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Mathematics instruction in the selected countries in Asia

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Abstract
This study examined the mathematics instructions in the five selected countries in Asia, namely Singapore, Shanghai-China, Malaysia, Japan, and the Philippines. A comparative analysis compared mathematics instructions regarding policy, curriculum, teacher training, teacher qualification, and innovations. The data used were based on policies on mathematics instruction and national reports, which relevant professional experts of the selected countries verified. Results showed significant similarities and differences in the mathematics instructions selected in Asia. However, among the five selected countries, Singapore had shown excellence in policy, curriculum, teacher training, teacher qualification, and innovations in achieving quality math education. Hence, adapting relevant policies and practices may improve mathematics instruction across countries.

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Introduction

A solid math education is not only a success indicator. However, it is crucial for a nation's future and competitiveness in the global information era. Mathematics training helps improve the environment and manipulate change, as well as student math performance. Math helps a nation be globally competitive and advance its economy; hence, it must be learned. According to ACME (2011), 'mathematics is vital for economic growth and technological progress,' and the nation aspires to compete globally. The "Programme for International Student Assessment" (PISA) and "Trends in International Mathematics and Science Study (TIMSS)" are international assessments of students' math knowledge that determine which countries are suitable for study. PISA and TIMSS found that several Asian nations excel in math literacy and performance. Shanghai-China has the highest mean math score (613), followed by Singapore (573). Malaysia averages 421 points. Japan placed 7th out of 65 nations with a mean score of 536. The Philippines skipped the survey (PISA, 2012). East Asian students outperform their classmates abroad, and the gap is rising.

The Philippines placed third and fourth to last in the TIMSS survey. After that, the nation avoided TIMSS in 2007 and 2011 and PISA in 2012. The research found that high school mathematics performance on the National Achievement Test (NAT) has declined recently. Singapore scores highest, with a mean of 605. Japan ranks 5th with 570 mean points, while Malaysia ranks 10th with 508. Shanghai-China declined the survey (TIMSS, 2003). In Malaysia, the Philippines, Laos, and other SEA countries, students' low performance is reflected in the previous several PISA scores and the quadrennial TIMSS, which reveals a decade-long decline in math and scientific achievement.

Teachers must use instructional design to improve math success. Certain elements impact a country's education system; thus, they must be carefully considered. Policy, curriculum, teacher certification, training, and innovations impact a country's education system. Specific and substantial variances in the characteristics might assist or hurt a nation. Economic development and prosperity depend on a well-planned education system. Mathematics is essential to our culture and civilization and adds to a well-rounded education. ACME, 2011a. Governments and educators should reform schools and curricula to teach pupils problem-solving abilities, which are essential in today's economy.

All cultures' economic, social, and cultural progress depends on education (humanium.org). R.A. No. 10533 mandates 13 years of elementary education in the Philippines and protects and promotes the rights of all people to excellent education at all levels. The Compulsion Education Act requires all Singaporean children to attend Primary School. The People's Republic of China's Compulsory Education Law requires nine school years. The schooling Amendment 2002 in Malaysia mandates six years of compulsory schooling, but Article 5 of Chapter 2 in the Fundamental Law of Education in Japan demands up to nine years.

According to unesco.org, the curriculum is a structured collection of values-based information, skills, and attitudes that students should study in formal and non-formal contexts. It helps pupils achieve learning goals. The education system of a nation may determine whether the curriculum is successful. Without qualified instructors, education for everyone is impossible (campaignforeducation.org). Students learn new things from trained instructors. They can adapt to school trends, especially math instruction. According to research, advanced degree instructors in math and science improve high school math and science success. Empirical research reveals that teacher qualification affects efficacy (Quinco *et al*., 2022) [37]. All students in the chosen Asian nations perform differently in arithmetic teaching, notably in Shanghai-China, Singapore, Malaysia, Japan, and the Philippines. Every country's legislation, curriculum, innovations, teacher qualification, and teacher training impact math teaching and performance.

For their potential to address social and economic issues, innovations must be adequately understood. Innovation skills need an innovation-friendly atmosphere and modification of many current innovation methods. Being adaptable to innovations may lead to discovering new national treasures. This research seeks to identify key facts and tactics top nations utilize to adjust policies and practices to enhance mathematics education worldwide.

Research Methodology

This study makes use of documentary analysis in reviewing and investigating the factual data from the policies on mathematics instruction from the Ministry of Education and national reports that are relevant and useful for this study in terms of the following factors, namely, policy, curriculum, teacher's Training, teacher qualification, and innovation that will determine the mathematics instruction in the selected countries in Asia.

Policy is the term used for the program of actions, the rules and regulations adopted by each country in national and international matters, expressly their educational system, educational structure, and set compulsory education. Curriculum is a term applied universally for the standardized type of educational system. It refers to the course offerings, mathematics curriculum, and instruction and how it is delivered. Teacher's Training is the term used for the Training the teachers undergo, such as induction and in-service Training (Cadosales *et al*., 2020) [5]. A teaching qualification is a term that is one of several academic and professional degrees that enable a person to become a registered teacher. Innovation is the term for new ideas, improvements, and educational reforms.

The study utilizes the purposive sampling technique in selecting five countries in Asia to be subjects of the study. Countries were selected through the data from the results of PISA 2012 mathematics literacy and TIMSS 2003 mathematics achievement: three top-performing countries were selected, namely, China, Singapore, and Japan; and two countries that have had alarming performance over the years were also selected, namely, Malaysia and Philippines.

Results and Discussion

A. Status of Mathematics Instruction in Selected Countries

1. Singapore

Singapore introduced compulsory education in 2003. Primary 6 is the minimal schooling requirement for Singaporean youngsters. Special needs children will be excused from compulsory schooling (moe.gov.sg). The administration said all youngsters should learn how to succeed in a knowledge-based economy. As of January 2015, 366 Singaporean schools are modernized. Its schools are among the world's top. Teachers from across the globe visit Singapore to learn how it excels in math, science, and reading. Singapore educators say an explicit curriculum offered by high-quality instructors in every school is the solution. Any school can provide Singapore-quality education with a regular curriculum and skilled instructors.

English, Mother Tongue, and Mathematics are the main goals of elementary education (moe.gov.sg). Primary education in Singapore emphasizes English and math. Singapore Math employs Concrete-Pictorial-Abstract. The lessons are simple and easy to understand, one concept at a time, and start with the concrete and pictorial stages, then the abstract stage, to help students learn mathematics meaningfully (homeschoolmath.net). All teachers receive Singapore curriculum training at the National Institute of Education at Nanyang Technological University, either in a diploma or degree course, depending on their level of education at entry (asiasociety.org). The Ministry of Education carefully selects prospective teachers from the top one-third of secondary school graduates.

Singapore selects teachers from the top third of high school graduates (ncee.org). Singaporean government elementary and secondary school teachers (including Junior Colleges) must have a Dip. Ed or PGDE. Only Nanyang Technological University's National Institute of Education (NIE) offers both degrees. Singaporean teachers must have a degree (Dip. Ed or PGDE), a Polytechnic Diploma, an 'A' level/IP/IB, and an 'O' level. Other competent instructors include mid-career professionals, relief teachers, and adjunct teachers (moe.gov.sg).

Singapore, a nation without natural resources but with one of the best standards of life, was transformed from a struggling port in the Straits of Malacca by the ruling government's pragmatic social and economic policies. As Singapore enters the 21st century, youth must be ready for tomorrow's problems. The official strategy is 'Thinking Schools, Learning Nation.' The 7th International Conference on Thinking opened with this national policy from then-Prime Minister Goh Chok Tong. Singapore has used TSLN since 1997 to be competitive in the global economy for the future generation. In 2003, the MOE launched the Teacher Work Attachment Programme to motivate and expose teachers to outside experiences. The attachment exposes participants to different commercial work contexts, forcing them out of their "comfort zones" (thinkingschoolsinternational.com). The 2006 "Teach Less, Learn More" (TLLM) movement helps teachers and schools concentrate on effective teaching so kids

are engaged, learn with comprehension, and are developed holistically beyond test and exam preparation.

2. Shanghai-China

The Chinese education system includes six years of elementary, three of lower secondary, and three of higher secondary. Children must attend nine years of elementary and lower secondary education before quitting or joining an upper secondary program at 15 (ncee.org). China has 12 years of basic education, six primaries and six secondary. Parents must enroll their children for up to 9 years of school. All Chinese students must study a baseline Math, Chinese, English, Science, and Humanities curriculum. Math is required till 18 (et-foundation.co.uk). Even at the secondary level, Chinese students are well-trained in arithmetic problem-solving. The English curriculum is comparable but more challenging and complicated (et-foundation.co.uk). Chinese teacher education includes pre-service and in-service training. Shanghai has four-year teacher training, and secondary teacher training institutes predominantly educate pre-service teachers, including math instructors (chineseembassy.org). Primary school teachers in Shanghai have somewhat adjusted training. Postsecondary sub-degree degrees are required for elementary school instructors. The three- to four-year programs provide a high school diploma and a certificate. Practical training is required for teachers (ncee.org).

The Chinese Ministry of Education began to approve using multiple texts and resources (ncee.org). Schools can use ministry-provided materials or identify other teaching materials they want to use, but these still need ministry approvals before classroom implementation. Primary school teachers must have postsecondary, sub-degree credentials. However, they may enroll in a teacher education institution after junior secondary. Secondary school teachers need a bachelor's degree and a professional certificate, and many have master's degrees. Secondary school teachers must complete upper secondary school before entering teacher education programs. They take identical curricula and get practical training like elementary school instructors. Lower secondary school candidates may complete the curriculum in two to three years, whereas upper secondary school candidates need four years (ncee.org).

Shanghai-China reform has two phases and aims to replace exam-focused schooling with quality education. The first wave (1988–1998) established a three-block curriculum: obligatory, optional, and extracurricular topics to improve student quality by combining social demands, student growth, and a school's disciplinary system. The second wave suggests a fundamental, enriched, and inquiry-based curriculum to replace the problematic, obscure, and less creative conventional curriculum. Schools should adjust the government's curricular framework to accommodate students' requirements. However, instructors should remember to "return class time to students" and that "to every question, there should be more than a single answer" (ries.revues.org). China's ministry of Education announced 10-year education reform and development guidelines on July 29, 2010. From kindergarten to universities, public to private, and academic to vocational education, the rules encompass practically every area of education (kpmg.de).

3. Malaysia

Malaysian formal schooling is 6-3-2-2. Children enter primary school at six and complete six grades. Grades 7-13 are divided into three years of lower secondary, two years of upper secondary, and two years of higher secondary (epdc.org). The school curriculum promotes mental, emotional, physical, and spiritual growth by teaching broad information, skills, healthy attitudes, and moral values. We want balanced, trained, skilled Malaysians who value national unity (ibe.unesco.org). Continuous curriculum reform strives to increase education quality to realize the National Education Philosophy. NEP aims to achieve the nation's objective of preparing children to be informed, prepared, and skillful for the millennium's demands. The national curriculum fosters unity by using a single language (the national language) and providing the same fundamental topics to all students in the National Education System. National Type Schools, which may teach in other main ethnic languages, preserve Malaysia's ethnic variety (ibe.unesco.org).

The government prioritized the Multimedia Super Corridor technological infrastructure initiative. There were 32 MSC-approved enterprises in 1999, 33% of which were software and 29% multimedia. For years, MSC firms increased manufacturing production by 20%. MSC was criticized for helping high-class manufacturers and businesses while excluding middle, lower, and rural masses from prosperity. New policies would fix the issue. Computers in all classrooms, 167 schools and four new universities, and $316 million for training institutes were part of the 2001 budget to promote computer literacy. Malaysia may follow Singapore in reducing the digital divide if the trend continues.

Malaysia is implementing pre-service and induction training for teachers, including short-term courses, seminars, and conferences to improve teaching skills and personal and professional growth. Lower and upper-secondary teachers in Malaysia have the exact academic requirements. All secondary teachers need a bachelor's degree or post-graduate certificate in education/teaching (unesco.org). In March 2014, students, instructors, and administrators used virtual desktop infrastructure to access computers, programs, and data. Even in rural and inland locations with low connection and energy, students and instructors get high-performance computing and instructional materials across devices with no IT setup or classroom modifications (teradici.com).

4. Japan

Citizens receive education according to their talents and capabilities without discrimination based on race, creed, sex, social class, economic condition, or familial origin (mext.go.jp). All Japanese have the right to education without restrictions. The local government provides financial aid to economically disadvantaged students (Elivera *et al*., 2022; Payusan *et al*., 2022) [13, 35]. Citizens must provide their children with a general education, and local government schools must not charge tuition (mext.go.jp). Japan has a 6-year primary education, 3-year junior secondary education, and 3-year senior secondary education, with more math courses than minor topics. Japan requires supervised fieldwork and a 4- to 8-week practicum following teaching certification. In-service training includes initial teacher induction.

Japanese math professors provided homework three to five times a week: 21%; German, 75%; US, 86% (factsanddetails.com). Japanese teachers reduce student tasks. Learning resources use lovely female figures in short

skirts and French maid attire to encourage arithmetic (factsanddetails.com). Under the new curriculum, math hours rose from 315 to 385. Since 2002, all students, even high performers and "slow learners," receive the same curriculum in the same classes (factsanddetails.com). Associate degrees are valid for three years in the granting prefecture and may be renewed like regular certificates. Bachelor's degrees are valid for ten years in the issuing prefecture and may be renewed by continuing university courses. All prefectures allow master's degree renewal by renewing a university course within ten years. A bachelor's degree in mathematics is required to teach secondary math. Japan prioritizes mathematics teacher education innovations less. Saturday practical math exercises are a Japanese education innovation. Mathematics teaching hours have grown since 2002.

5. Philippines

The Philippines is the only Asian nation and one of three in the world (with Angola and Djibouti) with a 10-year pre-university cycle (deped.gov). Though other Asian nations altered schooling, the Philippines stayed the same. This kept the Philippines crawling while other nations advanced. The Philippines did not participate in the next PISA Mathematics Literacy until 2003 since it placed lowest in Asia. The Senate of the Philippines passed Senate Bill 3286, the Enhanced Basic Education Act, on September 24, 2012. The Philippine House of Representatives adopted House Bill No. 6643 on November 19, 2012. On May 15, 2013, Philippine President Benigno Aquino III signed the Republic Act of the Philippines 10533, which enhances the Philippine Basic Education System by strengthening its curriculum and increasing the years for Basic Education, appropriating funds, and other purposes. The Enhanced Education Program (K-12) was created under this statute. This curriculum includes at least one year of Kindergarten, six years of elementary, and six years of secondary school. Four years of junior high and two years of senior high school comprise secondary education (gov. ph).

For the K-12 Program to be successful, preparations began in 2011 with Universal Kindergarten implementation, followed by Enhanced Curriculum for Grades 1-7, K-12 enactment, Curriculum for Grades 11-12, and Senior High School (SHS) implementation in SY 2016-2017. By 2016, the Enhanced Education Program would be fully implemented. The Content Standards, Performance Standards, and Learning Competency of all disciplines from the BEC Curriculum to this K-12 Curriculum, notably math, were changed. After Grade 3, BEC Curriculum students can handle whole numbers, basic operations, fractions, decimals, money, angles, plane figures, measurement, and graphing. However, the K-12 Curriculum requires more advanced learning beyond Grade 3 than the BEC Curriculum. Using appropriate technology, the learner applies numbers, number sense, measurement, geometry, patterns, algebra, statistics, and probability to critical thinking, problem-solving, reasoning, communicating, making connections, representations, and real-life decisions. The higher levels' learning experiences and desired learning objectives are improving from the previous curriculum (deped.gov.ph).

Learning materials and resources must be adequate and accessible to achieve this goal. Every public school in the Philippines uses blackboards/whiteboards and chalk/markers. Some schools feature overhead projectors for professors and students. Some schools have computer labs. Not all schools in the nation have suitable technology for teaching and learning. This research should focus on Philippine teacher training and qualifications. Kindergarteners may enroll in Elementary without attending Kindergarten. Kindergarten used to have LGU-funded volunteer instructors. Under the K-12 Program, Kindergarten is required and accessible in all public schools countrywide, according to Education Secretary Armin Luistro (philstar.com). The Department of Education (DepEd) has also issued a new memorandum on kindergarten teacher qualifications, known as Memorandum No. 80 series of 2014, which states that KTVs must be qualified to prepare for the K-12 Program. Elementary requirements remain unchanged. Junior and Senior High Schools exist. Junior High School requirements remain unchanged. The Department of Education (DepEd) invites interested teachers, professionals, practitioners, and experts to apply for full-time and part-time teaching posts for Grades 11 and 12 for the 2016-2017 school year. The four Senior High School (SHS) courses need applicants who want to teach core curriculum and applied and specialized topics. Applicants must be Filipino citizens and competent teachers in the academic, technical-vocational-livelihood, arts and designs, and sports tracks (deped.gov.ph). The Ateneo system (Manila, Davao, Zamboanga, Xavier University of Cagayan de Oro City), De la Salle University (DLSU), Centro Escolar University (CEU), Silliman University (SU) of Dumaguete City, St. Paul University, and University of San Carlos (USC) of Cebu City offer pre-service and in-service teacher training. These commercial institutions get government funding from CHED, DECS, and DOST for teacher in-service training (unpan1.un.org). A teacher's professional license requires a bachelor's degree in mathematics education or a related primary and professional education certificate. It is valid until retirement and must be renewed every three years.

B. Discussion on the Selected Variables of Mathematics Instruction

1. Policy: Education is the finest legacy a nation can leave its inhabitants since it helps society's progress. Hence, educated people must hold important positions to benefit society (articlesng.com). All chosen Asian nations established policies that benefit people and the country. All nations have obligatory education regulations with age and complexity constraints. Since 2003, Singapore has had a 6-year minimum obligatory education, and 366 schools have been modernized. Shanghai-China had a 9-year compulsory education and a 12-year primary education. Students may quit or continue school after 15. Malaysia has a 6-3-2-2 formal education system: 6 years in primary, three years in lower secondary, two years in upper secondary, and two years in higher secondary. Public schools in Japan are free, and the government helps financially struggling students. Field study is required from 4-8 years, in-service training for starting teachers is provided, and their official education structure is 6-3-3, six years in primary, three years in junior secondary, and three years in senior secondary. The K-12 program in the Philippines has been improved by a new law that changes the formal education structure to 1-6-4-2, one year in kindergarten, six years elementary, six years secondary (4 years junior secondary and two years senior secondary). Primary education is mandatory in the Philippines. The expanded education program would cover all primary education by 2016.

Table 1: Mathematics Instruction in terms of Policy, Curriculum, Teachers' Training, Teacher's Qualifications, and Innovation in Selected Countries in Asia.

Country	Policy	Curriculum	Teacher's Training	Teacher Qualifications	Innovations
Singapore	Educational Structure: 6-5	Kungfu Mathematics	Pre-service Training: 22 weeks	Bachelor's Degree: BSc(Ed) Mathematics	Thinking Schools, Learning Nation' (TSLN)
	Compulsory Education: 6 years (Primary Education) -CE Act (Cap 51) of 2003	Concrete-Pictorial-Abstract Approach	Induction Training: REQUIRED	Mid-career professionals, Relief teachers and Adjunct teachers also qualified	Teacher Work Attachment Programme
		One concept at a time		A' level/IP/IB holders and 'O' level holders	Teach Less, Learn More' (TLLM)
Shanghai-China	Educational Structure: 6-3-3	Shanghai Mastery Approach	Pre-service Training: 12 weeks	Primary school teachers: post-secondary, sub-degree holder	Shanghai-China Educational Reform
	Compulsory Education: 9 years - PRC Presidential Order No. 52 of 2006		Induction Training: VOLUNTARY	Secondary school teachers: Bachelor's Degree holder or (mostly) Master's Degree holder	
Japan	Educational Structure: 6-3-3	Japan Mathematics	Pre-service Training: 4-8 weeks	Advanced Level: Master's Degree	Saturday practical Math activities
	Compulsory Education: 9 years - BAE Chapter 2 (Act No. 120)	Problem Solving Approach	Induction Training: REQUIRED	Special Level: Bachelor's Degree (non-education programs)	Number of teaching hours in math increased
		Higher percent of Math subjects than minor subjects		Temporary Level: Associate (non-education programs)	
Malaysia	Educational Structure: 6-3-2-2	KBSM Mathematics Framework	Pre-service Training: 12 weeks	Bachelor's Degree in Education (B. Ed Mathematics) or a Post-graduate diploma in education/teaching	Virtual desktop infrastructure
	Compulsory Education: 6 years- Education Act of 2002	Technology Education (high-tech education)	Induction Training: REQUIRED	Public School Teachers: No licensing system; ONLY appointment of permanent teachers	Educational resources delivered to schools even in areas with limited access to connectivity and electricity
				Private School Teachers: obtain teaching license	High-performance computing
Philippines	Educational Structure: 1-6-4-2	Spiral Curriculum	Pre-service Training: 18 weeks	Bachelor's Degree in Math Education holder and/or Bachelor's Degree in Math or related major	Adapt the new curriculum, the K-12 Program (Enhanced Education Program)
	Compulsory Education: 13 years - R.A. 10533		Induction Training: VOLUNTARY	with Professional Education Certification	

2. Curriculum

The curriculum includes all teacher-led activities. It is also a master plan for choosing material and structuring learning experiences to change and grow learners' behaviors and insights. As seen, the Asian nations studied have diverse math curriculum delivery techniques. China and Singapore stressed a classroom maths education style among the five nations. The Shanghai Mastery Approach is used in China. However, Singapore uses the Concrete-Pictorial-Abstract Approach for Kungfu Mathematics Pictorial Understanding. Japan emphasizes Problem Solving, Structured Problem Solving, and other Solving Approaches. However, instructors may use alternative methods to teach arithmetic. Malaysia and the Philippines have math courses, but teachers decide how to teach. Malaysia uses KBSM math. However, the Philippines still adopts its Enhanced Basic Curriculum Program, notably its Mathematics Spiral Curriculum. Asian nations teach math according to their respective curriculum. Curricula are integrated to introduce similar themes for a given year level and improve teaching methods. Math instructors may learn more than just how nations score on the international league table. The content, breadth, ideas given, and degree of study youngsters participate in vary greatly. No matter what the national curriculum recommends, the teacher must creatively educate his/her pupils.

3. Teacher's Training

Student performance is most affected by instructor quality. Good instructors are among the most significant factors in student performance. One needs training to become a great teacher. Teacher training prepares teachers for careers (Principal, Teacher's College, 2009). Teacher education prepares students for teaching as a vocation. Bob Kizlik. Selected nations offer training programs to enhance math education. All chosen nations define pre-service and induction training methods. In Singapore, all teachers are trained at the National Institute of Education (NIE), which offers initial teacher preparation, graduate and in-service programs, and courses for serving teachers, department heads, vice principals, and principals. However, NIE

programs focus on pedagogy and connections between educational subjects rather than advanced academic training within a specific subject, so one cannot become a teacher in Singapore without high-level subject mastery (ncee.org). Malaysian pre-service and induction training includes short-term courses, seminars, and conferences for teachers to improve their skills and personal growth. Teacher education pre-service programs in the Philippines, Shanghai, and Japan incorporate mathematics teaching. The MEXT provides central seminars for head teachers and administrators in Japan.

Student teachers get pre-service teacher education before teaching. Pre-service training durations vary per nation (Cadosales *et al*., 2021) [4]. Shanghai pre-service training lasts 12 weeks. Pre-service training spans 22 weeks in Singapore, 4-8 weeks in Japan, 12 weeks in Malaysia, and 18 weeks in the Philippines. New teachers get induction training to prepare for their jobs. Training might be systematic or not. Voluntary induction training in Shanghai, China. New Singaporean teachers must undergo induction training. Japan requires induction training. Teachers in Malaysia must undergo induction training. Philippines induction training is optional. Quality teacher development is significant for an institution. Teachers not only need to excel in their subject area, but they also need to learn how to manage difficult pupils and sensitive issues. Teachers must be knowledgeable and competent to ensure children are safeguarded, have someone they can trust and interact with, and fulfill their potential.

4. Teacher Qualification

An excellent teacher is the most significant component in learning, and when they are in the classroom, scores climb, and the beneficial impact may be spectacular, particularly for poor and minority students (centerforpubliceducation.org). A bachelor's degree is required to teach in certain Asian nations. In Malaysia, publicly qualified teachers are appointed by passing the ESC selection exam and interview without a license. Singapore's Ministry of Education carefully chooses teaching candidates from the top one-third of secondary school graduates. All states need licensing and certification for full teaching positions (centerforpubliceducation.org). As in Malaysia, several states enable districts to recruit uncertified teachers in an emergency if they cannot meet staffing shortages. Some nations, including Shanghai, Japan, and the Philippines, need a teaching credential. Qualification in Singapore and Malaysia requires specific diplomas.

The National Board for Professional Teaching Standards has devised rigorous tests of teachers' knowledge and skills and recognized those with high abilities via licensing exams (centerforpubliceducation.org). Singapore does not need licensing exams for teachers. In Shanghai, China, elementary and secondary school students get identical curriculum and practical instruction for 2-4 years instead of board examinations. You must pass the license test to become a private school teacher in Malaysia. However, you do not need to take it if you are selected to teach public school. Licenses to teach in Japan expire after 3–10 years. However, they may be renewed at a university. After graduating and getting a diploma, one must pass the license test for teachers in the Philippines to teach in public schools. Private schools do not always need board-passing instructors. Since Singapore is the top education performer, passing the licensing test is not enough to become a certified teacher who can improve a country in math or any topic. It indicates that competent teacher selection is more critical in top-performing nations than passing the license test that other countries need.

5. Innovations

Most respondents believe education should focus on teaching pupils fundamental arithmetic ideas and processes. All students, even those with impairments and at risk of school failure, must learn how to "figure out" their arithmetic difficulties at home and in the workplace. Singapore is first in line with its TLLM strategy, which helps teachers and schools focus on the fundamentals of effective teaching so students are engaged, learn with understanding, and are developed holistically beyond test and exam preparation. However, China incorporates social demands, student growth, and a school's disciplinary system to promote student quality with a three-block curriculum: obligatory, optional, and extracurricular. The second wave suggests a fundamental, enriched, and inquiry-based curriculum to replace the problematic, obscure, and less creative conventional curriculum. Malaysian students, professors, and administrators used virtual desktop infrastructure to access computers, programs, and data. Even in rural and inland locations with low connection and energy, students and instructors get high-performance computing and instructional materials across devices with no IT setup or classroom modifications (teradici.com). Japan emphasizes mathematics teacher education innovations less. Saturday practical math exercises are a Japanese education innovation.

Conclusion

The Mathematics instruction of the selected countries in Asia differs in their commitment to putting Math at the forefront of efforts or making it one of the core subjects to be taught in school. The selected countries offered national curricula and utilized various strategies to carry out Mathematics Instruction. Results showed significant similarities and differences in the mathematics instructions selected in Asia. However, among the five selected countries, Singapore had shown excellence in policy, curriculum, teacher training, teacher qualification, and innovations in achieving quality math education. Hence, adapting relevant policies and practices may improve mathematics instruction across countries.

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