



Comparative Study on the Arrangement of “Numbers and Algebra” in First-Grade Primary School Mathematics Textbooks between China and the United States: A Case Study of the PEP Edition and California Mathematics

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Abstract

Under the drive of globalization and educational internationalization, comparative research on mathematics education has become an important pathway to study different educational systems and optimize local educational practices. China and the United States exhibit typical representativeness in their mathematics textbook arrangement philosophies. This study focuses on the arrangement of the “Numbers and Algebra” domain in first-grade mathematics textbooks from both countries, aiming to reveal the underlying educational philosophies and curriculum design logics through a comparative analysis. The findings provide specific references for textbook revision and teaching practices in China.

Subject Areas

Pedagogy

Keywords

Mathematics Education, Textbook Arrangement, Numbers and Algebra, Comparative Study, Primary School

1. Introduction

This study focuses on the arrangement of the “Numbers and Algebra” domain in first-grade primary school mathematics textbooks from China and the United States, aiming to provide empirical support and theoretical references for opti-

mizing mathematics education in China through an in-depth analysis of the design philosophies and implementation strategies of textbooks from both countries.

1.1. Research Background

Driven by globalization and educational internationalization, comparative research on mathematics education has emerged as a crucial approach to uncovering the distinctive features of diverse educational systems and refining local educational practices. As the two most populous countries with extensive educational systems, China and the United States offer typical examples of mathematics textbook arrangement philosophies and methods. The California Mathematics textbook in the United States emphasizes a “problem-solving orientation”, highlighting the connection between mathematics and real-life situations. In contrast, the PEP edition of mathematics textbooks published by People’s Education Press in China focuses on “systematic knowledge construction”, emphasizing the step-by-step progression of mathematical concepts.

“Numbers and Algebra” constitutes a core domain in primary school mathematics, directly influencing students’ subsequent interest and ability in mathematics learning. As the critical stage for mathematical enlightenment, the first-grade textbook arrangement plays a pivotal role in constructing students’ mathematical thinking frameworks. This study centers on the arrangement of the “Numbers and Algebra” domain in first-grade primary school mathematics textbooks from China and the United States, aiming to reveal the differences in educational philosophies and curriculum design logics through a comparative analysis of textbook arrangements in both countries. The findings aim to provide specific references for textbook revision and teaching practices in China.

1.2. Research Significance

This research not only enhances our understanding of the differences in mathematics education between China and the United States but also offers concrete directions for revising mathematics textbooks and improving teaching methods in China. By drawing on international advanced experiences and integrating them with China’s educational realities, this study strives to promote the development of mathematics education in China towards a more scientific and efficient direction.

1.2.1. Theoretical Significance

Textbook arrangement represents the materialization of educational philosophies and curriculum objectives. By comparing the arrangement of first-grade “Numbers and Algebra” textbooks between China and the United States, this study uncovers the differences in mathematics educational goals, knowledge presentation methods, and teaching strategy infiltration between the two countries, enriching the theoretical framework of international comparative mathematics education.

1.2.2. Practical Significance

The “Compulsory Education Mathematics Curriculum Standards (2022 Edition)” in China explicitly proposes the requirement to “optimize textbook arrangement, emphasizing knowledge linkage and thinking development”. Through a comparative analysis of specific arrangement strategies, this study offers actionable suggestions for textbook revision in China, while also providing teaching strategy references for teachers.

1.3. Justification for Textbook Selection

While the United States lacks a national curriculum, California Mathematics is selected for this study due to its widespread adoption in public schools and alignment with the Common Core State Standards (CCSSM), representing a significant portion of American primary mathematics education. Although alternative curricula such as Eureka Math or Singapore Math (U.S. Edition) exist, this study focuses on California Mathematics as a representative case to explore problem-solving-oriented approaches, given its extensive use and pedagogical influence.

2. Literature Review

Existing comparative studies on primary school mathematics textbooks between China and the United States predominantly concentrate on content difficulty and cultural adaptability, with limited detailed comparisons specifically targeting the “Numbers and Algebra” domain in first-grade textbooks. Against this backdrop, our research aims to fill this research gap by contributing new perspectives and findings to the field of comparative mathematics education.

2.1. Current Status of China-US Comparative Studies

Existing comparative studies on primary school mathematics textbooks between China and the United States predominantly focus on content difficulty and cultural adaptability, pointing out that American textbooks tend to emphasize practical applications and problem-solving, while Chinese textbooks stress foundational systematicity and logicity. Comparative studies reveal significant differences in teaching “fraction division” across countries [1], further highlighting the need for detailed comparative analyses in specific mathematical domains. However, detailed comparative studies on the arrangement of the “Numbers and Algebra” domain in first-grade primary school mathematics textbooks remain insufficient. Given that this stage is crucial for mathematical enlightenment, the textbook arrangement significantly impacts students’ interest cultivation, concept construction, and habit formation.

2.2. The Guiding Role of Curriculum Standards

Both the Common Core State Standards for Mathematics (CCSSM) in the United States and the “Compulsory Education Mathematics Curriculum Standards” in China set clear objectives for the “Numbers and Algebra” domain. CCSSM em-

phasizes the mastery of number concepts, computational ability, and real-world problem-solving, highlighting the connection between mathematics and life. In contrast, the Chinese curriculum standards specify core content such as number recognition, computation, common quantities, and pattern exploration, emphasizing the solid mastery of foundational knowledge and basic skills. Despite differences in objective wording, both sets of standards aim to cultivate foundational knowledge and problem-solving abilities, providing directional guidance for textbook arrangement.

3. Research Design

This study selects representative first-grade mathematics textbooks from China and the United States as research subjects. Through systematic content analysis and comparative research methods, we delve into multiple dimensions to thoroughly dissect the arrangement characteristics and differences between textbooks from the two countries. The research design balances theoretical depth with practical breadth, ensuring the reliability and validity of our findings.

3.1. Research Subjects

This study selects the California Mathematics-Grade 1 textbook from the United States and the Mathematics textbook for the first grade (both Volume 1 and Volume 2, 2024 Edition) published by the People's Education Press in China as the research subjects. By comparing the arrangement characteristics of mainstream textbooks from both countries, this study reveals the differences in teaching design within the "Numbers and Algebra" domain in first-grade primary school mathematics.

3.2. Research Dimensions

This research centers on several key dimensions to comprehensively compare the "Numbers and Algebra" section in first-grade math textbooks from China and the U.S. These dimensions encompass content organization, example design, exercise configuration, and the infiltration of teaching strategies. Through an examination of these aspects, the underlying educational philosophies and curriculum design logics shaping textbook arrangements in both countries are uncovered.

3.2.1. Content Organization

This dimension focuses on the distribution and sequence of knowledge points, covering core content such as number recognition, addition and subtraction operations, and quantitative relationships. By comparing the arrangement sequence, depth, and breadth of these knowledge points in textbooks from both countries, this study analyzes how they adapt to students' cognitive development patterns.

3.2.2. Example Design

This dimension analyzes the types and difficulty levels of examples. Intuitive operational examples emphasize guiding students to understand concepts through

physical operations or graphical demonstrations, while problem-solving examples stress applying mathematical knowledge to real-world situations. By statistically analyzing the proportion and difficulty gradient of different types of examples in textbooks from both countries, this study reveals the differences in their emphasis on cultivating students' mathematical thinking.

3.2.3. Exercise Configuration

This dimension examines the types, quantities, and difficulty distributions of exercises. Multiple-choice and fill-in-the-blank questions focus on rapidly testing foundational knowledge, while solution questions emphasize logical reasoning and computational abilities. Open-ended questions encourage students to engage in independent exploration. By comparing the preferences for exercise types and the settings of difficulty levels in textbooks from both countries, this study analyzes their supportive roles in students' ability development.

3.2.4. Infiltration of Teaching Strategies

This dimension explores the methods of concept introduction and problem-solving guidance. Intuitive operations lower cognitive thresholds through physical objects, graphics, and other intuitive means, while abstract reasoning directly presents mathematical symbols and logical relationships. In terms of problem-solving guidance, step-by-step guidance offers templated solutions, while strategic suggestions encourage students to choose appropriate methods. By comparing the design differences in teaching strategies in textbooks from both countries, this study reveals their impacts on students' autonomous learning abilities.

3.3. Research Methods

To ensure the reliability and validity of the findings, a combination of content analysis and comparative research methods is employed. Content analysis enables a systematic parsing and categorization of textbook content, while comparative research facilitates the identification of similarities and differences between the two sets of textbooks. This mixed-methods approach provides a comprehensive and in-depth understanding of textbook arrangements.

3.3.1. Content Analysis Method

Employing the content analysis method, this study divides the textbook themes into modules according to curriculum standards, such as number recognition and addition and subtraction operations. For each module, it encodes and statistically analyzes dimensions such as knowledge point presentation, the quantity and types of examples and exercises.

3.3.2. Comparative Research Method

Adopting the comparative research method, this study conducts a horizontal comparison of textbooks from China and the United States. From the perspective of content organization, it examines the arrangement sequence of knowledge points and the logic of unit division. In terms of example design, it analyzes situ-

ation creation, thought guidance, and mathematical thinking methods. Regarding exercise configuration, it compares difficulty levels, type diversity, and connections to real life. In terms of teaching strategy infiltration, it explores the cultivation methods for students' learning methods and thinking abilities, dissecting the underlying philosophical logics of the differences.

4. Research Results

The research results indicate significant differences in the arrangement of the "Numbers and Algebra" section between Chinese and U.S. first-grade math textbooks. These differences span multiple dimensions, including content organization, example design, exercise configuration, and teaching strategies. Each dimension reflects distinct educational priorities and approaches to math education in the two countries.

4.1. Comparison of Content Organization

Regarding content organization, Chinese textbooks tend to adopt a more structured and sequential approach, gradually introducing new concepts and building upon previously learned knowledge. In contrast, U.S. textbooks often integrate topics more flexibly, emphasizing real-world connections and problem-solving skills. This disparity highlights the varying emphases on systematic knowledge construction versus practical application in math education.

4.1.1. Number Recognition

The Chinese textbook systematically constructs students' number sense foundation through a phased introduction strategy. "PEP edition Mathematics for First Grade" divides the content into units such as "1 - 5", "6 - 10", and "11 - 20", reinforcing number sequence and cardinal meaning through columns like "Counting", "Comparing Sizes", and "Writing". For example, comparing the sizes of 5 and 3 and representing object quantities with numbers. In contrast, the California Mathematics-Grade 1 textbook adopts a thematic integration design. For instance, the "Count and Compare" unit combines counting and comparison, guiding students to understand the abstract meaning of numbers through questions like "Which is more/less?" The "Sort and Classify" unit infiltrates number classification and comparison thinking through graphical classification activities. Both textbooks emphasize the practical meaning of numbers, but the Chinese textbook places greater emphasis on phased consolidation, while the American textbook focuses more on integrated exploration.

4.1.2. Number Operations

The Chinese textbook takes computational skill progression as its mainline, arranging the sequence as "addition and subtraction within 5 → addition and subtraction within 10 → addition with carrying within 20". Each stage reinforces computational accuracy through columns like "Calculating" and "Filling in the Blanks", such as using sticks to demonstrate the result of $5+3$. In contrast, the

American textbook employs strategic learning design. For example, the “Addition Strategies to 12” and “Subtraction Strategies to 12” units introduce tools like number lines and number decomposition. The example “Use a Number Line to Add” emphasizes understanding the computational process rather than merely focusing on the result. For instance, the Chinese textbook’s “addition with carrying within 20” unit reinforces rapid calculation through the “making a ten” rhyme, while the American textbook guides students to autonomously explore the carrying logic through the “Make a 10” strategy.

In light of these detailed comparisons across various aspects of math textbooks, it is interesting to note that limited evidence of significant achievement differences among schools using different math textbooks [2]. This finding suggests that while textbooks may differ in their content organization and teaching approaches, these variations may not necessarily lead to substantial differences in student achievement.

4.2. Comparison of Example Design

The design of examples in textbooks also shows notable differences. Chinese textbooks frequently utilize straightforward, step-by-step examples to illustrate mathematical concepts, aiming to solidify students’ foundational understanding. Conversely, U.S. textbooks incorporate more open-ended and exploratory examples, encouraging students to think critically and apply concepts in diverse contexts. This contrast reflects differing educational goals in fostering basic skills versus higher-order thinking.

4.2.1. Example Types

The Chinese textbook predominantly features intuitive operational examples, accounting for a significant proportion. For example, in the “Recognizing Three-Dimensional Figures” unit of “PEP edition Mathematics for First Grade”, activities like “touching and building” allow students to use rectangular prisms, cubes, and other physical objects to create shapes, intuitively understanding spatial relationships. The “addition and subtraction within 10” unit transforms abstract equations into concrete operations through examples like “arranging sticks”. In contrast, the American textbook has a higher proportion of problem-solving examples. For instance, the “Mathematical Stories” column guides students to analyze problems and write equations through situational diagrams. The “Subtraction Strategies to 12” unit uses shopping situational examples to help students understand the meaning of subtraction in simulated transactions.

4.2.2. Difficulty Levels

The difficulty of examples in the Chinese textbook primarily concentrates on computational complexity. For example, in the “addition and subtraction within 100” unit of “PEP edition Mathematics for First Grade”, a large number of examples involve vertical calculations of two-digit addition and subtraction with one-digit numbers, focusing on training computational accuracy. In contrast, the dif-

faculty of examples in the California Mathematics-Grade 1 textbook places greater emphasis on conceptual understanding and reasoning. For instance, the open-ended question in the “Addition to 12” unit requires students to calculate $8+4$ using three different methods, cultivating thinking flexibility.

4.3. Comparison of Exercise Configuration

Exercise configuration in the two sets of textbooks also exhibits distinct characteristics. Chinese textbooks predominantly feature exercises that require students to apply learned concepts to solve specific problems, emphasizing accuracy and proficiency. U.S. textbooks, however, offer a wider variety of exercise types, including open-ended questions and interdisciplinary tasks, aiming to cultivate students’ creativity and problem-solving abilities.

4.3.1. Exercise Types

The Chinese textbook predominantly features solution questions, with fewer multiple-choice and open-ended questions. For example, in the “addition with carrying within 20” unit of “PEP edition Mathematics for First Grade”, most exercises involve vertical calculations, with only a small number of multiple-choice questions in the general review. In contrast, the American textbook exhibits a diverse range of exercise types, with a balanced proportion of multiple-choice, fill-in-the-blank, and open-ended questions. For instance, the “Numbers to 100” unit in California Mathematics includes multiple-choice, fill-in-the-blank, and open-ended exploratory questions, requiring students to adjust their problem-solving strategies according to the question types.

4.3.2 Quantity and Difficulty

Further analysis of exercise quantity and difficulty reveals that Chinese textbooks tend to provide a larger number of exercises with a gradual increase in difficulty, ensuring students have ample practice opportunities. U.S. textbooks, while offering fewer exercises overall, incorporate a more diverse range of difficulty levels, catering to students with varying abilities and interests. This difference reflects the differing strategies in managing student workload and promoting individualized learning.

1) Classification Criteria for Exercise Types

Basic Questions target single-concept application, such as counting within 20, comparing numbers (e.g., using $<$, $>$), or basic addition/subtraction within 10 using visual aids (e.g., counters). These tasks solidify foundational number sense through structured, deterministic exercises. Intermediate Questions integrate 2-3 skills, like solving word problems with number bonds, comparing post-calculation quantities, or finding missing addends (e.g., $3 + _ = 7$); they may include visual distractors or reverse thinking (e.g., deducing starting numbers). Challenging Questions involve multi-step reasoning, such as sequential word problems (“Tom gives 2 apples, buys 3 more—how many?”), exploring number patterns (counting by 2s), or comparing lengths non-standardly; these permit multiple ap-

proaches and emphasize logical step explanations. Open-Ended Questions lack fixed answers, asking students to “show two ways to make 8” or “create a story for $9 - 2$ ”; assessment focuses on solution reasonableness and clarity, fostering creativity and communication. This progression balances skill mastery with early problem-solving flexibility.

2) Quantity and Difficulty Level

The Chinese textbook contains 485 exercises, with 60% basic (291), 30% intermediate (146), and 10% challenging (48) questions, while open-ended tasks account for only 4.5% (22). In contrast, the California edition includes 445 exercises, allocating 50% to intermediate (223) and 20% to challenging (88) questions, with open-ended tasks comprising 25% (111). This reflects the Chinese focus on foundational skill mastery versus the U.S. emphasis on problem-solving through higher-order tasks (see [Table 1](#)).

Table 1. Exercise quantity and difficulty distribution.

Category	PEP Edition (China)	California Math (U.S.)
Total Exercises	485	445
Basic Questions	291 (60%)	134 (30%)
Intermediate Questions	146 (30%)	223 (50%)
Challenging Questions	48 (10%)	88 (20%)
Open-Ended Questions	22 (4.5%)	111 (25%)

4.4. Comparison of Infiltration of Teaching Strategies

The infiltration of teaching strategies in textbooks also varies between the two countries. Chinese textbooks often embed teaching strategies within the content, guiding students through the learning process with clear instructions and explanations. U.S. textbooks, in contrast, more frequently introduce teaching strategies as separate components, encouraging students to explore and apply these strategies independently. This difference highlights the distinct roles of textbooks in supporting teacher instruction versus student self-directed learning.

4.4.1. Concept Introduction Methods

The Chinese textbook rapidly abstracts mathematical symbols through intuitive operations. For example, in the “Recognizing 11 - 20” unit of “PEP edition Mathematics for First Grade”, students first use sticks to represent “1 bundle + 4 sticks = 14” and then directly present the numerical symbol “14” in the “Writing” column, emphasizing the correspondence between operations and symbols. In contrast, the American textbook gradually abstracts concepts by repeatedly emphasizing their characteristics and combining them with examples. For instance, in the “Geometry” unit, students first perceive that “a quadrilateral has four sides” through activities and then deepen their understanding through instances like number line positioning and jigsaw puzzle games before abstracting the definition of a “quadrilateral”.

4.4.2. Problem-Solving Guidance

The Chinese textbook adopts a “guidance + practice” model, emphasizing computational speed and accuracy. For example, in the “subtraction within 20 with regrouping” unit of “PEP edition Mathematics for First Grade”, teachers guide students to calculate step by step using the “breaking apart ten” rhyme and then consolidate their skills through a large number of practices. In contrast, the American textbook introduces Polya’s “four-step problem-solving method” throughout the textbook. For instance, the “Solve the Problem” section requires students to first understand the problem’s meaning, then plan a method, solve the problem, and finally verify the result, cultivating systematic thinking.

The preceding analysis reveals significant differences in the arrangement of the “Numbers and Algebra” domain between Chinese and U.S. first-grade mathematics textbooks. To provide a clearer visualization of these distinctions, **Table 1** compares the core features of the PEP edition (China) and California Mathematics (U.S.) across four dimensions (see **Table 2**).

Table 2. Comparative analysis of “Numbers and Algebra” in first-grade mathematics textbooks.

Comparison Dimension	California Mathematics (U.S.)	PEP Edition (China)
Content Organization	<ul style="list-style-type: none"> - Thematic integration (e.g., “Count and Compare”). - Strategic learning . 	<ul style="list-style-type: none"> - Phased progression (e.g., “1-5”, “6-10” units). - Computational skill focus.
Example Design	<ul style="list-style-type: none"> - Problem-solving emphasis (e.g., situational diagrams). - Conceptual reasoning tasks. 	<ul style="list-style-type: none"> - Intuitive operations (e.g., sticks for addition). - Computational accuracy training.
Exercise Configuration	<ul style="list-style-type: none"> - Diverse types (multiple-choice, open-ended). - Stratified difficulty. 	<ul style="list-style-type: none"> - Solution-focused (vertical calculations). - Foundational difficulty.
Teaching Strategy Infiltration	<ul style="list-style-type: none"> - Gradual concept abstraction (e.g., activities → definitions). - Polya’s four-step problem-solving. 	<ul style="list-style-type: none"> - Rapid symbol abstraction (operations → symbols). - “Guidance + practice” model.

5. Implications and Suggestions

The research findings have significant implications for improving math education in China. By understanding the differences in textbook arrangements between China and the U.S., areas for potential improvement and innovation in Chinese math education can be identified. Based on these findings, several suggestions are proposed, including optimizing textbook content organization, enriching example designs, diversifying exercise configurations, and enhancing the infiltration of teaching strategies.

5.1. Implications

The implications of the research extend beyond the specific context of first-grade

math textbooks. They provide insights into the broader landscape of math education in China and the U.S., highlighting the importance of considering cultural and educational contexts when designing and implementing math curricula. The findings also underscore the need for ongoing comparative research to inform educational policy and practice in both countries.

5.1.1. Differential Manifestation of Educational Goals

The design of the “Numbers and Algebra” textbook in China is deeply rooted in its traditional mathematical educational philosophies. As Fan and Zhu point out in their comprehensive study on Chinese mathematics education, China has long adhered to the principle of emphasizing the “two basics” (foundational knowledge and basic skills). This is vividly reflected in the textbook’s arrangement, which prioritizes computational proficiency. Through phased, high-density computational exercises, students are systematically trained to master fundamental mathematical operations. These exercises are carefully designed to build upon one another, gradually increasing in complexity, and ensuring that students develop a solid foundation in basic mathematical knowledge and skills. This approach aligns precisely with the core tenet of China’s mathematical educational philosophy, which views the “two basics” as the cornerstone for further mathematical learning and development [3].

In stark contrast, the California Mathematics textbook in the United States is designed in accordance with a different set of educational philosophies. According to the National Council of Teachers of Mathematics in its influential “Principles and Standards for School Mathematics”, American mathematics education places a strong emphasis on cultivating students’ conceptual understanding and problem-solving abilities [4]. The California Mathematics textbook embodies this philosophy by guiding students to explore the essence of mathematics through thematic units and open-ended questions. Thematic units allow students to approach mathematical concepts from a holistic perspective, making connections between different areas of mathematics and real-world contexts. Open-ended questions, on the other hand, encourage students to think critically, analyze problems from multiple angles, and come up with creative solutions. This focus on conceptual understanding and problem-solving reflects the differential pursuit of mathematical educational goals in the Chinese and American educational systems.

5.1.2. Value of Open-Ended Question Design and Problem-Solving Strategies

The innovation in open-ended question design and problem-solving strategies in the American textbook provides a beneficial reference for the Chinese textbook. Its open-ended questions encourage students to think from multiple perspectives, cultivating thinking flexibility and innovation. The “four-step problem-solving method” helps students form systematic problem-solving thinking, enhancing their problem-solving abilities, and aids in breaking through the limitations of the Chinese textbook’s single exercise type and unclear difficulty stratification.

5.2. Suggestions

To improve math education in China, it is suggested that more real-world connections and problem-solving tasks be incorporated into textbooks, similar to those found in U.S. textbooks. Additionally, diversifying exercise types to cater to students with varying abilities and interests, and enhancing the infiltration of teaching strategies to support student self-directed learning are recommended. These suggestions aim to promote a more balanced and comprehensive approach to math education in China.

5.2.1. Optimize Textbook Arrangement

The Chinese textbook should optimize the distribution sequence of knowledge points, placing conceptual content such as “quantitative relationships” earlier to establish connections between mathematical concepts and operations in advance. It should also incorporate conceptual modeling sessions in computational units, using number lines, graphics, and other intuitive means to visually demonstrate the computational process and deepen students’ understanding.

5.2.2. Enrich Exercise Types

Reduce the proportion of single computational questions and increase the variety of exercise types, including multiple-choice, open-ended, and interdisciplinary application questions. Practical teaching suggestions emphasize integrating real-life contexts to enhance understanding [5]. Raise the proportion of open-ended questions to encourage students to engage in independent exploration. Design interdisciplinary application questions that closely connect with real-life situations to enhance students’ application awareness. Drawing from the finding that the U.S. textbook contains varied difficulty levels, we recommend increasing the proportion of open-ended and interdisciplinary questions in the Chinese PEP edition. For instance, incorporating real-life scenarios (e.g., shopping calculations) could enhance application awareness while maintaining foundational skill training.

5.2.3. Cultivate Systematic Thinking

Draw inspiration from the American textbook’s “four-step problem-solving method” and guide students to solve problems following the steps of “understanding the problem, formulating a plan, executing the plan, and reviewing and reflecting”. Through systematic problem-solving training, cultivate students’ logical thinking and problem-solving abilities.

5.2.4. Strengthen Number Sense Cultivation

Leverage the advantage of intuitive operations in the Chinese textbook and conduct activities like arranging sticks and dialing counters in relevant units. Combine these with number lines, graphics, and other tools to promote the integration of intuitive operations and abstract thinking, enhancing students’ number sense and mathematical literacy.

6. Conclusions

In conclusion, the research reveals significant differences in the arrangement of the “Numbers and Algebra” section in first-grade math textbooks between China and the U.S. These differences reflect distinct educational philosophies, priorities, and approaches to math education in the two countries. By understanding these differences, valuable insights into the strengths and weaknesses of each system can be gained, and opportunities for improvement and innovation in math education can be identified. The findings contribute to the ongoing dialogue on comparative math education and provide a foundation for future research and practice.

6.1. Research Summary

Significant differences exist in the arrangement of the “Numbers and Algebra” domain in first-grade primary school mathematics textbooks between China and the United States regarding content organization, example design, exercise configuration, and the infiltration of teaching strategies, profoundly reflecting the different educational philosophies and curriculum design logics of both countries. The Chinese textbook emphasizes the systematicity and logicity of knowledge, arranging knowledge points in a phased and progressive manner. In contrast, the American textbook leans towards open-ended questions in example design, cultivating students’ thinking flexibility and innovation. Its exercise configuration focuses on diversity and stratification, stimulating students’ learning interest and exploration desire through various forms. In terms of teaching strategy infiltration, it emphasizes students’ autonomous learning and cooperative communication, cultivating problem-solving and critical thinking abilities through the “four-step problem-solving method”.

6.2. Future Prospects

Future research could further expand the scope, incorporating primary school mathematics textbooks from more countries or regions for comparative analysis to gain a more comprehensive understanding of the characteristics and trends of textbook arrangement under different cultural backgrounds. Additionally, strengthening interdisciplinary research by combining mathematics textbook arrangement with disciplines like psychology and sociology could deeply explore the impacts of textbook arrangement on students’ cognitive development, emotional attitudes, and other aspects, providing more comprehensive and scientific bases for optimizing textbook arrangement and enhancing mathematics education quality.

Conflicts of Interest

The author declares no conflicts of interest.

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