

Understanding the Mathematics Curriculum of the Philippine and Singapore Education Systems: A Comparative Analysis

Marco R. Ocumen¹, Roar A. Callaman²

¹College of Education, Graduate Studies, University of Southeastern Philippines, Davao City, Philippines

²Faculty, College of Education, Graduate Studies, University of Southeastern Philippines, Davao City, Philippines

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.9020143>

Received: 29 January 2025; Accepted: 05 February 2025; Published: 07 March 2025

ABSTRACT

There are limited comparative studies about the specific difference and potential learning opportunities between Singaporean and Philippine mathematics curricula. This study aimed at exploring the differences between the mathematics curricula of Singapore and Philippines, focusing specifically on the scope and sequence, and the grade level placement and progression of mathematical concepts. Through a comparative analysis of academic publications from 2020-2024, the research analyzed peer-reviewed articles, conference papers, theses, dissertations, and books using specified keywords across electronic databases including Web of Science and IDESR. The findings reveal distinct approaches between the two countries: Singapore's curriculum emphasizes depth over breadth with a focused spiral curriculum approach, strict mastery-based progression, and early introduction of advanced concepts with clear benchmarks. In contrast, the Philippines adopts a broader approach with greater emphasis on cross-curricular integration, real-world applications, and flexible progression paths to accommodate diverse learner needs. While Singapore maintains tight control with strict mastery requirements, the Philippines offers more flexibility in concept revisiting and horizontal integration. The study concludes that while Singapore's structured approach has proven successful in international assessments, the Philippine system's flexibility better addresses its diverse student population and resource contexts. The findings suggest that Philippine mathematics education could benefit from incorporating elements of Singapore's depth-focused approach while maintaining its adaptive flexibility.

Keywords—mathematics education, Singapore, Philippines, comparative analysis, mathematical concepts progression

INTRODUCTION

Curriculum scholars define curriculum through various lenses that have evolved over time. Dulo [1] reiterated the description of Tyler [2] of curriculum as planned learning experiences designed to achieve educational objectives, while Syomwene [3] highlighted the view of Taba [4] that it as a systematic plan for learning that includes goal, content, methods, and evaluation. In the context of mathematics education, Pepin and Gueudet [5] defines mathematics curriculum as an organized system of mathematical content, processes, and applications designed to develop mathematical proficiency. Wittmann [6] expands this definition by characterizing mathematics education as a coherent progression of mathematical ideas connected through careful sequencing and integration of concepts.

The mathematics curriculum serves as a cornerstone for developing critical thinking, problem-solving abilities, and logical reasoning skills essential for academic and professional success [7]. Research by the Organization for Economic Cooperation and Development (OECD) demonstrates strong correlations between effective mathematics curricula and student achievement in international assessments [8]. Studies show that well-designed curricula not only enhance mathematical proficiency but also contribute to the development of 21st-

century skills necessary for global competitiveness [9]. Mathematics curriculum quality significantly influences a nation's capacity for technological innovation and economic development [10].

One of the most recognized countries because of its promising mathematics curriculum is Singapore. In fact, as reported in the latest PISA 2022 results, Singapore maintained its global leadership in mathematics with a mean score of 575 points, significantly above the OECD average of 472 points. Singapore's students demonstrated exceptional mathematical literacy, with 41% of their students achieving highest proficiency levels (Level 5 or 6), compared to the OECD average of 9% [11]. This is a clear manifestation of how well-crafted, effectively implemented, constantly monitored, and appropriately evaluated the curriculum of Singapore is. In stark contrast, the Philippines, which participated for the second time, scored 355 points in mathematics, placing it among the lowest performing countries and significantly below both the OECD average and Singapore's score [12]. This is a manifestation that the Philippines has a lot to learn from the best practices of Singapore in terms of strengthening the mathematical literacy of their learners.

While extensive research exists on Singapore's mathematics curriculum success, limited comparative studies examine the specific difference and potential learning opportunities between Singapore and Philippine mathematics curricula. Understanding these differences becomes more crucial as the Philippines seeks to enhance its mathematics education outcomes and global competitiveness in STEM fields. Thus, this study was conducted to provide insights into effective instructional strategies and content organization from both systems which teachers, curriculum developers, and policymakers may use to inform pedagogy, assessment, and curriculum reforms and improvement.

This study aimed at exploring the mathematics curriculum of Singapore and Philippines. Specifically, this study sought answers to the following questions:

1. How do the scope and sequence of mathematical topics differ between Singapore and Philippines basic education mathematics curricula?
2. What are the key differences in the grade level placement and progression of mathematical concepts between the two countries?

METHODS

Methodology for the Review

This comparative analysis employed a systematic approach to data collection to ensure a comprehensive and impartial examination of the corpus of easily accessible scholarly literature. Data sources included books, theses, dissertations, conference papers, peer-reviewed publications, and works from a variety of academic disciplines, such as psychology, education, and educational technology. Searches were conducted using specified keywords using "AND" and "OR" to make each search more precise such as "mathematics curriculum in Singapore," "mathematics curriculum in the Philippines," "scope AND sequence of the mathematics curriculum in Singapore," "scope AND sequence of the mathematics curriculum in the Philippines," "grade level placement AND progression of mathematical concepts in the mathematics curriculum of Singapore" and "grade level placement AND progression of mathematical concepts in the mathematics curriculum of the Philippines" across several electronic databases, including Web of Science and International Database of Education Systematic Reviews (IDESR). Backward and forward snowball searches were used to find additional articles on Google Scholar from reference lists of the included studies and reviews.

To filter the collected data, certain inclusion and exclusion criteria were developed. The inclusion criteria were satisfied by English-language studies and publications that were relevant to the mathematics curricula in Singapore and the Philippines and published within the last five years (2020–2024). Research, opinion articles, and papers that have nothing to do with education were not considered.

Following the collection of data, a thematic content analysis was used to evaluate and synthesize the findings. The collected articles were initially categorized based on whether they addressed the Singaporean or Philippine math curricula. The review's framework identified sub-themes: Scope and Sequence of Mathematics Curriculum and Grade Level Placement and Progression of Mathematical Concepts. These sub-themes served as examination criteria for each article, and the results were compared to identifying the differences of the curriculum between the two countries.

Scope and Limitations of the study

Scope. This literature study aims to address a wide range of aspects related to the mathematics curriculum in Singapore and Philippines. Since the mathematics curriculum is too broad to be explored, the researcher decided to focus on two important aspects of the curriculum only (i.e., scope and sequence, grade level placement and progression of mathematical concepts). While majority of the identified and included articles in the review were written by authors from Singapore and Philippines, the study is similarly global in scope to provide a worldwide viewpoint, looking at studies and reports from other nations.

Limitations. Even if the study aims to be comprehensive, it is important to understand its limitations. First off, the scope only includes publicly accessible, English-language articles, papers, and reports. This might lead to a bias in language and accessibility, excluding potentially useful material from non-English sources or paywall-protected publications. Second, because the study focuses mostly on research literature from the last five years, it could have overlooked important publications or historical trends that could have contributed to a deeper understanding of the subject. To make sure the review is still relevant and up to date, this criterion was put in place. Lastly, this study relies on already published data because it is a review of the literature rather than an original research initiative. This suggests that the limitations and biases inherent in the main research influence the study.

RESULT AND DISCUSSION

Scope and Sequence of Mathematical Topics

Table 1 shows the synthesis of the scope and sequence of mathematical topics in Singapore and Philippine mathematics education.

Table 1. Synthesis of the Scope and Sequence of Mathematical Topics in the Mathematics Education of Singapore and Philippines

	Singapore	Philippines
Key Features	Spiral curriculum approach Mastery-based progression Strong emphasis on number sense Integration of algebraic thinking	K-12 curriculum framework Spiral progression approach Focus on five content areas Integration of 21st-century skills
Implementation	Carefully structured learning blocks Regular review and reinforcement Systematic concept building	Grade-level specific competencies Quarterly learning plans Integration with other subjects

	Focus on fundamental skills	Performance-based assessment
Notable Characteristics	Depth over breadth Strong foundations before advancement Interconnected mathematical concepts Clear learning trajectories	Emphasis on real-life applications Progressive skill development Contextualized learning Multiple intelligence approach

Scope and Sequence in Singapore

As shown in Table 1, the scope and sequence of mathematical topics in Singapore's curriculum represents a masterfully crafted progression that follows a spiral approach, where concepts are introduced, reinforced, and expanded upon systematically throughout the educational journey. The curriculum begins with fundamental number sense and basic operations in the early years, gradually building complexity while maintaining strong connections between different mathematical domains [13]. This approach ensures that students develop a robust understanding of core concepts before moving on to more advanced applications, with each new topic building upon previously established knowledge in a carefully structured manner that promotes deep understanding and retention [14].

The vertical alignment of Singapore's mathematics curriculum exhibits remarkable consistency, guaranteeing that ideas taught in lower grades function as foundational knowledge for more complex subjects in subsequent years. Concrete procedures are presented before abstract thinking is needed, and the order is deliberately crafted to correspond with cognitive growth phases [15]. Before moving on to more difficult subjects like algebra, advanced geometry, and data analysis, students may build solid core abilities in arithmetic operations, measurement, and basic geometry thanks to this well-considered approach. In order to minimize learning gaps and foster confidence in mathematical skills, the curriculum places a strong focus on mastery learning, which guarantees that students become proficient at each level before moving on [13].

Students can identify the connections between distinct mathematical ideas and their applications because to the curriculum's integration of several mathematical strands, which produces a complex tapestry of interwoven knowledge. Patterns and functions are associated with both numerical and spatial notions, but number sense and operations are consistently associated with measurement and geometry [16]. Students get a comprehensive grasp of mathematics as a single discipline rather than as a collection of disparate subjects thanks to this linked approach. To ensure that students comprehend the significance and usefulness of mathematical ideas in daily life, the curriculum's scope goes beyond pure mathematics to incorporate real-world applications [14].

The concepts are presented in a logical order that supports students' cognitive growth and gradually enhances their ability to think mathematically. In the early years, a lot of effort is spent learning place value, basic operations, and basic measurement ideas to build strong number sense and basic operational fluency [17]. As pupils advance, the curriculum presents more complex mathematical concepts, such as fractions, decimals, and percentages, before moving on to pre-algebraic notions and formal algebraic reasoning. By ensuring that students have the prerequisite knowledge for every new subject, this meticulous sequencing lowers cognitive load and fosters effective learning outcomes [18].

The curriculum avoids the "mile-wide, inch-deep" approach that is prevalent in many other educational systems by having a comprehensive yet targeted scope. Every subject is thoroughly examined, and enough time is allotted for pupils to gain conceptual comprehension as well as procedural fluency [19]. Students may better understand how different ideas relate to and support one another because to the curriculum's clear linkages across diverse mathematical areas. In addition to improving recall, this method helps students become

more adept at using mathematical reasoning in a variety of contexts and problem-solving scenarios [20]. To guarantee that foundational knowledge and abilities are preserved and enhanced throughout time, the sequence also includes frequent concept spiraling and review [21].

Scope and Sequence in the Philippines

As shown further in Table 1, the K–12 Basic Education Program is in line with the Philippine mathematics curriculum's extensive breadth and sequence structure, which covers five essential subject areas: numbers and number sense, measurement, geometry, patterns and algebra, and data analysis and probability. From kindergarten through senior high school, this framework is intended to give pupils a gradual and cohesive mathematics education [22]. While making sure that concepts are introduced and reinforced using a spiral progression approach that considers students' cognitive development stages and prior knowledge, the curriculum places a strong emphasis on the development of critical thinking, problem-solving abilities, and mathematical communication [23].

The breadth of the curriculum is implemented according to a meticulously planned pattern in which basic ideas are presented in the early grades and progressively extended over the course of the educational process [24]. The elementary years (Grades 1-3) lay a great focus on the development of number sense, basic operations, and fundamental measuring abilities. Concepts are taught using real-world examples and circumstances. By introducing increasingly complex operations, geometric concepts, and fundamental algebraic thinking, the middle grades (Grades 4-6) build upon these foundations while preserving close ties to real-world applications and problem-solving scenarios that are pertinent to the experiences and cultural background of Filipino students [25].

With each grade level building on prior knowledge and presenting new mathematical concepts at suitable developmental stages, the curriculum's sequencing shows a purposeful progression from fundamental to advanced topics [26]. The curriculum's handling of the shift from arithmetic to algebraic thinking is a prime example of this sequential development; prior to the presentation of formal algebraic notation, pre-algebraic concepts are progressively introduced through pattern recognition and problem-solving [23]. Additionally, the curriculum includes many chances for pupils to relate mathematical ideas to other subject areas, which aids in their development of a more comprehensive view of mathematics as a whole rather than as a collection of discrete subjects [27].

Junior high school (grades 7–10) broadens the focus of mathematics education to include more complex algebra, geometry, and statistics while preserving links to practical applications and settings for problem-solving [26]. To prepare pupils for more advanced mathematics in senior high school, this level teaches more rigorous mathematical reasoning and proof. In keeping with the demands of 21st-century education and Filipino culture, the curriculum at this point also places a strong emphasis on the development of mathematical modeling abilities and the use of technology in mathematical inquiry and problem-solving [28].

The development of fundamental mathematical processes and abilities, such as problem-solving, reasoning, communication, linkages, and representation, is included in the curriculum's scope, which goes beyond only teaching mathematical material [25]. Students are guaranteed to acquire not just procedural fluency but also conceptual comprehension and the capacity to apply mathematical reasoning in a variety of circumstances thanks to the integration of these processes across grade levels and curriculum areas. Recognizing the varied requirements and skills of Filipino students, the sequence also includes frequent evaluation points as well as chances for remediation and enrichment [23].

Comparative Analysis of Scope and Sequence between Singapore and Philippines

Given the discussion of the scope and sequence of the mathematics curriculum in Singapore and Philippines, noticeable differences are highlighted. Table 2 shows the comparative analysis of the scope and sequence of the mathematics curriculum between Singapore and Philippines.

Table 2. Comparative Analysis of the Scope and Sequence of the Mathematics Curriculum between Singapore and Philippines

Aspect	Singapore	Philippines	Key Differences
Scope and Sequence	<p>Highly focused spiral curriculum</p> <p>Mastery-based progression</p> <p>Strong emphasis on depth</p> <p>Explicit concept connections</p>	<p>Broader spiral curriculum</p> <p>Progressive skill development</p> <p>Focus on breadth</p> <p>Integration with other subjects</p>	<p>Singapore emphasizes mastery before progression</p> <p>Philippines covers more topics with less depth</p> <p>Singapore has more explicit vertical alignment</p> <p>Philippines emphasizes cross-curricular integration</p>

As shown in Table 2, Singapore and the Philippines handle curricular depth versus breadth differently, which is the main source of their differences in scope and order. With fewer subjects addressed in greater detail at each level, Singapore's curriculum exhibits a more concentrated and intense approach. With enough of practice and application opportunities for every subject, the Singaporean curriculum prioritizes mastery of foundational ideas before moving on [29]. To introduce pupils to a greater range of mathematical ideas while preserving links to real-world applications and cross-curricular integration, the Philippine curriculum, in contrast, includes a bigger number of topics with somewhat less depth [22].

In addition, there are notable distinctions between the two systems in the vertical alignment of mathematical notions. Stronger vertical coherence may be seen in Singapore's curriculum, which pays close attention to precursor abilities and makes clear linkages between ideas across grade levels. Every new idea builds directly on previously learned abilities in a very well-organized order [17]. Although it likewise follows a spiral pattern, the Philippine curriculum exhibits greater vertical alignment flexibility, enabling a variety of entrance points and learning routes [26]. This disparity reflects the two nations' divergent educational agendas and settings.

Moreover, there are significant differences in how the spiral curriculum model is implemented in the two systems. With ideas reviewed at increasingly greater degrees of complexity and rigorous adherence to mastering standards prior to progression, Singapore's spiral method is more strictly regulated [30]. With a stronger focus on horizontal integration across topics and real-world applications, the Philippine spiral curriculum exhibits better implementation flexibility, enabling idea revisiting [31]. The two nations' disparate social settings and educational objectives are reflected in this discrepancy.

Furthermore, different methods in scope and sequencing are revealed by the way advanced mathematical ideas are treated. With a clear path toward abstract mathematics thinking and problem-solving, Singapore presents sophisticated subjects early in the curricular sequence [19]. With a greater focus on creating real-world linkages and practical applications, the Philippine curriculum often introduces more complex ideas later [25]. This discrepancy indicates differing cultural expectations for mathematical proficiency as well as philosophical perspectives on mathematical education.

Finally, there are also clear trends in the extent and order of the integration of technology with contemporary teaching methods. With explicit rules for its usage in improving mathematics comprehension, Singapore's curriculum incorporates technology in a highly organized way [15], [19]. The Philippine curriculum emphasizes adaptation in implementation and takes a more flexible approach to technology integration, recognizing that resource availability varies by location [27]. The two educational systems' disparate resource circumstances and infrastructure capacities are reflected in this discrepancy.

Grade Level Placement and Progression of Mathematical Concepts

Table 3 shows the synthesis of the grade level placement and progression of concepts in Singapore and Philippine mathematics education.

Table 3. Synthesis of the Grade Level Placement and Progression of Mathematical Concepts in the Mathematics Education of Singapore and Philippines

	Singapore	Philippines
Key Features	<p>Early introduction of advanced concepts</p> <p>Strategic concept sequencing</p> <p>Careful consideration of cognitive development</p>	<p>Sequential development</p> <p>Grade-level standards</p> <p>Vertical articulation</p> <p>Horizontal integration</p>
Implementation	<p>Primary 1-6 structured progression</p> <p>Clear benchmarks at each level</p> <p>Systematic skill development</p> <p>Regular assessment points</p>	<p>K-10 core mathematics</p> <p>Senior High specializations</p> <p>Remedial programs</p> <p>Advancement opportunities</p>
Notable Characteristics	<p>Age-appropriate complexity</p> <p>Logical concept progression</p> <p>Clear learning objectives</p> <p>Measurable outcomes</p>	<p>Flexible progression</p> <p>Competency-based</p> <p>Learner-centered</p> <p>Inclusive education</p>

Grade Level Placement and Progression of Mathematical Concepts in Singapore

As shown in Table 3, with each grade level methodically expanding on prior knowledge while introducing new ideas at suitable development stages, Singapore's grade level placement of mathematical topics displays a profound grasp of cognitive development and learning progression. With a significant emphasis on tangible experiences and visual representations, the elementary grades (elementary 1-2) place a great deal of attention on developing a strong number sense, basic operations, and fundamental measuring ideas. Since it cultivates the mental schemas required for more complex mathematical reasoning and problem-solving skills that will be needed in upper elementary and secondary levels, this foundation is essential for success in the future [32].

In addition, mathematical difficulty significantly increases as students move from Primary 3 to Primary 4, providing increasingly complicated ideas while preserving close ties to previously taught content. Students face more difficult fractional, decimal, and geometric concepts during these years, with a greater focus on mental math tactics and problem-solving methods. The curriculum carefully supports this shift by progressively raising the degree of abstraction and complexity in mathematical activities while offering assistance through the concrete-pictorial-abstract method. Additionally, more formal mathematical language

and symbols are introduced during this time, preparing pupils for the more abstract ideas they would come upon in upper elementary [33].

Moreover, students are encouraged to exhibit increased independence in their mathematical thinking during the upper elementary years (elementary 5–6), which are a critical time when they start to meet more complex mathematical topics. Before formal algebraic notation is presented, pre-algebraic thinking is included into problem-solving scenarios in these grades, marking the beginning of the placement of algebraic notions. Before introducing pupils to abstract symbolic representations, our methodical approach guarantees that they comprehend the fundamental ideas. This level's curriculum also places a strong emphasis on integrating diverse mathematical strands, which enables students to make connections between distinct mathematical topics and how they are used in practical settings [34].

Furthermore, in order to guarantee that learners gain both procedural fluency and conceptual comprehension, the evolution of mathematical topics over the school levels is carefully planned. Every new subject is presented with clear links to previously taught ideas, assisting students in understanding how new information builds on what they already know. The program offers frequent practice and application opportunities, with increasingly challenging problem-solving scenarios that call for students to combine several ideas and abilities. Students gain confidence in their mathematics skills via this methodical development, which also gets them ready for more challenging coursework in secondary school [35].

Careful consideration of the cognitive demands of various mathematical ideas is also shown in the arrangement of subjects throughout grade levels. Only when pupils have gained the requisite basic knowledge through tangible and visual experiences are abstract notions offered. Before going on to more complex subjects, the curriculum has frequent evaluation points to make sure students have mastered prerequisite abilities [33]. In addition to preventing learning gaps, this meticulous attention to placement and advancement guarantees that pupils build a strong mathematical foundation that will benefit their future studies in secondary school and beyond.

Grade Level Placement and Progression of Mathematical Concepts in the Philippines

As shown further in Table 3, a systematic grade-level placement method is used in the Philippine mathematics curriculum to ensure that mathematical ideas are appropriately progressed throughout grade levels while taking into account pupils' cognitive growth stages and preparedness for learning [36]. Beginning with basic numeracy abilities in kindergarten, the concepts are introduced and progressed via ever more advanced mathematical notions until senior high school [27]. The goal of this progression is to prepare students for admission into the workforce or further education while upholding high academic standards and being developmentally appropriate. The system outlines precisely what children should know and be able to perform at each step of their mathematics education through grade-level standards and learning abilities [28].

Developing a strong number sense, basic operations, and fundamental measuring abilities through tangible experiences and familiar situations is a major focus of the teaching of mathematical concepts in the K–3 grades. With a focus on employing manipulatives and visual aids to enhance comprehension, students are exposed to mathematical concepts via activities that are relevant to their everyday lives and local cultures [37]. With frequent opportunities for practice and reinforcement of important concepts through a variety of activities and contexts that reflect the experiences of Filipino students, the progression during these years is carefully timed to ensure that students develop strong foundational skills before moving on to more complex concepts [22].

Moreover, with the introduction of increasingly abstract notions while preserving links to tangible representations and practical applications, the middle grades (grades 4–6) reflect a substantial shift in the complexity of mathematical ideas. Students face more difficult fractional, decimal, and geometric concepts during these years, and there is a greater focus on mathematical reasoning and problem-solving techniques [38]. Concepts are arranged at this time to facilitate the steady growth of abstract thought while offering enough scaffolding in the form of contextual problems and visual models to assist students in bridging the gap between concrete and abstract comprehension [25].

Furthermore, during the critical junior high school years (Grades 7–10), students are expected to exhibit increased mathematical thinking and problem-solving skills as well as start working with more formal mathematical ideas. During these years, students go from simple equations to more intricate algebraic expressions and functions, making the placement of algebraic ideas more noticeable [23]. The integration of various mathematical strands is another focus of the curriculum during this time, which aids students in understanding the relationships between algebra, geometry, and statistics while enhancing their capacity to apply mathematical ideas in a variety of situations that are pertinent to Philippine society [27].

Finally, with mathematical topics positioned strategically to prepare students for their chosen courses, the senior high school mathematics curriculum (Grades 11–12) offers a variety of tracks and strands to meet a wide range of student interests and professional objectives. Both foundational mathematics courses and specialized courses that complement students' academic or career paths are part of the development at this level [39]. While retaining the rigor required for college preparedness or career success, this flexible approach to placement guarantees that all students acquire the proper mathematical preparation for their future ambitions [37].

Comparative Analysis of Grade Level Placement and Progression of Mathematical Concepts between Singapore and Philippines

Given the discussion of the grade level placement and progression of mathematical concepts in the mathematics curriculum in Singapore and Philippines, noticeable differences are highlighted. Table 4 shows the comparative analysis of the grade level placement and progression of concepts of the mathematics curriculum between Singapore and Philippines.

Table 4. Comparative Analysis of the Grade Level Placement and Progression of Concepts of the Mathematics Curriculum between Singapore and Philippines

Aspect	Singapore	Philippines	Key Differences
Grade Level Placement and Progression of Concepts	<p>Early introduction of advanced concepts</p> <p>Strict sequential progression</p> <p>Clear benchmarks</p> <p>Limited flexibility</p>	<p>More flexible progression</p> <p>Grade-level standards</p> <p>Multiple entry points</p> <p>Remedial opportunities</p>	<p>Singapore has more rigid progression.</p> <p>Philippines offers more flexibility.</p> <p>Singapore introduces concepts earlier.</p> <p>Philippines accommodates diverse learners</p>

As shown in Table 4, there are notable conceptual and practical distinctions between Singapore and the Philippines, as seen by the grade-level placement of mathematical ideas. With formal mathematical concepts presented earlier in the educational journey, Singapore's approach exhibits a more expedited placement of higher concepts [32]. The Philippine system shows a more gradual progression, with greater emphasis on building foundational understanding through concrete experiences before moving to abstract concepts. This fundamental difference reflects varying approaches to cognitive development and mathematical readiness between the two systems [28].

In addition, there are noticeable disparities between the two nations in terms of the flexibility of the advancement pathways. With explicit expectations for performance at every grade level and little room for departure from the prescribed order, Singapore's system upholds a more inflexible progression structure [33]. More progression flexibility is provided by the Philippine system, which has several entrance points and paths

to meet the demands of different learner types and resource situations. This disparity is a reflection of the two countries' divergent educational agendas and sociocultural settings [22], [23].

Moreover, the way that evaluation and progression criteria are applied and how they affect grade-level placement vary greatly. With distinct benchmarks and criteria at every level, Singapore's system places a strong emphasis on mastering requirements prior to promotion [34]. The evaluation and advancement processes in the Philippine system are more flexible, placing more of an emphasis on ongoing development and more repair possibilities. This discrepancy is a result of differing perspectives on educational justice as well as shifting social norms around academic success [38].

Furthermore, different priorities in the two systems are shown by the arrangement of specialized mathematical information. With a distinct trend toward higher-level mathematical reasoning, Singapore's curriculum introduces complex mathematical ideas at younger grade levels [35]. With a stronger focus on real-world applicability and practical applications, the Philippine curriculum often places specialized subject later in the sequence. Different educational objectives and social demands for mathematical preparation are reflected in this discrepancy [39].

Finally, different approaches to grade-level placement are seen in the way challenging students are treated. While maintaining high standards and providing focused intervention, Singapore's system offers intense support within grade-level expectations [33]. With a variety of support systems and alternate development routes, the Philippine system exhibits more adaptability in accepting varying learning speeds. This discrepancy is a result of the two nations' disparate approaches to educational inclusion and resource availability [37].

CONCLUSION

The study reveals that Singapore's curriculum demonstrates a more focused and intensive approach in terms of scope and sequence that emphasizes depth over breadth, with strong vertical coherence and explicit concept connections. In contrast, the Philippines curriculum adopts a broader approach with greater emphasis on cross-curricular integration and real-world applications, though with relatively less depth in topic coverage. These differences extend to their implementation of the spiral curriculum approach, where Singapore maintains tighter control with strict mastery requirements, while the Philippines offers more flexibility in concept revisiting and horizontal integration. Moreover, Singapore implements a more accelerated and rigid structure in terms of grade level placement and progression of mathematical concepts, introducing advanced concepts earlier with clear benchmarks and limited flexibility in progression paths. The Philippine system, on the other hand, adopts a more flexible approach with multiple entry points and pathways to accommodate diverse learner needs.

These fundamental differences reflect varying philosophical approaches to mathematics education, different societal contexts, and distinct educational priorities between the two countries. The implications of these findings suggest that while Singapore's structured approach has proven successful in international assessments, the Philippine system's flexibility better addresses the diverse needs of its student population and resource contexts. Thus, the Philippine mathematics education could benefit from incorporating elements of Singapore's depth-focused approach while maintaining its adaptive flexibility, particularly in areas where resource availability and student readiness allow for more intensive mathematical concept development.

Declarations

Funding. The authors received no financial support for the research, authorship, and/or publication of this article.

Ethical Approval. All studies included in this research adhered to the ethical principles outlined in the Philippine Health Research Ethics Board (PHREB), created under DOST Special Order No. 091 s. 2006.

Conflict of Interest. No conflict of interest exists for this manuscript for any of the authors

Data Availability. Data will be available on request.

REFERENCES

1. Dulo, A. A. (2021). The Concept of School Curriculum and Instruction: Learning Material for Undergraduate Students in Education Discipline. Retrieved on December 24, 2024 from <https://scholar.archive.org/work/hb2t36osnfdte3hog3cac66ty/access/wayback/https://nadre.ethernet.edu.et/record/20094/files/curriculum%20and%20instruction.pdf>
2. Tyler, R.W. (1949). Basic principles of curriculum and instruction. Chicago: University of Chicago Press.
3. Syomwene, A. (2020). Curriculum theory: characteristics and functions. European Journal of Education Studies. DOI: <https://doi.org/10.5281/zenodo.3718433>
4. Taba, H. (1962). Curriculum development: Theory and practice. New York: Harcourt, Brace, & World.
5. Pepin, B., & Gueudet, G. (2020). Curriculum resources and textbooks in mathematics education. Encyclopedia of mathematics education, 172-176. DOI: https://doi.org/10.1007/978-3-030-15789-0_40
6. Wittmann, E. C. (2021). Connecting mathematics and mathematics education: Collected papers on mathematics education as a design science (p. 318). Springer Nature. Retrieved on December 24, 2024 from <https://library.oapen.org/handle/20.500.12657/43294>
7. Sitopu, J. W., Khairani, M., Roza, M., Judijanto, L., & Aslan, A. (2024). The importance of integrating mathematical literacy in the primary education curriculum: A literature review. International Journal of Teaching and Learning, 2(1), 121-134. Retrieved on December 24, 2024 from <https://injournal.org/index.php/12/article/view/54/82>
8. Schleicher, A. (2019). PISA 2018: Insights and interpretations. OECD Publishing. ERIC Number: ED601150
9. Chileshe, C. B. (2023). Mathematics teachers' classroom practices in the context of 21st century skills: a case of one secondary school in Lusaka district, Zambia (Doctoral dissertation, The University of Zambia). Retrieved on December 24, 2024 from <https://dspace.unza.zm/handle/123456789/8978>
10. Lubis, M. S. A., Fatmawati, E., Pratiwi, E. Y. R., Sabtohadhi, J., & Damayanto, A. (2022). Understanding curriculum transformation towards educational innovation in the era of all-digital technology. Nazhruna: Jurnal Pendidikan Islam, 5(2), 526-542. Retrieved on December 24, 2024 from <https://scholar.archive.org/work/kmcjuo4azreyno2vm4ymv7zlx/a/access/wayback/https://e-journal.ikhac.ac.id/index.php/NAZHRUNA/article/download/2110/917>
11. Tan, O. S. (2021). Singapore math and science education: The larger picture beyond PISA achievements and “secret” factors. Singapore Math and Science Education Innovation: Beyond PISA, 17-41. DOI: https://doi.org/10.1007/978-981-16-1357-9_2
12. Alinsunurin, J. (2021). Unpacking underperformance: Learning mindsets and the challenge of academic achievement among Filipino students. AIM RSN PCC Discussion Paper, 4.
13. Scerif, G., Blakey, E., Gattas, S., Hawes, Z., Howard, S., Merkley, R., ... & Simms, V. (2023). Making the executive ‘function’ for the foundations of mathematics: The need for explicit theories of change for early interventions. Educational Psychology Review, 35(4), 110. DOI: <https://doi.org/10.1007/s10648-023-09824-3>
14. Choy, B. H., Lee, M. Y., & Mizzi, A. (2020). Insights into the Teaching of Gradient from an Exploratory Study of Mathematics Textbooks from Germany, Singapore, and South Korea. International Electronic Journal of Mathematics Education, 15(3), em0592. <https://doi.org/10.29333/iejme/8273>
15. Toh, T. L. (2021). School calculus curriculum and the Singapore mathematics curriculum framework. ZDM–Mathematics Education, 53(3), 535-547. DOI: <https://doi.org/10.1007/s11858-021-01225-6>
16. Serçe, F., & Acar, F. (2021). A comparative study of secondary mathematics curricula of Turkey, Estonia, Canada, and Singapore. Journal of Pedagogical Research, 5(1), 216-242. DOI: <https://doi.org/10.33902/JPR.2021167798>
17. Efendi, M. Y., & Hsi, N. L. (2020). The comparison of elementary curriculum education between Indonesia and Singapore. Journal Of Teaching And Learning In Elementary Education, 3(1), 22-36. DOI: <http://dx.doi.org/10.33578/jtlee.v3i1.7323>

18. Baysal, E., & Sevinc, S. (2022). The role of the Singapore bar model in reducing students' errors on algebra word problems. *International Journal of Mathematical Education in Science and Technology*, 53(2), 289-310. <https://doi.org/10.1080/0020739X.2021.1944683>
19. Teo, T. W., & Choy, B. H. (2021). STEM education in Singapore. *Singapore math and science education innovation: Beyond PISA*, 43-59. DOI: https://doi.org/10.1007/978-981-16-1357-9_3
20. Ng, S. F. (2022). The model method: Crown jewel in Singapore mathematics. *Asian Journal for Mathematics Education*, 1(2), 147-161. DOI: <https://doi.org/10.1177/27527263221107526>
21. Peñuela, N. Y. A. (2020). Professional Development Program for the Implementation of Singapore Math Curriculum Elements at a Private School in Bogotá.
22. Kilag, O. K., Sasan, J. M., Maguate, G., Odango, J., Cruz, J. N. D., & Fulgencio, R. (2024). Curriculum Innovation in Philippine Education: The MATATAG Curriculum. *International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRIS)*, 1(6), 727-732. Retrieved on December 24, 2024 from https://www.researchgate.net/profile/Sydney-Rome-Dela-Cruz/post/I_need_the_reference_of_this_article/attachment/6731c95e5511f57e967b1d2a/AS%3A11431281289597454%401731316061393/download/%E2%9C%85%2BIMJRIS%2BV1%286%29%2B727-732%2B-%2B61%2BCurriculum-Innovation-in-Philippine-Education.pdf
23. Garcia, M. T. T., & Dela Rosa, M. T. P. (2021). Implementation of the Junior High School Mathematics Curriculum. *Asia Pacific Journal on Curriculum Studies*, 4(1), 25-48. DOI: <https://doi.org/10.53420/apjcs.2021.3>
24. Refugio, C. N., Galleto, P. G., Noblefranca, C. D., Inoferio, H. V., Macias Jr, A. O., Colina, D. G., & Dimalig, C. Y. (2020). Content Knowledge Level of Elementary Mathematics Teachers: The Case of a School District in the Philippines. *Cypriot Journal of Educational Sciences*, 15(3), 619-633. DOI: 10.18844/cjes.v15i3.4551 Available at <https://files.eric.ed.gov/fulltext/EJ1262222.pdf>
25. Ruiz, A., Niss, M., Artigue, M., Cao, Y., & Reston, E. (2023). A first exploration to understand mathematics curricula implementation: results, limitations and successes. *Mathematics Curriculum Reforms Around the World*, 231. DOI: https://doi.org/10.1007/978-3-031-13548-4_16
26. Dio, R. V. (2020). Exploring vertical coherence of content topics in Philippine spiral Kto10 mathematics curriculum. *International Journal of Learning, Teaching and Educational Research*, 19(11), 259-282. DOI: <https://doi.org/10.26803/ijlter.19.11.15>
27. Oliva, R. E. (2023). The effectiveness of the spiral progression approach in teaching junior high school mathematics in Zambales, Philippines. *Journal of Education Naresuan University*, 25(4), 91-101. Retrieved on December 24, 2024 from https://so06.tci-thaijo.org/index.php/edujournal_nu/issue/download/16846/5427#page=102
28. Barrot, J. S. (2023). K to 12 curriculum reform in the Philippines: Towards making students future ready. *Asia Pacific Journal of Education*, 43(4), 1193-1207. DOI: <https://doi.org/10.1080/02188791.2021.1973959>
29. Lee, Y. J., & Ho, J. (2022). Basic education in Singapore. In *International Handbook on Education in South East Asia* (pp. 1-25). Singapore: Springer Nature Singapore. DOI: https://doi.org/10.1007/978-981-16-8136-3_6-2
30. Heng, T. T., & Song, L. (2020). A proposed framework for understanding educational change and transfer: Insights from Singapore teachers' perceptions of differentiated instruction. *Journal of Educational Change*, 21(4), 595-622. DOI: <https://doi.org/10.1007/s10833-020-09377-0>
31. Tirol, S. L. (2022). Spiral Progression Approach in the Kto 12 Science Curriculum: A Literature Review. *International Journal of Education (IJE)*, 10(4). DOI: <https://doi.org/10.5121/ije.2022.10403>
32. Chan, S. W., Looi, C. K., & Sumintono, B. (2021). Assessing computational thinking abilities among Singapore secondary students: A Rasch model measurement analysis. *Journal of Computers in Education*, 8(2), 213-236. DOI: <https://doi.org/10.1007/s40692-020-00177-2>
33. VanTassel-Baska, J., Hubbard, G. F., & Robbins, J. I. (2021). Differentiation of instruction for gifted learners: Collated evaluative studies of teacher classroom practices. *Handbook of giftedness and talent development in the Asia-Pacific*, 945-979. DOI: https://doi.org/10.1007/978-981-13-3041-4_45
34. Vicente, S., Verschaffel, L., Sánchez, R., & Múñez, D. (2022). Arithmetic word problem solving. Analysis of Singaporean and Spanish textbooks. *Educational Studies in Mathematics*, 111(3), 375-397. DOI: <https://doi.org/10.1007/s10649-022-10169-x>

35. Borji, V., & Farsani, D. (2023). Intended mathematics curriculum in grade 1: A comparative study. *Eurasia Journal of Mathematics, Science and Technology Education*, 19(3), em2237. DOI: <https://doi.org/10.29333/ejmste/12977>
36. de Guzman, A. B., & Adamos, J. L. (2020). Like the layers of an onion: curricular noticing as a lens to understand the epistemological features of the Philippine K to 12 secondary mathematics curriculum materials. *Educational Research for Policy and Practice*, 19(3), 389-409. DOI: <https://doi.org/10.1007/s10671-020-09264-8>
37. Bartolome, D. J. (2023). Spiral progression approach in teaching mathematics: Its implementation in the public secondary school. *Quantum Journal of Social Sciences and Humanities*, 4(3), 81-100. DOI: <https://doi.org/10.55197/qjssh.v4i3.226>
38. Gratela, K. F., Dio, R. V., & Deri, R. A. (2023). Mapping of Philippine Kto10 Most Essential Learning Competencies (MELCs) in Probability and Statistics. *EDUCATUM Journal of Science, Mathematics and Technology*, 10(2), 19-28. DOI: <https://doi.org/10.37134/ejsmt.vol10.2.3.2023>
39. Diago, P. N., & Parcutilo, J. O. (2023). Surfing the Mathematical Waves: Instructional Practices of Mathematics Teachers in Island Public Schools of Surigao City, Philippines. *American Journal of Educational Research*, 11(9), 555-561. DOI:10.12691/education-11-9-3