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A Comparative Policy Analysis of Elementary Teacher Education in the Top Performing Asian TIMSS Countries

ABSTRACT: This paper analyzed elementary TED (Teacher Education) programs in the top performing TIMSS (Trends in International Mathematics and Science Study) Asian, i.e. Japan, South Korea, and Singapore countries to explore how much emphasis should be placed on general content knowledge, versus general pedagogical knowledge, and versus methodological pedagogical knowledge. Three theoretical frames of reference were analyzed during this process: whether the programs were consecutive or concurrent; the model of partnership followed between universities and field experience institutions; and the overall status of teachers in the society as categorized by position-based or career-based. Methodologically, only peer-reviewed literature published between 2000 and 2018 was used. It was found that the top performing Asian TIMSS countries usually: have consecutive and concurrent options; provide very intensive TED experiences to their students focusing on diverse and practical field experiences; place more emphasis on academic subject expertise than pedagogy; require students to major in at least one academic subject; have national accreditation institutes for unifying standards; their sponsor countries enforce various types of induction and professional development once in the field; offer salaries competitive with other professions that require the same amount of years and training; and, most importantly, only accept the top academic achievers into their programs. One of the recommendations is that since Saudi Arabia has just initiated "Vision 2030", a sort of privatization schema for the entire economy, it seems higher selection criteria will be critical to TED in line with this national vision.

KEY WORDS: Teacher Education; Trends in International Mathematics and Science Study; Asian Countries; Comparative Study.

INTRODUCTION

This paper analyzes elementary teacher education programs in the top performing Asian (TIMSS = Trends in International Mathematics and Science Study) countries. This is critical since there is still a very controversial and complicated understanding in the literature as to: *how much emphasis*

should be placed on the GCK (General Content Knowledge), as opposed to the GPK (General Pedagogical Knowledge), and as opposed to the MPK (Methodological Pedagogical Knowledge). This study explores these questions, while analyzing the elementary TED (Teacher Education) programs of: Japan, South Korea, and Singapore (*cf* Haruo, Hiroki & Akira,

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2013; Jho, Hong & Song, 2016; Clement, 2017; and Sabrin, 2018b).

This study relies on peer-reviewed literature on these topics (Jones, 2004; Pautasso, 2013; and Kelly, Sadeghieh & Adeli, 2014), published between 2000 and 2018 in the English language regarding TED programs that prepare students to teach at the “primary level”, a term that variously covers KG-8th grade or KG-5th depending on the context. We will now turn to three other theoretical frames of reference that will be utilized throughout this study.

There is a spectrum of initial teacher education models found globally ranging from the concurrent to the consecutive. The consecutive model is where students receive a Bachelor’s degree in a particular subject and then enroll in a Diploma or Masters level program of TED at the end of their degree. The concurrent model is that which combines specialized education in one or more academic subjects with TED (coursework and field experiences) throughout the completion of the Bachelor’s degree and sometimes Graduate studies (Tatto *et al.*, 2008; Haskins, 2016; and Sabrin, 2018a, 2018b and 2018c).

The OECD (Organisation for Economic Co-operation and Development) countries, for example, can be generally categorized as belonging to one of these two categories or having both options within the same country (Tremblay, Lalancette & Roseveare, 2012; and Ingvarson *et al.*, 2013:24 and 50). About 11 of 35 and 17 of 22 OECD countries with available data require a M.S. (Master of Science) degree for primary level and secondary level teaching respectively (OECD, 2014:502). These two TED models will be important indicators for describing the general framework of TED programs in this study.

The second theoretical reference point for this study will be the type of partnership followed between universities and the institutions, where their field experiences take place. Some scholars, such as J. Buitink & S. Wouda (2001) and D.W. Maandag *et al.* (2007), have tried to synthesize the different types of collaboration between schools and universities into five models: (1) school as workplace or work placement

model; (2) school with a central supervisor or coordinator model; (3) trainer in the school as a trainer of professional teachers or partner model; (4) trainer in the school as the leader of a training team in the school or network model; and (5) training by the school or training school model (Buitink & Wouda, 2001; and Maandag *et al.*, 2007). The main difference along this spectrum is that power and responsibility of the university gradually secedes to the school going from the first to the fifth model. This paradigm will be applied to TED field experiences in this study, when enough data is available to classify.

The third theoretical reference point for this study will be the status and role of teachers in the society as categorized by position-based or career-based. Generally, the former is more centralized and the teacher is a civil servant, compared to the latter being decentralized with more local decision-making and individual autonomy. Career-based countries are the likes of South Korea, Japan, and France —where all decisions regarding recruitment, pay, area of placement, and the like, are through the Ministry of Education; salaries in such systems tend to be much higher over time based on experience compared to position-based systems (Ingersoll & Merrill, 2011; Greany *et al.*, 2016; and Sabrin, 2018a).

Position-based countries are those like the USA (United States of America) and UK (United Kingdom), where matters are usually decided at local, district, city, or statewide levels and salaries tend to flatten out much faster in such systems; however, the individual has more control over their career as a teacher. Career-based systems put the burden of finance, but luxury of control, with the government (particularly helpful when trying to avoid teacher shortages). Teachers in such systems have the luxury of semi-permanent jobs, but reduced freedom (Ingvarson *et al.*, 2013:112; Greany *et al.*, 2016; and Sabrin, 2018a).

In sum, we could say that career-based positions are more prominent in more politically and culturally centralized countries, whereas position-based positions are in more politically and culturally individualistic (decentralized) or “market-based” countries.

Given the geo-political influence of Japan on the world stage, this study will start with a discussion of their TED programs.

FINDINGS AND DISCUSSION

Firstly, Context of Japan. In the most recent TIMSS (Trends in International Mathematics and Science Study) rankings, Japan ranked fifth for 4th and 8th grade Math. As for Science, Japanese students achieved fourth place for 4th and 8th grade respectively (TIMSS Website, 2016). Japan follows the concurrent model for primary teachers, and the consecutive for secondary teachers, which seems to be the most popular trend in the top TIMSS countries. Japan offers an example of a country whose TED (Teacher Education) system has spurred some innovative ideas on the macro and micro levels. Future teachers are essentially civil servants in line with the career-based model of teachers (Ingvarson *et al.*, 2013:112).

TED in Japan has traditionally been conducted only at the undergraduate level; however, in 2008, “Graduate Schools of Teacher Education” were established, reaching a total of 25 institutions by 2014. The main qualification to enter such programs is merely a Bachelor’s degree, and the program itself is one to two years ending in a Postgraduate Diploma in teaching or Master’s degree. Although the Ministry of Education provides a framework, individual faculties at universities create their own curricula. Most programs don’t require a concluding thesis to graduate; hence, a primary criticism is that students learn about research, but do not participate in it at any deep level (Ingersoll *et al.*, n.y.:41-54; and Eid, 2014:4 and 9).

On a policy level, a common response at the Higher Education Bureau and National Institute for Educational Policy Research in Japan, for example, was that although research was viewed as important in general, it was not deemed a high enough priority to include in the packed curriculum of TED students, which was centered on subject matter (Eid, 2014:7-9; Zhao, 2015; and NIER, 2016).

The malcontent towards the state of TED globally over the past three decades has called for national reforms that have been

variously labeled “research-based”, “science-based”, “standards-based”, and the like. One of the most popular forms of research that has appealed to teacher educators and their students alike for its practicality has been action research, whereby a teacher is involved in a cycle of constant reflective research and implementation of data discovered about their own teaching on a daily basis to improve their teaching (Darling-Hammond, 2012). A study on the effects of the new Graduate level TED in Japan, including the attempted introduction of research (particularly action research) courses, will be looked at in the context of Waseda University and Tokyo Gakugei University. However, first a brief outline of Japanese TED is in order (APPEID, 1990; Arimoto, 2002; and Darling-Hammond, 2012).

Japanese TED (Teacher Education). All applicants to national universities in Japan must take a national exam that will determine which university and program students can attend. Similar to Korea, Japanese TED is very competitive as it is a very lucrative (economically as well as in terms of social status) profession,¹ that is aspired to in the country. In 1999, for example, only one in 12 graduates secured a position. After Bachelor’s degrees, students can teach in their appropriate fields or continue to Graduate studies. Upon appointment to a position, new teachers must participate in a mandatory one-year induction program, which includes 30 days of out of school training, and 60 days of in-school mentor-based training (Schumann, 2006; Ingvarson *et al.*, 2013; and Watson, 2016).

New teachers are assigned a school-wide team of experienced teachers for mentoring through: giving and receiving observations, lectures, feedback on teaching materials and lesson plans, and collaborative planning and feedback among teachers. Once in the field, teachers are also required to not only change grade levels within their schools every two

¹Teachers in South Korea have starting salaries that are more than 2.5 times that found in countries, such as the USA (United States of America), and correspondingly over 90 percent of eighth grade students in countries, such as Japan and South Korea, have teachers who majored in Mathematics in their university studies, compared to 61 percent of their counterparts in the USA. See, for further information, L. Ingvarson *et al.* (2013:154); and Mohammed Sabrin (2018a and 2018c).

years to better grasp the connections between the skill sets and knowledge taught at each level, but even periodically change schools to teach a variety of learners (Collinson & Ono, 2001; and Howe, 2005).

Teachers wishing to pursue graduate study must receive permission and follow up with the Board of Education; they can enroll in a two year full-time program (during which their salary continues unchanged); or they can enroll for one year as full-time and finish part-time while continuing to teach part-time during the latter portion; and the third option is to enroll in night classes for two years (there's no financial support for this last method). There are also options for taking unpaid leave for up to three years without losing one's position to pursue graduate studies (APPEID, 1990; Collinson & Ono, 2001:236; and Ingvarson *et al.*, 2013).

While no data has been found evaluating the effectiveness of the pre-service TED programs in Japan, one can say that at least on paper things look very promising. And of course the TIMSS (Trends in International Mathematics and Science *Study*) results are a helpful indicator as well. However, there has been some empirical data also collected on the students of graduate TED programs in Japan, which we will turn to at the moment (*cf* Collinson & Ono, 2001; Clement, 2017; and Yenmez, 2017).

A Japanese Case Study. Waseda University and Tokyo Gakugei University have recently undergone a change to offering their TED (Teacher Education) program at the Graduate (Masters) level. This transition has offered some benefits, but two main criticisms on the part of students have been that: the theory learned is not well connected to the practical field experiences; and that a research based approach to TED was not implemented (Hood, 2001; Shimizutani, 2011; and Eid, 2014). While recent studies have shown that the overwhelmingly mainstream of the TED field (90%) don't consider student evaluations a reliable enough indicator of the quality of TED to use in assessing quality (Eid, 2014; and Kyriakides *et al.*, 2014), given the lack of literature on this recent change it doesn't hurt to consider what has been said later on in this

discussion.

At Tokyo Gakugei University, in particular, the main objective of the TED program was seen as developing "school leaders who could coordinate between teachers to develop and continuously improve elementary or lower secondary school curriculum"; and research education was seen as a pivotal part of doing this (*cf* Eid, 2014; Seker & Maehara, 2014; and Project IMPULS, 2016). At the undergraduate level, for example, students are required to take at least four units of research methodology; at the Graduate level, students must take at least two courses from an "educational practice development cluster" and a "research methodology in education cluster" (Eid, 2014:10).

In terms of the TED Faculty at Waseda University, they are not required to have research experience, nor are there any compulsory courses dedicated to research methodology; there are one to two elective courses on using questionnaires. Again a primary theme among teacher educators was that most educators in Japan don't see the importance of research for teachers, particularly those not having trouble teaching, as well as the idea of there not being enough time to include such courses as obligatory, given students' schedules of completing 46 credits in two years (Tanaka, 2011; Eid, 2014:11-13; and Imafuku *et al.*, 2015).

Speaking of students at the TED program of Waseda University, students interviewed were often found to take 18 credits of compulsory subjects, and about 16 credits of electives, aside from a teacher-training course, which is completed simultaneously during 15 days (cited in Eid, 2014:13). Students also felt that there were not any opportunities to practice the issues they felt they needed most help on at their field experiences since mentors chosen for field experiences are based on the network of the university Professor and not the matching of students to mentors or necessarily university philosophy of education to the PDS or Professional Development Schools (*cf* Brooks, Steen & Williams, 2009; Eid, 2014:14; and Parker *et al.*, 2016).

Regarding specific statistics on student opinions of the use of research in education

experiences at Waseda University: 60% of students who provided data through interviews or questionnaires reported they had not been involved in any training programs related to research methodology; nor in data analysis (60%); action research (70%); writing a research report (60%); nor using data and research in decision-making (50%). As for courses, 90% felt that there was a lack of research methodology courses in the university education, and 60% believed they had not learned to conduct research during their studies. Despite the policy framework data mentioned above, 70% even reported that they had not learned how to plan for research or prepare research questions, or design a survey questionnaire (cited in Eid, 2014:18).

The Proverbial “Take-Away”. In sum, Japan has concurrent and consecutive systems for primary and secondary education respectively (although we have not discussed the latter as it is outside the scope of this paper)—as well as adding to this an elaborate emphasis on the importance of induction for new teachers. Formal induction programs are required in half of OECD (Organisation for Economic Co-operation and Development) countries with available data (Bracey, 1997; Arimoto, 2002; and OECD, 2014:503).

Even at the micro level, the use of collaborative “learning study” as a way to plan, teach, and reflect on one’s teaching has been found to not only help in Japan (to which the method is attributed), but other countries who’ve imitated this practice (Davies & Dunnill, 2008), when applied correctly (Parks, 2009). Lastly, Japan has also utilized case-based learning for ethics education in TED (Maruyama & Ueno, 2010; and Doig & Groves, 2011).

Secondly, Context of South Korea. As for South Korea, in the most recent TIMSS (Trends in International Mathematics and Science Study) rankings, South Korea ranked 2nd for 4th grade Math and first for 8th grade Math. In Science, South Korean students achieved first place for 4th grade and third for 8th grade (Sen & Arican, 2015; and TIMSS Website, 2016). South Korea accomplishes these rankings despite having the burden of some of the highest pupil per class ratios

among OECD (Organisation for Economic Co-operation and Development) countries, about 36.7 average students per class in 2002 middle schools for example (Kim & Han, 2002:82). Hence, it probably requires the most of our attention in this study. The primary TED (Teacher Education) program is concurrent and contains an extensive mandatory induction program (OECD, 2014:508). Teaching in South Korea can be categorized as career-based (Ingvarson *et al.*, 2013:112).

The success of South Korean TED probably stems from the immense amount of competitiveness in South Korean national culture; however, this competitiveness has many structural aspects that can be easily imitated. The status of teaching, its commensurate salary, and the qualifications needed to enter the profession in South Korea goes almost unrivaled compared to most of the other countries in this study (Choi, 2014; OECD, 2016; and NCEE, 2018).

There are 13 institutions for primary level teachers to graduate from in South Korea: 11 public “universities of education” (roughly one per major district), which are essentially 2 year colleges of teacher education that were extended to four year Bachelor’s degree programs in 1981 and re-labeled universities (however they don’t offer any other concentrations or majors outside of TED); one public “national university of education”, aptly titled “Korea National University of Education”; and one Department of Elementary Education at Ewha Woman’s [sic] University (private). Most primary teachers are graduates from the first 11 universities of education mentioned; they are located in Seoul, Inchon, Pusan, Taegue, Gwangju, Gongju, Chonju, Cheju, Chinju, Cheongju, and Chuncheon. About 5,000 candidates for elementary school teachers are produced yearly (KEDI, 2006; Ryu *et al.*, 2006; and Sook *et al.* eds., 2012).

Secondary level teachers come from a wide variety of avenues, including traditional Undergraduate TED programs in the national university, Graduate programs, and shorter alternative routes, the last of which have led to concerns over teacher quality at the

secondary level (Kim & Han, 2002:49-51; and CIEB, 2016).

While this paper focuses on primary level TED, the shortage of primary level teachers in South Korea has led to occasional government exceptions for secondary level teachers to teach at the primary level, which has created tension in the education sector among professionals (APPEID, 1990; Kim, 2002; and NCEE, 2018).² Hence, occasional points will be made regarding secondary level teachers when relevant. Similar to the USA (United States of America) and UK (United Kingdom), the existence of teachers graduating from alternative TED programs has created a “wild card” aspect to teacher quality (Sabrin, 2018a, 2018b and 2018c).

South Korean TED. Admission to a primary TED (Teacher Education) program depends on a high school diploma and a student’s score on a College Scholastic Ability Test, like any other major. Recently, interviews have also been introduced into the procedure given the competitive nature of the profession; teaching was the number one ranked profession sought after in surveys done on high school students (cited in CIEB, 2016; and Kwon, 2016).

Once admitted, students experience a concurrent curriculum of subject area content and pedagogy courses lasting four years. However, first they must finish what we might refer to as university breadth requirements. These general courses are 25% of the Bachelor’s degree curriculum (35 credit hours); of this 25% and 65% are courses that are required in the Humanities, Natural and Social Sciences, and Physical Education. The other 35% of general courses are electives from within the aforementioned fields. The required courses are comprehensive foundational courses, while the electives are essentially advanced, more focused inquiry into specific topics of the required courses (CIEB, 2016; and Kwon, 2016).

The other 75% of students’ coursework is coursework related to their actual education

major—educational theory coursework, subject specific methods, the actual subject they have chosen to specialize in teaching and which will be written on their eventual teaching certificate, a graduation thesis, and their nine week field experiences. The field experiences are four courses in: observation practice, participation practice, teaching practice, and administrative work practice (Kim & Han, 2002:58; CIEB, 2016; and Kwon, 2016).

Upon graduation from their Bachelor’s degree, students will be awarded a “grade two” teaching certificate; they can advance to a “grade one” certificate after three years of experience and 15 credit hours of in-service training. There is two weeks pre-employment training on-site, as well as six months of post-employment training to all serve as mandatory induction. All teachers must take two extensive employment examinations to be appointed as teachers in any public school. The first test is multiple choice: 30 points dedicated to the study of education, and 70 points dedicated to the study of their major subject. This test chooses 120% the expected size of employment. The second test consists of essay writing and an interview, given to those that passed the first test (Kim & Han, 2002:58 and 64; CIEB, 2016; and Kwon, 2016).

In terms of further promoting competitiveness, the South Korean government has also instituted a “Master Teacher” program, whereby the top teachers maintain teaching roles but also take on mentoring roles at the school and district levels, helping develop curriculum, pedagogical practices, and evaluation systems. To qualify, teachers must be grade one certificate holders and have 10 to 15 years teaching experience; an extensive screening process is involved, but upon appointment Master teachers are given research grants of \$150/month in addition to their normal pay (CIEB, 2016; and Yiannouka & Tan, 2017).

While all of these elements of South Korean primary TED could rightly be seen as competitive, roughly 100% of graduates will be provided a position due to the shortage of elementary teachers, compared to 20% of secondary teachers (Kim & Han, 2002:65-66).

²This problem has been exacerbated by the fact that there are more primary schools than secondary ones, but more educational institutes for secondary school teachers than for primary ones. See, for further information, O.N. Kwon (2016).

Table 1:
Example of Curriculum: Seoul National University of Education, 2002

Classification: General	Subject Offering	Credits
Required	Philosophy 2 and 15 subjects	33(35)
Electives	General logic 2 and 29 subjects	16
		49(51)
Classification: Specialized	Subject Offering	Credits
Required Courses	Foundation of elementary education 2 and 8 subjects	13
Optional Courses	Educational Technology 2 and 2 subjects	2
Specialized subject & Extracurricular activities	Elementary school ethics education 12 and 25 subjects	48(59)
Art and Physical Education	Practice in elementary school physical education 1(20) and 6 subjects	5(10)
Specialized course	12 courses by specialization, each worth 20 credits	20(20-30)
Teaching practice	Observational practice [1 week] and 4 subjects	4
Discretionary subject	2 courses	4
Total		150(168-178)

Notes: The numbers indicate credit hours; the numbers in parenthesis indicate class hours.
Source: "Seoul National University of Education" in <http://www.snue.ac.kr> (28/10/2017).

If it were not for the overall high standards of South Korean education, such a statistic for primary teachers would be a catastrophic blow to maintaining high standards for teacher quality (Kim & Han, 2002; and Townsend & Bates eds., 2007).

In terms of professional development, it is not mandatory; however, in-service training is offered about 180 hours (30 days) per year, and teachers can earn certificates that help towards promotions and wage raises (CIEB, 2016). In-service training is required for promotion to grade one as a teacher, or wage raises; there are 1,322 institutions for in-service training as of 2002. However, the biggest critique of the existing in-service education is that it is essentially a mimic of the pre-service experience with no customization or change idiosyncratic to the experiences of existing teachers (Kim & Han, 2002:59-60). This is a rough outline of South Korean TED, but we will provide a more detailed glance at some of the most popular institutions' curricula (Kim & Han, 2002; CIEB, 2016; and Diem, Levy & Sickle, 2018).

A South Korean Case Study. As an example of the particularities of South Korean TED (Teacher Education), one could look at the curriculum of the Gyongin branch of the Korean National University of Education. Since Asian, and particularly South Korean, TED programs are most lauded for their

emphasis on subject matter, it behooves us to take a look at what an *elementary level* Mathematics education major takes (Kim & Han, 2002; and Choi, 2014). Their *content knowledge* subjects are all two credits with the exception of Introduction to Geometry (which is three credits): Linear Algebra; Calculus; Probability and Statistics; Introduction to Abstract Algebra; Topology; and Introduction to Geometry. See table 1.

The *Pedagogy Knowledge* subjects are: Assessment in Mathematics Education; Theory of Mathematics Education; Theory of Teaching Mathematics Materials; Psychology of Mathematics Education; and Teaching Problem Solving—all are three credit courses except Assessment in Mathematics Education, which is two credits. Students must take at least 21 credits between these two categories. As can be seen there is a fairly balanced ratio between content knowledge and content specific methods; however, there is a roughly 70/30 ratio of subject coursework to pedagogy coursework at the secondary TED (Teacher Education) level.

On a macro level, institutions' of TED as a whole in South Korea range from a 78/22 percent ratio of subject to pedagogy knowledge as in Seoul National University to 60/40 percent found at Ewha Women's private university (Kwon, 2016). Nonetheless, almost all public TED institutions are almost

exactly like the Seoul National University distribution (Kim, 2002:165).

As can be gleaned from the above discussion, there are many aspects of South Korean TED that might be highly beneficial if adopted elsewhere; however, due to psychological pressure that nations feel to follow countries politically more powerful, much of the recent discourse among South Korean educators has been to implement ideas that have not been found to have profound effects in their host countries or may not be suitable for the contexts intended (Kim, 2004; and Choi, 2014).

For example, on the level of policy a comparison of reform plans between the USA (United States of America) and South Korea found that South Korean reform efforts were often found to imitate ideas attempted in the USA 5-10 years prior. This pattern was found regarding issues of school staffing, introduction of merit-based pay for teachers, and increasing the length of TED between the 1980s and 2000s (Yeom & Ginsburg, 2007). Some have also called for general decentralization similar to the USA to allow for more pedagogically creative and versatile graduates (Kim, 2002; and Sabrin, 2018a and 2018c).

These are ideas that seem to contradict what we know about good TED, as will be seen in the analysis section, but were copied from the USA by South Korea. Attempts to introduce child-centered pedagogy in pre-schools has also been met by resistance from parents of private pre-schools who don't believe in such an approach, and are in a position to exert influence since they are the ones funding the schools (Kim, 2004; Harkins & Barchuk eds., 2014; and Sabrin, 2018a and 2018c).

It might be safe to also say that switching from a teacher-centered to student-centered approach would also take a more dialectical approach to pedagogy than currently exists at the TED programs themselves since it is well-known that without such deep excavation of teachers' beliefs about teaching, they usually teach as they were taught as children (Kim, 2004; Jambor, 2009; and Schreurs & Dumbraveanu, 2014).

Thirdly, Context of Singapore. As for our last country, then, it is Singapore. In the

most recent TIMSS (Trends in International Mathematics and Science Study) rankings, Singapore ranked first for 4th grade Math and second for 8th grade Math. As for Science, Singapore students achieved second and first place for 4th and 8th grade respectively (TIMSS Website, 2016). As for the pedagogical model, then, Singapore's one TED (Teacher Education) institution offers a motley of consecutive and concurrent options (NIE Singapore, 2009; Musset, 2010; and Lau, 2015).

It is actually one of the two countries in this study that offers options to specialize in a subject even at the primary level—the other being South Korea. It is also ironically in the lowest tier of percentage of national expenditure spent on education compared to the other 15 countries in the recent TEDS-M (Teacher Education and Development Study in Mathematics) data set, a data set which will be discussed in the analysis section (Ingvarson *et al.*, 2013:27, 31 and 40).

Singaporean TED. Singapore only has one TED (Teacher Education) institution, the NIE (National Institute of Education), which is a part of NTU (Nanyang Technological University). Needless to say, Singapore's TED is highly centralized and, hence, career-based. TED is aligned with the format of the public education system: primary education is grades one to six; secondary is grades seven to ten, which would be referred to as lower secondary in typical international studies; and post-secondary, a term usually referring to tertiary education globally, is grades 11 and 12 (Kong *et al.* eds., 2008; and MoE Singapore, 2016).

Most future teachers enter the NIE after grade 12. Teachers are trained in four concurrent and four consecutive program types at the NIE. The concurrent programs are: two types of a general Diploma program, each called option A and option C (two years each); a Bachelor's of arts in education; and a Bachelor's of science in education (four years each). The A Diploma students are trained to teach two subjects, while those studying under the C option are trained to teach three subjects. These Diploma graduates' coursework takes place at the NIE, just like the Bachelor's degree students, and they walk away qualified to teach, but

their degree is not considered a university level degree. Furthermore, Singapore intends to phase out the two-year Diploma option and have 30 percent of the teaching force to have a Master's degree by 2020. All four of these concurrent programs are to teach at the primary level (Kong *et al.* eds., 2008; Ingvarson *et al.*, 2013:99 and 108-109; and MoE Singapore, 2016).

The four consecutive programs at the NIE are all Postgraduate: one is a Postgraduate Diploma in education to teach secondary; the second is a Diploma to teach lower secondary; and the third and fourth are to teach primary, but labeled options A and C, which mean the same specialties as they did for the concurrent programs mentioned above. These Postgraduate programs are one year, but could be considered five years if you consider the pre-requisite Bachelor's degree needed to enroll in them. Within the school system, about 75 percent of teachers are Graduates, and the other 25 percent are Non-Graduates (Ingvarson *et al.*, 2013:99 and 108-109; and MoE Singapore, 2016).

In terms of entrance to these programs, then, they are very competitive as the government has implemented vast reforms since 1996, raising starting salaries to the point that they are now similar to starting salaries for fields that require equivalent years of study, such as Engineering, Business, and Law. All student teachers become MoE (Ministry of Education) employees from the beginning of their TED programs, with guaranteed employment upon completion, and receive a full salary for up to two years will all the typical benefits of a civil servant in Singapore (*cf* Kong *et al.* eds., 2008; Reid & Kleinhenz, 2015; and MoE Singapore, 2016).

This is aside from their tuition being paid and receiving various stipends to cover their educational expenses. In return, graduates must complete a bond of service after graduation lasting three to five years, depending on the type of program they graduate from. Those who drop out or don't complete their program are responsible for paying back money received prorated. This career-based approach to TED is not only compelling for students, but also appealing

to governments who can centrally control for teacher shortages or oversupply (Ingersoll *et al.*, n.y.:71-83; Goodwin, 2012; and MoE Singapore, 2016).

Entrance to the programs has varying qualifiers, but revolve around typical educational background certificates, applications, and interviews, but also mandatory proficiency in the English language. Upon acceptance, students are assigned to schools as temporary full-time contract teachers, so that they live the life of a teacher from day one and ensure that they have made the right career choice, an appealing set-up to be imitated. Students accepted are often from the top third of the student population (Ingersoll *et al.*, n.y.:71-83; Goodwin, 2012; and Reid & Kleinhenz, 2015).

Once within the program, standards are no less stringent. A grade of a C is acceptable and challenging to achieve, as there is little grade inflation. In terms of coursework, courses are counted in the AUs (Academic Units); an AU is about one hour per week of lecture or tutorial plus three hours of laboratory or fieldwork. Each course is about two or three AUs. Field experiences are 10-12 AUs. Curricula vary among the eight various paths to graduation; however, all students must specialize in a subject even at the primary level (Koedel, 2009; Goodwin, 2012; and MoE Singapore, 2016).

BA (Bachelor of Arts) degree seekers must specialize in an Art and BS (Bachelor of Science) degree seekers must specialize in a Science. All programs have a course in communication skills regarding how to use English for various topics, and most programs require about 20 hours of direct community service leadership and participation (Ingersoll *et al.*, n.y.:71-83; Goodwin, 2012; and MoE Singapore, 2016).

Teaching practicums are required of all students, but emphasis on the practicum varies by program types: for the Bachelor's degree, it is 16 percent; for the Diploma, it is 23 percent of total pre-service education; and for the Postgraduate Diploma, it is 25 percent. Students often teach at the schools the government plans to appoint them to later, and cooperating teachers are, although

assigned by the schools, advised to have 2-3 years experience and be specialized in the same subject as the student (Ingersoll *et al.*, n.y.:71-83; Kong *et al.* eds., 2008; Goodwin, 2012; and MoE Singapore, 2016).

Induction is mandatory and typically involves four core in-service courses, like classroom management, basic counseling, working with parents, and reflective practice. Additionally, new teachers are assigned a “team” of educators similar to Japan—a “buddy” who is a teacher specialized in the same subject, a mentor who is a more experienced teacher teaching a similar subject, and a supervisor who is usually the head of the department he/she works in (Ingersoll *et al.*, n.y.:71-83; and Goodwin, 2012).

In regards to professional development, all teachers are entitled to 100 hours of paid PD (Professional Development) annually, which can be utilized for courses or even towards their pursuit of entire degrees. There is also a career ladder where one can achieve levels of Master Teacher, the leadership track to achieve MoE positions, or Senior Specialist for the more research inclined. Singapore’s career ladder is said to probably be the best globally (Darling-Hammond & Lieberman, 2012; Goodwin, 2012; and Bautista, Wong & Gopinathan, 2015).

As has been seen, Singapore offers a wide array of TED options for a country that is only half a million with about 27,000 teachers in 354 schools as of 2006; however, it makes sense for a country with the diversity that Singapore has (Ingvarson *et al.*, 2013:81). On the micro level, something that is rarely seen globally is that in Singapore, there is the concept of “white space” introduced in 2005, which is extra time given to teachers for interdisciplinary and more engaging lesson planning during their school work-day, from 7:30 AM to 2 PM (*cf* Parsons & Beauchamp, 2012; Ingvarson *et al.*, 2013:123; and Bautista, Wong & Gopinathan, 2015).

A Comparative Look. Coming full circle, we have seen that South Korea is probably the strongest in teacher education, as measured by the TIMSS (Trends in International Mathematics and Science Study) results of its students,

among the three Asian territories analyzed. Although, it starts behind Singapore at second place at the fourth grade level, it surpasses it by 8th grade. As for Science, South Korea starts off strong at first place at fourth grade, but drops to third (behind Singapore at number two) by eighth grade. Such a pattern seems expected given the focus on intensity in the South Korean TED (Teacher Education) program, often associated with success in Math, as opposed to the more avenues for creativity in the Singaporean TED program. Japan generally fell behind both of these countries in the TIMSS rankings (APPEID, 1990; Kim, 2002; Deng & Gopinathan, 2016; Jho, Hong & Song, 2016; and Lee & Tan eds., 2018).

Japan followed the concurrent model for its elementary TED programs, and the consecutive model for its secondary TED programs. It was also seen that similar to their European counterparts, the Japanese have drifted toward Graduate studies for TED, but as of this writing are not requiring it for employment like many European countries (Shimizutani, 2011; Tanaka, 2011; and Sabrin, 2018b). Japan also maintains minimalist control over curriculum, since they only provide a framework, while individual faculty at universities create their own curriculum. This is an approach well known about the infamous Finnish TED system (Maruyama & Ueno, 2010; Shimizutani, 2011; and Tanaka, 2011).

Once in the field, Japanese teachers not only have to periodically change the grade level they teach, but even schools, to diversify their teaching skills. Teachers wishing to pursue Graduate studies are even paid their normal teacher salary while doing so as long as they are full time or part time students, in the latter case of course they’d be teaching part time. Although there was no direct evidence found regarding the nature of the university-school collaboration for field experiences, we can infer that given their disjointed nature and the fact that they merely took place based on who the university faculty had contacts with at the schools, that these experiences are somewhere between a network and training school model on the

Buitink and Wouda scale. Japanese teachers had career-based positions. An idiosyncratic strength of Japanese TED was the use of collaborative “learning study”, something that could possibly be duplicated successfully in similarly “cooperative” cultures, such as Saudi Arabia (Sabrin, 2013; Seker & Maehara, 2014; and Lee & Tan eds., 2018).

The primary weaknesses of Japanese TED were found to be weak research skills inculcated in students and theoretical knowledge learned in the classroom not being well connected to field experiences. This latter point probably has to do with the fact that school mentors were merely chosen on the basis of university faculty networks, and neither the matching of educational philosophies between student and mentor, nor the matching of university philosophy to school philosophy (Bracey, 1997; Redecker *et al.*, 2010; and Shimizutani, 2011).

As for Singapore, then, it was our second best in TIMSS, and offered concurrent options not only at the primary, like Japan, but even secondary levels. Needless to say, consecutive was offered at both levels of education as well. Singapore is the most versatile of our three countries, and allows (rather requires) students to specialize in a subject matter, even if they are seeking primary level certification. Singapore teachers are in career-based positions and participate in what seem to be partner model field experiences according to the Buitink and Wouda scale, given the harmony between coursework and field experiences (NIE Singapore, 2009; Deng & Gopinathan, 2016; and Clement, 2017).

Singaporean future teachers have to handle rigorous admission requirements for TED, but end up in very well paying positions, to the extent that their starting salaries equate those of starting lawyers and engineers. Interesting idiosyncrasies of the Singaporean experience is that students are MoE (Ministry of Education) employees from the time they enter their TED program. Students receive a free education, with additional stipends, and are even guaranteed employment after graduation (NIE Singapore, 2009; Goodwin, 2012; Bautista, Wong & Gopinathan, 2015; and MoE Singapore, 2016).

This career based approach, similar to Japan, allows government to implement policy that avoids shortages and oversupply in teachers. Also worthy of note is that their field experiences start from day one of their TED program, and not just near the end as occurs in even some concurrent programs globally, like some institutions in the USA (United States of America). Similar to Japan, students are assigned an entire team of mentors, not just one, and induction is mandatory; however, teachers are not required to change teaching grades or schools after entering the field as was the case in Japan. Similar to Japan, Singapore offers paid professional development, albeit more generous as it is annually permanent, but both can be used towards graduate studies or traditional forms of professional development (Arimoto, 2002; Bautista, Wong & Gopinathan, 2015; MoE Singapore, 2016; and Sabrin, 2018a and 2018c).

As for our last country, South Korea, highlights include that TED is concurrent, there’s extensive mandatory induction, and ends up in a career based position, like the other two countries of the study. South Korean TED has rigorous admissions criteria and a commensurate salary upon employment. It was noted that particularly in the case of South Korea, secondary teachers can often teach primary level students, which confounds attempts to draw inferences about the structure of their TED programs being the primary reason for the results they achieve. The only weakness seems to have been that in-service education after graduation was just like pre-service education and not adapted to an employed teacher’s needs (Kim, 2004; Yeom & Ginsburg, 2007; and Lee & Tan eds., 2018).

More important than all of this, however, is that it seems that despite the fact that all three of these countries have no problem offering concurrent options for TED, they still outperform their European counterparts and everyone else for that matter in the TIMSS rankings, even those purposely using consecutive programs to produce teachers with higher content knowledge. It seems that the secret behind this seems to be the fact that Asian countries, such as those in this study,

have students that by default outperform their peers in academic subject matter in other countries in the top ten TIMSS list (Kim, 2004; Zhao, 2015; and Lee & Tan eds., 2018).

The top performing Asian countries only admit the top academically achieving students to their TED programs to begin with. A recent study regarding the top performing countries on PISA (Programme for International Student Assessment) found that the top Asian countries recruit their future teachers from the top third of each cohort: top five percent in South Korea, and the top 30 percent in Singapore (Ingvarson *et al.*, 2013:156 and 169).

Furthermore, as has been explicated elsewhere, despite the fact that the ratio of pedagogical knowledge to subject content knowledge in the top achieving TIMSS countries is similar to those performing much worse on TIMSS, the secret to success of the former is that they simply have quantitatively more hours of academic study overall for university students, cover more topics, and are more rigorous in their study of the subject matter (Musset, 2010; Jones & Moreland, 2015; and Sabrin, 2018a, 2018b and 2018c).

CONCLUSION

We can say after looking at the TED (Teacher Education) systems of the aforementioned countries that it seems the top performing Asian TIMSS (Trends in International Mathematics and Science Study) countries usually have the following in common in their elementary TED programs: they usually have consecutive and concurrent options; attract the top academic achievers into their programs; have strict filters for admission; provide very intensive TED experiences to their students focusing on diverse and practical field experiences; place more emphasis on academic subject expertise than pedagogy; enforce students to major in at least one academic subject; have challenging criteria for graduation from the program; have national accreditation institutes for unifying standards; their sponsor countries enforce various types of induction and professional development once in the field; and, lastly, these countries offer salaries competitive with other professions that require the same

amount of years and training since they are usually career-based positions.

Since Saudi Arabia's educational system is also career-based, it seems higher selection criteria is the most important practice of this discussion that should be encouraged in Saudi Arabia and be worth the investment to attract and keep the most qualified teacher candidates. Also, since Saudi Arabia has also just initiated "Vision 2030", a sort of privatization schema for the entire economy, it seems higher selection criteria will be critical to TED in line with this national vision.³

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³**Statement:** Herewith, I declare that this paper is my original work; it is not product of plagiarism and not reviewed or published by other scholarly journals elsewhere.

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