

POLICY AND PRACTICE OF MATHEMATICS TEACHER EDUCATION IN TAIWAN

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Introduction

Which job has the best reputation in Taiwan? Teachers (Huang, 2003)! A high prestige to teaching jobs and a significant regard to education in the traditional Chinese culture place lofty social status to teachers. The historical background of political, economic, and social contexts resulted in generous salary and other benefits for today's teachers. All the remuneration for the public school teachers is from the government, which is stable and ensure. These factors make a teaching career extremely attractive, especially to people who seek stable lives. Therefore, becoming a teacher is a competition task. Candidates face rigorous evaluation and serious competition throughout the processes of preparing to be a teacher. These include entering teacher education program, taking teacher qualification examination, and being screened for a job opportunity. The government plays an important role by setting up the guidelines for the teacher education processes from recruiting, training and qualifying pre-service teachers, as well as developing in-service teachers' professional competencies.

In Taiwan (Chinese Taipei), each elementary or secondary student is assigned to a particular class with a fixed classroom upon the time he/she enters a school. Then all the students in the same class will take the same courses at that classroom except for some special subjects such as physical education, music, and fine arts, which are held in some other places. For elementary school education, often one teacher teaches all the subjects for a class except in fifth and sixth grades, where some subjects are taught by other teachers who are more competent on the subjects. Thus, the elementary school teachers are prepared to teach all subjects. In contrast to the elementary level, each subject in secondary level is taught by the teachers who are specialized to teach that subject.

The teaching profession generally manifests the characteristics of dignity and authority. The role of a teacher in school is similar to that of a parent at home. This role comprises authority and dignity in the oriental culture. The teachers not only have to teach students subject matter knowledge, they are also responsible for supporting the personal development of students, fostering the convention behavior of students, and educating students how to deal with people and affairs in the society.

Another characteristic of teaching profession is routinization. Teachers have to do

many routine chores at school in addition to their teaching. Many teachers stay at school during their empty periods to correct homework, tests, and teacher-parent communication booklets if needed. Some teachers prepare for the next class; some do student counseling; some read magazines and newspapers. If necessary, some even hold teacher-parent conferences. Some teachers also utilize their time to socialize or do recreational events, such as playing table tennis and badminton, or chatting at coffee time. Along with the job security condition, this comfortable working environment makes the teaching job an attractive profession. This also leads to the narrowing of the path to becoming a teaching profession. Candidates have to pass one competition after another in order to get a teaching job. In the following sessions, this article will describe the main features of how the competitive system of mathematics teacher education formed and how it operates now in Chinese Taipei (Taiwan), with a focus on national policies and institutions.

Development and Transformation of Teacher education

Teacher education in Taiwan is drastically influenced by the political, economic, and social contexts. Its historical development could be divided into three major periods.

Developmental Periods of Teacher Education and Its Transformation

The Initiation of Teacher Education

The initiation of Taiwan's teacher education began in the Japanese colonial period (1895-1945). The first formal institution with the function of teacher training was established in 1896, the *Kokugo Gakkou* (Japanese Language School).¹ The purpose of this school was to educate teachers and professional people for private and public sectors. It prepared teacher educators and elementary school principles and teachers in teaching a variety of subjects. At that time the school only educate Japanese to become teachers (Wu, 1983). And the main purpose of the education was to teach the Japanese language to the Taiwanese people and ultimately cultivating the Japanese disposition in the Taiwanese people. In 1899, three "normal schools" were established to educate Taiwanese teachers in teaching the various elementary school subjects, including arithmetic (Wu, 1983; p. 18). This marked the first time that Taiwan people had a chance to be educated as teachers and be equipped to teach mathematics in the formal teacher education system. For most of the colonial period, the teacher education system had two branches: those that specifically educated the Japanese people and those that specifically educated the Taiwanese people. It wasn't until the final four years of the

¹ In 1895, a predecessor named ShiZanGan GakuDou (Zhishanyan School) of the Kokugo Gakkou was established and recruited 21 Taiwanese to learn Japanese. Although the original purpose of this education was not to educate teachers, but 5 of them taught Japanese teachers to speak Taiwanese next year. This institution can be considered as an informal teacher education institution.

colonial period (1941~1945), that the segregation in the teacher education system was terminated (Wu, 1983; P. 65) . In addition to establishing the teacher education institutions, the Japanese government enacted the first official regulation of teacher education, “Official Regulation of Taiwan Governor-General Normal School” in 1899 (Lee, 1995; Wu, 1983).

In 1946, the second year after Taiwan Retrocession, a new page of Taiwan’s teacher education was written. The first institution educating high school teachers – The Provincial Taiwan Normal College – was established, which became the first college-level teacher education institution as well. In 1947, the Nationalist (KMT) government amended and enacted the Normal College Regulation, stipulating that the normal college should educate high school teachers. This was Taiwan’s first official regulation regarding high school teacher education (Cheng, 1998). The establishment of these teacher education institutions and the enactment of these regulations laid the foundation of the protectionist teacher education system for the next several decades. The protectionist system was an educational system mainly dominated by the national government and executed by normal colleges/schools.

The Rise and Decline of the Protectionist Teacher Education System

The rise and decline of the protectionist teacher education system was primarily influenced by the political, economic, and social contexts in Taiwan. The KMT government from Mainland China, venerating the Confucian tradition, emphasized education and believed it could affect the rise and fall of a nation. In addition, the KMT wanted to shatter the existing educational system, which had been designed to instill the idea of “Japanization” into people’s minds and to establish Japanese as an official language. In the colonial period, elementary schools taught Japanese, therefore the best way for the KMT to teach the Taiwanese to speak Mandarin and to side against the Japanization idea was to let them go to junior high schools in which they can study the “Chinese language” and become exposed to anti-communist ideas. The government could then promote the regenerated Taiwanese culture which included the Chinese culture combined with the Three Principles of the People (Chen, 1998).² These principles attach great importance on the massive people’s rights and livelihood, which against the educational thought that only the elites were suitable to study for the imperial examinations held by the imperial China at the dynastic period. In 1950, less than 32% of the elementary school graduates went to junior high or vocational schools, therefore the government, aside from promoting elementary school education, spent immense efforts encouraging high school education (Ministry of Education [MOE], 1976, p. 1668). Through years of continuous efforts, the government finally established a nine-year

² Three Principles of People is the ideological basis of the political program of the Chinese Nationalist leader Sun Yat-sen (1866–1925), including the principles of nationalism, democracy, and socialism (It is sometimes translated as “The People’s Welfare/Livelihood” or “Government for the People”).

compulsory education system in 1968, which gave people the right and obligation to receive nine years of free compulsory education. Because the success of an education system depends on its teachers, in 1955, President Chiang Kai-Shek, utilized the motto “Teachers First, Normal Education Foremost”, to greatly improve the quality of teachers (MOE, 1976, p. 565).

After enduring some bad times in the early days following the Taiwan Retrocession, Taiwan’s economy took off and continued to grow until the 1980s. During this period, the government believed that the quality of teachers could influence the thinking and inner quality of people, which in turn could influence the development of politics, economy, and the national defence of the country (Cao & Liang, 2002). Consequently, the government believed that after screening the pre-service teachers to the preparation institutions, all their preparation and benefits should be covered by the government as a protection to the stability of the teacher education system. Therefore, teachers should be educated at the government’s expense and be guaranteed job assignments, similar to civil servants. A student who could not enter the government appointed and funded teacher education institutions had hardly any chance to become a teacher. It was also true that in the time when economy was weak, the first few years after Taiwan Retrocession, a teacher education paid by government’s expense was a great way to attract talented people to work in education. For these reasons, the government ended up dominating and supporting the teacher education system in Taiwan for decades. Within this period, the government held the authority to determine which institutions could educate teachers, when to increase or decrease the number of teacher education institutions, the number of teachers being educated, and the locations of service by novice teachers. The primary features of Taiwan’s teacher education system during this period were protective, uniform and closed.

During this period, the government endeavored to expand and improve the qualities of teacher education institutions and improve the quality of these institutions. Between 1960 and 1967, the normal schools educating elementary teachers became junior colleges one by one and for more than 20 years elementary teachers were educated in this way. In 1987, a total of nine teachers’ junior colleges were elevated to teachers’ colleges. This raised the mandatory degree requirements for becoming an elementary level teacher. As for secondary teachers, the Taiwan Provincial Normal College was changed to the Taiwan Provincial Normal University in 1955 and thus, the first university-level teacher education institution was born. This institution is the now National Taiwan Normal University (MOE, 1996, p. 1089). Eventually, one university became insufficient in preparing enough high school teachers, so the government established two normal colleges in 1967 and 1971, also for the purpose of educating high school teachers. These two colleges were changed into universities in 1989. During this period of the protectionist teacher education system, there were three normal universities that educated high school teachers, and nine normal colleges that educated

elementary school teachers.

Throughout this period, in order to attract talented students to the teaching career and to avoid a shortage of teachers in schools, the government provided an excellent package of incentives. Before 1994, the incentives included: (1) Free tuition, free accommodation, and subsidies for books and clothing for pre-service teachers; (2) Automatic certification to be a qualified teacher upon graduation; (3) Guaranteed job assignments by the government upon graduation. (4) The obligation to teach for a minimum of 5 years (including one year paid practicum) in return for a tuition-free teacher preparation education. If the graduates wanted to change from a teaching career to other professions, they had to pay back the full amount of the tuition, accommodation, and subsidy to the government. (5) Generous remuneration and benefits for a long life. The benefits include salary, comprehensive health insurance, summer and winter vacations, and retirement, all of which were intended to retain school teachers by taking care of their needs throughout their entire lives. The goal of the entire process from recruitment, to training, and to retention was aimed at pursuing the recruitment of talented high school students into teaching, and then retaining these teachers in the teaching profession (Fwu & Wang, 2002).

From the 1960s to the 1980s, Taiwan's economy improved rapidly, along with the people's living standards. As a result, teachers' salaries were greatly increased. In the 1980s, the protectionist teacher education system did not match the prevalent ideas of a free society and a free economy. In the late 1980s, about ten years after the death of President Chiang Kai-Shek, there were many political changes in Taiwan: later presidents gradually improved Taiwan's infrastructure, lifted the Martial Law, and officially terminated the "Period of Communist Rebellion". Multi-party politics took shape, the people's ways of thinking were liberated, and the legislative system was strengthened. These situations repeatedly shocked the protective, uniform and closed teacher education system. In the early 1990s, the economy began to slump, one consequence is that the number of college graduates more seriously overtook the number of available jobs than they did previous years. This reason along with the prevalent idea of free society raised the voice of opening accesses to teacher education from some scholars and educational communities, giving all universities an opportunity to educate teachers. This tide finally crushed the decades-old protectionist teacher education system.

The Rise of Competitive Teacher Education System

As a consequence of the pressure on opening access to teacher preparation, in 1994, the government enacted the Teacher Education Act (TEA), which opened multiple means towards teacher education. This act is a milestone in the history of teacher education in Taiwan. Compared to the old protectionist teacher education system, the reformed TEA made changes in recruitment, training, and employment, as follows. (1) All 4-year universities or colleges were allowed to run teacher education for k-12 teachers as long as they met the requirements for applying to be a teacher education

institution. (2) Free-tuition was eliminated from teacher education except for those who would be working in remote areas. (3) A graduate from teacher education universities/colleges was not certified as a qualified teacher until he/she passed the Teacher Qualification Assessment (TQA).³ (4) The government was no longer responsible for job assignments for teachers. A qualified teacher has to apply for a teaching job through the process of an on-site screening and selection in a school-based or city/county government-based context. (5) There was no requirement at all for minimum service except for a small pool of pre-service teachers receiving free tuition.

The retention policy for teachers, on the other hand, remained unchanged; teachers still enjoyed favorable remuneration and benefits. For instance, although teachers have a 2-month summer vacation and a 21-day winter vacation, they are still paid a salary for the entire year. Furthermore, they are given an additional 1.5 months new-year-bonus and a 1 month of “the merit-of-professional-performance” bonus every year. Teachers in elementary and junior high schools are exempted from income taxes as a reward for teaching in compulsory education levels. Besides, the salary promotion remained to base on teaching years attached to the individual. Teachers also enjoy partially-government-funded Civil Servant & Teacher Insurance, which includes disability, endowment, death, family dependents’ funerals, and a munificent pension.

This new reform opened the entrances to teacher education but retained the liberal salary and benefits which made the teaching profession more accessible and attractive. In recent years, Taiwan’s economy has remained in a recession, and the decreasing number of newborns has resulted in fewer school-aged students. This has caused a lower demand for teachers, and therefore the government has limited and reduced the amount of places available to potential teachers, within each university. The competition to receive a teacher education has increased as a result of not only the benefits and advantages available to teachers, but also because of a lower necessity for new and additional teachers.

Reformation of Mathematics Teacher Education

Traditional approaches to teaching mathematics within schools have affected mathematics teacher education in Taiwan profoundly. Similar to other Eastern Asian countries, school education in Taiwan is focused heavily on helping students to achieve high rankings in entrance examinations, which will allow them to advance to the next level of education. The traditional teachings of mathematics were dominated by formal mathematical content and the narrative way of teaching. The junior high school mathematics textbooks before 2001, and the elementary school textbooks before 1996, were standardized in Taiwan. That is, the textbooks for all students of the same grade

³ The full name for “Teacher Qualification Assessment” is “Teacher Qualification Assessment from Kindergarten to Senior High School.”

are the same. The questions in senior high school entrance examinations were also formulated according to the standardized textbooks.

In 1997, a new national standardized junior high school mathematics textbook was put into practice. In view of the fact that students in Taiwan generally disliked the subject of mathematics the most, and that often even those with high grades also disliked mathematics, the authors of the textbook believed mathematics education has not kept up with the changing society and needed a radical transformation. They permeated some open views in mathematics education into the nationally standardized version textbook – the one according to which entrance examination questions were formulated. Thus, they worked at infusing cartoons and mathematical learning activities into the textbooks. These changes centered on students; the links between mathematics and life; the cultivation of students' creativity, thinking, as well as reasoning abilities; and on an active attitude towards learning mathematics and appreciating mathematics (Hsieh, 1997). The authors also raised the idea that a further purpose which this textbook reform could serve was to have their application throughout the country to create a widespread teacher education amongst in-service and pre-service teachers. This is because that the questions of the entrance examinations were formulated from the textbooks, the teacher educators usually included the textbooks in their teaching materials. Therefore, the textbook reform immediately affected in-service mathematics teachers, and changed the content of the education of pre-service high school mathematics teachers.

There was a big change in elementary mathematics teacher education in 1996. Since then, elementary mathematics textbooks have been edited by private publishers and reviewed by the government. It was a time when the thinking of constructivism was vogue in Taiwan, and the writers of textbooks, affected by such thinking, put many student-methods into the textbooks. Although this constructivism movement was later on being criticized by the society, and was considered not successful, but as a result, in-service and pre-service mathematics teachers began to deeply consider the way students think, shifting the view towards teaching from teacher-centered to student-oriented. Moreover, beginning in the 1980s, researches in mathematics education were initiated and promoted by Dr. Fou-Lai Lin. These researchers in mathematics education – the very educators of teachers in this country – gradually began to investigate mathematics teaching through research and literature studies instead of only through their own experience. As a product of these occurrences, mathematics teacher education in Taiwan moved towards a new realm, combining practical experience with mathematics education research.

Teachers' Career and their Teacher Education

The General Situation of Teacher Levels

There are two types of teachers in Taiwan who teach children ranging from ages 6~17 years old, and they are secondary school teachers and elementary school teachers. Secondary school teachers teach in either junior high or senior high schools, which include students from the 7th~9th grades or the 10th~12th grades, respectively; collectively, this means they teach youth from the age of 12~17. Most of them teach within a single stage (either junior or senior high school) and a single subject, such as Chinese, English, Mathematics, History, Biology, Computer, Home Economics, and so on.

Elementary school teachers teach in elementary schools, educating students of the 1st to 6th grades, or ages of 6~11 years old. These teachers teach and thus are prepared for teaching all subjects as generalists, and are prepared for teaching at any grade level. Therefore, teacher preparation institutions require a broad array of subject areas, such as language arts, social science, mathematics, natural sciences, music, arts, and crafts.

Although junior high and senior high school teachers are prepared together, junior high along with elementary schools are classified as compulsory education while senior high schools are not. In other words, compulsory education is singled out in accordance to the grade levels, but teacher education is stratified in the light of subject specialty or comprehensiveness in preparation stages. In the school year of 2007-2008, there were about 96 thousands of elementary school teachers (see Table 1), and among them, 99% were employed by public schools and only 1.00% taught in private schools. In the same year, there were 78 thousands of high school teachers and 85% of them served as public school teachers. In terms of the compulsory education, 143 thousands of teachers were employed to teach within compulsory years, and a low percentage, as low as less than 1% of teachers served in private schools. In contrast, a relatively high percentage, 37%, of teachers served in private schools for the non-compulsory stage. Schooling is mainly a public sector activity in Taiwan. Although the private school teachers have to follow the government's regulations in education and policies, they only receive a minimal funding from the government. The public school teachers, military personnel, and civil servants are called "Military-Civil Servant-Teacher" as a group, and are employed and paid by the government, receiving a stable income and good benefits (Executive Yuan, 2005). The private sector schools enjoy the autonomy of employment while offering salaries and benefits in the light of public sector schools.

Table 1

The proportions of teachers are employed in public and private schools (school year 2007-2008)

	Public schools		Private Schools		Total
	Number	%	Number	%	
Taiwan	162,329	92.79	12,609	7.21	174,938
Preparation levels					
Elementary	96,142	99.00	974	1.00	97,116
High	66,187	85.05	11,635	14.95	77,822
Junior	46,437	99.62	177	0.38	46,614
Senior	19,750	63.29	11,458	36.71	31,208
Whether Compulsory					
Compulsory	142,579	99.20	1,151	0.80	143,730
Elementary	96,142	99.00	974	1.00	97,116
Junior High	46,437	99.62	177	0.38	46,614
Non- Compulsory					
Senior High	19,750	63.29	11,458	36.71	31,208

Teacher Salaries and Benefits

Concerning income, a beginning teacher's monthly salary is 40,690 NT dollars (equivalent to about 2300 USD, converted using PPPs for GDP)⁴. It is much higher than the 28,817 NT dollars (equivalent to about 1600 USD, converted using PPPs for GDP)⁵ which the rest of the full-time employees from other industries receive on average. If a teacher's rank of salary is constantly raised over a period of twenty-four years, the final salary could reach up to 71,235 NT dollars (equivalent to about 4000 USD, converted PPPs for GDP). If a teacher has a Master or Doctorate degree, his or her salary is about 6,000 NT dollars (equivalent to 300 USD, converted using PPPs for GDP) to 10,000 NT dollars (equivalent to about 500 USD, converted using PPPs for GDP), more than that of those who do not have a Master or Doctorate degree. As for raising the rank of salaries, as long as a teacher gains a grade of B or higher on his/her year-end evaluation, which almost all teachers do, his/her salary will be raised by one rank the following year. In general, teachers are able to receive a grade above B unless they commit specific errors.⁶

⁴ According to The World Factbook, new Taiwan dollars per US dollar is 32.19 and GDP (purchasing power parity)/ GDP (official exchange rate) is 1.86 in 2006

⁵ According to the data given out by the Directorate-General of Budget, Accounting and Statics, Executive Yuan, R.O.C. , in 2007 the average salary of employees with full time payroll is 28,817 NT dollars (equivalent to about 1627.68 US dollars, converted PPPs for GDP).

⁶ The Civil Servant Performance Rating Measures Act, Article 7.

Regarding benefits, teachers enjoy a marriage subsidization (salary of two months), a birth allowance (salary of two months), a funeral subsidization (salary of three to five months), children education subsidy,⁷ health check-up grants, and parental leave. Teachers also enjoy an excellent pension upon retirement, which was almost the same or higher than the amount they would receive if they were still on the job before 2007. However, a reform of reducing the pension was implemented starting in 2007, which limited the percentage of pension to salary on the job to be at most 95%. At present, the percentage is from 85% to 95% depending on the teaching years. As a result, the pension is not too much less than the last year salary.

Furthermore, a teacher has excellent job security and dismissal from a job rarely occurs. This is due to the protection by the rule of the government and also to the courtesy established between relationships and kindness, valued in traditional Chinese culture. According article 14 of the Teachers' Act (2006), a teacher may not be dismissed, suspended, or denied a renewed employment after being employed unless the following situations of incompetent teaching occur: being sentenced to a prison term for more than one year; being convicted of corruption and malfeasance; being deprived of civil rights, with the rights thereof not yet been reinstated; being issued an interdiction, with the interdiction thereof not yet been revoked; having behaved inappropriately and therefore impaired the teacher's morals and dignity; or being proven to have a mental disorder by a qualified physician. Though the Teachers' Act regulates a set of possible dismissal reasons, public school teachers are generally not dismissed for disciplinary reasons or underperformance. When a case of suspended incompetent teaching occurs, the members in the "Teacher Evaluation Committee" for each school, due to sentiments, take the loosest standard in judging the case. Therefore, in general, dismissals of teachers from teaching position are only possible in extraordinary circumstances and rarely occur in Taiwan. Teachers are employed with an automatically renewable contract of a typical duration of two to four years, regardless of their performance.

Teachers' Social Status

In the aspect of social impression, the job satisfaction of secondary and elementary school teachers in Taiwan is the highest amongst all kinds of careers, especially since teaching provides relative advantages in terms of professional knowledge, morality evaluation, stability, and routinization (Huang, 2002). Besides, the professional prestige and socio-economic status of secondary and elementary school teachers are high, similar to those of directors and professionals (Huang, 2003). Teachers who have devoted to the job of education, which is regarded as a job filled with academic

⁷ According to Key Points in Paying Government Military Personnel, Employees and Teachers. Each child has the maximum grant for 35,800 NT dollars (equivalent to about 2022.11 US dollars, converted PPPs for GDP) each semester.

knowledge, bring an academic impression into society. Moreover, the strong belief in respecting teachers and truth within the Chinese culture also brings a higher social status to teachers. The thought, “teachers, first in status, and then in career,” attracts many people who find ideals to devote their life to this career, which is full of honor. Additionally, teachers receive higher pay and have a long summer vacation of two months and a winter vacation of three weeks. This is also a factor which attracts many people seeking a stable life to devote themselves to the teaching career.

Challenges Faced by Aspiring Teachers

Even though the career of a teacher is a desirable one, aspirants still have to face and overcome many challenges. Because of school system policies in Taiwan and the teaching-hours-regulation, teachers often have to face the challenges of large classes,⁸ students with diversity abilities in a class,⁹ long school hours,¹⁰ students with low learning motivation,¹¹ etc. In addition, the high status of teachers in the traditional culture has slowly begun to erode as society has taken steps in becoming more open. Beliefs such as “Teacher for a day, Mentor for life” or “Heaven, Earth, King, Parents, Teachers (*tian, di, jun, qin, shi*)” all reflect the high authority of teachers, but these images are slowly becoming less prominent. Many parents of students have more requests and questions, while many students have stronger autonomy and are brave enough to challenge the authority of teachers. Aside from the previously mentioned challenges, junior high school teachers also have to face the pressures of the national common entrance examination, which students are required to take before entering senior high school. Teachers in Taiwan often consider the grades of these examinations as their responsibility, so aside from feeling the examination pressures, they also feel the necessity to devote extra time in helping students make preparations. Although elementary school teachers do not have to face pressures when their students advance into the next level of education, they have to face the challenges of an intensive teaching load. About half of the elementary schools have fewer than or equal to 12 classes, 48.76% in 2007, meaning that there are only two classes per grade for each of the six grades, in this case, each teacher is forced to teach many subjects. Besides, each class

⁸ The average number of classes in elementary schools was 28.5 and 34.2 in junior high schools, during the school year 2007 in Taiwan.

⁹ Regulations for Organizing Normal Classes Grouping and Learning Groups at Elementary/Junior High Schools, Article 4.

¹⁰ Most of the elementary and secondary school teachers must go to school before 7:00 A.M. and leave school after 5:00 P.M.; they often need to communicate with students’ parents or to deal with student’s situations.

¹¹ According to the survey results of TIMSS2007, the attitude of 4th graders learning math (learning interest) in Taiwan ranks last place amongst thirty-six countries; the attitude of 8th graders is ranked thirty-nine amongst forty-nine countries.

has more than 28 students and only be equipped with 1.64 teachers in average.¹² Moreover, elementary school teachers need to teach more subjects than secondary school teachers and, as a result, it is hard for elementary teachers to master and have enthusiasm in teaching all subjects. Due to the decreasing amount of new entrants to elementary schools, the surplus of teachers in a school is a common occurrence. In such a case, the latest teachers to enter the school are forced to move from their present school to another school. This means that teachers are facing a situation in which they have to leave a familiar school, or even worse in an extraordinary situation, leave their home.

The Narrow Entrance – Screening and Selection of Teachers

Despite these working conditions, compared to other jobs, teaching still provides a very attractive career in terms of income, working hours, career development opportunities, and job security. Because of this, many graduates dream of getting a teaching career, but just how does one become an official teacher—a government officially approved, qualified teacher who get a fulltime teaching job in a public or private school?¹³ The TEA enacted in 1994 released government's obligation to assign pre-service teachers to schools. Therefore, the MOE (2005a) requires that schools at all levels should hold public screenings and selections in accordance with laws and regulations when employing official teachers. They can also screen and select substitute teachers when necessary. The screening and selection for official teachers should be implemented through written tests, oral tests, teaching demonstrations, and on-site performance tests. Applicants are assessed through a combination of more than two of the above methods. In contrast to employ official teachers, elementary and secondary schools may employ substitute teachers through a public screening and selection process, but schools can also employ substitute teachers directly without any public screening process. The first public screening and selection was held in 1997, and from then on, more have been conducted each year.

At present, there are two ways to screen and select official junior high and elementary school teachers. The main method is the joint screening and selection held by the department of education of each city's/county's government and entrusted by junior high schools. Most schools fill up the vacancies of teaching positions through this kind of joint annual screening and selection process. Other schools hold screenings and selections by themselves because of some extraordinary situations, for example, if they need to fill up vacancies of teaching positions and the joint screening dates have passed. Regarding the joint screening and selection, the department of education of the

¹² This number is calculated from the data in the data set provided by MOE (MOE, 2009).

¹³ Usually once a teacher is employed by a school, he/she will be able to renew the employment contract every two to four years automatically without going through a firmed evaluation process. Therefore, the teacher status is similar to a tenure employment.

city/county government, according to the different levels of schools, sets up a committee which is composed of staff members from related schools. The committee formulates the details of screening, such as the qualification of applicants, the method of testing, the number of teachers to be employed, and the time of testing, etc. One school may take the responsibility for administrative work and provide the place for screening. For the schools that hold screening by themselves instead of participating in the joint screening, the recruitment committee of each school will implement the screening process. Although the screening method is decided by the recruitment committees of each school or the local government, the details are roughly the same, and sketched briefly as follows.

Generally, the screening and selection of teachers after they have received their teaching credentials occurs in two rounds. The first round is through written tests to assess the applicants' education professional knowledge and/or subject matter knowledge. The screening and selection of some districts also include English as a testing subject. Mostly, the examination questions are made up by professors in universities. Two to five times of the quota allowed in admitting applicants, which usually only contains low percent of applicants, will be selected to move on to the second round of the examination, which assess applicants through teaching demonstration and personal interview, evaluated by usually three to five judges. The judges for the teaching demonstration are mainly school teachers, while one school principal or director of school divisions is often included. Occasionally, a university faculty may be included as an expert from the outside system. Those judging the personal interviews are mainly administrative staff, such as elementary/junior high school principals or directors of school divisions. The duration of the teaching demonstration is generally around twenty to twenty-five minutes. Some screenings include oral tests within this duration, while some do not. If an oral test is included, it usually is held after a ten to fifteen minutes of actual teaching, the judges will then ask the applicant subject matter questions related to his/her teaching. The topic of teaching is drawn by the applicant twenty minutes before the teaching demonstration, and the applicant could use these twenty minutes to prepare. For the junior high level, the teaching topic is of the subject the applicant specifically teaches, for instance, a mathematics teacher would teach a topic on mathematics. For the elementary level, the applicants are mainly asked to teach Chinese and Mathematics. The personal interview in the second round generally around takes ten to fifteen minutes. During this time, the applicants would be asked questions about educational background, experiences, ideas of education, classroom management, knowledge and ability of teaching, ability to express, looks and behaviors, and administrative management, etc. For joint screening and selection, there is still a last phase of the process – job placement. The applicants who passed two rounds of the screening would be able to choose a school in which they want to teach, starting with the applicant with the highest grade in the second round and continuing in order.

There is a huge competition in the screening and selection for official teaching positions. It is not held only for pre-service teachers, but for all the in-service teachers who want to change schools. Take the screening and selection of 2007 as an example, for the elementary level, the total success rate of all the screening and selection tests held across the country was 3.9%; that of the junior high teachers was 16.18%. The exact rate especially for junior high mathematics teachers was not available, but can be estimated to be 15%.¹⁴ These rates are very low, but the data includes those in-service teachers who wanted to change school as well. Regarding to the employment rate of the pre-service teachers, the government only announced the data of schools below the secondary level, but no split data for elementary or junior high levels. For the year of 2007, 18.1% (i.e., 2,379) out of 13,136 pre-service teachers who received credentials acquired an official teaching job, 17.6% (i.e., 2,305) became substitute teachers, while others (64.3%, 8452) became reserve teachers (MOE, 2007a, p. 129). These reserve teachers who do not gain a teaching job are generally called “wandering teachers” in Taiwan.

In short, before the implementation of the teacher education system regulated by TEA in 1994, Taiwan’s teacher education was a career-based system; the appointment of teacher education was a commitment to lifelong employment made before the beginners received any training. In contrast, after the reformed system carried out, the appointment of teacher education is usually not a commitment to lifelong employment. But once when a teacher gets an official teaching job, it is usually a commitment of lifelong employment. Although Taiwan’s teacher employment holds more features of the career-based model, but at the entering teaching position point, it has a feature of the position-based model, selecting the best-suited candidate for teaching positions.

The Structure of Pre-Service Teacher Education

To become eligible to attend the screening and selection tests for a teaching position, pre-service teachers have to pass through a series of educational processes. There are four levels of teacher education programs in Taiwan. Independently, they prepare teachers for early childhood education, elementary school, secondary school and special education. All teacher education institutions are universities, and they will be called teacher education universities from here on.

In regards to the route of preparation, the teacher education program is an additional program of the bachelor degree. Pre-service teachers must obtain a bachelor’s degree, complete the pre-service teacher education curriculum, and finish the educational practicum before they can participate in the teacher qualification assessment. Since the first two requirements are provided to students simultaneously,

¹⁴ Yearbook of Teachers Education Statistic, 2007, p. 233, 237, 248. The enrollment rate of the junior high mathematics teachers was approximated from the data in this yearbook.

Taiwan's programs type is concurrent. The preparation process includes two phases: taking the pre-service teacher education curriculums and attending educational practicum. The teacher education curriculum together with the practicum constitutes the teacher education program.

Before the reform of 1994, once when a student received a Bachelor's degree from the normal universities or colleges, he/she was awarded a certification of teaching. But after the reform, the completion of the teacher education program does not earn any degree. Instead, in order to be regarded as completing a teacher education coursework, one has to at least gain a Bachelor's degree before or at the same time of the completion of his/her teacher education coursework (teacher education curriculum). The requirement set the standard of the teachers to a level of having university degrees or higher. Usually, future teachers spend four years to complete the requirements for a bachelor's degree and meanwhile finish the required teacher education curriculum, and then they will need to spend another half year to complete the educational practicum. The pre-service teacher education curricula are established by the universities or colleges, which are approved by the MOE. The educational practicum takes place in elementary and secondary schools, but both the teacher education universities and the schools take the responsibility for the supervision of intern teachers. There are also students in masters or Ph. D. programs entering the teacher education programs, but they take the pre-service teacher education curriculum with undergraduates. Therefore, there are no consecutive teacher education programs in Taiwan. The government of Taiwan has decreed the kinds of learning experiences and opportunities teacher education programs must provide, what levels of students they can enroll, etc. Furthermore, the teacher education programs established by teacher education universities are required to be examined and verified by the government so that the types of teacher education programs are all consistent within the same level.

In terms of the number of universities and pre-service teachers, in 2007, there were 59 universities that had government's permission to enroll new students into secondary and elementary teacher education programs. Among them, 48 universities were allowed to enroll new pre-service teachers for the secondary level, and 23 were allowed to enroll new pre-service teachers for the elementary level. The maximum quotas allowed by the government for each level were 5,249 for secondary pre-service teachers and 2,981 for elementary ones.

In actual fact, according to the investigation made by Taiwan TEDS-M team, there were 30 universities preparing secondary mathematics pre-service teachers in 2007, and 398 intern teachers in total. Among the universities, twenty one of them prepared no more than 10 intern teachers each, six of them prepared 11~20 intern teachers, and the other three prepared 61~80 intern teachers. During the same year, there were 30 universities preparing a total of 3930 elementary level intern teachers. These intern teachers were allowed to teach most school subjects including mathematics. Among

them, there were five universities, each of which prepared no more than ten intern teachers, five universities prepared 11~20 interns, five prepared 21~30 interns, four prepared 31~60 interns, two prepared 71~100, and nine prepared 201~400 interns. For the elementary level, some intern teachers would drop from the practicum because of the few vacancies. Therefore, the numbers of intern teachers who finish the educational practicum would be smaller.

Teacher Education System and Institution

Current Teacher Education System

The current pre-service teacher education (TE) system in Taiwan is regulated by the Teacher Education Act (TEA) and the Teacher Education Act Enforcement Rules (TEAER), which were enacted in 1994, 1995 and last¹⁵ amended in 2005, 2003, respectively. There are other rules that regulate the establishment and evaluation of related units, such as TE centers, of the system¹⁶. These regulations establish targets, institutions, curricula, and related contents of the TE system in Taiwan. To establish the most important act for teacher preparation, the Teacher Education Act, the MOE entrusts experts and scholars in academia to research, plan, and make a proposal. This proposal is then passed by the Legislative Yuan, signed by the President and enforced by the Executive Yuan. According to the regulations, it is necessary for Taiwan to train four levels of teachers: secondary school, elementary school, kindergarten, and special education teachers. The education institutes include (1) normal education schools,¹⁷ (2) universities with TE affiliated departments (majors), and (3) universities with TE centers. These institutions are all universities, thus, they will be called TE universities in the following paragraphs.

The MOE expected to have many universities apply for the establishment of TE centers and programs after enacting the TEA, and therefore, there should be a fair, objective, and high quality evaluation system to control the quality of the centers or programs, ultimately, to assure the teachers' quality. To reach this goal, an objective and professional committee should be established (MOE, 1995). Therefore, in 1995, one year after the TEA enacted, the TEAER was enacted and required the MOE to establish a

¹⁵ Before the article was written in 2009.

¹⁶ Other major rules that regulate the TE systems include: (1) MOE's Regulations Governing Teacher Education Certification Committee, (2) Regulations of Teacher Center Establishment in University, (3) Regulations Governing Teacher Qualification Certification from Kindergarten to Senior High School, (4) Key Points in Teacher Qualification Verifying Committee, (5) The Operative Principles of Educational Practicum for Teacher Education Universities, (6) Guidelines of Screening and Selection for Teachers in Public Schools, (7) The Operative Key Points of Evaluations of Teacher Education at Universities.

¹⁷ These schools are in a rapid reform. Now there are two kinds of them, one is "normal universities" that mainly educate secondary level pre-service teachers; the other is "universities of education" that mainly educate elementary level pre-service teachers.

committee to evaluate and deliberate the teacher education affairs. In the same year, the Teacher Education Review Committee (TERC, *shi zi pei yu shen yi wei yuan hui*) was established to conduct TE issues. Later on, in 2002, the regulation for establishing the TERC was raised one statutory level, being included in the amended TEA in 2002. One year later, the most recent regulations governing the TERC called “MOE’s Regulations Governing the TERC” (2003) were enacted.

According to the “MOE’s Regulations Governing the TERC” (2003), the committee should be formed with experts called together by the MOE and there should be 21-27 members.¹⁸ Currently in 2008, there are 14 professors from TE universities, 6 MOE officers, 4 high school principals, 2 teacher representatives, and one Executive Yuan officer in the TERC.¹⁹ Their mission includes (1) recommendations and consultation regarding TE policy, (2) reviewing the planning of, and important development projects in TE, (3) reviewing the establishment, recognition, changes, terminates, and evaluation of TE universities, and (4) reviewing TE courses. To describe these missions concretely, the committee not only supports the planning of TE policies by the MOE, it also determines whether a university can institute a TE center, whether a department (major) in a university is qualified to be affiliated with TE, whether normal universities/colleges can be classified as universities,²⁰ how TE universities can maintain the qualifications of educating teachers, whether the TE program of each TE university can be approved by the MOE, and so on. To sum up, the Taiwan government gives the TERC two important functions in the TE system. One is the quality control of the TE institutes, and the other is the planning, execution, and control of the TE curriculum.

The Teacher Education University

The TEA overturned the traditional TE system and it took away the indispensability of the normal universities/colleges. Prior to the innovation, those who wanted to become teachers had to attend normal universities/colleges, except for a very small amount of educational departments (majors) that were allowed to provide teacher education in the comprehensive universities. The requirements of the top normal universities were usually high, and students who gained admittance were often in the top percentiles academically in their age group. However, the TEA opened up more channels for teacher education. More universities set up TE programs, and normal universities/colleges no longer had a monopoly. The MOE (2006b) actively encouraged normal universities/colleges to cooperate or merge with universities. Three normal

¹⁸ In the predecessor enacted in 1995, entitled “the MOE’s Key Points Governing the TERC” regulated 19~23 committee members for TERC.

¹⁹ The member list is based on the 67th meeting record of the Teacher Education Certification Committee in 2008.

²⁰ This function is no longer in action from 2005 on when all normal colleges were upgraded to universities.

colleges that trained elementary teachers pioneered in the cooperation. They either merged with other universities, or set up some non-teacher-education-affiliated departments or schools and became universities that provided TE majors. Six other normal colleges that trained elementary teachers also changed their names to “universities of education (UOE)” in 2005, and they are still working toward the transformation to comprehensive universities. In 2008, one of the UOE merged with another university and became a comprehensive university with TE departments. Moreover, three normal universities that train high school teachers are gradually setting up non-teacher-education-affiliated programs. In general, normal universities that train junior high teachers are in the process of transforming to comprehensive universities.

On the other hand, comprehensive universities were allowed to establish TE centers after 1994. These universities must apply to the MOE and be approved by the TERC in order to establish a TE center. The requirements for the establishment are plainly regulated by the law, Regulations of Teacher Center Establishment in University (1995), which determines the number of teaching staff, library facilities, and the curriculum of TE programs. The requirements for teaching staff are five or more specialized academics who excel in the subjects they are teaching; they are usually the instructors of the education professional curriculum. Libraries must be equipped with at least one thousand education libraries and more than twenty subscriptions to professional education periodicals. The regulations of the curriculum of the TE programs differ according to the levels of schooling.

To sum up, currently, there are three kinds of TE universities that prepare secondary or elementary school teachers in Taiwan: (1) normal universities/UOE; these universities prepare more teachers. Three normal universities mainly prepare secondary level teachers and nine UOE mainly prepare elementary teachers; (2) universities with TE affiliated departments (majors); (3) universities with TE centers. Some of the universities prepare both secondary and elementary level teachers while others prepare only one level. Some of the universities act as multiple kinds of TE universities, for example, having TE centers and TE affiliated departments at the same time. No matter what, none of the universities offer only TE and related coursework, not even for those normal universities and universities of education which still keep the words “normal” and “education” in the name of their schools. Since the rapid reform of the TE system, the number of each kind of universities has varied year by year. In general, the number of TE universities is not regulated or limited. Universities who are interested in TE and meet the requirements described above are allowed to apply. Although any university can apply for TE, the MOE still can terminate the TE accreditation of these universities according to the result of their TE evaluation. The excess of certified teachers in the recent years had led to a reduction in the number of TE institutions. Although the MOE can utilize evaluations of TE programs as the basis for limiting the number of teachers or terminating TE programs, this is not the main purpose of their evaluations. The primary

purposes of the evaluations are to inspect and control the quality of pre-service teachers and to improve the effectiveness of TE.

Quality Assurance and Program Requirements

Evaluation of Teacher Education Programs

After the reforms of the teacher education system in 1994, many universities established teacher education programs. The next year, 22 universities established teacher education centers, and the trend continues over the years. It reached a peak in 2004, where 75 universities were training teachers at various levels in Taiwan. However, the regulations described above were not sufficient to ensure the quality of teacher education programs offered by these universities. In order to secure the quality of TE and prevent low-grade performance of teachers, the MOE has carried out evaluations of these universities. The evaluation is focused on the TE universities' inputs, curriculum, processes, and outcomes,

There were two phases to the implementation of TE evaluations. The first phase lasted from 1997 to 2004; the second phase started in 2005 and is still operating. During the first phase, the goal of the evaluation was to understand the progress of the TE universities in establishing the education curriculum. The evaluation included written evaluations and field visitations. There were five levels of evaluation results, and these were not disclosed to the public. These evaluations were used to assist in improvements of the TE universities; they were not used as evidence for the accreditation of their TE programs. Along with decreasing number of retiring teachers and decreasing birth rate, the demand for new teachers was declining as well, which resulted in a demand for fewer teachers. At the same time, the society demanded a higher standard of teacher professionalism. The public expected the government to supervise the TE effectively, to inspect strictly, and to establish a contributory pension system to the TE programs.²¹ (MOE, 2008a) Therefore, the TERC decided in 2005 to adjust the admission quota of pre-service teachers according to the regular evaluations of the TE centers. Starting in 2006, institutions that received a third level rating would have to stop admitting students. Those that received a second level rating would decrease student admissions by 20%, and those that received first level rating would retain the same admission quota. (MOE, 2006a, p. 204) The same principle also applied to normal universities/UOE that received evaluations for the first time in 2006, and it continues to be applied until the present day.²²

Currently, MOE (2007b) evaluations of TE universities fall into two categories;

²¹ If a university is required to terminate its TE programs, the MOE will set up rules for the university to guarantee the rights of the remaining students.

²² MOE news release, Evaluations of Teacher Education Centers of Universities, 2006, 2007.

evaluations of normal universities/UOE and universities with TE affiliated departments are done on an as-needed basis by the MOE. There is no set schedule for this category of evaluation. In contrast, evaluations of TE centers are conducted on a regular and prompt basis. The methods are primarily based on field visitations. Newly established TE institutions must be evaluated one year after establishment. After the initial evaluation, institutions are evaluated every four years. Institutions that do not receive first level ratings are required to be evaluated the following year. Issues being evaluated include distinguishing features, organization, selection and counseling of students, use of finance, quality of instructors, planning and execution of program and teaching, educational practicum and associated counseling, employment counseling, and promotion of in-service teachers' education.

In general, the process of TE evaluations includes three phases: preparation, evaluation, and conclusion. The duration of each phase ranges from a few months to half a year; altogether the process takes about one and a half years. Taking the year 2007 as an example, the preparation phase started in February. The National Academy for Educational Research Preparatory Office confirmed the universities that were to be evaluated and convened a preparation meeting to edit the evaluation guidelines for TE institutions according to the different level of schooling. In June, the list of evaluation committee members was proposed. The MOE then ratified the list and sent invitations to the nominated members. The evaluation phase started around July. During this phase, a meeting was called to explain the evaluation process to the universities; the universities also submitted status description forms to describe their current situations and distinguishable characteristics. An orientation was held in September for the evaluation committee members, and the field visitation to the various universities took place over a two-month period. At the end, the evaluation committees met to discuss the findings and mailed the final results and comments to each university. The conclusion phase took place between January and June of the next year. This was a period when universities could appeal to the committee regarding their results, followed by the editing and finalizing of the evaluation reports. Then the evaluation committee submitted its reports to TERC for review, and the MOE approved the final copies of the reports and published them. Finally, follow ups were done on universities receiving third level rating in June.

Among the evaluation processes, field visitation is the most crucial element of the TE evaluation. Generally, it takes one day to evaluate one level of schooling (i.e. one TE program) in one TE university. Again, using 2007 as an example, the field visitation process included eight parts: status presentation by the TE universities, looks up information and related documents, interviews with faculty and staff, interviews with students, field inspection of teaching, evaluation committee meetings, and comprehensive discussion of evaluators and university staffs. Through these processes, the evaluation committee uses various channels to understand the conditions of the

evaluated institutions.

The TE evaluations are usually conducted on the base of program level. This is because some TE universities are equipped with programs for different levels of schooling. Therefore, one TE university may receive different ratings regarding programs that prepare teachers for different levels of schooling. Regarding the effects of the evaluation, many TE universities, after receiving second level ratings, actively improve their program and achieve first level ratings. However, in past three years, six TE universities received third level ratings and have been disqualified from providing TE programs. Furthermore, starting from 2005, some institutions terminated their TE programs due to a lack of applicants which resulted from having too many TE programs and low employment rate of official teachers. Seventeen TE universities have terminated their TE programs completely and 9 have terminated some of their TE programs.

Entering Teacher Education Programs

There are clear requirements in every phase in the process from entering TE to becoming a certified teacher in Taiwan. The TEA (1994) regulates that admissions to a TE programs must be enrolled students in their second or higher year of university, or enrolled master students or doctoral students. They also have to pass the various program selection processes specific to their own TE institutes.²³ Although the law does not limit the number of admissions, in order to prevent the imbalance between supply and demand of teachers due to the surplus of teachers, the MOE moved to decrease the number of admissions of normal universities/UOE every year starting from 2004. The target was to decrease admissions by 50% in three years. (MOE, 2004) This policy restored the admission numbers back to the levels of those before the innovation. (MOE, 2008b, p. 337) This action forced the normal universities/ UOE, which allowed all students to take the TE programs before, to set up screening and selection processes to select qualified entrants from applications in order to decrease the number of admissions. Since the universities with TE centers had always had screening and selection policies, this movement rendered almost all TE universities employed screening and selection for the admission to the TE programs at both secondary and elementary levels.

The screening and selection criteria and processes for secondary and elementary TE programs are determined by each university. However, they share many common features. The MOE decides the number of admissions for each university according to the levels of schooling not the subjects that these students intend to teach. Therefore, the screening and selection for entering the TE programs is held according to the levels of schooling. No matter the level of schooling, among the students that are admitted by a TE university, students who want to become mathematics teachers vary in number

²³ Teacher Education Act, Article 9.

from all to none. This means that the TE universities cannot guarantee the number of students who will become mathematics teachers. This situation forces the TE universities to avoid subject-specific questions or requirements in the selection process except for the normal universities that have their mathematics departments prepare secondary pre-service mathematics teachers. For both of the secondary and elementary levels, the selection processes for the majority of the TE universities are open for students to apply. Students accomplishing the first year academic work in university are eligible to apply for a TE program. Each TE university has the autonomy to employ its own screening and selection contents, criteria and processes. Therefore, a variety of screening systems reflect the diversity of Taiwan's TE selection practices. Many TE universities for both secondary and elementary levels base their selection on applicants' grades in the first academic year, and they may support it with some tests such as general educational knowledge tests, language tests, attitude tests, or personality inventory, etc.²⁴ Some universities also take student character, moral conduct, and their extracurricular activities into account.

According to these selection standards, compared with other students in the same university, the students in the TE programs usually achieve a high standard in grades of the curriculum, maturity of personality development, and passion for education. However, these standards do not indicate whether there is a difference in students' mathematics competency, a required teaching subject in elementary and junior high schools. One way to investigate this question is by looking at the distribution of the majors of the TE students. At this point, the elementary and secondary cases should be treated separately. The elementary level TE students are prepared to teach a variety of subjects when they enter into the teaching field. Students with other majors such as a foreign language or social studies can also participate in the TE selection processes. As students who are admitted are from different majors, student capacity in mathematics is not uniform. Although it is not possible to determine whether these students have better or worse capacity in mathematics, it is reasonable to predict that, in average, they will have less capacity in mathematics in comparison to the students in the science fields of the same university.

On the other hand, secondary level TE students are prepared for teaching specific subjects when they go into the teaching field. Therefore, the majority of the students who intend to teach mathematics in junior high schools come from mathematics departments or science fields.²⁵ The grades of the first academic year include part of the grades from the mathematics courses they studied in the year. Since some of the TE universities take the first year grades into account in screening and selection of students

²⁴ According to Key Points in TE Selection Process from various TE university.

²⁵ In the year 2008, the graduating class in Taiwan who are becoming high school math teachers are 87% math majors, and 4% science field majors.

to TE programs, students who pass the TE selection process usually have higher capacities in mathematics than other students in the same university. In conclusion, there are no effective guidelines to compare the mathematics capacities in elementary and junior high education students with students in mathematics related majors. However, students who are admitted to the secondary school mathematics TE programs usually have better capacities in mathematics than other students at the same university.

Teacher Education Curriculum

The TEA prescribes that the curriculum of TE programs should comprise three parts: a General Curriculum, a Subject Matter Curriculum, and an Education Professional Curriculum. In addition, to be qualified for teaching, students must graduate from the university, complete the Educational Practicum, and pass the teacher qualification assessment.²⁶ Another thing that is worth mentioning is that, in an attempt to elevate the quality of teachers, the government (MOE, 2006c) is encouraging the universities to increase the ratio of master to non-master students in secondary and elementary teacher education programs. Also, the government is doing research to push TE from the undergraduate level to the master level.

According to TE related regulations, the General Curriculum in pre-service TE is defined as the common curriculum required for all students. The contents are not clearly defined in the regulations. Therefore, the majority of the TE universities accept the completion of a bachelor's degree as completing the General Curriculum. According to the Enforcement Rules of the University Act, students are required to earn 128 credits (semester units), obtain a bachelor's degree and to meet the requirements of a major-specific curriculum concurrently. Major-specific curricula are different in each university. However, universities usually allow students to take about 10-30 credits of elective courses from any major of their choice.

The Subject Matter Curriculum (SMC) is defined as the specific curriculum that aims at improving the TE students' strengths in subjects that they will teach in the future. The curriculum is proposed by the TE universities and then approved by the MOE. For future junior high mathematics teachers, the SMC consists of their university mathematics courses. The MOE (2002) sets the upper and lower limits of the subject matter credits according to principles of balance, flexibility, and uniformity. Take mathematics for example, the lower and upper limits are 30 and 40 credits respectively. Among these, 24 credits are required in six areas, including analysis, algebra, geometry, probability and statistics, general education in mathematics, and information. Each area requires at least 3 credits and electives require at least 6 credits. These are university level mathematics courses. For the elementary level, there is no regulated SMC due to the nature of interdisciplinary education.

²⁶ Teacher Education Act, Article 9 and 11.

The Education Professional Curriculum (EPC) in pre-service TE is designed according to the levels of schooling and aim at improving the TE students' educational competencies. The TE universities have to choose courses from a pool of various areas of courses set by the MOE (2003). Each university has autonomy in deciding which courses to choose in an area. According to the regulations set by the government for EPC to prepare junior high school teachers, the curriculums should include the following subjects: Foundation of Education Curriculum, General Pedagogy Curriculum, Materials and Methods of Teaching for mathematics, and Teaching Practice for mathematics. The required credits for these courses are 4, 6, 2, and 2 respectively, totaling 14 credits. In addition, each TE university has to plan and provide 12 elective credits. Thus, the complete required credits are 26 credits.

The EPC for preparing the elementary level teachers must include Basic Subject Matter Curriculum in Teaching, Foundation of Education Curriculum, General Pedagogy Curriculum, Materials and Methods of Teaching in three or four fields, Teaching Practice. The required credits are 10, 4, 6, 8, and 2 respectively, totaled up to 30 credits. In addition, each TE university will plan 10 elective credits. Thus, the complete required credits are 40 credits. In the Basic Course Curriculum in Teaching, there is a two-credit basic mathematics elective course available for the students. The contents provide an extended knowledge of elementary school mathematics.

Although the credits required described above seem large, there are some overlaps between the baccalaureate curriculum and the pre-service TE curriculum. For a junior high level TE student, if he/she majors in mathematics, the required credits for the baccalaureate curriculum (128 credits) usually includes the SMC in the pre-service TE curriculum. Thus, TE students only need 26 additional credits for the pre-service TE curriculum. A total of 154 credits will allow a TE student to meet the TE course requirements and graduate from the universities. If a student majors in education, then the 128 credits required for the major would include the EPC. Thus, the TE student only needs 30-48 credits of university level mathematics courses. Some of the mathematics course credits can be counted in the baccalaureate credits; these may lower the total credits a student needs to take. If a student majors in subjects other than mathematics and education, he or she will need to earn credits for both SMC and EPC. In this case, some students will utilize the elective credits in the baccalaureate curriculum to lower the credits needed in teacher education.

In the elementary level TE programs, if the TE students come from education colleges or TE colleges, or major in education, the 128 baccalaureate credits required for students usually include part of the EPC. At present, TE students in these institutions are required to take between 138-150 credits.²⁷ For students from other colleges, or in other

²⁷ According to the regulations of credits for receiving a bachelor degree including completing the TE curricula from all UOE.

majors, at least 40 credits of additional EPC should be added up to their 128 baccalaureate credits in order to meet the TE course requirements and graduate from the universities.

Both elementary level and junior high level TE students need to complete the pre-service TE curriculum before graduating from universities. The teacher education universities will then verify and award TE Certificates and/or Subject Matter Certificates. After TE students have received these certificates and qualified for university graduation, they can apply for the next stage in teacher education: enroll in Educational Practicum Curriculum.

The Educational Practicum

The Educational Practicum (EP) is designed to train pre-service teachers in teaching. According to TEAER, the content must include a teaching internship, “homeroom” teaching (general class affairs) supervision, administrative work practice, and study and training activities. Intern teachers need to be in schools on a full-time base for the duration of half a year at either elementary, junior or senior high schools according to which level they are educated to teach. The TEAER also requires the TE universities to establish their own regulations regarding the details of the EP and to carry it out. The regulations should include:

- (1) Principles for selecting EP schools and internship supervisors in these schools;
- (2) Internship supervision methods, number of students assigned to each internship supervisor from TE universities and from practicum schools, internship plan content, EP matters covered and methods employed in internship evaluations;
- (3) Number of hours students will spend teaching per week during the internship, their rights and obligations, and internship contracts; and
- (4) The way of handling unsatisfactory (failing) EP performance, etc. The TEAER also regulate that the EP performance evaluation will be conducted jointly by the TE university and the EP schools, with each contributing 50 percent of the score.

However, the details set by the TE universities are not the same. The EP schools cannot adjust their programs for intern teachers coming from different TE universities. The MOE (2005b) has thus determined a guideline for universities to follow. The guideline contains several significant regulations including:

- (1) A universal starting date of the EP;
- (2) Requiring TE universities to visit and counsel the EP schools, handle “back to university training activities” for intern teachers, edit EP counseling literatures for intern teachers, setting up hotlines and internet resources, etc;
- (3) Requiring EP schools to establish counseling groups to coordinate EP counseling plans and promotes practicum related works;

- (4) Requiring internship supervisors from TE universities to be members of the teaching faculty in the universities. In this way, doctoral and master students cannot teach intern teachers unless they have met the qualification to teach in universities;
- (5) Requiring that internship supervisors from schools to be qualified for teaching credentials and have more than 3 years of teaching experience. In this way, if school principals, directors, or administrators meet these conditions, they too can be internship supervisors.
- (6) Limiting the numbers of days off taken by the intern teachers,
- (7) Setting the ratio of practicum topics and evaluation criteria to be 40% teaching internship, 30% “homeroom” teaching (general class affairs), 20% administrative work practice, and 10% study and training activities.

Currently the counseling system in EP is intact and matches the above regulations in reality. Each EP school will have a team to counsel intern teachers under a systematic plan. Fifty percent of the intern teachers’ evaluations are scored by the internship supervisors, principals, directors of the EP schools; the other 50% are scored by internship supervisors from the universities, who usually visit an intern once to three times during his/her EP period.

Intern teachers understand that part of their grade is determined by the EP schools. Thus, before choosing an EP school, intern teachers usually research each school’s practice and counseling situations. They aim for schools that have less administrative work and more teaching works. When such school is available, intern teachers will probe the willingness of the school to accept intern teachers. If it fits for both parties, they will each commit to sign a contract for EP. Furthermore, some of the intern teachers will choose their home school as their first priority. In this way, they will be more familiar with the schools and may receive help from their former teachers to communicate with the schools’ administration systems; and it provides a more comfortable environment for their EP. The other way is that an intern teacher may pick a school for their practicum from a list of schools provided by the TE universities.

Young intern teachers with eagerness of teaching and proficient skills in using computers are usually welcomed by these schools. Generally, intern teachers find schools for their practicum quite easily. This is also due to the fact that the EP schools do not need to cover the EP costs, e.g., they do not need to pay the interns or the supervising teachers. Instead, interns have to pay a four-credit fee for their EP.

Entry to the Teaching Profession: Assuring the Teacher Qualification

After completing the EP with a passing grade and after the TE university approves the completion of pre-service TE curriculum, from the standpoint of a TE university, a

pre-service teacher is regarded as ready to start teaching in the field. Therefore, the TE university will issue a certificate of completion of pre-service TE.²⁸ Then, the pre-service teacher will take the Teacher Qualification Assessment; and the MOE will issue teaching credentials after passing. At this point they are officially qualified to teach in the field.²⁹ After becoming qualified teachers, pre-service teachers can participate in the on-site screening and selection for teaching positions in various locations.³⁰

From the planning by the MOE one can see that the country hopes for pre-service teachers to possess knowledge and competencies in many aspects after completing the TE programs. For mathematics teachers in the junior high and senior high school levels, this includes knowledge regarding mathematics specific courses, education professional knowledge, pedagogical mathematics knowledge and abilities. The aspect of mathematics specific courses is satisfied through the university level mathematics courses in the TE universities. It comprises the most important areas of mathematics, such as Analysis, Algebra, Geometry, Probability and Statistics, etc. At the same time, the professors demand that their non-mathematics major students achieve the same standards as those of mathematics majors because the courses are given by the mathematics departments. In the aspect of education professional knowledge, the satisfaction is determined by two standards: one is passing Basic Curriculum in Education and Method Curriculum in Education courses offered by TE universities, the other is passing the Teacher Qualification Assessment (TQA). The aspect of pedagogical mathematics knowledge and ability is determined by two standards: the first is passing the courses, Materials and Methods of Teaching for Mathematics, and Teaching Practice for Mathematics offered by TE universities. The second is completing the Educational Practicum, which is supervised by university professors, and secondary school teachers as well as principals to ensure pre-service teachers are competent.

The TQA is held once every year. It takes place two months after the students have finished the EP, which is at the end of March. This is a national common test; it is also the last step of the quality control of pre-service teachers. This test is developed by Teacher Qualification Verifying Committee of the MOE and an administrative work institution appointed by MOE (2005c). The Teacher Qualification Verifying Committee has 19-21 members with a vice minister of MOE as its leader. Other members include government officials, educational institution representatives, TE university representatives, administrative work institution representatives and teacher representatives. The assessment includes two general subjects and two professional subjects. The former are the Chinese Comprehension Test and the Educational Principle

²⁸ Teacher Education Act, Article 9.

²⁹ Regulations Governing Teacher Qualification Certification from Kindergarten to Senior High School, Article 8.

³⁰ Teacher Education Act, Article 14.

and System test. The latter are the Development and Adolescent and Counseling test, and the Curriculum and Teaching test. The latter is written differently for junior high and elementary levels. The total score for each subject is 100 points. The passing standards are (1) at least 60 points for the average of the four subjects, (2) no more than two subjects with scores less than 50 points, (3) no grades of zero.³¹ Students who pass the assessment will receive teacher certificates from the MOE and become qualified teachers. In the years of 2007 and 2008, administration of the assessments was conducted by The National Academy for Educational Research Preparatory Office. The passing rates were 67.9% and 75.6%, respectively.

Teacher Educator

The success or failure of school education is determined by the teachers' qualities. And the success or failure of TE is often determined by the qualities of teacher educators. There are two categories of teacher educators in Taiwan: the first category is university level teachers, the other is teachers of educational practicum or teaching practicum in schools. The General Curriculum and SMC of the pre-service TE curriculum is offered by universities. They are not designed especially for TE students. Instructors are all professors of related majors in universities. They usually do not separate their teaching for TE students and other university students. The EPC part of the pre-service TE curriculum is also offered by universities. The courses in this curriculum are all related to education. Instructors are usually professors with pedagogical experience and training. A few universities arrange their students to teach in the field schools at the time the students are taking the Mathematics Teaching Practicum course in this curriculum. Thus, the instructors need to be talented in teaching specific subjects, such as mathematics at the junior high level. The second category is composed of internship supervisors, directors and principals in the elementary or secondary schools at which the students practice. The school internship supervisors teach the students about subject teaching and homeroom operation. The directors, principals, and other administrative staffs teach students about administrative procedures. Generally, the instructors of EPC and supervisors of EP in the universities are faculty members of the TE centers and TE related colleges. Currently, most of them have doctoral degrees.

³¹ Regulations Governing Teacher Qualification Certification from Kindergarten to Senior High School, Article 8.

Resources of Teacher Education in Taiwan

Financing of Teacher Education

The TE programs are held in TE universities and schools with EP. After entering TE programs, aside from completing the programs, pre-service teachers have to graduate from universities too in order to gain teacher qualification. Pre-service teacher education curriculums and baccalaureate curriculums are to be taken in universities, while EP is executed in secondary schools or elementary schools. These schools have no funds as expenditures for intern teachers but TE universities do. So the funding for educating pre-service teachers can be divided into the expenditure for the TE profession, like TE centers, and the expenditure of organizations which are not concerned with TE, like the office of academic affairs and the department of mathematics. The first part is specifically for TE programs and its objectives are aimed towards funding the pre-service teachers to complete TE curriculums and EP; the other is generally for all students in the universities.

For the school year of 2007-2008, this research approximated the annual expenditure of TE universities for a regular university student by the expenditure of general organizations not specifically concerned with TE. Using a reasonable model to calculate, the annual expenditure of general organizations in TE universities was approximately 11,750 USD (USD equivalency converted using PPPs for GDP) per university student. Using the same model, this research approximated the annual expenditure of TE universities for a pre-service teacher by the expenditure of organizations concerning TE. Again by using a reasonable model, the annual expenditure of organizations concerning TE in TE universities was approximately 316 USD (USD equivalency converted using PPPs for GDP) per pre-service teacher. In total, the annual expenditure of TE universities on educating a pre-service teacher with a bachelor's degree was approximately 12,066 USD (USD equivalency converted using PPPs for GDP). Also see Table 2 and 3.

Table 2

Annual expenditure of organizations concerning teacher education in teacher education universities per pre-service teacher (school year 2007-2008)

	Expenditure on Teacher education	Pre-service teacher ^a	Average
NTW dollars	203,850,738	36,455	5592
US dollars	11,514,193	36,455	316

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

^a Including all future teacher of every school levels.

Table 3

Annual expenditure of teacher education universities per pre-service teacher (school year 2007-2008)

	Bachelor education			Teacher education	Total
	Expenditure	All student ^a	Average		
NTW dollars	157,132,979,011	755,332	208032	5592	213624
US dollars	8,875,412,723	755,332	11750	316	12066

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

^a Not including future teacher in educational practicum.

In terms of the cumulative expenditure of TE universities per pre-service teacher, teacher preparation contains two parts which are the bachelor's degree and the TE program. The first one is for 4 years and the other should be approximated at 3.5 years, due to the fact that university students are allowed to enter a TE program during sophomore year; so the remained 3 college years plus a half year of EP makes 3.5 years. Using a reasonable model to calculate, the cumulative expenditure of TE universities on educating a pre-service teacher with a bachelor's degree was approximately 48107 USD (USD equivalency converted using PPPs for GDP). Also see Table 4 & 5.

Table 4

Cumulative expenditure of organizations concerning in teacher education of teacher education universities per pre-service teacher over the average duration of teacher education studies (school year 2007-2008)

	Expenditure (per year)	Duration (year)	Total
TW dollars	5592	3.5	19571
US dollars	316	3.5	1105

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

Table 5

Cumulative expenditure of teacher education universities per pre-service teacher over the average duration of teacher education studies (school year 2007-2008)

	Bachelor education			Teacher education	Total
	Expenditure (per year)	Duration (year)	Total		
NTW dollars	208032	4	832127	19571	851698
US dollars	11750	4	47001	1105	48107

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

The source of the expenditure of TE universities is the same as other universities. Mainly, they come from government subsidy, tuition and schooling, fund-raising and contributions, cooperative education, and site renting. The results of the TE evaluation affect the government subsidy. In the school year of 2007-2008, the proportion of current expenditure for TE universities was 77.91%, with the other 22.09% being the capital expenditure (see Table 6). However, the detailed ratio of staff cost is not certain.

Table 6

Relative proportions of expenditure on universities with teacher education and teacher education centers by resource category (school year 2007-2008)

	University		Teacher education center	
	Current	Capital	Current	Capital
Taiwan	77.9	22.1	89.6	10.4

Note. Distribution of public and private sources of funds for teacher education institutions after transfers from public sources.

The proportions of expenditures distributed amongst public and private TE universities were 54% and 46%, respectively. Among all universities in Taiwan, the annual tuition fee per student of public universities was averaged at about 3,360 USD (USD equivalency converted using PPPs), while the average annual tuition fee per student of private universities was about 1.8 times the tuition of public universities, approximately 6,130 USD (USD equivalency converted using PPPs). Also see Table 7 and Table 8.

Table 7

Relative proportions of public and private expenditure on universities with teacher education, as a percentage (school year 2007-2008)

	University		Teacher education center	
	Public	Private	Public	Private
Taiwan	54.0	46.0	41.1	58.9

Note. Distribution of public and private sources of funds for teacher education institutions after transfers from public sources.

Table 8

Estimated annual average tuition fees charged by universities with teacher education (school year 2007-2008)

	Percentage of full-time students enrolled in		Annual average tuition fees charged by institutions (for full-time students)	
	public	private	public	private
NTW dollars	85.2	14.8	59,490	108,526
US dollars	85.2	14.8	3,360	6,130

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

Beside tuition fees, pre-service teachers have to pay credit fees for the EPC, and supervision fees for the EP, which are counted as 4 credit fees. The credit fees regulated by each TE university were different and ranged from 48 USD per credit to 96 USD (USD equivalency converted using PPPs) per credit in the school year of 2007-2008. On average, one had to pay 2027 USD (USD equivalency converted using PPPs) to complete a secondary level TE program or 2731 USD (USD equivalency converted using PPPs) to complete an elementary level TE program. Also see Table 9. As for the subsidies for students, there were many public subsidies for university students such as student loan, scholarship, etc. However, besides the very few government-funded pre-service teachers, there were no particular subsidies for pre-service teachers.

Table 9

Estimated total average credit fees charged by universities with teacher education (school year 2007-2008)

	Least credits			Average fee (per credit)	Total fee
	Course in university	Educational practicum ^a	Total		
NTW dollars					
High school	26	4	30	1,196	35893
Elementary school	40	4	44	1,099	48351
US dollars					
High school	26	4	30	68	2027
Elementary school	40	4	44	628	2731

Note. In equivalent US dollars converted using PPPs for GDP, by level of education, based on full-time equivalents.

^a Guidance fees for Educational Practicum Curriculum are counted as 4 credit fees.

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