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Implementing and Evaluating Primary School Curricula Across National Contexts: A Systematic Literature Review of Indonesia, Finland, Singapore, and Malaysia

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Abstract

Primary education curricula play a critical role in developing foundational knowledge, skills, values, and twenty-first-century competencies. However, differences in curriculum governance, implementation, and evaluation across national contexts warrant systematic examination. This study reviews the development, structure, implementation, and evaluation of primary education curricula in Indonesia, Finland, Singapore, and Malaysia to identify comparative insights for curriculum development in Indonesia. A systematic literature review was conducted using the Scopus database, covering English-language journal articles published between 2016 and November 19, 2026. Following PRISMA 2020 guidelines, 488 records were identified, of which 23 studies met the eligibility criteria. The data were analyzed through thematic synthesis and cross-national comparative analysis. The findings reveal shared

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commitments to holistic student development, competency-based learning, and student-centred approaches. However, the four countries differ in curriculum governance, teacher autonomy, instructional practices, and assessment systems. Curriculum implementation is influenced by teacher capacity, institutional support, socioeconomic conditions, and educational resources. Evidence concerning student learning outcomes remains uneven across countries and competency domains, limiting direct comparisons of national curriculum effectiveness. The findings suggest that effective curriculum development requires alignment among policy objectives, classroom implementation, assessment practices, and contextual needs. For Indonesia, priorities include strengthening teacher professional development, contextualizing learning materials, improving assessment practices, and ensuring equitable access to educational resources..

Keywords: Primary Education; Curriculum Implementation; Curriculum Evaluation; Systematic Literature Review; Comparative Education

INTRODUCTION

Primary education is a fundamental stage in the development of children's knowledge, skills, values, and attitudes. At this level, learners establish foundational competencies that influence their subsequent educational experiences and participation in society. The curriculum plays a central role in guiding this process because it defines educational objectives, learning content, pedagogical expectations, and assessment practices. Therefore, the quality of a primary education curriculum cannot be understood solely through its written objectives; it also depends on how those objectives are interpreted, implemented, and evaluated in educational settings (Chapman et al., 2018). Contemporary primary education is increasingly expected to respond to social, technological, economic, and cultural changes. In addition to foundational literacy and numeracy, schools are expected to develop critical thinking, creativity, communication, collaboration, digital literacy, and other competencies associated with twenty-first-century learning. These expectations have encouraged countries to reconsider curriculum content, instructional approaches, and assessment systems. Nevertheless, incorporating new competencies into curriculum documents does not automatically ensure that learners acquire them. Their development depends on the alignment between curriculum objectives, learning

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activities, teaching resources, and assessment practices (Bas, 2026; González-Salamanca et al., 2020).

Curriculum implementation involves several interconnected dimensions that need to be distinguished analytically. The intended curriculum refers to the knowledge, competencies, and learning objectives established in official curriculum frameworks (Ross, 2023). The implemented curriculum concerns what teachers actually teach and how learning activities are organized in classrooms. Meanwhile, the attained curriculum relates to what students ultimately learn and demonstrate through their knowledge, skills, and competencies (Mohammadi & Shekari, 2014). Examining these dimensions together provides a more comprehensive understanding of curriculum development and implementation than examining curriculum policies or student achievement independently (Chiang et al., 2026). Differences between intended, implemented, and attained curricula may emerge because educational policies are interpreted and enacted within diverse institutional and classroom conditions. Teachers may experience challenges in translating curriculum expectations into appropriate learning activities, while schools may differ in their access to instructional materials, technology, professional development, and institutional support. Students' socioeconomic backgrounds and local cultural contexts may also influence their learning experiences. Consequently, curriculum implementation should be examined as a contextual process rather than assumed to occur uniformly across schools or educational systems (Chiang et al., 2026; Mohammadi & Shekari, 2014).

Teachers occupy a particularly important position in translating curriculum expectations into classroom practices. Their subject knowledge, pedagogical competence, professional beliefs, and understanding of curriculum objectives can influence instructional decisions and assessment strategies. However, effective implementation also requires supportive school leadership, adequate learning resources, relevant professional development, and coherent educational policies. These factors interact with one another and may create different opportunities and constraints across national contexts. Understanding their influence is therefore essential when evaluating how curriculum reforms are experienced and enacted in primary schools (Ntumi et al., 2026). A comparative examination of primary education curricula can provide insights into how different educational systems respond to similar educational challenges under distinct national conditions. Indonesia, Finland, Singapore, and Malaysia offer relevant contexts for such an examination because their curriculum policies and educational practices reflect different historical, institutional, cultural, and policy environments. Comparing these countries may reveal

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common priorities, distinctive implementation approaches, and contextual factors that shape curriculum practices. However, meaningful comparison requires attention to differences in educational structures, curriculum terminology, and the scope of evidence reported in the literature (Bintyelyes et al., 2026; Thahira et al., 2026).

In Indonesia, primary education curriculum reform has involved efforts to strengthen learning quality while responding to national priorities and local needs. Research has examined the implementation and stakeholder implications of the Merdeka Curriculum in primary schools (Wardani et al., 2023), as well as the integration of local wisdom into curriculum development and learning activities (Fathurrochman et al., 2026; Ferdi Hasan & Monita, 2026; Hernawan et al., 2022). Other studies have explored the development of learning designs that connect mathematical literacy with primary school curriculum content (Amir et al., 2019). Together, these studies indicate several dimensions of curriculum development and implementation that warrant further synthesis. In Finland, research on primary education has addressed curriculum knowledge, teaching practices, and approaches to supporting pupils' learning. Studies have examined conceptualizations of knowledge in Finnish primary school curricula (Hillbom et al., 2025), teachers' experiences of integrating information and communication technology into craft education (Törmälä, 2021), and the use of visual representations to develop mathematical problem-solving skills (Kaitera & Harmoinen, 2022). Research has also considered approaches for capturing pupils' perspectives on educational experiences (Niemi et al., 2018). These studies provide insights into curriculum-related practices, although their specific research emphases differ.

In Singapore, curriculum research has examined desirable attributes and priorities within primary education in relation to broader educational expectations. For example, Phaisamran and Phaisamran (2024) conducted a comparative study of desirable attributes in the primary education curricula of Thailand and Singapore. This work provides a point of reference for examining curriculum orientations and the competencies emphasized in Singapore's primary education context. Nevertheless, the available evidence needs to be considered alongside research from the other countries to identify similarities and differences in curriculum structures, implementation practices, and evaluation approaches. In Malaysia, studies have addressed several aspects of primary curriculum development, implementation, and learning support. Research has examined the evaluation of English language textbooks used in the KSSR curriculum (Momand et al., 2019), teachers' perceptions of CEFR-aligned English textbook implementation

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(Govindarajoo et al., 2025), and the integration of global citizenship education into curriculum-related practices (S. Z. S. Zakaria et al., 2021). Other studies have explored environmental education (Phang et al., 2016), educational technology and learning resources (Tan & Lim, 2019), and competencies associated with contemporary learning (Abdullah et al., 2026; Fan et al., 2025). This range of topics illustrates the diversity of curriculum-related research in Malaysia.

Although these studies contribute important evidence, the literature is distributed across different subject areas, curriculum components, research designs, and educational concerns. Some studies focus on curriculum policy or textbook content, whereas others investigate classroom implementation, teacher perceptions, learning resources, or particular student competencies. Such differences make it difficult to develop an integrated understanding of how primary education curricula are structured, implemented, and evaluated across the four countries. A systematic synthesis is therefore needed to organize the available evidence and examine the extent to which findings can be compared across national contexts. This systematic literature review addresses that need by examining research on primary education curricula in Indonesia, Finland, Singapore, and Malaysia. It focuses on curriculum development and structure, implementation in teaching and learning, factors that facilitate or constrain implementation, and approaches used to evaluate curriculum relevance and outcomes. Evidence concerning student learning outcomes is also considered where it is connected to curriculum-related research, particularly in literacy, numeracy, science, critical thinking, digital literacy, and twenty-first-century competencies. By synthesizing these dimensions, the review aims to identify shared patterns, national differences, and implications for curriculum development in Indonesia. The review is guided by six research questions:

RQ1: How are primary education curricula developed and structured in Indonesia, Finland, Singapore, and Malaysia?

RQ2: How are primary education curricula implemented in the four countries in terms of curriculum planning, classroom practices, teaching approaches, and assessment?

RQ3: What teacher-related, institutional, socioeconomic, and policy factors facilitate or constrain the implementation of primary education curricula across the four countries?

RQ4: How are primary education curricula evaluated, and what approaches are used to assess their relevance, implementation, and effectiveness?

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RQ5: What supporting evidence is available regarding student learning outcomes, particularly in literacy, numeracy, science, critical thinking, digital literacy, and twenty-first-century competencies?

RQ6: What similarities and differences emerge from the comparative analysis of primary education curricula across Indonesia, Finland, Singapore, and Malaysia, and what evidence-informed practices may inform curriculum development in Indonesia?

RESEARCH METHOD

1.1. Research Design and Systematic Literature Review

This study employed a Systematic Literature Review (SLR) to examine primary education curricula across four national contexts: Indonesia, Finland, Singapore, and Malaysia. The review focused on three interrelated dimensions of curriculum: development, implementation, and evaluation. A systematic review approach was adopted to identify, select, critically appraise, and synthesize relevant scholarly publications in a transparent and reproducible manner (Snyder, 2019). The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure a systematic reporting process and provide a clear account of study identification, screening, eligibility assessment, and inclusion (Page et al., 2021). The review was designed to generate both country-specific and cross-national insights into how primary education curricula are developed, structured, implemented, and evaluated. The analysis considered curriculum policies, educational objectives, content organization, teaching and learning practices, teacher readiness and professional autonomy, assessment practices, and institutional and contextual factors influencing curriculum implementation. Student learning outcomes, particularly in literacy, numeracy, science, critical thinking, digital literacy, and other twenty-first-century competencies, were considered as supporting evidence for understanding curriculum evaluation rather than as the primary focus of the literature search. The review also sought to identify similarities, differences, contextual influences, and potentially transferable practices across the four countries, with particular attention to their implications for primary education curriculum development in Indonesia.

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1.2. Search Strategy and Data Sources

The literature search was conducted using the Scopus database. The search strategy focused exclusively on primary education curriculum research and combined terms related to primary education, elementary schooling, curriculum development, curriculum implementation, and curriculum evaluation with the names of the four countries under investigation. Country-specific search strategies were developed to capture relevant national curriculum terminology, including *Kurikulum Merdeka* and *Kurikulum 2013* for Indonesia, *basic education curriculum* and *national core curriculum* for Finland, primary education curriculum terminology for Singapore, and *Kurikulum Standard Sekolah Rendah (KSSR)* for Malaysia. The search terms were applied to the title, abstract, and keywords fields to identify publications addressing the curriculum of primary-level education. The publication period was restricted to studies published between 2016 and November 19, 2026, corresponding to the date on which the Scopus search was conducted. The search was limited to English-language journal articles to maintain consistency in the screening and synthesis process. The database filters included publication year (2016–2026), document type (article), language (English), source type (journal), and relevant subject areas. These restrictions were applied consistently across the four country-specific searches.

1.3. Eligibility Criteria and Study Selection

Studies were considered eligible if they: (1) were published between 2016 and November 19, 2026; (2) were written in English; (3) were published as journal articles; (4) examined primary education or elementary school education, corresponding to Grades 1–6 in Indonesia, Primary 1–6 in Singapore, Years 1–6 in Malaysia, and Grades 1–6 within Finland's basic education system; and (5) addressed at least one of the following dimensions: curriculum development, curriculum design and structure, curriculum implementation, or curriculum evaluation. Studies were excluded if they focused exclusively on early childhood education, secondary education, or higher education; examined teaching methods or individual learning interventions without a substantive connection to the primary education curriculum; investigated student achievement without a meaningful relationship to curriculum development, implementation, or evaluation; or did not provide identifiable evidence relevant to one of the four countries. Publications that did not meet the specified document and language criteria were also excluded.

The initial Scopus searches generated 488 records across the four countries. Following the application of database filters, including publication year, document type, language, source type,

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and subject area, 109 records remained for title and abstract screening. Specifically, the initial search identified 26 records for Indonesia, 141 for Finland, 170 for Singapore, and 151 for Malaysia. After database filtering, the respective numbers were reduced to 13, 57, 6, and 33 records. Thus, 379 records were removed through the database filtering process, leaving 109 records for subsequent screening. The title and abstract screening resulted in the exclusion of 40 records that did not meet the preliminary relevance criteria, while 69 reports were retained for full-text retrieval and eligibility assessment. All 69 reports were successfully retrieved and assessed through full-text examination. Following this assessment, 46 reports were excluded because they did not meet the established eligibility criteria. Ultimately, 23 studies were included in the systematic literature review. The study selection process is illustrated in Figure 1 using the PRISMA 2020 flow diagram.

1.4. Data Extraction and Synthesis

Relevant information was extracted from each eligible study using a structured framework covering publication details, country, educational level, research design, curriculum policies, structure, implementation, assessment, contextual factors, key findings, and implications. The evidence was synthesized through deductive and inductive thematic coding. Initial themes included curriculum development and structure, implementation practices, teacher readiness and autonomy, assessment and evaluation, and contextual factors. Additional themes were developed when recurring patterns emerged. A cross-national comparison was then conducted to identify similarities and differences among Indonesia, Finland, Singapore, and Malaysia in curriculum objectives, organization, implementation, assessment, and contextual conditions. The analysis also identified evidence-informed practices relevant to Indonesia, while considering national differences to avoid unsupported comparisons.

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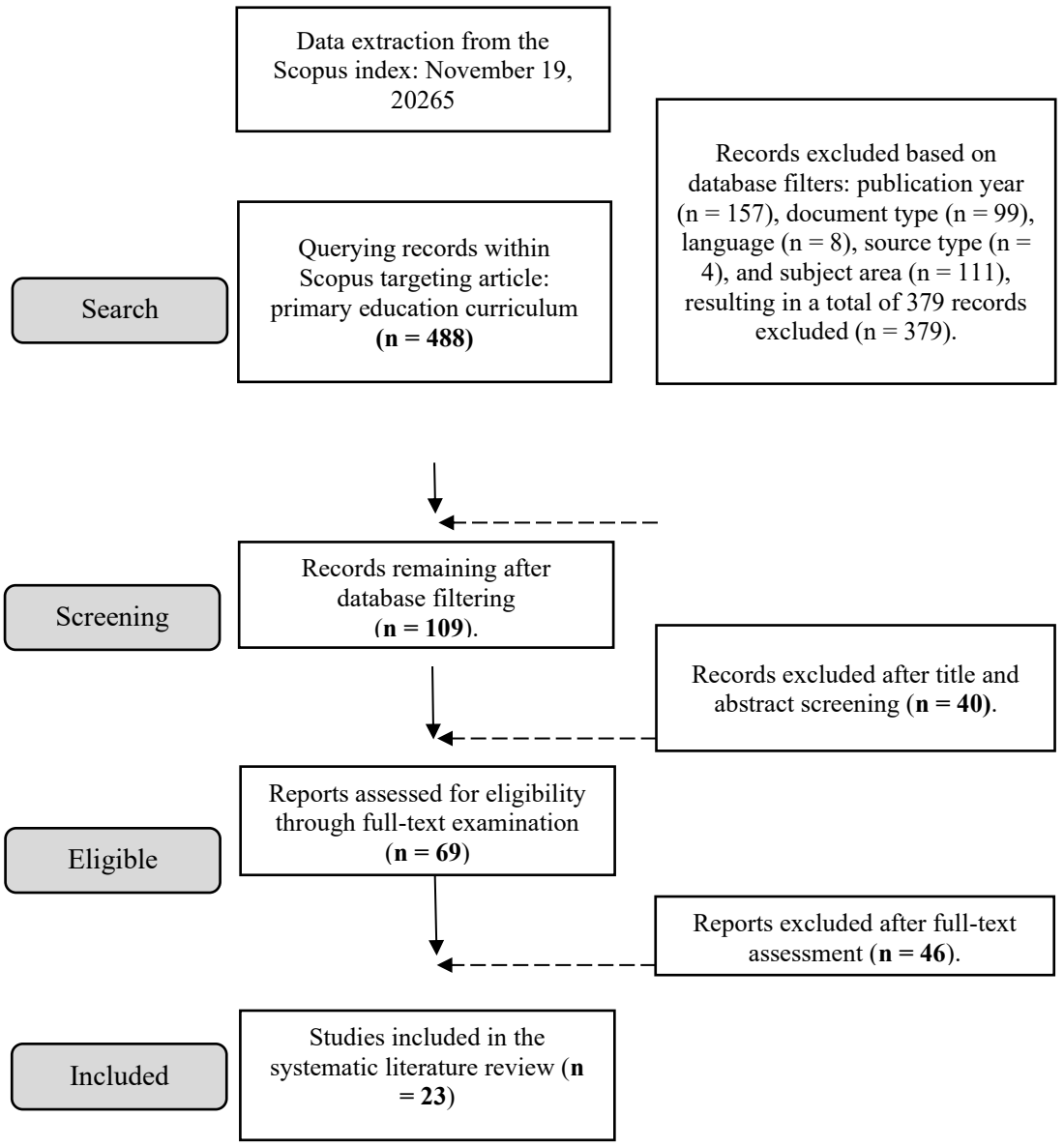

Figure 1. Systematic Literature Review information flow using PRISMA

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RESULT AND DISCUSSION

1.5. Research Result

1.5.1. Curriculum Development and Structure

RQ1: How are primary education curricula developed and structured in Indonesia, Finland, Singapore, and Malaysia?

The reviewed studies indicate that primary education curricula in Indonesia, Finland, Singapore, and Malaysia differ in their development processes, organizational structures, educational orientations, and approaches to local adaptation. Although all four countries emphasize foundational knowledge and broader student competencies, they vary in the distribution of responsibilities between national authorities, schools, and teachers. These differences reflect distinct educational priorities and governance arrangements within each national context.

1.5.2 Curriculum Development and Governance

Indonesia, Singapore, and Malaysia adopt relatively centralized approaches to curriculum development, whereas Finland provides greater responsibility to local authorities and schools. In Indonesia, the national government establishes curriculum policies and learning frameworks. The introduction of the Merdeka Curriculum represents a shift toward competency-based education, with greater flexibility for schools to organize learning according to students' needs and local contexts. Teachers, school leaders, and communities also contribute to the adaptation of curriculum policies at the school level (Wardani et al., 2023). In Finland, the national curriculum establishes common educational objectives and guidelines, while municipalities and schools develop local curricula. Teachers have considerable professional autonomy in interpreting national objectives and organizing learning in accordance with local circumstances. This arrangement reflects a governance model in which national consistency is combined with local responsibility and professional expertise (Kantelinen et al., 2025; Niemi et al., 2018).

Singapore follows a centrally coordinated model led by the Ministry of Education (MOE). National educational priorities guide curriculum development, particularly through initiatives such as *Thinking Schools, Learning Nation* and *Teach Less, Learn More*. These initiatives emphasize thinking skills, learner engagement, and holistic development. Schools and teachers are responsible for translating national priorities into educational activities and programmes (Phaisamran & Phaisamran, 2024). Similarly, Malaysia develops its primary curriculum through

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the Ministry of Education, particularly the Curriculum Development Division. The Standard Curriculum for Primary Schools (*Kurikulum Standard Sekolah Rendah*, KSSR) provides national learning standards and content. Its development is aligned with the Malaysia Education Blueprint 2013–2025, which emphasizes bilingual proficiency, thinking skills, leadership, ethics, and national identity (Govindarajoo et al., 2025).

1.5.3 Curriculum Structure and Learning Organization

The four countries organize primary education through different structures. Indonesia provides six years of primary education, divided into three developmental phases: Phase A (Grades 1–2), Phase B (Grades 3–4), and Phase C (Grades 5–6). The Merdeka Curriculum combines intra-curricular learning with the *Projek Penguatan Profil Pelajar Pancasila* (P5) (Fauzan et al., 2023). It also integrates Natural Sciences and Social Studies into a single subject, *Ilmu Pengetahuan Alam dan Sosial* (IPAS), reflecting an effort to connect subject knowledge with broader learning themes. In Finland, primary education covers Grades 1–6 as part of a nine-year comprehensive basic education system. The curriculum combines subject-based instruction with multidisciplinary learning modules (*monialaiset oppimiskokonaisuudet*). This arrangement encourages connections between different subject areas. The reviewed literature also identifies the use of digital learning tools, including ePortfolios in craft education, as part of learning organization and documentation (Törmälä, 2021).

Singapore organizes primary education into six years, from Primary 1 to Primary 6. Its curriculum combines academic subjects with programmes supporting knowledge, skills, character, and citizenship development. These include language subjects, mathematics, humanities and arts, as well as Character and Citizenship Education (CCE), Co-Curricular Activities (CCA), and Values-in-Action (VIA). Consequently, curriculum organization extends beyond academic instruction to include personal and social development (Phaisamran & Phaisamran, 2024). Malaysia also provides six years of primary education under the KSSR framework. Primary education is delivered through national schools (*Sekolah Kebangsaan*) and national-type schools (*Sekolah Jenis Kebangsaan*), including Chinese- and Tamil-medium schools. The curriculum includes languages, mathematics, science, history, Islamic or moral education, and other subjects. Themes such as STEM, environmental education, and global citizenship are incorporated across existing subjects (Govindarajoo et al., 2025; S. Z. S. Zakaria et al., 2021).

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1.5.4 Curriculum Orientation and Key Competencies

All four countries emphasize competencies beyond the acquisition of subject knowledge, although their priorities differ. Indonesia's Merdeka Curriculum emphasizes foundational literacy and numeracy alongside character development through the Pancasila Student Profile. Its six dimensions include faith and noble character, global diversity, mutual cooperation, independence, critical reasoning, and creativity. These dimensions connect academic development with national values and character education. Finland emphasizes holistic development, pupil participation, and transversal competencies. Its curriculum orientation includes multiliteracy, information and communication technology skills, critical thinking, and cultural competence. The concept of *Bildung* also provides a philosophical foundation for developing individuals who can participate responsibly in society. Singapore emphasizes holistic education through the integration of cognitive development, social-emotional learning, character education, and twenty-first-century competencies. Its curriculum highlights communication, social awareness, self-management, and lifelong learning (Phaisamran & Phaisamran, 2024). Malaysia's curriculum emphasizes bilingual proficiency, thinking skills, leadership, ethics, spirituality, and national identity. Global citizenship, sustainable development, and environmental awareness are also incorporated as cross-curricular themes, broadening the scope of student competencies (Zakaria et al., 2021).

1.5.5 Curriculum Flexibility and Local Adaptation

Curriculum flexibility varies across the four countries. Indonesia provides schools and teachers with opportunities to adapt learning activities to students' needs and local circumstances. Local content (*muatan lokal*) and the integration of regional values provide mechanisms for connecting national curriculum objectives with community contexts (Fathurrochman et al., 2026). Finland provides substantial autonomy to municipalities, schools, and teachers in developing and implementing local curricula. This enables educational objectives and learning arrangements to be adapted to pupils' needs and local circumstances (Niemi et al., 2018). In Singapore, flexibility operates within a centrally coordinated curriculum framework. Schools provide programmes and activities that support students' different interests and abilities while maintaining national educational priorities (Phaisamran & Phaisamran, 2024). Malaysia maintains standardized national curriculum requirements, but teachers may adapt instructional materials to local contexts. Research on CEFR-aligned English textbooks, for example, highlights

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the importance of making learning materials relevant to pupils' linguistic and cultural backgrounds (Govindarajoo et al., 2025).

1.5.6 Curriculum Implementation

RQ2: How are primary education curricula implemented in the four countries in terms of curriculum planning, classroom practices, teaching approaches, and assessment?

Curriculum implementation involves translating curriculum policies and learning objectives into instructional planning, classroom practices, teaching approaches, and assessment activities. Across Indonesia, Finland, Singapore, and Malaysia, implementation reflects differences in teacher autonomy, school-level planning, instructional practices, and assessment approaches. Although all four countries emphasize student-centred learning and holistic development, the ways these principles are implemented vary across national contexts (Hillbom et al., 2025; Phaisamran & Phaisamran, 2024; Wardani et al., 2023).

1.5.7 Curriculum Planning

In Indonesia, schools translate the Merdeka Curriculum's learning outcomes into instructional plans, organizing learning activities according to three developmental phases: Phase A (Grades 1–2), Phase B (Grades 3–4), and Phase C (Grades 5–6). Planning also integrates intra-curricular learning with Pancasila Student Profile Strengthening Projects (P5), providing opportunities to address students' learning needs and local contexts (Wardani et al., 2023). In Finland, planning combines national curriculum guidelines with local curricula developed by municipalities and schools. Teachers have professional responsibility for organizing learning activities, including multidisciplinary modules that may involve pupils in selecting themes and activities (Hillbom et al., 2025; Niemi et al., 2018). Singapore follows centrally coordinated planning under the Ministry of Education, with academic instruction organized alongside character and citizenship programmes (Phaisamran & Phaisamran, 2024). Malaysia implements school-level planning through KSSR and DSKP, incorporating subject learning standards and cross-curricular themes, including global citizenship and environmental education (Govindarajoo et al., 2025; N. A. Zakaria et al., 2021).

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1.5.8 Classroom Practices

Classroom practices in Indonesia include contextual learning activities that connect subject content with students' experiences and local environments. The integration of Natural Sciences and Social Studies into IPAS provides opportunities for interdisciplinary learning, while traditional games such as *Fort Defending* have been used to support mathematical literacy through collaborative activities and learning worksheets (Amir et al., 2019; Wardani et al., 2023). In Finland, classroom activities emphasize practical exploration, inquiry, and multidisciplinary learning. Examples include investigating natural phenomena, conducting experiments, and documenting learning through digital ePortfolios (Niemi et al., 2018; Törmälä, 2021). Singaporean classroom practices combine academic instruction with group activities, project work, Character and Citizenship Education, and Values-in-Action programmes (Phaisamran & Phaisamran, 2024). In Malaysia, teachers use textbooks and supplementary digital resources to support classroom instruction, although instructional materials may require cultural and linguistic adaptation to suit pupils' (Govindarajoo et al., 2025; Momand et al., 2019; Zulkifli et al., 2021).

1.5.9 Teaching Approaches

Teaching approaches reflect different ways of facilitating student learning. Indonesia emphasizes differentiated instruction to accommodate students' varying readiness and learning needs, alongside project-based activities through P5(Wardani et al., 2023). Finland prioritizes inquiry-based, participatory, and collaborative learning, encouraging pupil agency and active involvement in knowledge construction (Havu-Nuutinen et al., 2022; Niemi et al., 2018). In Singapore, project-based learning and teacher-facilitated activities are used to develop critical thinking, communication, and student engagement (Phaisamran & Phaisamran, 2024). Malaysia promotes 21st-century learning (PAK21), higher-order thinking skills (HOTS), and inquiry-oriented approaches, particularly in STEM learning activities (Phang et al., 2016).

1.5.10 Assessment Practices

Assessment practices also differ across the four countries. Indonesia emphasizes diagnostic and formative assessment to identify learning needs and monitor competency development, complemented by observations of student participation and character development in P5 activities (Wardani et al., 2023). Finland uses continuous assessment through teacher observations, pedagogical documentation, digital portfolios, and pupil self- and peer-

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assessment (Niemi et al., 2018; Törmälä, 2021). Singapore adopts a holistic assessment orientation that considers academic achievement alongside students' social and emotional development (Phaisamran & Phaisamran, 2024). Malaysia implements School-Based Assessment (PBS) aligned with DSKP performance standards, supported by classroom tasks, projects, and assessment activities (Govindarajoo et al., 2025).

1.5.11 Curriculum Implementation

RQ3: What teacher-related, institutional, socioeconomic, and policy factors facilitate or constrain the implementation of primary education curricula across the four countries?

The implementation of primary education curricula in Indonesia, Finland, Singapore, and Malaysia is influenced by interconnected teacher-related, institutional, socioeconomic, and policy factors. These factors shape how curriculum objectives are translated into classroom practices and determine the extent to which schools can respond to students' diverse learning needs. The reviewed studies identify both facilitating conditions and persistent constraints across the four countries.

1.5.12 Teacher-Related Factors

Teacher competence, professional autonomy, and readiness are important factors in curriculum implementation. In Indonesia, the Merdeka Curriculum provides opportunities for teachers to apply differentiated instruction, while the *Guru Penggerak* programme supports professional collaboration and curriculum adaptation. However, teachers face challenges in shifting toward student-centred approaches and strengthening their technological and pedagogical competencies (Wardani et al., 2023). In Finland, professional autonomy enables teachers to adapt instructional strategies to pupils' needs. Nevertheless, limited ICT training, software difficulties, and the need for stronger preparation in multilingual education constrain some classroom practices (Tiermas & Alisaari, 2026; Törmälä, 2021). In Singapore, teachers receive support for implementing project-based learning and character education, although multiple instructional and assessment responsibilities may increase their workload (Phaisamran & Phaisamran, 2024). In Malaysia, teachers are required to adapt CEFR-aligned textbooks to pupils' linguistic and cultural backgrounds, while unfamiliar content and additional preparation demands may complicate implementation (Govindarajoo et al., 2025).

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1.5.13 Institutional Factors

School leadership, infrastructure, and learning resources influence the capacity of institutions to implement curriculum requirements. In Indonesia, principals play an important role in coordinating instructional activities and P5 projects. However, infrastructure limitations and administrative demands remain challenges for school-level implementation (Wardani et al., 2023). In Finland, coordination among teachers and the availability of appropriate digital facilities affect the integration of technology into classroom learning (Törmälä, 2021). Singapore's structured school programmes provide institutional support for academic and character development, although coordinating additional programmes and student support requires effective school management (Phaisamran & Phaisamran, 2024). In Malaysia, digital learning resources offer additional instructional support, but limited equipment, supplementary materials, and internet access may restrict their use in some schools (Momand et al., 2019; Zulkifli et al., 2021).

1.5.14 Socioeconomic Factors

Students' socioeconomic, linguistic, and geographical backgrounds influence their access to learning opportunities. In Indonesia, local wisdom and traditional games connect classroom activities with community experiences, while differences in students' foundational competencies following COVID-19 disruptions create additional instructional demands (Amir et al., 2019; Wardani et al., 2023). In Finland, multilingual pupils, particularly those from immigrant backgrounds, may experience literacy difficulties and challenges in developing school belonging (Tiermas & Alisaari, 2026). In Singapore, family and community participation through programmes such as Values-in-Action supports connections between school learning and social engagement (Phaisamran & Phaisamran, 2024). In Malaysia, community-based environmental initiatives provide opportunities for contextual learning, but urban–rural disparities may affect access to educational infrastructure and resources ((Govindarajoo et al., 2025; Phang et al., 2016)

1.5.17 Policy Factors

Policy arrangements influence implementation consistency and the flexibility available to schools. Indonesia's Merdeka Curriculum provides flexibility in instructional organization, but differences in school readiness may result in variations in implementation and increase the need for sustained policy guidance (Wardani et al., 2023). Finland's National Core Curriculum (POPS

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2014) combines national objectives with local autonomy; however, broad curriculum expectations concerning digital competence may be implemented differently across schools (Törmälä, 2021). Singapore's centralized policy direction provides common educational priorities, although prescribed instructional arrangements may constrain some school-level flexibility (Phaisamran & Phaisamran, 2024). In Malaysia, KSSR and DSKP establish common curriculum standards, while the integration of cross-curricular themes requires sufficient instructional time and resources (N. A. Zakaria et al., 2021; Zulkifli et al., 2021).

Overall, the findings indicate that curriculum implementation depends on the alignment of teacher capacity, institutional readiness, socioeconomic conditions, and policy support. Professional development, effective school leadership, equitable learning resources, and context-responsive implementation are therefore important conditions for translating curriculum objectives into meaningful classroom practices.

1.5.18 Curriculum Evaluation

RQ4: How are primary education curricula evaluated, and what approaches are used to assess their relevance, implementation, and effectiveness?

The reviewed studies indicate that curriculum evaluation across Indonesia, Finland, Singapore, and Malaysia involves different approaches to examining curriculum relevance, monitoring implementation, and assessing educational effectiveness. These approaches range from policy-level reviews and curriculum document analysis to classroom observations, teacher feedback, and student learning assessments. However, the evidence varies across countries, and the evaluation of specific learning interventions should be distinguished from the evaluation of an entire national curriculum.

1.5.20 Indonesia

Curriculum evaluation in Indonesia is reflected in the formative assessment of the Merdeka Curriculum before its wider implementation. The initial implementation in 1,114 Sekolah Penggerak provided an opportunity to examine the curriculum's perceived advantages, compatibility, complexity, trialability, and observability (Wardani et al., 2023). This evaluation also considered weaknesses in the previous 2013 Curriculum, particularly content density and administrative assessment demands, which informed the shift towards more essential learning outcomes. At the school level, implementation monitoring involves principals' supervision and

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the role of Guru Penggerak in supporting teachers' interpretation of learning outcomes and curriculum implementation (Wardani et al., 2023). Student assessment under the Merdeka Curriculum emphasizes diagnostic and formative approaches to identify students' initial competencies and guide instructional adjustments. Literacy, numeracy, and character development are among the areas assessed, including through observational rubrics in the Pancasila Student Profile Strengthening Project (P5) (Wardani et al., 2023). In addition, the evaluation of a game-based mathematical literacy intervention illustrates the use of expert validation and classroom practicality assessments in examining the quality of specific learning designs (Amir et al., 2019). Nevertheless, such intervention-level findings should not be interpreted as evidence of the overall effectiveness of the national curriculum.

1.5.21 Finland

Curriculum evaluation in Finland is represented in the reviewed literature mainly through curriculum document analysis and classroom-based qualitative research. Hillbom et al. (2025), for example, examined knowledge representations in Finnish primary school curricula, providing insight into the curriculum's underlying educational orientation. At the classroom level, evaluation approaches include pupil participation activities, peer interviews, and visual ranking techniques to understand students' experiences and involvement in learning (Niemi et al., 2018). Research on ePortfolios in primary craft education also illustrates how teachers' experiences and the challenges of integrating digital tools can inform assessments of curriculum implementation (Törmälä, 2021). These studies suggest that implementation evaluation extends beyond checking curriculum compliance to examining classroom experiences, learner participation, and teachers' pedagogical practices. Assessment practices described in the literature emphasize documenting learning processes and using digital portfolios and opportunities for pupil reflection (Törmälä, 2021). However, the available studies provide more insight into particular subjects and classroom practices than into a comprehensive national evaluation of primary curriculum effectiveness. Consequently, the evidence is insufficient to draw broad conclusions about the overall effectiveness of the Finnish primary curriculum.

1.5.22 Singapore

The available literature describes a more centrally guided approach to curriculum evaluation. Phaisamran and Phaisamran (2024) discuss national curriculum reviews, including the

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Primary Education Review and Implementation (PERI) Committee, and examine curriculum characteristics in relation to academic development, holistic education, and twenty-first-century competencies. Their analysis also considers curriculum components such as learning objectives, content, instructional time, learning activities, and assessment. In terms of implementation, attention is given to how national educational priorities are translated into school programmes, including project-based learning and character and citizenship education. Assessment is discussed as encompassing both academic achievement and students' social and emotional development, rather than focusing exclusively on academic performance (Phaisamran & Phaisamran, 2024). Nevertheless, the evidence available in the reviewed literature is primarily descriptive and comparative. It provides an overview of Singapore's curriculum orientation and evaluation priorities but offers limited empirical detail on systematic classroom-level monitoring and the long-term effects of curriculum implementation in primary schools.

1.5.23 Malaysia

Curriculum evaluation in Malaysia is illustrated through studies examining curriculum materials, school-based assessment, and the implementation of specific learning programmes. Momand et al. (2019) evaluated the Year 6 KSSR English textbook using criteria related to content, language skills, exercises, and textbook presentation. Their findings highlight the importance of evaluating the suitability and completeness of instructional materials in supporting curriculum delivery. Other research examines teachers' perceptions of CEFR-aligned English textbooks, providing evidence about the implementation challenges associated with instructional materials and their cultural suitability (Govindarajoo et al., 2025). At the student level, assessment is associated with School-Based Assessment (Pentaksiran Berasaskan Sekolah/PBS), guided by the Curriculum and Assessment Standard Documents (DSKP), and includes the use of formative assessment and performance standards (Govindarajoo et al., 2025). Studies evaluating specific educational interventions, including digital learning applications and environmental education programmes, also demonstrate the use of pre- and post-tests, usability assessments, and performance-based evaluation (Abdullah et al., 2026; Phang et al., 2016; Zulkifli et al., 2021). These findings provide evidence about the evaluation of particular learning resources and programmes, but they do not independently establish the effectiveness of the Malaysian primary curriculum as a whole.

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1.5.24 Cross-Country Synthesis

The four countries demonstrate different emphases in evaluating primary education curricula. Indonesia's reviewed literature highlights formative policy evaluation, school-level supervision, and diagnostic assessment. Finland's studies emphasize curriculum analysis, pupil participation, and qualitative documentation of learning processes. Singapore's literature describes centrally guided curriculum reviews and a holistic orientation towards academic and non-academic development. Malaysia's studies place considerable emphasis on evaluating textbooks, instructional resources, school-based assessment, and specific educational interventions. Despite these differences, evaluation across the four contexts involves examining the relationship between curriculum intentions, classroom implementation, and student learning.

1.5.25 Student Learning Outcomes

RQ5: What supporting evidence is available regarding student learning outcomes, particularly in literacy, numeracy, science, critical thinking, digital literacy, and twenty-first-century competencies?

This section reviews evidence of primary students' learning outcomes in Indonesia, Finland, Singapore, and Malaysia, focusing on literacy and numeracy, science and critical thinking, digital literacy, and twenty-first-century competencies.

1.5.26 Literacy and Numeracy

In Indonesia, Amir et al. (2019) developed the *Fort Defending* (Bentengan) game for first-grade students, integrating mathematical literacy, number ordering, and phonetic recognition. The intervention received positive expert validation and practicality assessments, indicating its potential to support foundational learning. However, it does not demonstrate improvements in national student achievement. In Finland, Tiermas and Alisaari (2025) reported associations between students' perceptions of reading and writing competence, academic agency, and school belonging. In Malaysia, studies evaluating English textbooks identified strengths and limitations in learning materials, but primarily reflected teacher perceptions rather than direct measurements of student proficiency (Govindarajoo et al., 2025; Momand et al., 2019). Direct primary-level evidence for Singapore was limited.

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1.5.27 Science and Critical Thinking

Direct evidence of science and critical-thinking outcomes remains limited. Finnish research describes inquiry-oriented activities and pupil participation (Niemi et al., 2018), while studies from Indonesia and Singapore mainly identify these competencies as learning priorities rather than report measured outcomes (Wardani et al., 2023). In Malaysia, Eh Phon and Razali (2024) reported that a STEM mobile augmented reality intervention involving 100 Year 6 students increased mean test scores from 5.47 to 7.61 ($p < .001$). This finding represents improvement within a specific intervention, not the national curriculum as a whole.

1.5.28 Digital Literacy and Twenty-First-Century Competencies

Törmälä (2021) examined ePortfolio activities involving 43 Finnish third-grade pupils and identified both digital learning opportunities and barriers, including network interruptions and differences in ICT skills. In Malaysia, digital interventions reported positive usability or programme-related outcomes (Zulkifli et al., 2021). Regarding broader competencies, Niemi and Lipponen (2018) found that participatory activities supported Finnish second-grade pupils' collaboration and self-expression. Phang et al. (2016) reported environmental engagement among 15,623 Malaysian Year 6 students across 80 schools.

1.5.29 Learning Outcome Patterns

Overall, evidence is uneven across countries and domains. Malaysia provides several intervention-based findings, while Finland offers classroom-level evidence of participation and digital learning. Indonesia has evidence from a specific integrated literacy intervention, whereas direct primary-level evidence for Singapore remains limited. The available studies do not support comparisons of national curriculum effectiveness. Further research using consistent, direct, and longitudinal measures of primary students' learning outcomes is needed.

DISCUSSION

1.5.30 Comparative Perspectives on Primary Education Curricula

The comparative analysis of primary education curricula in Indonesia, Finland, Singapore, and Malaysia reveals that contemporary curriculum development increasingly emphasizes holistic student development, competency-based learning, and the integration of academic and non-academic competencies. Although the four countries operate within different educational

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governance structures and sociocultural contexts, their curriculum frameworks share the objective of preparing students not only to acquire foundational knowledge but also to develop critical thinking, creativity, collaboration, communication, and social responsibility. This orientation reflects a broader movement in primary education from content-oriented instruction toward learning experiences that integrate knowledge, skills, values, and real-world contexts. The four countries, however, translate these shared objectives into different curricular arrangements. Indonesia incorporates character and competency development through the Pancasila Student Profile and its associated co-curricular projects (Wardani et al., 2023). Finland emphasizes transversal competencies, multiliteracy, and student agency within its national core curriculum (Hillbom et al., 2025; Niemi et al., 2018). Singapore integrates academic learning with character development and twenty-first-century competencies through its broad-based curriculum and social-emotional learning framework (Phaisamran & Phaisamran, 2024). Meanwhile, Malaysia promotes thinking skills, leadership, ethics, and national identity through the aspirations of the Malaysia Education Blueprint and the KSSR curriculum framework (Govindarajoo et al., 2025; S. Z. S. Zakaria et al., 2021). These arrangements indicate that holistic education is a shared policy orientation, although its implementation mechanisms differ according to national priorities.

An important comparative distinction concerns the relationship between national curriculum direction and local flexibility. Indonesia and Finland provide opportunities for contextual adaptation, but the distribution of decision-making authority differs. Indonesia establishes national learning outcomes and developmental phases while allowing schools to adapt operational curriculum planning and instructional activities (Wardani et al., 2023). Finland provides a more decentralized arrangement in which municipalities, schools, and teachers interpret national curriculum guidelines in developing local learning plans (Hillbom et al., 2025; Törmälä, 2021). By contrast, Singapore and Malaysia maintain stronger central curriculum direction through their respective national education authorities (Phaisamran & Phaisamran, 2024; Vasugi et al., 2025). These differences suggest that curriculum flexibility should not be understood simply as the absence of central regulation. Rather, it involves the extent to which schools and teachers can translate national objectives into learning experiences that respond to students' needs and local circumstances. A national curriculum may provide coherence and common expectations, while local flexibility can improve contextual relevance. However, flexibility also requires sufficient teacher competence, institutional support, and appropriate learning resources. Consequently, the effectiveness of a curriculum framework depends not only

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on its formal design but also on the capacity of educational institutions to implement it consistently.

The comparison also highlights the importance of cross-curricular learning. Environmental awareness, global citizenship, digital competence, and character education are incorporated through different subjects, projects, and school activities. Indonesia uses P5 projects to connect learning with character development and local contexts, while Finland emphasizes multidisciplinary learning and student participation. Singapore integrates community-oriented activities through programmes such as Values-in-Action, whereas Malaysia incorporates global citizenship and environmental themes across selected curriculum subjects (Niemi & Lipponen, 2018; Phang et al., 2016; Phaisamran & Phaisamran, 2024; Wardani et al., 2023; Zakaria et al., 2021). This convergence suggests that cross-curricular integration can provide opportunities for students to apply academic knowledge to social and environmental issues. Nevertheless, the available studies do not establish that these approaches produce equivalent learning outcomes across the four countries.

1.5.31 Differences in Curriculum Implementation

Although the four countries share broad curriculum objectives, their implementation approaches differ in terms of curriculum planning, teacher responsibilities, classroom pedagogy, and assessment practices. These differences demonstrate that curriculum implementation is shaped by the interaction between national policy arrangements and the professional and institutional conditions within schools. In Indonesia, the Merdeka Curriculum provides a framework based on learning outcomes and developmental phases, with an emphasis on essential content, differentiated instruction, and project-based character development. Its implementation requires teachers to adapt instructional strategies to students' learning needs and to integrate subject knowledge with contextual learning activities (Wardani et al., 2023). Classroom-level examples, such as the integration of traditional games into mathematical literacy activities, illustrate how instructional design can connect curriculum content with students' familiar experiences (Amir et al., 2019). However, translating curriculum flexibility into consistent classroom practice remains dependent on teacher readiness and the availability of appropriate support.

Finland demonstrates a different implementation model through the professional autonomy of teachers and the integration of multidisciplinary learning. Teachers operate within

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national and local curriculum frameworks but have substantial responsibility for selecting instructional methods and organizing learning experiences (Hillbom et al., 2025; Törmälä, 2021). Participatory approaches, including pupil reflection and peer interviews, provide opportunities for students to contribute to classroom learning and evaluation (Niemi & Lipponen, 2018). Nevertheless, evidence from digital portfolio implementation indicates that professional autonomy alone does not eliminate practical barriers. Platform usability, network reliability, pupils' existing digital skills, and the additional time required for technology-assisted activities can affect classroom implementation (Törmälä, 2021). Singapore's implementation approach is characterized by stronger national coordination and the integration of academic, character, and competency-oriented learning. Project-based learning, character education, and co-curricular programmes are positioned within a structured national curriculum framework (Phaisamran & Phaisamran, 2024). This arrangement provides a common direction for schools, although the available literature in the reviewed corpus provides more detailed descriptions of curriculum orientation than direct evidence of how consistently these approaches are implemented across primary classrooms.

Malaysia similarly operates through a centrally structured primary curriculum under the KSSR and DSKP frameworks. Implementation includes the use of curriculum-aligned textbooks, language learning resources, and approaches intended to strengthen higher-order thinking and twenty-first-century learning. However, studies of CEFR-aligned English textbooks reveal that the suitability of instructional materials depends on their alignment with students' cultural and learning contexts, as well as teachers' ability to adapt them (Momand et al., 2019; Vasugi et al., 2025). Research on digital and STEM interventions also demonstrates the potential of technology-supported instruction, while highlighting the importance of infrastructure and implementation conditions (Eh Phon & Razali, 2024; Zulkifli et al., 2021). Taken together, these findings indicate that no single implementation model can be considered universally appropriate. Centralized systems may provide greater consistency in curriculum direction, whereas decentralized or flexible arrangements may create opportunities for contextual adaptation. However, both approaches require effective teacher preparation, supportive school leadership, suitable instructional materials, and coherent assessment practices. The comparison therefore reinforces the importance of examining curriculum implementation as a process rather than assuming that the formal adoption of a curriculum guarantees its enactment in classrooms.

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1.5.32 Facilitating and Constraining Factors

The implementation of primary education curricula across the four countries is influenced by interconnected teacher-related, institutional, socioeconomic, and policy factors. The findings indicate that curriculum reform depends not only on the quality of policy design but also on the readiness of teachers, the capacity of schools, and the broader conditions in which students learn. Teacher competence and professional readiness are particularly important. In Indonesia, the implementation of differentiated learning, project-based activities, and technology integration requires teachers to develop new pedagogical and professional competencies (Wardani et al., 2023). Finland's curriculum arrangements demonstrate the importance of teacher professionalism and decision-making capacity, since local adaptation requires teachers to interpret curriculum objectives and select appropriate instructional approaches (Hillbom et al., 2025; Törmälä, 2021). Evidence from Malaysia also indicates that teachers' perceptions and capacity to adapt instructional materials influence the practical use of curriculum resources (Momand et al., 2019; Vasugi et al., 2025). These findings suggest that professional development should extend beyond introducing new policy requirements and provide sustained opportunities for teachers to develop, apply, and evaluate instructional practices.

Institutional support is another significant factor. The availability of appropriate learning materials, school leadership, digital infrastructure, and technical assistance affects the extent to which curriculum objectives can be translated into classroom activities. Törmälä (2021), for example, identifies platform complexity, login difficulties, and network interruptions as barriers to ePortfolio implementation in Finnish primary education. In Malaysia, unequal access to digital resources and infrastructure, particularly in rural areas, constrains the use of technology-supported learning materials (Vasugi et al., 2025). These examples demonstrate that the adoption of digital learning initiatives requires more than providing software or devices; schools also need reliable connectivity, user-friendly platforms, technical support, and teachers who can integrate technology meaningfully into instruction. Socioeconomic and cultural conditions also influence students' learning opportunities. Research on multilingual pupils in Finland highlights the relationship between literacy experiences, academic agency, and school belonging (Tiermas & Alisaari, 2025). In Malaysia, the use of internationally aligned English textbooks raises questions about the cultural relevance of learning materials for students in different school contexts (Vasugi et al., 2025). In Indonesia, regional diversity creates a need for curriculum materials and instructional strategies that respond to local languages, cultures, and educational resources.

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These findings indicate that curriculum implementation should consider differences in students' backgrounds and learning environments rather than assume that uniform instructional resources will produce similar experiences for all pupils.

Policy coherence further shapes implementation. National curriculum frameworks need to provide clear learning expectations while allowing sufficient room for schools to respond to local conditions. If curriculum objectives, teacher preparation, instructional materials, assessment practices, and resource allocation are not aligned, implementation may become fragmented. The Indonesian experience illustrates the importance of supporting curriculum flexibility with teacher development and institutional capacity (Wardani et al., 2023). Similarly, the experiences reported in Finland and Malaysia show that local adaptation and technology integration require appropriate infrastructure and practical support (Törmälä, 2021; Vasugi et al., 2025). Overall, the comparison suggests that facilitating and constraining factors should not be treated as isolated variables. Teacher competence is affected by professional development opportunities and school support; digital learning depends on both teacher readiness and infrastructure; and curriculum relevance is influenced by the relationship between national objectives and students' sociocultural contexts. Effective curriculum implementation therefore requires coordinated action across policy, school management, teacher development, and community engagement.

1.5.33 Curriculum Evaluation and Student Learning Outcomes

The comparison of curriculum evaluation practices and student learning outcomes reveals differences in how the four countries monitor educational progress and assess the relationship between curriculum objectives and classroom learning. The reviewed literature identifies diagnostic and formative assessment, classroom documentation, participatory evaluation, school-based assessment, and programme-specific evaluation as approaches used across the four systems. However, the evidence varies considerably in its scope and its ability to demonstrate the effectiveness of national curricula. Indonesia's Merdeka Curriculum emphasizes diagnostic and formative assessment to identify students' learning needs and support differentiated instruction. Assessment also includes the observation of student participation and character development through P5 activities (Wardani et al., 2023). Classroom-level interventions, such as the Fort Defending game, provide examples of how specific learning designs can be evaluated through expert validation and classroom practicality assessments (Amir et al., 2019).

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Nevertheless, the validation of an instructional intervention should be distinguished from an evaluation of the overall effectiveness of the national curriculum. The available evidence therefore provides insights into particular instructional practices and policy implementation rather than a comprehensive assessment of national student achievement.

Finland places considerable emphasis on continuous assessment, student participation, and documentation of learning processes. Studies of primary classroom practices illustrate the use of participatory tools and digital portfolios to support reflection and provide evidence of student learning (Niemi & Lipponen, 2018; Törmälä, 2021). These approaches can capture aspects of learning that may not be fully represented through conventional tests, including student agency, collaboration, and learning processes. However, the reviewed studies do not provide a comprehensive longitudinal evaluation of how these practices affect learning outcomes across the national primary school population. In Singapore, the reviewed literature describes a holistic approach to student development and assessment, including academic and non-academic competencies (Phaisamran & Phaisamran, 2024). However, evidence on the specific measurement of primary students' outcomes across literacy, numeracy, digital literacy, and social-emotional competencies remains limited in the available corpus. International assessment results should also be interpreted carefully. PISA assesses 15-year-old students and cannot be used as direct evidence of primary school curriculum effectiveness. More generally, international assessment performance alone does not establish a causal relationship between curriculum design and student achievement.

Malaysia provides examples of programme-level evaluation and student learning assessment. The STEMAR intervention reported statistically significant improvements in Year 6 students' test scores following the use of mobile augmented reality in STEM learning (Eh Phon & Razali, 2024). Other studies examine the usability of road safety courseware and the reported outcomes of specific digital learning programmes (SmartShield, 2024; Zulkifli et al., 2021). These findings demonstrate the potential contribution of targeted interventions to particular learning objectives. However, they should not be interpreted as evidence of the effectiveness of the entire KSSR curriculum. Across the four countries, the learning outcome evidence covers foundational literacy and numeracy, scientific understanding, digital learning, and broader competencies such as participation, collaboration, creativity, and character development. Nevertheless, the evidence is uneven. Some studies report direct student-level measurements, while others describe curriculum intentions, teacher perceptions, classroom practices, or the usability of

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learning resources. These forms of evidence cannot be treated as equivalent indicators of student achievement. A central implication is that the relationship between curriculum design, implementation, and student outcomes requires more systematic investigation. The existence of competency-based curriculum objectives does not necessarily demonstrate that students have acquired the intended competencies. Similarly, positive findings from a classroom intervention cannot automatically be generalized to national curriculum performance. More comparable primary-level indicators, longitudinal studies, and evaluations across diverse school contexts are needed to establish how curriculum implementation relates to sustained student learning outcomes.

1.5.34 Implications for Primary Education Curriculum Development in Indonesia

The comparative findings provide several implications for the continued development and implementation of primary education curricula in Indonesia. The experiences of Finland, Singapore, and Malaysia offer useful insights, but their practices should be adapted rather than directly transferred. Indonesia's geographical diversity, cultural and linguistic characteristics, differences in school resources, and institutional conditions require context-sensitive curriculum development. First, teacher capacity development should become a central component of curriculum improvement. Finland's emphasis on teacher professionalism and local curriculum interpretation illustrates the importance of preparing teachers to make informed pedagogical decisions within a national framework (Hillbom et al., 2025; Törmälä, 2021). For Indonesia, this suggests strengthening continuous professional development, school-based mentoring, and peer collaboration to support teachers in implementing differentiated instruction, formative assessment, and contextual learning. Existing teacher development initiatives, including the Guru Penggerak programme, can provide a foundation for more sustained professional learning. The priority should be to connect professional development with actual classroom challenges rather than focus primarily on administrative compliance.

Second, curriculum flexibility should be accompanied by stronger contextual adaptation of instructional materials. Malaysia's experience with CEFR-aligned English textbooks demonstrates that internationally developed learning resources may require adaptation to local cultural and linguistic contexts (Vasugi et al., 2025). For Indonesia, learning materials should reflect students' everyday experiences, local languages, cultural practices, and environmental conditions. The integration of traditional games into mathematical literacy activities illustrates

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how familiar cultural practices can provide meaningful contexts for learning (Amir et al., 2019). Local adaptation should not reduce academic expectations; instead, it should provide accessible pathways for students to engage with national learning outcomes. Third, student participation and character development could be strengthened through more participatory assessment practices. Finnish classroom research demonstrates the potential of visual reflection and peer interviews to capture students' perspectives and support classroom participation (Niemi & Lipponen, 2018). Singapore's reported multi-stakeholder assessment orientation also provides an example of incorporating different perspectives into student development (Phaisamran & Phaisamran, 2024). In Indonesia, age-appropriate self-assessment, peer feedback, and structured reflection could complement P5 project evaluation. Such practices may help teachers understand students' experiences and participation while supporting the development of independence, collaboration, and responsibility.

Fourth, the alignment between curriculum objectives, classroom pedagogy, and assessment requires continued attention. The Merdeka Curriculum emphasizes essential learning outcomes, differentiated instruction, and formative assessment. These priorities can be strengthened when teachers use assessment information to identify learning difficulties and adjust instructional strategies. In particular, foundational literacy and numeracy should remain central priorities, while science inquiry, problem-solving, digital literacy, and twenty-first-century competencies are developed progressively and integrated into meaningful learning experiences. This requires assessment approaches that examine both students' acquisition of foundational knowledge and their ability to apply it in different contexts. Fifth, digital curriculum development should be accompanied by equitable infrastructure provision and attention to usability. Research from Finland and Malaysia shows that digital learning initiatives may be constrained by complex platforms, network interruptions, and unequal access to equipment (Törmälä, 2021; Vasugi et al., 2025). Indonesia should therefore consider the readiness of individual schools when introducing technology-supported learning. Age-appropriate platforms, teacher training, technical support, reliable connectivity, and alternative learning arrangements for schools with limited infrastructure are all important considerations. Digital integration should support learning objectives rather than become an additional requirement that increases the burden on teachers and schools. Finally, curriculum evaluation should be strengthened through systematic and continuous evidence collection. Policy implementation data, classroom assessment, teacher experiences, and student learning outcomes should be considered together. Evaluations should

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distinguish between the implementation of curriculum components and their effects on student learning. Longitudinal and context-sensitive research is particularly important for understanding how the Merdeka Curriculum operates across different regions and school conditions. Such evidence would enable policymakers to identify which practices are effective, for whom, and under what institutional circumstances.

CONCLUSION

This systematic literature review examined the development, implementation, evaluation, and reported learning outcomes of primary education curricula in Indonesia, Finland, Singapore, and Malaysia, based on 23 selected studies. The findings reveal that the four countries share a commitment to holistic student development, competency-based learning, and the integration of academic knowledge with character education and twenty-first-century competencies. However, they differ in curriculum governance, institutional arrangements, teacher autonomy, instructional approaches, and assessment practices. The review also identifies common implementation challenges, including teacher readiness, unequal access to educational resources, digital infrastructure limitations, and the need to accommodate students' diverse cultural, linguistic, and socioeconomic backgrounds. Although the literature reports outcomes in literacy and numeracy, science and critical thinking, digital literacy, and twenty-first-century competencies, the available evidence varies in scope and methodological strength, limiting direct comparisons of national curriculum effectiveness.

The findings have several implications for primary education curriculum development, particularly in Indonesia. Curriculum flexibility needs to be supported by continuous teacher professional development, school-based mentoring, and collaboration to strengthen the implementation of differentiated instruction, student-centred learning, and formative assessment. Instructional materials should also reflect students' cultural, linguistic, and environmental contexts while maintaining national learning expectations. Furthermore, assessment practices should capture not only academic achievement but also student participation, collaboration, creativity, critical thinking, and character development. Digital learning initiatives require appropriate infrastructure, teacher competence, and equitable access, particularly in remote and underserved schools. The experiences of Finland, Singapore, and Malaysia provide useful comparative insights; however, their practices should be selectively adapted to Indonesia's educational priorities and local conditions rather than directly replicated.

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This review has several limitations. The literature search was restricted to the Scopus database, English-language journal articles, and publications from 2016 to 19 November 2026; therefore, relevant studies indexed in other databases or published in other languages and formats may have been excluded. In addition, the distribution of studies across countries and research domains was uneven, while differences in research designs, assessment instruments, and participant characteristics limited direct cross-country comparisons. Future research should prioritize longitudinal investigations of curriculum implementation and student learning outcomes, particularly following the implementation of the Merdeka Curriculum across diverse Indonesian school contexts. Further comparative studies using consistent primary-level indicators are also needed to examine literacy, numeracy, science, digital literacy, and twenty-first-century competencies. Research on teacher professional development, institutional support, educational equity, and the cost-effectiveness of instructional innovations would further strengthen the evidence base for context-sensitive and sustainable primary education curriculum development.

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