

Higher Education



Taiwan enjoys excellent global competitiveness in spite of limited land and natural resources. According to the World Competitiveness Yearbook 2015 published by the International Institute for Management Development (IMD) in Switzerland, Taiwan ranked fifteenth overall in global competitiveness among 60 countries, and was notably outstanding in “Economic Performance” and “Business Efficiency.”

One reason for Taiwan’s economic prowess is its quality human resources, an accomplishment closely tied to the issue of higher education. In the Global Competitiveness Report published by World Economic Forum (WEF) published in 2015, Taiwan ranked fourteenth in “Higher Education and Training.” Taiwan’s human resources provide highly-qualified workers in sufficient supply to the labor market and bring positive benefits for industry innovation.

Universities, Colleges and Junior Colleges

Higher education institutions in Taiwan include 2-year junior colleges, 5-year junior colleges, and universities. Like most countries, the study period is 4 years for an undergraduate university degree, 1 to 4 years for a master degree, and 2 to 7 years for a doctoral degree. The popularization of education has led to a rapid increase in universities, colleges and student enrollment numbers, although the figure has leveled off in recent decades. In SY2015, there are 158 universities, colleges and junior colleges, totaling 1,332,445 students. Reforms in teacher training have played an important part in the expansion of higher education. Significant improvements in teacher

quality can be attributed to policy adaptations and the newly implemented evaluation system. Currently, Ph.D. degree holders account for over 80% of faculty in universities, the figure having increased by 15% in the past 10 years. Professors account for one-third of all teaching personnel.

To maintain competitiveness, Taiwan’s government has invested more than US\$400 million in higher education annually in the last five years to encourage universities to enhance their standards for research and teaching, and the results have been remarkable.

Although Taiwan’s higher education system has gained recognition for its achievements in many areas, tuition still remains very reasonable. Tuition is about NT\$58,720 (US\$1,924) dollars per year at public universities, and about NT\$109,944 (US\$3,552) dollars at private universities. College tuition stands at only 10~20% of the national per capita GDP, considerably lower than that of many other countries, which in some cases is over 30%.

The Ministry of Education and several universities have jointly established the Higher Education Evaluation and Accreditation Council of Taiwan in the year 2005 to conduct evaluations of universities. This evaluation of accreditation consists of Institutional

Evaluation and Program Evaluation. The former is held every 6 years to examine whether schools have achieved their strategic goals, while the latter is also conducted once every 6 years to examine the quality of faculty, teaching, research, and service. The Ministry also encourages universities to obtain international certification. The Higher Education Evaluation and Accreditation Council of Taiwan, for example, is a member of several international organizations, such as the Asia-Pacific Quality Network (APQN) and the International Network for Quality Assurance Agencies in Higher Education (INQAAHE).

Another of Taiwan’s significant achievements is in the area of “Innovation”. In a report from the World Economic Forum (WEF), Taiwan ranked eleventh among 144 countries in innovation in 2015. While universities are pursuing for innovation, university students in Taiwan exhibit abundant creativity. To encourage students to unleash their creativity, the Ministry screens and selects outstanding students to study abroad under sponsorship by the government. In recent years, students from Taiwan have been making their mark in international design competitions such as Germany’s iF Awards and Red Dot Award every year. ■



More Signs of Progress in Education



Everywhere around the world competition is getting fiercer and more talent is migrating across borders. How can Taiwan's higher education industry face up to these challenges so as to promote commercial innovation while strengthening Taiwan's international competitiveness?

Knowledge and innovation is the only way to increase global competitiveness. Countries the world over spare no effort in investing in the cultivation of innovation and talent by improving their higher education systems. Thus since 2006, the Ministry of Education has been promoting a plan called "Develop World-Class Universities and Research Centers." The program was renamed "Heading toward Top Universities" and has been in place since April 2011. After 7 years, we are now reaping the rewards:

A Taiwan is Reaching Out to the World

Looking at various international assessments, as of the end of 2015, 11 universities subsidized by this plan are ranked as top 500 universities in the world as well as the world's top 100 universities in the global university rankings (Quacquarelli Symonds, QS). In addition, seven schools are ranked among the 500 schools in Shanghai Jiao Tong University's Academic Ranking of World Universities in 2015 and their ranks improved year by year. This is a sign that the subsidized schools have inspired themselves to meet international benchmarks and rise up to international competition with the top schools in the world.

B The Quality of Students Continues to Improve

In terms of teaching, we see the light at the end of the tunnel for reform. Top universities in Taiwan have instigated reforms in their general education systems and interdisciplinary programs.

For example, National Taiwan University offers 183 open courses which have accumulated more than 10 million CTRs so far and are



awarded The Outstanding Site Awards in 2014 and educator Award for Excellence in 2015 by Open Education consortium. National Sun Yat-Sen University has established "Collegiate Learning Outcomes Assessment "COLA" for long-term follow-up survey and has accumulated 7,582 person-times taking the survey so far, implementing a mechanism for guaranteeing students' learning results and quality as well as establishing a support system for students and teachers. In addition, the number of foreign teaching staff and researchers hired by top universities in Taiwan has increased from 339 in 2010 to 420 in 2015 for improving the overall teaching and research quality. As for shouldering its social responsibilities, top universities doing their parts by offering educational opportunities for disadvantaged students. Since 2011, the total number of students admitted through star admission is 12,842, making up more than 10% of the total numbers of students admitted via various channels.

C The University is Becoming a Place for Innovation in Business

Taiwan's innovative ability has been recognized in the World Competitiveness Yearbook published by IMD. In recent years, the number of patents and new breeds developed by Taiwanese universities has continued to

grow and the income derived from intellectual property related products has increased significantly. The number of patents and new breeds developed has grown from 320 in 2005 to 1,581. As of the end of 2015, the expenses for industry-academia cooperation provided by non-governmental sectors have grown to 4.103 billion dollars, a proof that Taiwan universities promote industrial innovation and make contributions to the society through research and development.

D Campuses Play Host to the World

"Internationalization" is the key to global visibility. Whether the universities in a country are attractive to foreigners is also a criterion in evaluating national power. The number of teachers and students of top Taiwanese universities doing short-term research, participating in exchange-programs or studying double degrees have increased from 1,868 in 2010 to 6,216 in 2015. The number of foreign students studying in Taiwan or as exchange students in Taiwan has grown from 4,662 in 2005 to 18,118 in 2015. In addition, on average, almost 558 international conferences are held in top Taiwanese universities each year, thereby increase the international mobility of teachers and students, strengthen the international interaction of teachers and students while broadening the horizons of Taiwanese students. III



Vocational and Technological Colleges and Universities

1 School System

The higher technical and vocational education in Taiwan is divided into 2 levels: junior colleges, technical colleges and universities of science and technology.

1 Junior colleges

Junior colleges are established according to Junior College Act and are divided into 2-year program (2-year colleges) and 5 year-program (5-year colleges). Students take 5-year program must complete 220 credits and those take 2-year program must complete 80 credits in order to graduate and receive an associate degree.

2 Technical colleges and universities of science and technology

Technical colleges and universities of science and technology are established according to the “University Act” for nurturing highly-specialized professionals and vocational ones. Technical colleges and universities of science and

technology may have associate-degree programs, bachelor programs, master degree programs and doctoral degree programs. Students take 4-year program need to complete 128 credits, and those take 2-year program need to complete 72 credits in order to graduate. Students take master degree program need to complete 24 credits and finish their thesis and students take doctoral degree program need to complete 18 credits and finish their doctoral thesis in order to graduate.



2 Characteristics of Technological and Vocational Education

- 1 A comprehensive system.
- 2 Private schools offer excellent courses actively .
- 3 Multiple school systems and subjectsfor adaptive development.
- 4 Great Accomplishments brought by industry-academia cooperative projects.
- 5 Offer effective and practical teaching.
- 6 Fruitful results achieved in international competitions.

3 Key Points for Development of Technological and Vocational Education

- 1 Take great care of disadvantaged students: 1. first 3 year free school tuition for 5-year junior college program; 2. sponsorship program for disadvantaged universities, colleges and junior colleges students; 3. other sponsorship measures.
- 2 Implementation of Multichannel Admission
 - 1/Amount control: it's for emphasizing equally on the national's overall development, features of local industries and development of vocational and technological colleges and universities; in the future, total amount will be adjusted according to the demands of

manpower from industries and the overall development of our nation.

2/ Separation of examination and enrollment system: the school system and subjects of vocational and technological colleges and universities are diverse, therefore, a separation of examination and enrollment system is applied in order to integrate various admission methods, simplify the procedure of enrollment and upgrade the quality of examination.

3/ Multiple admission program

- 1 5-year junior college: 5-year junior college admits mostly junior high school graduates and its ways of entrance include exam-free admission and special enrollment.
- 2 4-year technical college & 2-year junior college.
 - A Admission not through paper examinations.
 - A Value students' performances in competitions as well as their abilities to obtain credentials – “special achievement-based admission” (incorporated into elite class of vocational high school).
 - B In order to balance the gap between urban and rural areas, and take care of disadvantaged students in rural areas – “Vocational Star Admission.”

B Admission that requires paper examination.

A “Recommendation and screening-based admission” is to highlight the spirit of being practical and usable emphasized by technological and vocational education, plus, this method requires the students’ scores in joint entrance examination, students’ certificates of merits, and their performances in competitions.

B To select and fill in the priority departments in universities with the joint entrance examination scores for “application-based admission” and individual recruitment by schools.

3 2-year technical college: 2-year technical colleges admit 2-year and 5-year junior college graduates. Channels for admission include day school nursing department: its admission is based on joint entrance examination scores.

3 To actively enhance teaching quality: 1. to upgrade the teaching quality of junior college; 2. to implement the Teaching Excellence Project for encouraging universities of science and technology and technical colleges; 3. to enhance teachers’ skills in teaching practice in vocational and technological colleges and universities; 4. to introduce resources offered by industries to vocational and technological colleges and universities to assist in teaching; 5. to encourage students to participate in various



competitions; 6. to implement certification system.

4 To promote vocational and technological colleges and universities evaluation: for upgrading the quality of vocational and technological colleges and universities. The evaluation is based on “school as a whole”, and the evaluation for general school affairs and various departments is done together.

5 To nurture talents through industry-academia cooperation: 1. industry-academia class: through the interaction between industry and academia, the following two classes nurture talents demanded by industry through such cooperation: (1) industry-academia cooperation class; (2) industry master program 2. off-campus internships; 3. the 2nd bachelor program for people who already obtained their first bachelor’s degree; 4. industry schools.

6 To value the innovative industry-academia research and development: 1. comprehensive industry-academia law; 2. to establish local industry-academia cooperation centers; 3. to promote industry-academia cooperation in industry zone program.

7 To develop exemplary university of science and technology: to clearly define that higher technical and vocational education focuses on talent nourishment and innovative research and development of industry-academia cooperation, emphasizing

the research and development by the cooperation of industry-university of science and technology, laying foundation for basic skills, and capabilities to add values to patented technology transfer. Meanwhile, promoting practice teaching in order to achieve the goals of improving students’ practical skills and competitiveness which are vital in facilitating the reform of technical and vocational system as well as guiding vocational and technological colleges and universities to rediscover their features as technical and vocational education.

8 To recreate technical and vocational schools by linking with industries: The Phase 2 of the Technological and Vocational Education Reform Plan (2013-2017) is implemented with the following 9 strategies from 3 aspects: 1.system adjustment (integrating policies, department adjustment, talent selecting through practice), 2.course revitalization (flexible courses, renewed facilities, practical curriculum development), 3.promoting employment (employment right after graduation, innovation and entrepreneurship, certificate and ability attained).

9 Initiate international cooperation and exchange: 1. facilitating international cooperation and improving students’ foreign language proficiency; 2. recruiting foreign students.

4 The Vision for Vocational Education

1 Implementation of the 12-year Basic Education: According to the regulations of the Senior High School Education Act, the 12-year Basic Education was officially implemented in SY2014. The free school tuition policy for vocational school students (including the first-3-year of the 5-year junior college program), starting from first graders, will be implemented in phases.

2 To popularize and deep root holistic education: encouraging vocational and technological colleges and universities to integrate their general education curricula and professional curricula, having programs and disciplines that are trans-disciplinary and interdisciplinary and offering channels for communication between general education and professional subjects in order for teachers to deepen the concepts and design of general education curricula and their teaching strategies.

3 To enhance the teaching quality of vocational and technological colleges and universities: to implement “Teaching Excellence Project for Encouraging universities of Science and Technology and Technical Colleges” and “Program for Subsidizing Colleges to Improve the Overall Teaching Quality” in order to assist vocational and technological colleges and

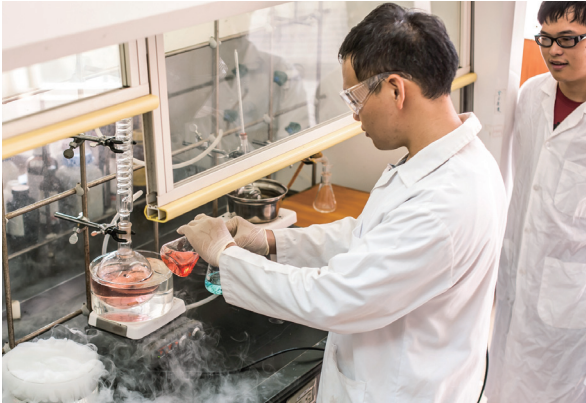


universities in developing a comprehensive management mechanism, action plans to ensure their teaching quality, and to nurture professional talents that are good at both theories and practice.

- 4
- Let the evaluation system guide the development of vocational and technological colleges and universities: evaluation system of technical colleges and universities is changed from letter grading system to accreditation and from criterion-reference to self-reference to allow schools to develop their distinctive features and return to the goal that the evaluation system is for self-improvement.
- 5
- To nurture practical and usable professionals: to plan for more innovative practice for vocational and technological colleges and universities and cultivate teachers' professional practical skills, guide school return to policy for practical and usable, spread talent cultivate model of industry-academia cooperation to enhance students' competitiveness in the job market.
- 6
- To construct a heavyweight town of higher education in Eastern Asia: subsidizing vocational and technological colleges and universities in organizing international cooperation to enhance students' foreign language proficiency as well as encouraging these schools to have classes especially for foreign students for exporting our quality higher education.
- 7
- To actively promote cross-strait academic exchange: to gradually promote cross-strait academic exchange. In addition to promoting the recognition for Mainland China academic credentials and allowing Mainland China students to study in Taiwan, it is also important to improve the quality of cross-strait seminars, visits and learning experience exchange between teachers and students based on the current

cross-strait academic exchange as well as allowing vocational school graduates from Mainland China to apply for studying two-year junior colleges in Taiwan to facilitate cross-strait cultural and educational exchange and promote amicable interaction between both parties.

- 8
- To encourage recurrent education: to encourage vocational and technological colleges and universities to offer recurrent education classes for non-students, providing learning channels for on-the-job training.
- 9
- To shoulder the responsibilities of serving the society: the features of technological and vocational education lie in the fact that they are closely connected to industrial practice. By promoting “Developing Technological University Paradigms”, expansion of industrial talents and skill-consulting mechanism are continued to be developed. Meanwhile, schools are encouraged to develop their own features, hire professionals specialized in intellectual property to make relevant plans and promote the results so that the promotion on school intellectual-property-related products is enhanced qualitatively, not quantitatively to further establish an atmosphere of research and development that emphasize on technology shift.■



Quench your Thirst: A Drink Refilling Device Won i-ENVEX 2016

Wu, Chen-Fong, Junior, Department of Digital Technology Design, Asia-Pacific Institute of Creativity
Shiao, Chi-Lin, Sophomore, Department of Digital Technology Design, Asia-Pacific Institute of Creativity
Huang Zheng-Xian, Freshman, Department of Digital Technology Design, Asia-Pacific Institute of Creativity
Liu, Chieh-Wen, Consultant for Invention Patent



Thirst being quenched is one of the most satisfying experiences in one's life. The need that can be appeased through remote control is even super. Taiwan delegation from Asia-Pacific Institute of Creativity won a top prize at the International Engineering Invention & Innovation Exhibition (i-ENVEX) 2016 held in Malaysia with just such a device.

Titled Smart Automatic Drink Refilling Device, it's the outcome of solving the interruptive refills of drinks during meetings. The innovation incorporates the school's feature of promoting tea and pottery art, said Department Chair Yeh, Lu-Tsou. “We took the advantage to be among the first to apply robot technology in the daily life activity: drinking, which makes it more fun,” added Yeh.

The 10cm-diameter circle-shaped invention is designed to load up to three kilograms of drinks that can serve six people. With the aid of micro controller and RFID locating technique, it tours along the magnet route on the conference table to where signals emit to fulfill its task. Its interactive nature attracted many visitors to stop by and inquiry during the exhibition.

The winning device has also undergone minute and complicated invention process during which signal disconnection and control failure occurred. Participating students Wu Chen-Fong, Shiao Chi-Lin, and Huang Zheng-Xian, nevertheless, countered all difficulty under the guidance. “We always wanted to apply what we have learned into real life and found great joy innovating” they said.

Nurturing the business potential, the Technology Transfer Center under the Industrial Technology Research Institute has reached the team to discuss the possibility of commercialized the product, according to Yeh.■





Less is More: National Central University Won “2016 Asia BRICOM”

Lin, Guan-Hong, Junior, Department of Civil Engineering, National Central University
 Lee, Yu-Che, Junior, Department of Civil Engineering, National Central University
 Hong, Wun-Saio, Junior, Department of Civil Engineering, National Central University
 Qiu, Ji-Zheng, Junior, Department of Civil Engineering, National Central University
 Wan, Hung-Hsien, Junior, Department of Civil Engineering, National Central University
 Chen, Sih-En, Junior, Department of Civil Engineering, National Central University
 Cheng, Hai-Ning, Junior, Department of Civil Engineering, National Central University



A team from National Central University grabbed the overall championship in “2016 Asia BRICOM” in Japan. The team also snatched the top prize of categories “Structural Cost”, “Presentation” and “Prediction of Deflection”.

The winning design is aimed to achieve the desired deflection with the simplest structure, and therefore yield the best efficiency upon loading. Eventually, the 4 meters long and 1.7kg bridge won them the gold.

In deciding the theme, team leader Lin Guan-Hong pinpointed Taiwan. The bridge structure implies the island’s circuit railway, which symbolizes the continuous development of Taiwan. The red, white, and black colors

intertwine upon the bridge relate to the internationally renowned Alishan Forest Railway. “We integrate Taiwan’s history and features with the iron bridge aesthetics, which is expected to increase the world’s understanding toward our country,” said Lin.

Other entries also inspired the NCU team. Aesthetically speaking, the humpback bridge stands with smooth radian, decorated with dominant gold color with black symbolizing the Thai royalty, by the Thailand representatives, was pretty outstanding among all entries, said the NCU team.

Participating in the competition allowed us to associate with international peers from different countries and cultures; experienced what is not available in class; and refine the skills of teamwork, self-learning, and accumulate practical experiences. The NCU representatives will not stop with the victory, and are resolute to lay a much more solid foundation of knowledge applied in practices.^{III}

