and bridge the education divide, Fair Distribution Program for senior vocational schools was implemented in 2009 as a means to encourage senior vocational schools make adjustment in their curricula and features development as well as making vertical integration with junior high schools. The program assists the senior vocational schools in the community to maintain the already established horizontal integration with each other, but to extend to vertically partnering with junior high schools, so that education resources such as instructors, curricula, and equipments can be shared. Consequently, the senior vocational schools can be recognized by families and students in the same community as well.

Implementing "Quality Improvement Program for Senior High Vocational Schools"

As a means to build the foundation for the upcoming 12-year compulsory education, the government has studied and planned for the preparation of groundwork. The First Priority Regions of Education were studied and those senior vocational schools with development potentials were selected for special guidance and assistance so that the disadvantaged regions may have more quality schools in the future. Since 2007 academic year, Quality Improvement Program for senior vocational schools was initiated and would be implemented in three stages. All the public and private schools in Taiwan may submit their competitive proposal. Applicants are screened through two stages before the finalists are determined. As of 2010 academic year, 126 schools were selected for guidance and assistance.

Elevating Teaching Quality in Junior Colleges

Many Junior colleges had their history as senior vocational schools, and with their structures and missions changed, their teaching personnel must also make appropriate adjustment. In 2004 the MOE Subsidy for Technical and Vocational Institutions to Develop Overall Teaching Quality Enhancement was put in place, and this program was amended later in 2006 to become MOE Subsidy for Junior Colleges to Develop Overall Teaching Quality Enhancement, limiting the scope to only junior colleges. According to their individual strengths, resources, vision and direction of school development, the applicant schools submitted plans to elevate teaching quality, strengthen student learning effectiveness, and improve curriculum and course planning – all with the final goal of elevating the quality of the overall education.

Implementation of "Teaching Excellence Projects for Universities/Colleges of Technology"

Teaching Excellence Projects for Universities and Colleges of Technology began in 2006 for improving teaching quality in higher education institutions, and for developing best practices in teaching excellence in Taiwan. The primary objects are: (1) improve instructors' professional quality in teaching, (2) develop sound curriculum planning, (3) strengthen students' needs in learning and their learning effectiveness, (4) establish evaluation systems, and (5) establish and improve institutional teaching quality related structures and systems.

Establishing TVE Institutional Feature Discipline Development

To encourage TVE institutions to plan and develop institutional focus disciplines, TVE Institutional Features and Best Practices Grants became available in 2001. TVE institutions have already gradually established and developed focus directions based on their own specialties and features. The future direction is to continue guide and assist all TVE institutions to increase inter-institutional cooperation and intra-institutional resource integration; also to follow the lead of

government's policy, regional features or institutional focus development to strengthen all TVE institutions' feature discipline development to make major breakthroughs.

Strengthening Faculty's Practical Teaching Capabilities in TVE Institutions

Three tasks were laid in place in 2010 to strengthen the practical teaching capabilities for TVE faculty members: (1) encourage institutions to appoint new faculty members with practical industrial experiences in the field they will teach, (2) support TVE faculty members to conduct research and services in public and private sectors, and (3) establish faculty promotion process that include sound technical report or practical R&D outcome as evaluation metrics.

Infusion of Industry Resources for Collaborative TVE Teaching

For cultivating quality professional talents with practical capabilities and employability, starting in 2010 TVE institutions are encouraged to adopt the dual-instructor system. Thus, with the infusion of professionals and experts from industry, the connection between TVE education and industries can be strengthened.

Planning Practical Curricula for TVE Institutions

For meeting the future needs of the industry, it is important to appropriately cultivate all types of professional technical human resources and develop institutional specialties. *R&D and Trial Program for TVE Practical Curricula* was put in place in 2010 for guiding all disciplines to plan practical and application-oriented courses and contents, as well as for nourishing students in solving practical problems.

Encouraging Students to Participate in All Competitions

To motivate students to become proficient in professional skills, to obtain excellent practical capabilities, and to possess global perspectives, the program for encouraging students in TVE institutions to participate in international technical skills was expanded in 2005, either through cultivating contestants for international competitions or sponsoring international competitions themselves. Starting in 2010, high performance students or teams were supported for their airfare to go abroad to participate in international competitions or invention conventions. Such participation in international or domestic competitions increases students' practical capabilities, professional competitiveness, and international recognition.

Substantiating the Professional Certification System

For strengthening skill levels for students in TVE institutions and to internalize their professional capabilities, the professional certification system must be substantiated. Faculty and students alike are encouraged to actively obtain technical certifications. Conducting Project Technician Skill Tests, modifying rules and regulations for the entrance examination procedures, as well as implementing special projects were all used as motivations. This has to be done to respond to the structural changes in industries, the increases in the number of high-level technical personnel needed by the industry, students and faculty must be motivated to obtain professional certification both in quantity and quality. Only by doing so the professional competencies of the faculty can be strengthened,

and the teaching quality as well as student competitiveness in job market can be elevated.

Promoting Evaluations for TVE Institutions

Senior Vocational High Schools

To prepare for the upcoming 12-year compulsory education, and to improve the education quality and performance, the second-stage evaluation mechanism for senior vocational schools has been implemented in 2011 and will continue on to 2015. If a school receives marks below Grade 3 in any three fields stipulated in the "Criteria for Evaluating School Operations," or subjects in "Criteria for Evaluating Subjects" receive marks below Grade 3, the school and/or the discipline must be put under remedial guidance. A follow up evaluation process would then take place within one year to assure the improvement of school operations.

TVE Higher Education Institutions

To ensure the improvement of education quality at TVE higher education institutions, the entire institution is considered as an evaluation unit, and the overall institution operations and all departments/graduate departments are evaluated in one process. Each institution is accredited once every five years; the departments that receive 3rd grade level will be re-evaluated one and two years after the evaluation process for guidance visit and remedial action tracking. Evaluation results is posted on the Evaluation Information Portal for the public examinations as well as serving the basis for reviewing each institution's tuition/fees adjustment, enrollment level, and grants and supports.

Cultivating Industrial-Academic Cooperation Talents

Special Industrial-Academic Cooperation Classes

Six Special Classes/Short Curricula (see Table 4) are in action through tight interactions between the industry and academia to cultivate the talents needed by the industry.

Student Off-Campus Internship Program

The fundamental rules and guidelines for supporting student internship outside institutions were created in 2010 to encourage TVE junior colleges to set up required and elective courses in order to substantively promote the internship curriculum. The curricula include Summer Short Curriculum, Semester Curriculum, Academic Year Curriculum, and Overseas Practical Training Curriculum.

Post-baccalaureate Second-Major Program

This program offers students who have already obtained at least a bachelor's degree and have satisfied the military obligations to learn to obtain professional practical experiences and cross-disciplinary learning. The curriculum is meant to strengthen the employability of students and to induce student job placement upon graduation, and the curriculum is designed to meet the needs of industry by combining courses from different departments or even colleges. The time restriction for completing the curriculum is one to two years, and students are assisted in obtaining professional certifications, practical experiences, or foreign language skills.

Table 4: The Types of Classes for Cultivating Industrial-Academic Cooperation Talents

Types of Classes	Description
Practical Skills Short Curriculum	Three years, tuition free; as an extension of Technical Skills program in junior highs; courses concentrate on practical experiences to prepare students for employment.
TVE High School Cooperative Work Experience Education	Three years, tuition free; may be one of the three models: rotation, staged, and internship; the most common one is rotation.
Industry Special Needs Classes	Three years, tuition free; institutions apply admission by direct advancement to accept students; the instructional equipments and practical training materials are subsidized through special projects to strengthen practical training/teaching.
Industry and Academia Cooperation	Uses three-in-one (TVE high school + TVE junior colleges + firms) or four-in-one (the afore mentioned three + vocational training center) model to develop 3+2 (3 years in TVE high school and 2 years in 2-year TVE junior college), 3+2+2 (3 years in TVE high school, 2 years in 2-year TVE junior college, and 2 years in 2-year baccalaureate program), 3+4 (3 years in TVE high school and 4 years in 4-year baccalaureate program), or 5+2 (5 years in 5-year junior college and 2 years in 2-year baccalaureate program) curricula vertical feeding path.
Industrial-Academic Cooperation Master's Special Classes	Invite partner firms to jointly plan curriculum, cultivate talent cultivation, and offer employment consultation; as a basis for industrial and academic cooperation.
The Last Mile Program	Focus on strengthening the interdisciplinary learning, cross-disciplinary innovation, and practical experiences in the last 1 to 2 years.

Cross-Disciplinary Program

To meet the needs of industry and society, strengthen the competiveness in the industry upon graduation, universities of technology and colleges of technology are encouraged to offer short curricula degree or short credit curricula in cross-disciplinary learning in areas such as healthcare and cultural innovation (part of the Six Emerging Industries) or other fields (e.g., Ocean Law and Policy, New Resident Family Management) that would meet the needs of government policies.

Emphasizing Industrial-Academic Cooperation Innovation and R&D

Consummate Industrial-Academic Cooperation Rules and Regulations

As the number of industrial-academic cooperation in junior colleges and above increased and the patterns grew to be more complex, the Ministry of Education amended the 2012 *Statute for Institutions of Higher Education Implementing Industrial-Academic Cooperation*. The primary purpose of this amendment is to guide the institutions to strengthen their operative mechanisms for the industrial-academic cooperation, specifying that the institutions should conduct comprehensive planning according to their own unique characteristics in teaching and research, and the institutions should set policies to promote internal personnel development, technological R&D, and the utilization of intellectual properties that are related to the industrial-academic cooperation. Among these subject matters, the utilization of intellectual property and related policies should abide by the principles and intentions of *Fundamental Science and Technology Act* (amended and became effect in December 2011) and create rules and systems for a comprehensive intellectual property management mechanism, including the distribution of cooperative R&D profit and benefit, the resolution of conflict of interest, and protecting the participating teachers and students from breaking the laws unintentionally.

Mechanisms for Encouraging and Guiding Industrial-Academic Cooperation

The *Initiative for Motivating Industrial-Academic Cooperation Performance* seeks to lead institutions to value social functions, to highlight the diversified scope in education operation and institutional operation and management, then to create a positive competitive environment. This initiative provides grants to 31 higher education institutions to motivate each and every one of them to create mechanisms for managing R&D results, to fortify the ability in intellectual property management, to promote higher education originated and derived enterprises, and to attract more faculty members into participating in industrial-academic cooperation; in order to promote the developments and innovations in industries.

Establishing Regional Industrial-Academic Cooperation Centers

Six Regional Industrial-Academic Cooperation Centers have been established to integrate the windows for sharing industry-government-academia resources. These centers assist regional partner institutions in industrial-academic cooperation efforts and to increase cooperation forces. These centers provide industries with a platform for sharing professional information on futuristic and practical R&D results; they also help construct mechanisms for managing and utilizing resources, processes, and R&D results for industry-academia cooperation.

Promoting Industrial-Academic Cooperation Plans in Industrial Parks

Institutions are encouraged to meet industries' needs according to their own specialties and submit project R&D or innovation plans in the form of Production Projects to help enterprises in the industrial parks resolve their problems. These projects should include students so they can "learn by doing" and pick up practical experiences. Thus, the gap in labor needs between what academia can supply and what the industries really need can be narrowed.

Setting up Co-op Technological Development Centers

Twelve such centers were established to encourage TVE institutions to utilize the technologies they have developed in the industrial-academic cooperation works, especially in the six major fields of precision machineries, photo-electronic machineries, power electronics and communications, biotech healthcare and intensive agriculture, green energy and environmental ecology, and leisure and service innovations.

The Plan for Developing Technological University Paradigms

The purpose of The Plan for Developing Technological University Paradigms is to clearly orient TVE higher education institutions with cultivating professionals and industry-academic cooperation and innovation R&D squarely at the center. The TVE higher education institutions shall focus on the industry-academic cooperative R&D, firmly embedding fundamental technologies and adding values through technology transfers; the teaching goals should promote teaching practical skills to increase student implementation capabilities and competitiveness. These are extremely important in driving the reforms of TVE structure and systems as well as to return the original intent and features of technological and vocational education to TVE higher education institutions.

The project began its trial in 2012 with the selection (with financial grants provided) of six institutions to be developed into science and technology university paradigms; two universities will also establish Industry-Academic R&D centers. The universities who receive grants should focus on the application technology and human resource needs of domestic industries, and to integrate resources in teaching, intellectual property, and other industry-related resources in the region, and each university establishs its innovation development centers in accordance to its own distinctive characteristics; thus becoming the driving force behind the development of feature industries of Taiwan.

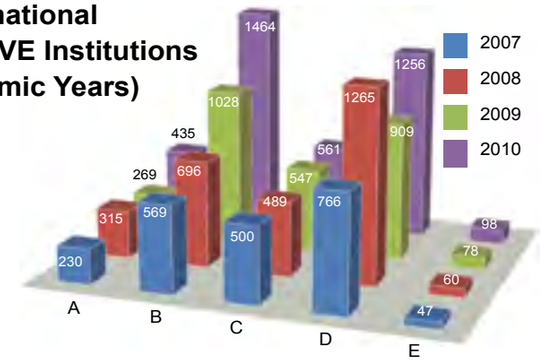
Developing International Cooperation and Exchange

International Cooperations and Elevating Student Language Capabilities

To expand the global perspectives for faculty and students at TVE institutions and to increase student employability and competitiveness in job market, and to create a sound international environment (including campuses, curricula, and administrations), several measures have been implemented. Other than providing grants for TVE institutions to participate in international cooperations and to elevate students' foreign language capabilities, instructional materials and competence metrics in Business English for TVE institutions have also been designed and published as a means to gradually establish testing mechanisms in Professional English. These efforts focus on practicality and aim to improve the language capabilities students will need in their professional fields, so their employability and competitiveness can be increased. The activities for TVE institutions' international cooperation in 2007-2010 academic years are listed in Figure 9.

Figure 9: Activities in International Cooperation for TVE Institutions (2007-2010 Academic Years)

A. Exchange Teachers
B. Exchange Stuents
C. Internatioal Academic
D. Classes Taught in English
E. International Schools (with Joint-Degrees)



Admission of International Students

For expanding the number of international students admission and pressing on the linking exporting higher education industry with *Connect to Asian-Pacific: Long-term Development in Southeast Asian Project*, TVE institutions are encouraged to promote international cooperation projects such as cross-national academic cooperation and/or student/teacher exchange programs in order to attract international students to study in Taiwan, enrolling in degree programs, short-term programs, or Chinese language programs or other related curricula. As a result, the global perspective and competiveness for TVE institutions can be enhanced.

Table 5: The Number of International Students Admitted to TVE Institutions (2007-2011 Academic Years)

Academic Year	in Degree Programs	in Short-term Study Programs	in Chinese Language Programs
2007	1,261	415	442
2008	1,419	367	597
2009	1,835	646	560
2010	2,245	672	737
2011	2,667	672	826

The Outlook of Technological and Vocational Education

Implementing Twelve-Year Compulsory Education

To increase the quality of her citizenries and to rationalize junior highs, allowing junior high schools to become adaptive, active, innovative, high quality, and excellent, thus elevating the quality of education in senior vocational high schools, Taiwan began the planning of twelve-year compulsory education in 2011 academic year and to be completely implemented in 2014 academic year. This twelve-year compulsory education is citizen's rights and not obligation, therefore its characteristics are "non-forced," "admissions mostly through direct advancement," and "tuition exemption." The plan will be implemented in stages, starting with senior vocational high schools (including the first three years of five-year junior colleges) where students from families with income below NT$114,000 receiving free tuition. By academic year 2014, tuitions for all senior vocational high school students will be exempted, and most students will be admitted by direct advancement.

Popularized and In-depth Holistic Education

To cultivate students with humanistic literacy, social concerns, and international perspectives, TVE institutions are encouraged to integrate general education curricula with professional curricula and to create cross-departmental and cross-disciplinary courses and programs. This increase of dialogs and exchanges between the departments of general education and professional ones would allow general education to have a more in-depth application of the concept and design of the curricula and teaching strategy. Through providing diversified general knowledge courses with teaching designs that are more life-like, student interest in learning may be increased. Institutions are also encouraged to create labor learning and service learning curricula that contains cultural concerns, so the students may "learn by doing" and "practice what they were taught" to actually implement and experience the holistic education.

Elevating Teaching Quality in Higher-Level TVE Institutions

In order to elevate the overall quality of TVE, the MOE Implementation Directions Regarding Grant Subsidies for Technology Colleges/Universities Promoting Teaching Excellence and MOE Subsidy for Junior Colleges to Develop Overall Teaching Quality Enhancement are continued, and through grants to guide TVE institutions to develop sound management structures/systems and action plans to assure and improve teaching quality. Instructors are encouraged to strengthen practical teaching and to adjust/reform curricula in school, so the professional talents with balanced theory and practice background can be cultivated.

Facilitating TVE Institutional Development through Evaluation

For guiding TVE institutions to develop their special features, to increase teaching quality, and to cultivate quality talents – all following the international higher education trends and the needs of the development of industries – TVE Evaluation will be changed from Grade System to that of Accreditation, and from criterion-referenced to self-referenced; thus allowing each institution to develop its own features and return to using evaluations as the basis of self-improvement.

Cultivating Practical, Application-Oriented Professionals

The purpose is to plan curriculum reform in TVE institutions' practical curricula and cultivate instructors' practical professional capabilities, thereby returning to the original intent of TVE being practical and application-oriented, as well as expanding the model of cultivating talents through tightly-woven industrial-academic relationships. This is done to increase student competitiveness in the job market in the future. The related plans are: (1) implementing the *Plan for Technical and Vocational Institutes To Enact Practical Industrial Courses for Research and Development and Trial Program*; (2) implement the *Plan for Technical and Vocational Institute Student Off-Campus Fieldwork Courses*; (3) implement the *Plan for Technical and Vocational Institute Instructors to go to Public and Private Sector Institutions for Research and Study Service*; (4) implement the *Plan for Technical and Vocational Institutes to Hire Neighboring Industrial Sector Experts to Co-Teaching in Class*; (5) implement post-bachelor second major degree programs; (6) continue to conduct all types of industrial-academic cooperation special classes; and (7) implement the *Plan for Developing Technological University Paradigms*.

Becoming a Key Platform in Higher Education in East Asia

In order to actively introduce and export the higher education, TVE institutions are given resources to seek international cooperation to elevate the foreign language capability of their students, actively setting up all-English curricula, degrees, and classes, and to provide financial support to priority schools to open diversified and multi-channel curricula. Furthermore, TVE institutions are encouraged to apply for opening special classes for international students as stipulated in *MOE Regulations Regarding International Students Undertaking Studies in Taiwan*, and conduct transitional education through opening special classes abroad as stipulated in *MOE Directions Regarding Transitional Education Application and Review Process*, as to actively export our quality higher education.

Actively Promoting Academic Exchanges Across the Taiwan Strait

After the amendment of *Act Governing Relations between the Peoples of the Taiwan Area and the Mainland China Area*, *University Act*, and *Junior College Law,* active efforts have been maded in studying ways to vitalize Cross-Strait academic exchanges with China. Because of restrictions from national security, past history, and social, economic, and cultural factors, the process of expanding cross-strait academic exchange has been gradual in nature. Besides continuing the process of degree recognition for Chinese universities and admission of Chinese students, based on the foundation of academic exchange programs, efforts are being made to elevate the quality of conferences, visitation, and faculty/student exchange programs. Admitting junior college graduates from China to TVE two-year program has also been studied. It is the goal of the program to induce friendly interactions through these increased cultural/academic exchanges.

Exploring Diverse Recurrent Educations

TVE institutions are encouraged to create recurrent education special classes to the general public in order to provide channels to continuing education while employed. Currently such opportunities are offered by TVE-affiliated continuing education schools and continuing education programs in junior colleges, but child-care recurrent education special classes (responding to the increased needs of improving instructor quality caused by the tuition exemption policy for children age of five), nursing and other industry-academia cooperative recurrent education special classes, and recurrent education special classes specific to people in Hualian-Taitung remote regions are all being developed. There will be continuing effort in improving, simplifying existing recurrent education structure, in assisting TVE institutions in more flexibly consolidate and utilize teaching resources to create practical special classes that match the expectation of the public and the needs of the industries.

Strengthening the Practice of Social Services Responsibilities

The special characteristics of TVE have close ties with practices in the industries. In order to actually accomplish the function of "strengthen services to the society and contributing to the economy for the society" and continuously explore ways in the cultivation of talents and technological consultation mechanisms for the industries. It also encourages institutions to appoint, base on their specific R&D characteristics and resources, intellectual property management personnel to devote in R&D planning and the application of results. Thus, institutions may elevate the commercialization of its intellectual properties from increasing quantity to that of improving quality, resulting in establishing an environment that induces technology transfer and research and development. In addition, institutions need to follow the directives outlined by the rules and regulations in industrial-academic cooperation to fortify the exchanges and utilizations of human resources between academia and industry; and finally, based on the industry needs, to construct innovation R&D platform for cross-institutional intellectual property cooperative operations and industry-academia partnership alliances, so the institutions may become the sources for driving the industry's innovations.

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