Comparative study of mathematics curriculum standards in China and Australia

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Abstract. This study examines the Compulsory Education Mathematics Curriculum Standards (2022 Edition) (referred to as "CCM") and the Australian Curriculum: Mathematics (Version 9.0) (referred to as "ACM"). The research finds that CCM emphasizes systematic and rigorous instruction, introduces an integrated and practical field, adds academic quality standards, and adopts a core competence-oriented evaluation approach. In contrast, ACM emphasizes mathematical literacy, practical application skills, interdisciplinary learning, and the integration of information technology, with a diverse range of assessment methods. Implications: China's mathematics education should refine the alignment of goals and content across learning stages, balance knowledge depth with general competencies, improve the evaluation system, promote the deep integration of information technology, and develop a localized curriculum identity.

Keywords: Australia, compulsory education mathematics curriculum standards, curriculum standard changes, comparative study

1. Introduction

Mathematics curriculum standards are guiding documents issued by the state to direct mathematics teaching. They provide a framework for teaching activities, reflect national educational philosophies and policies, promote the comprehensive development of students, and highlight the unique educational value of mathematics as a discipline. Curriculum standards drive the reform and development of mathematics education and serve as a basis for evaluating students' academic performance and teachers' teaching quality. Analyzing the logical structure and development trends of mathematics curriculum standards helps teachers design and implement classroom instruction that aligns with the standards' principles and requirements. Comparing the mathematics curriculum standards of China and Australia is an effective way to understand the essence of these standards.

In April 2022, China issued the Compulsory Education Mathematics Curriculum Standards for the compulsory education stage, and in the same month, Australia released Version 9.0 of its Australian Curriculum: Mathematics, which came into effect in 2023. The mathematics education systems of China and Australia differ significantly in terms of historical background, cultural traditions, and social needs. China's mathematics education is known for its solid foundation and strong computational skills, while Australia places greater emphasis on inquiry-based learning and the application of mathematics in real-life contexts. A comparative analysis of the mathematics curriculum standards of China and Australia can help identify strengths in each system, facilitate the mutual enrichment and integration of educational philosophies, and promote international exchange and cooperation in mathematics education. Such a study also holds practical significance for understanding and implementing China's curriculum standards.

From an international perspective, this paper takes the mathematics curriculum standards of China and Australia as the research object—specifically, China's Compulsory Education Mathematics Curriculum Standards (2022 Edition) (hereafter referred to as "CCM") and Australia's Australian Curriculum: Mathematics (Version 9.0) (hereafter referred to as "ACM"), revised in 2024. The study conducts qualitative research and quantitative analysis of the content scope of the compulsory education stages covered by ACM and CCM. It explores the similarities and differences between the two countries in terms of curriculum nature and philosophy, curriculum goals, curriculum content, academic quality, and evaluation. This comparative study aims to provide insights for promoting international exchange and cooperation in mathematics education and offer valuable references for the reform and development of China's mathematics education.

2. Comparison of the nature and philosophy of mathematics curriculum

Mathematics is a fundamental discipline that provides essential knowledge and tools for other subjects such as science, engineering, economics, and technology. The nature of the mathematics curriculum refers to the fundamental attributes and functions of mathematics as a discipline in education. It addresses questions such as what mathematics is, why mathematics should be learned, and how mathematics should be taught. Meanwhile, the philosophy of the mathematics curriculum provides the theoretical foundation and value orientation for mathematics education, influencing curriculum design, teaching methods, and evaluation standards. It emphasizes student-centered learning, practical applications, critical and creative thinking, and lifelong learning. The goal of the mathematics curriculum philosophy is to develop students' mathematical literacy, equipping them with the mathematical skills and thinking necessary for personal development and social participation. Therefore, understanding the philosophy of the mathematics curriculum holds significant importance (see Table 1).

Table 1. Comparison of the nature and philosophy of ACM and CCM

	ACM	CCM
Core Competencies	Understanding, Fluency, Problem Solving, Reasoning	The "Three Abilities": Ability to observe the real world with a mathematical perspective, ability to think about the real world with mathematical reasoning, and ability to express the real world with mathematical language
Curriculum Nature	Focuses on developing students' mathematical literacy and practical application skills	Foundational, universal, and developmental
Curriculum Philosophy	Focuses on understanding and application, problem-solving, logical reasoning, communication and expression, continuous learning and adaptability, as well as cultural and social awareness	Acquisition of basic mathematical knowledge, fundamental skills, essential thinking, and basic practical experience (referred to as the "Four Fundamentals"); development of the ability to apply mathematical knowledge and methods to discover, pose, analyze, and solve problems (referred to as the "Four Abilities")

ACM and CCM share several similarities. Both emphasize the development of core competencies. ACM highlights numerical literacy, mathematical reasoning, and problem-solving, while CCM focuses on mathematical abstraction and logical reasoning. Both aim to develop students' mathematical thinking and problem-solving skills. In terms of teaching methods, both ACM and CCM adopt heuristic teaching and cooperative learning approaches. These include encouraging students to explore mathematical problems through observation, experimentation, and reasoning, as well as fostering communication and collaboration through group discussions and project-based learning. Regarding assessment, both ACM and CCM employ comprehensive and formative evaluations, focusing on students' mastery of knowledge, application of skills, thinking processes, problem-solving ability, and learning attitudes. They both utilize a variety of assessment methods, such as observation, oral expression, and written tests. In terms of curriculum integration, both ACM and CCM advocate for interdisciplinary learning, integrating mathematics with other fields such as science, technology, and engineering. This helps students establish cross-disciplinary connections and solve real-life problems.

On the other hand, ACM and CCM exhibit notable differences. In terms of content selection, ACM offers greater flexibility, emphasizing the relevance of mathematics to students' daily lives and future careers, while reflecting an international perspective on mathematics education. In contrast, CCM maintains a relatively stable disciplinary framework, emphasizing the characteristics of mathematics as a subject and the inheritance of China's rich traditional culture. In terms of curriculum nature, ACM places greater emphasis on developing students' mathematical literacy and practical application skills, highlighting the connection between mathematics and daily life to stimulate students' interest and engagement. Conversely, CCM emphasizes the foundational, universal, and developmental nature of mathematics, aiming to establish a solid mathematical foundation for students' future learning and life, with a stronger focus on the acquisition of basic knowledge and skills.

In summary, while ACM and CCM differ in their implementation and focus areas, both are committed to cultivating students' mathematical thinking, problem-solving abilities, and the essential competencies needed to face future challenges.

3. Comparison of curriculum objectives

3.1. Comparison of overall curriculum objectives

CCM divides its objectives into overall objectives and stage-specific objectives, which are described from three dimensions: knowledge and skills, process and methods of mathematical thinking, and emotional attitudes and values. ACM, on the other hand, divides its objectives into overall and year-specific objectives, which progress through four levels: awareness, understanding, mastery, and application.

Table 2. Comparison of overall curriculum objectives

ACM	CCM
1. Building a solid foundation of mathematical knowledge and skills The curriculum integrates mathematical content into six core areas: number, algebra, measurement, space, statistics, and probability. By streamlining content (e.g., reducing the amount of content in the Chinese curriculum) and optimizing presentation, it ensures that students grasp key mathematical concepts and improve learning efficiency. 2. Developing seven general capabilities The mathematics curriculum should collaborate with other disciplines to develop seven general capabilities, including computational skills, critical and creative thinking, and information and communication technology (ICT) competence. 3. Integrating cross-disciplinary themes and real-world contexts The curriculum requires mathematics teaching to incorporate three cross-disciplinary themes: the history and culture of Aboriginal and Torres Strait Islander peoples, Asian cultures and Australia's relationship with Asia, and sustainable development.	Through learning mathematics during compulsory education, students will gradually develop the ability to observe the real world with a mathematical perspective, think about the real world with mathematical reasoning, and express the real world using mathematical language (the "Three Abilities"). Students will acquire the basic mathematical knowledge, fundamental skills, essential thinking, and basic activity experience necessary for future life and development (the "Four Fundamentals"). Students will explore the connections within mathematics, between mathematics and other disciplines, and between mathematics and life. They will discover and pose problems, and use knowledge and methods from mathematics and other subjects to analyze and solve problems (the "Four Abilities").

From the Table 2, it is clear that ACM and CCM share many similarities in their overall curriculum objectives. Both emphasize mathematical understanding, problem-solving ability, effective communication, and practical application. However, there are differences in the specific wording and focus. ACM places more emphasis on the development of specific mathematical knowledge and skills, while CCM focuses more on the comprehensive competencies and capabilities that students acquire through learning mathematics.

3.2. Comparison of stage-specific objectives

China has a nine-year compulsory education system, which includes Grades 1–6 for primary school and Grades 7–9 for junior high school. CCM divides the learning stages into: Stage 1: Grades 1–2; Stage 2: Grades 3–4; Stage 3: Grades 5–6; Stage 4: Grades 7–9. CCM organizes learning into four areas: number and algebra, geometry, statistics and probability, and integrated practice. The curriculum content within these areas progresses step-by-step according to stage-specific objectives and is structured into different learning themes (see Table 3).

Table 3. CCM stage-specific objectives

CCM Stage-Specific Objectives			
Stage	Learning Area	Elective Topics	Objective Dimensions
Primary School: Stage 1 (Grades 1–2) Stage 2 (Grades 3–4) Stage 3 (Grades 5–6) Junior High School: Stage 4 (Grades 7–9)	Number and Algebra Geometry Statistics and Probability Integrated Practice	No	Knowledge and skills, process and methods, emotional attitudes and values

In Australia, most states implement a 13-year education system (F–12), which includes preschool, primary school, and secondary school, covering ages 5 to 16. Foundation (F) is similar to China's kindergarten. F-2 = Early years (similar to kindergarten and Grades 1–2 in China) Grades 3–6 = Primary school; Grades 7–10 = Junior high school; Grades 11–12 = Senior high school. All students up to Grade 10 are required to complete compulsory education. ACM divides the learning stages into: Stage 1: Foundation–Grade 2; Stage 2: Grades 3–6; Stage 3: Grades 7–10. ACM's learning areas include number and algebra, geometry, and statistics and probability. Content is organized progressively according to stage-specific objectives and divided into different learning themes (see Table 4).

Table 4. ACM stage-specific objectives

ACM Stage-Specific Objectives			
Stage	Learning Area	Elective Topics	Objective Dimensions
Stage 1 (F–2) Stage 2 (Grades 3–6) Stage 3 (Grades 7–10)	Number and Algebra Geometry Statistics and Probability	Yes (10A)	Awareness, understanding, mastery, and application

3.3. Comparison of mathematical competency objectives

ACM proposes seven general capabilities: Literacy; Numeracy; Information and Communication Technology (ICT) Competence; Critical and Creative Thinking; Personal and Social Capability; Ethical Understanding; Intercultural Understanding. ACM also defines four mathematical competencies: understanding, fluency, problem-solving, and reasoning.

CCM emphasizes the mathematical and educational characteristics of the "Three Abilities" objectives. It defines mathematics as a discipline that studies quantitative relationships and spatial forms, while also highlighting the basic features of mathematics: generality, rigor, and broad applicability (see Table 5).

Table 5. Comparison of mathematical competency

Comparison of Mathematical Competency	
ACM	CCM
"Seven general capabilities": Literacy Numeracy Information and Communication Technology (ICT) Competence Critical and Creative Thinking Personal and Social Capability Ethical Understanding Intercultural Understanding	Ways of Observing and Exploring the Real World (Using a Mathematical Perspective to Observe the Real World). This primarily involves mathematical abstraction and intuitive imagination, corresponding to the generality of mathematics. Ways of Understanding and Interpreting the Real World (Using Mathematical Thinking to Understand the Real World). This mainly includes logical reasoning and mathematical operations, corresponding to the rigor of mathematics. Ways of Describing and Communicating the Real World (Using Mathematical Language to Express the Real World). This focuses on mathematical modeling and data analysis, corresponding to the broad applicability of mathematics.

CCM emphasizes that students should develop the ability to discover and pose problems as well as the ability to analyze and solve problems. It places particular importance on cultivating students' awareness of application and innovative thinking, as well as developing number sense, symbol sense, spatial awareness, geometric intuition, data analysis skills, computational ability, reasoning ability, and modeling thinking. Since the beginning of the 21st century, China has increasingly prioritized the cultivation of innovative talent. Developing students' innovative awareness and creative ability has become a pressing national goal for talent development. CCM specifically emphasizes the mathematical and educational characteristics of the "Three Abilities" objectives. In the description of the "nature of the curriculum," the definition of mathematics retains the traditional statement that "mathematics is the science of studying quantitative relationships and spatial forms." However, it further emphasizes the core characteristics of mathematics: generality, rigor, and broad applicability.

CCM places greater emphasis on data analysis and related abilities, while ACM specifically highlights the ability to apply information technology. This demonstrates that the core competencies currently promoted in China's mathematics curriculum — the six key mathematical competencies — not only reflect the developmental needs of Chinese students but also align with global trends in mathematics curriculum reform.

4. Comparison of mathematics curriculum content

The Australian Curriculum: Mathematics (ACM) is developed by the Australian Curriculum, Assessment and Reporting Authority (ACARA) to provide a consistent learning framework for students across all year levels nationwide. ACM emphasizes the applicability and understanding of mathematics, encouraging students to apply mathematical knowledge in their daily lives and work. The structure of the Australian mathematics curriculum is based on three broad content strands (content dimensions) and four core mathematical proficiencies (proficiency dimensions). These dimensions combine to form the overall framework of the mathematics curriculum (see Table 6).

Table 6. Structure of curriculum content

Structure of Curriculum Content	
Content Dimensions	Proficiency Dimensions
Number and Algebra: This strand covers the understanding of numbers, computational skills, and the application of algebraic expressions. Students are required to master the four basic operations, numerical relationships, and algebraic rules. Measurement and Geometry: This strand includes problems related to length, area, volume, and knowledge of geometric shapes, position, and direction. It encourages students to understand the properties of spatial objects and use this knowledge to solve practical problems. Statistics and Probability: Students learn how to collect, organize, analyze, and interpret data, as well as the basic concepts of probability. This part particularly emphasizes the application of data analysis and randomness in real life.	Understanding: Students need to grasp mathematical concepts, understand underlying principles and logical relationships, and be able to clearly express this knowledge. Fluency: Students should develop proficiency in mathematical operations and calculations, including mental arithmetic, written calculations, and using technological tools. Problem Solving: Encourages students to apply mathematical knowledge to solve complex problems in daily life, fostering analytical and creative thinking. Reasoning: Students are expected to develop the ability to reason, argue, explain, and derive logical conclusions, ensuring the rigor of mathematical thinking.

ACM adopts a flexible yet well-defined framework based on content and proficiency dimensions to guide mathematics instruction at all year levels. This ensures that students develop well-rounded skills in understanding, fluency, problem-solving, and reasoning. Additionally, the curriculum emphasizes practical applications, cross-disciplinary connections, and flexible assessment mechanisms to adapt to the diverse needs of students.

The Chinese mathematics curriculum (CCM) consists of four learning domains: Number and Algebra; Shapes and Geometry; Statistics and Probability; Comprehensive Practice. In terms of progression, mathematics instruction during the compulsory education period is divided into four stages: Stage 1: Grades 1–2; Stage 2: Grades 3–4; Stage 3: Grades 5–6; Stage 4: Grades 7–9. Based on the stage objectives, the content of the four learning domains is introduced progressively according to different themes at each stage. In addition, CCM describes "curriculum content" from three perspectives: "content requirements," "academic requirements," and "teaching guidelines," which specify what students should learn, the level they should reach, and how they should learn (see Table 7).

Table 7. CCM curriculum content framework

Domain	Stage	Theme
Number and Algebra	Stage 1	Numbers and operations, numerical relationships
	Stage 2	Numbers and operations, numerical relationships
	Stage 3	Numbers and operations, numerical relationships
	Stage 4	Numbers and expressions, equations and inequalities, functions
Shapes and Geometry	Stage 1	Recognition and measurement of shapes
	Stage 2	Recognition and measurement of shapes, position and movement of shapes
	Stage 3	Recognition and measurement of shapes, position and movement of shapes
	Stage 4	Properties of shapes, transformations of shapes, shapes and coordinates
Statistics and Probability	Stage 1	Classification
	Stage 2	Collection, organization, and presentation of data
	Stage 3	Collection, organization, and presentation of data, probability of random events
	Stage 4	Sampling and data analysis, probability of random events
Comprehensive Practice	Stage 1	Six thematic activities
	Stage 2	Four thematic activities
	Stage 3	Four thematic activities
	Stage 4	Project-based learning

Overall, both ACM and CCM aim to provide a comprehensive and balanced mathematical education system focused on developing students' mathematical thinking and application skills. However, differences in culture, education systems, and teaching philosophies lead to variations in implementation and emphasis.

Framework Dimensions: Both ACM and CCM use multiple dimensions to structure the mathematics curriculum. ACM is based on three content dimensions (Number and Algebra, Measurement and Geometry, Statistics and Probability) and four proficiency dimensions (Understanding, Fluency, Problem Solving, Reasoning). While CCM does not explicitly list proficiency dimensions, it similarly emphasizes four learning domains (Number and Algebra, Shapes and Geometry, Statistics and Probability, Comprehensive Practice).

Progressive Learning Content: Both ACM and CCM progressively introduce learning content according to students' developmental stages, ensuring that students master necessary mathematical knowledge and skills step by step.

Emphasis on Practical Application: Both ACM and CCM stress the application of mathematical knowledge in real-life situations, encouraging students to solve practical problems using the mathematical concepts they have learned.

Cross-Disciplinary Connections: Both frameworks highlight the importance of connecting mathematics with other disciplines to broaden and deepen students' learning experiences.

Naming of Learning Domains: Although the core learning areas are similar, the naming conventions differ. For example, "Measurement and Geometry" in ACM corresponds to "Shapes and Geometry" in CCM.

Comprehensive Practice Activities: CCM places particular emphasis on "Comprehensive Practice" as a separate learning domain, incorporating thematic activities or project-based learning at different stages. ACM does not have a comparable component.

5. Comparison of academic performance and assessment

Academic performance and assessment under the Australian Curriculum: Mathematics (ACM) are primarily established and implemented by educational institutions in each state and territory based on the Australian Curriculum guidelines (see Table 8).

Table 8. Main framework of ACM academic performance and assessment

Academic Performance	Standardized Learning Outcomes: The curriculum establishes learning outcome standards for each grade level to ensure that students receive a consistent level of education across different regions. Teaching Resources and Support: Teachers are equipped with various resources and teaching tools to help every student understand and master mathematical knowledge. Personalized Learning: To meet the needs of students with different learning abilities, schools typically provide multi-tiered teaching support and extracurricular tutoring.
Academic Assessment	Formative Assessment: Throughout the teaching process, teachers assess students' understanding through classroom activities, assignments, and quizzes, adjusting the teaching pace and methods as needed. Summative Assessment: Mid-term exams, final exams, and standardized tests are the main ways to evaluate students' mastery at the end of a learning period.
National Assessment	Australia conducts an annual national assessment program (NAPLAN – National Assessment Program – Literacy and Numeracy) to evaluate the mathematical abilities of students in Grades 3, 5, 7, and 9. NAPLAN focuses on essential math skills such as calculation and problem-solving. The results help the government and schools understand students' math proficiency and guide improvements in educational policy and teaching practices.
Grading and Feedback	In math assessments, students are usually graded according to the Australian curriculum standards on an A to E scale: A – Significantly above expected standard; B – Above expected standard; C – Meets expected standard; D – Below expected standard; E – Significantly below expected standard. Teachers evaluate students' performance based on test scores, classroom performance, participation, and project work, providing feedback to help students improve.

Overall, the Australian mathematics curriculum emphasizes student understanding and application. The assessment methods are diverse and focus on individualized learning and student development.

In comparison, the Chinese Compulsory Education Mathematics Curriculum Standards (2011 Edition) (CCM) introduces the concept of academic performance standards. These standards define students' academic achievement at the end of each learning stage, reflecting the requirements of core competencies. The academic performance standards provide a comprehensive description of students' academic achievements based on core competencies and curriculum content. They serve not only as a basis for designing and evaluating academic exams but also as a guiding framework for student learning activities, teaching activities, and textbook development.

Basis for Academic Performance Standards: Requirements for the development of core competencies; Overall curriculum goals and stage-specific content requirements; Academic requirements (see Table 9).

Table 9. CCM academic performance standards and assessment

Academic Quality Standards	Evaluation: Mathematical Competence: Based on structured mathematical knowledge topics, students are expected to develop abstract thinking, reasoning, computational ability, geometric intuition, and spatial awareness as part of the "Four Basics" (basic knowledge, basic skills, basic ideas, and basic activity experiences). Application in Real-Life and Technological Contexts: Through solving problems in familiar life and social contexts, and engaging with mathematical and technological situations aligned with cognitive development patterns, students develop skills such as modeling, data analysis, application awareness, and innovation. Interest and Reflection: Through mathematical practice and exploration, students gradually build curiosity and a desire to learn mathematics, developing confidence, independent thinking, cooperative inquiry, and critical reflection. This fosters the initial formation of self-reflection.
Basis for Exam Questions and Evaluation: Academic quality standards serve as the foundation for setting examination questions and evaluation criteria. They also guide students' learning activities, teachers' teaching strategies, and textbook development.	Evaluation Subjects: Students, teachers Evaluators: Teachers, parents, peers, and students themselves Evaluation Objectives: To motivate student learning and improve teaching quality Evaluation Principles: Guided by the assessment of mathematical literacy, based on academic quality standards, the system emphasizes diverse goals, multiple methods, process-focused evaluation, and inclusive development. Evaluation Methods: Written tests; Oral tests; Project reports; Classroom observation; Post-class interviews; Classwork and homework; Growth records; Teacher evaluation; Self-evaluation; Peer evaluation; Parental evaluation

ACM and CCM both emphasize students' core competencies and personalized learning, while employing diverse evaluation methods. In terms of academic quality, ACM, guided by the Australian Curriculum Framework, sets learning outcome standards for each grade level and provides teaching resources to ensure students grasp mathematical knowledge. Additionally, personalized learning is offered to accommodate students' varying learning abilities. CCM introduces academic quality standards that focus on core competencies, combining these standards with the curriculum content to depict students' academic achievements and guide learning, teaching activities, and textbook development. For academic evaluation, ACM utilizes both formative assessments (such as classroom activities, assignments, and quizzes) and summative assessments (including mid-term and final exams, as well as standardized tests) to measure student progress. On the other hand, CCM's evaluation system is centered around mathematical core competencies, employing a variety of assessment methods, such as written and oral tests, activity reports, and more. The evaluation process involves multiple stakeholders, including teachers, parents, classmates, and the students themselves.

6. Insights

The comparison between the Chinese and Australian compulsory education mathematics curricula reveals that China's mathematics education needs to strike a balance between "cultural roots" and "global perspectives." It is crucial to preserve the depth of core disciplinary competencies while enhancing the practical value and social adaptability of the curriculum through structural optimization, technological empowerment, and cultural innovation. Future curriculum revisions should focus on refining stage-specific goals, interdisciplinary integration, and reforming the evaluation system, aiming to cultivate learners who possess logical thinking, cultural confidence, and global competence. Based on the comparative study of the Chinese and Australian curricula, the following thoughts and suggestions can be made for the improvement of China's mathematics curriculum standards:

6.1. Optimizing curriculum structure: refining stage-specific goals and content alignment

Scientific Classification of Ability Levels: The Australian curriculum clearly defines core competency standards for each grade level through "Proficiency Levels" and supports them with assignment samples for evaluation. In contrast, China's Compulsory Education Mathematics Curriculum Standards (2011 edition) lacks clarity in progressive levels. It is suggested to further refine the stage-specific goals from elementary to middle school, such as breaking down the "Numbers and Algebra" domain into specific ability indicators (e.g., computational skills, equation modeling) and providing actionable assessment tools to help teachers focus on key teaching points.

Enhancing Interdisciplinary and Practical Learning: The Australian curriculum emphasizes the integration of mathematics with other subjects (e.g., finance, environmental science). For example, in algebra, real-world problems like interest rates and budgeting are introduced. China could adopt a similar design by adding modules such as "Financial Mathematics" and "Data-Driven Decision Making," incorporating real-life contexts (e.g., family budgeting, community resource allocation) to improve students' ability to solve complex problems.

6.2. Deepening competency development: balancing depth of knowledge with generic abilities

Strengthening Mathematical Communication and Collaboration Skills: The Australian curriculum requires students to demonstrate their analysis through mathematical modeling and data reporting, while China's curriculum tends to focus more on theoretical derivations and problem-solving techniques. It is recommended to add specific requirements for "mathematical communication skills" in the curriculum goals, such as through group projects (e.g., designing a community recycling plan) that encourage students to explain problems and strategies using mathematical language, supported by information technology tools (e.g., data visualization software).

Integrating Critical Thinking and Cultural Identity: While China's curriculum mentions traditional culture (e.g., the abacus, Nine Chapters on the Mathematical Art), it often stays at the symbolic level. The curriculum could borrow from Australia's approach to exploring indigenous mathematical wisdom, such as designing inquiry-based tasks related to measurement techniques in the Zhou Bi Suan Jing (a classic Chinese text) or exploring topics like "Mathematics in the Silk Road Trade," thus deeply integrating the history of mathematics with cultural identity.

6.3. Improving the evaluation system: constructing a benchmarking quality monitoring framework

Establishing a Unified National Quality Evaluation Standard: Australia ensures educational fairness by publishing achievement standards and teaching resources on national curriculum websites. China could build a digital monitoring platform (e.g., an online adaptive assessment system) to track students' mathematical literacy progress dynamically, and design layered question banks to address regional disparities, thus reducing the educational gap between urban and rural areas.

Promoting Diversified Evaluation Methods: China's curriculum evaluation still relies heavily on paper-and-pencil tests, while Australia emphasizes process-oriented evaluation (e.g., project reports, practical tasks). It is recommended to clarify the application of "portfolio assessments" in the curriculum standards, incorporating classroom performance, interdisciplinary project outcomes, and more into the comprehensive evaluation system.

6.4. Empowering teaching with technology: promoting deep integration of information technology

Developing Intelligent Teaching Support Tools: The Australian curriculum provides teaching resources and parent guides via digital platforms. China could expand the functions of the national smart education platform, incorporating interactive mathematical experimental tools (e.g., dynamic geometry software) and AI-powered personalized learning path recommendations to support teachers' precise teaching and students' independent learning.

Using Technology for Cross-Cultural Mathematical Exchange: Virtual reality (VR) technology could be used to simulate ancient mathematical scenarios (e.g., astronomical observations in the Han Dynasty) or collaborate with Australian schools on online projects (e.g., joint analysis of climate change data) to enhance students' global perspectives and cross-cultural understanding.

6.5. Cultural heritage and innovation: constructing localized curriculum features

Exploring the Mathematical Connotations of Traditional Culture: China's curriculum could draw inspiration from Australia's systematic integration of indigenous culture by combining "Pythagoras' Theorem" with astronomical calculations in the Zhou Bi Suan Jing, or by exploring topics like "Geometric Aesthetics in Chinese Ancient Architecture," allowing students to experience the cultural value of mathematics.

Innovating the International Expression of Curriculum: While maintaining the rigor of Chinese mathematics education, international advantages in practical application and interdisciplinary integration should be incorporated. For example, the "Equation" module could be linked to basic economics, or a "Belt and Road" themed data statistical task could be designed to reflect the social service function of mathematics.

Funding project

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