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Assessment of the Influence of Mathematics Culture on Primary School Students' Interest in Mathematics Learning

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Abstract: **Based on literature review and expert interviews, this study developed measurement tools to empirically demonstrate the positive and significant influence of mathematical culture on primary school students' interest in mathematics learning. An evaluation index system was established to measure the impact of mathematics culture on students' interest, and an evaluation model was constructed to assess the influence of mathematics culture on primary school students' interest in mathematics learning.**

Keywords: **Mathematics culture; Primary school students; Interest in mathematics learning; Evaluation model.**

I. INTRODUCTION

Culture is the fundamental driving force behind the continuous development of society, representing the soul of a country or a nation. Mathematics culture refers to the thoughts, spirit, language, methods, and viewpoints of mathematics, as well as their formation and development. It also encompasses the contributions and significance of mathematics in human life, science and technology, and social development, along with related humanistic activities (Ministry of Education, 2018). Mathematics culture is an essential part of human culture, guiding value judgments and educational choices in mathematics, and shaping people's mathematical behaviors. Mathematics, as a form of cultural power, has always existed with a rational spirit, influencing both personal life and broader social material conditions and moral behaviors (Klein, 2005). Mathematical learning interest refers to students' positive emotional orientation or intention towards mathematics courses and learning.

Since the reform and opening up, especially with the implementation of the basic education curriculum reform, China has made significant progress in mathematics education. However, the phenomenon of high scores but low abilities persists, and students' lack of interest in mathematics remains a key issue in primary and secondary education (Curriculum Standard Research Group, 2003). The core of educational reform lies in the curriculum. The mathematics curriculum standards indicate that mathematics culture, as a component of the curriculum, should permeate the entire set of textbooks to stimulate interest in learning mathematics (Ministry of Education, 2012). Therefore, various regions have launched mathematical culture practice activities to enhance students' interest in learning mathematics. It is widely held that mathematics culture can stimulate students' interest in learning mathematics, and from this logical starting point, efforts have been made to strengthen mathematics culture practices in teaching. What is the specific impact of mathematics culture on students' interest in learning mathematics? How can we evaluate its impact? These are the practical and research questions that need to be addressed.

II. LITERATURE REVIEW

The literature on mathematics culture has evolved significantly over the years, providing diverse perspectives on its definition and importance in educational contexts. Understanding the influence of mathematics culture requires a deeper exploration of its multifaceted components, including the historical, philosophical, and pedagogical aspects. In the section, we will delve into the specific content of mathematics culture as conceptualized by various scholars, highlighting how these elements collectively contribute to shaping students' interest in mathematics learning.

A. The Content of Mathematics Culture

The concept of mathematics culture was first proposed by R. Wilder, who elaborated on the idea of mathematics as a cultural system (Zhang & Guo, 2006). The notion of mathematics as a cultural system has been regarded as the first mature view of the philosophy of mathematics since the 1930s (Zhang, 1998). With the advancement of science and technology, particularly the use of computational, informational, and digital technologies represented by computers, mathematics has become increasingly prominent in social life, drawing continuous attention to mathematics cultural education. According to Zheng, Wang, and Cai (2000), mathematics culture is an open system that includes the behaviors, concepts, and attitudes specific to the mathematics community. From the perspective of concepts, behaviors, and attitudes, the definition of mathematics culture covers a broad range without much overlap, although the specific content of mathematics culture is not entirely clear. Dai (2003) defined mathematics culture as the sum of mathematical knowledge, methods of thinking, their applications in human activities, and relevant folklore and beliefs. This definition clarifies the specific content of mathematics to some extent. Gu (2008) argued that mathematics culture can be divided into a broad sense and a narrow sense; the narrow sense includes the thoughts, spirit, methods, and viewpoints of mathematics, as well as their formation and development, while the broad sense also encompasses the history of mathematics, mathematical aesthetics, mathematical education, intersections between mathematics and the humanities, and the relationship between mathematics and various other cultural elements. This definition can be seen as an integration of previous definitions, describing both conceptual and specific aspects of mathematics culture.

Some scholars also argue that mathematics culture is the sum of mathematical knowledge, spirit, ideas, methods, awareness, thinking, and events (Song & Kang, 2015). Moreover, according to the mathematics curriculum standards, humanistic activities related to mathematics are also considered a part of mathematics culture. Whether exploring the connotation of mathematics culture from the perspectives of concepts, behaviors, and attitudes or describing it through its specific content, it becomes evident that mathematics culture is a multidimensional concept. Its complexity and diversity enable researchers to understand it from various perspectives.

B. Measurement of Mathematics Culture

Culture is inherently complex, but that does not mean it cannot be measured. Geert Hofstede conducted measurements of national cultures along dimensions such as power distance and uncertainty avoidance (Hofstede, 2016). Since the 1990s, researchers have begun to focus on the measurement of mathematics culture. Norman Levitt discussed the importance of mathematics culture and argued for strengthening research in its measurement, although he did not provide operational methods or a framework for measuring mathematics culture (Levitt, 1997). In 1996, George Molland at the University of Aberdeen conducted measurements on mathematics and mathematical research, which were considered an intersection of natural sciences, technical sciences, and social sciences (Molland, 1996). However, the measurement of mathematics culture inherently involves interdisciplinary work.

Adamra and Pitu conducted a study involving primary school students in Singapore using expert interviews, measuring the effectiveness of local culture in mathematics teaching from aspects such as learning activities, student performance, and reactions to instruction (Ardana et al., 2017). In recent years, domestic researchers in China have begun to focus on the measurement of mathematics culture. Li and Zeng used historical methods and experimental approaches to measure and analyze the effects of HPM (History and Pedagogy of Mathematics) teaching methods on students' motivational achievements in mathematics (Li & Zeng, 2017). With advancements in information technology, multivariate statistical methods have been widely used in humanities and social science research, making it possible to measure complex social phenomena. Cultural measurement requires the introduction of multivariate statistical methods, and quantitative analysis techniques such as regression analysis, factor analysis, cluster analysis, correlation analysis, and structural equation modeling are used in cultural measurement (Wu, 2014).

C. Structure of Interest

Interest is the best teacher, and stimulating students' interest in learning has always been a focus in education and teaching, as well as a subject of continuous research. Since the 1980s, the educational field has paid attention to the impact of non-intellectual factors on students' learning, leading many researchers to shift their focus towards learning interest. Hidi, Baird, and Krapp divided interest into individual interest and situational interest based on the relationship between the activity subject and the object (Hidi & Baird, 1988; Krapp, 1989). After the concepts of individual and situational interest were introduced, researchers in the field of education mainly used this classification to delve deeper into interest, leading to the development of common models of interest structure (Hidi & Anderson, 1992).

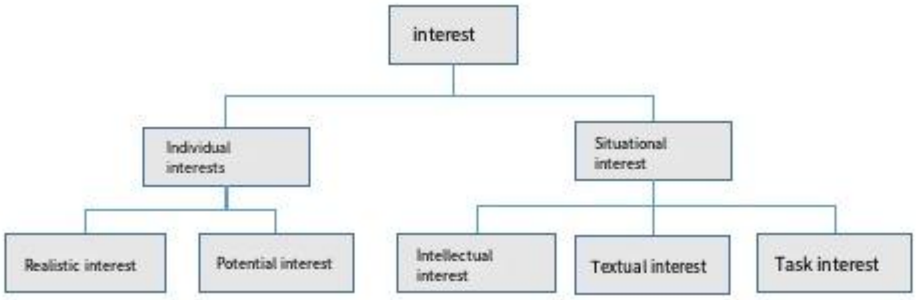

Figure 1: Model of Interest Structure

D. Measurement of Interest

The measurement of learning interest is a critical aspect of research into interest. Based on the interest structure model, the measurement of learning interest is divided into assessments of situational interest and individual interest. Depending on the research objective, researchers may choose to focus on one or both aspects of interest.

Koller (2011) used a student self-assessment approach with a 4-point scoring system to compile a five-item individual interest questionnaire to measure students' individual interest. Ainley, Hillman, and Hidi (2002) also employed a self-assessment method to measure learning interest, using a 5-point scoring system that measured interest in movement from three dimensions: knowledge, emotion, and value. Boscolo (2003) and Tsai (2008), among others, developed subject-specific interest scales. Moreover, numerous researchers (Zhu et al., 2009; Hulleman et al., 2010; Lisa et al., 2010) have focused on measuring situational interest and have developed scales for this purpose.

In China, the measurement of learning interest has primarily focused on academic subjects. In the 1980s, a study led by Professor Zhu Zhixian conducted a survey of the ideals, motivations, and interests of young people across ten provinces, covering twelve subjects including mathematics, language, and foreign languages. Subsequently, researchers began to focus on measuring interest in specific subjects within particular scopes. For instance, Hu (1996) compiled a physics learning interest scale for middle school students; Xu (1997), Xiang (2000), and Tang (2008) created interest measurement tools for chemistry and English learning. These tools provided valuable insights into the study of interest measurement in the Chinese educational context.

III. RESEARCH DESIGN, TOOLS, AND FRAMEWORK

Building on the understanding of mathematics culture and its implications, the present research seeks to empirically evaluate the impact of mathematics culture on primary school students' learning interest. To achieve this goal, a well-designed research framework is crucial. The section outlines the methodological approach used in this study, encompassing the design of research tools, expert consultations, and the establishment of a research framework to systematically assess the influence of mathematics culture on students' interest.

A. Research Design

Mathematics culture and mathematics learning interest are the two core concepts in this study. To explore the influence of mathematics culture on primary school students' interest in mathematics, the research combined literature review with expert interviews to determine the dimensions of the questionnaire, thereby developing measurement tools. The expert interviews consisted of three questions: What do you think are the components of mathematics culture? How do you believe mathematics culture influences primary school students' learning of mathematics? In what aspects are these influences manifested? With the experts' consent, the interviews were recorded for easy data collation. The results of the expert interviews are summarized in Table 1.

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Table 1: Summary of Interview Results

	Components of Mathematics Culture	Influence on Primary School Mathematics Learning	Main Manifestations
Expert 1	History of mathematics, symbols, knowledge, methods, ideas, spirit	Broaden knowledge, interest, understanding	Interest, understanding
Expert 2	Mathematical knowledge, thinking methods, spirit	Influences all aspects	Interest, problem-solving
Expert 3	History of mathematics, knowledge, thinking methods	Interest, understanding, study habits	Interest, broaden knowledge
Expert 4	Knowledge, ideas, methods, applications	Knowledge scope, interest, confidence	Interest, understanding
Expert 5	Mathematical concepts, knowledge, methods, spirit, activities	Knowledge scope, interest, habits, thinking	Interest, understanding
Expert 6	Ideas, methods, spirit, activities	Mathematics interest, ideas, knowledge scope	Interest, problem-solving, thinking
Expert 7	Mathematical knowledge, thinking, methods	Interest, confidence, knowledge scope	Interest, broaden knowledge
Expert 8	Knowledge, history, thinking methods	Interest, ideas, knowledge scope	Interest, knowledge scope
Expert 9	Mathematical knowledge, methods, activities	Interest, understanding, study habits	Interest, broaden knowledge
Expert 10	Knowledge, thinking methods, mathematical activities	Interest, deeper understanding, broaden knowledge scope	Interest
Expert 11	Mathematical knowledge, ideas, methods, spirit	Interest, thinking, habits	Interest, understanding
Expert 12	Knowledge, ideas, application awareness	Difficult to enumerate	Interest, habits
Expert 13	Mathematical knowledge, ideas, spirit, methods	Interest, thinking, habits	Interest
Expert 14	Knowledge, history, thinking, spirit	Interest, understanding, knowledge scope, habits	Interest, understanding
Expert 15	Mathematical knowledge, history, thinking	Interest, understanding	Interest, knowledge scope

Using the concept of "common factors" in mathematics, we identified the "common factors" in the experts' understanding of mathematics culture components. It is evident from Table 1 that the components of mathematics culture include mathematical knowledge, thinking methods, spirit, activities, applications, etc. The influence of mathematics culture on primary school mathematics learning mainly focuses on mathematics interest, understanding, and habits. Based on literature research and expert interviews, the research framework was initially established.

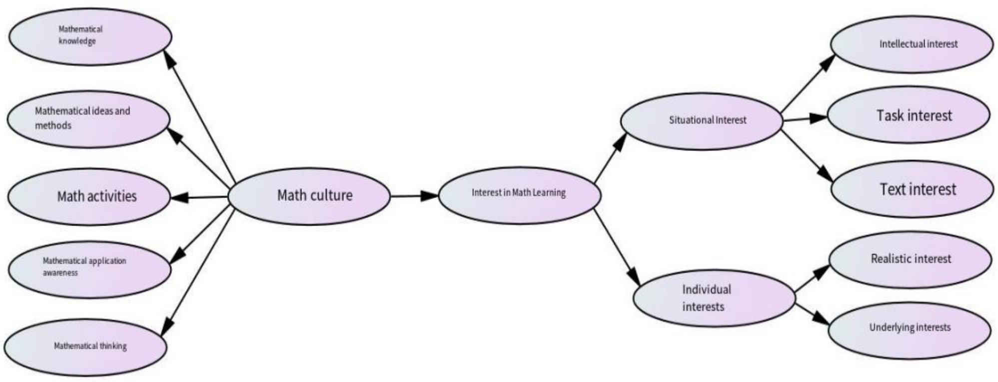

Figure 2: Research Framework Diagram

Figure 2 shows the research framework diagram. In this study, the forms of mathematics culture specifically refer to mathematical knowledge, methods, thinking, application awareness, and related activities at a given stage. Mathematics

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learning interest refers to students' affective orientation or inclination towards mathematics courses and learning. According to the theory of interest classification, mathematics learning interest is divided into situational interest and individual interest. Situational interest is a type of thematic interest that is triggered by specific contexts, represented in the form of "Did you know?" sections in elementary school mathematics textbooks. Thus, situational interest in this study refers specifically to students' interest in these forms of mathematics culture embedded in the curriculum. Individual interest, on the other hand, is a continuous, enduring affective inclination or intention towards mathematics, which can be further divided into current interest and potential interest. Current interest refers to the existing emotions towards learning mathematics, while potential interest is closely linked to values.

B. Research Tools

The research tools were compiled by organizing experts, front-line teachers, and research staff. A self-developed "Survey on Mathematics Culture and Primary School Students' Interest in Mathematics Learning" was used, consisting of four parts. The first and fourth parts were questionnaires about mathematics culture, the second part was a situational interest questionnaire on primary school mathematics culture, and the third part was an individual interest questionnaire on mathematics learning for primary school students. Constructing an evaluation model for the influence of mathematics culture on mathematics learning interest is a quantitative approach to exploring this influence. By reviewing the literature, we adopted existing ideas from models such as primary school mathematics textbook difficulty models (Cai et al., 2013), student workload evaluation models (Song et al., 2015), and the preliminary construction of evaluation index systems for lower-grade primary school students' awareness of mathematical symbols (Li & Song, 2016). These were used to create the evaluation tools and explore the evaluation index system.

To compile the evaluation tools, a pre-survey was conducted and the results were used for revisions. During the pre-survey, 1000 questionnaires were distributed, with 968 returned, resulting in a recovery rate of 96.8%. After eliminating invalid questionnaires, the effective sample size was 711. Using SPSS statistical software for statistical analysis, exploratory factor analysis was performed to reduce the dimensions of the mathematics culture questionnaire from five aspects to four. The resulting dimensions were mathematical knowledge and methods, mathematical activities, application awareness, and mathematical thinking. The three dimensions of situational interest were defined as text interest, task interest, and knowledge interest, while the dimensions of individual interest were categorized into current interest and potential interest. The evaluation index system is shown in Table 2.

Table 2: Evaluation Index System

	Mathematics Culture				Primary School Students' Mathematics Learning Interest				
Dimension	Knowledge & Methods	Activities	Application Awareness	Thinking	Text Interest	Task Interest	Knowledge Interest	Current Interest	Potential Interest
Item	a1, a2, a3, a5, a6, a8, a15	a9, a10, a11	a12, a13, a14	d2, d3, d4	b1, b2, n3, b4, b5	b6, b7, b8, b9	B10, b11, b12, b13	c1, c2, c6	c4, c5, c7

C. REvaluation Framework

Based on the literature analysis, expert interviews, and pre-survey results, the final evaluation framework was determined.

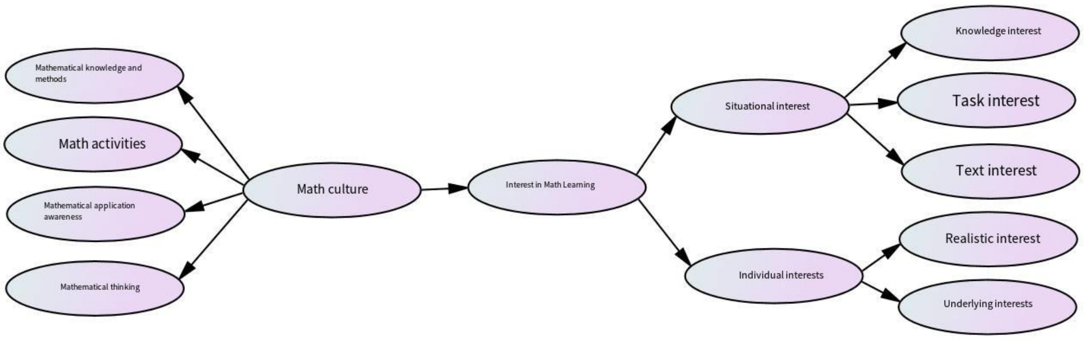

Figure 3: Evaluation Architecture Diagram

Figure 3 illustrates the evaluation framework. The research hypothesis is that mathematics culture positively influences primary school students' interest in learning mathematics. To prove or explain this hypothesis, it is necessary to demonstrate that the various aspects of mathematics culture depicted in the research framework have a positive and constructive impact on students' interest in learning mathematics. The specific hypotheses to be validated include:

(1) Mathematical knowledge and methods have a positive impact on mathematics learning interest.

(2) Mathematical thinking positively influences mathematics learning interest.

(3) Awareness of mathematical applications has a positive impact on mathematics learning interest.

(4) Mathematical cultural activities positively influence mathematics learning interest.

IV. EVALUATION MODEL

Before developing the evaluation model, it is essential to ensure the reliability and validity of the collected data and instruments. This study conducted a formal survey followed by rigorous statistical analyses to verify the appropriateness of the tools. The subsequent section presents the condition checks performed on the gathered data, which served as a foundation for constructing and validating the evaluation models used in this research.

A. Condition Check

A formal survey was conducted, and a total of 2215 questionnaires were distributed, with 1926 valid questionnaires returned, and 287 deemed invalid. Procedures for coding, data entry, and review of invalid questionnaires were conducted in the same manner as in the pre-survey process. The conditions for factor analysis of the questionnaires were examined again, and Tables 3, 4, and 5 present the statistical results of the questionnaire evaluations.

Table 3 presents the KMO (Kaiser-Meyer-Olkin) and Bartlett's sphericity test results for the mathematics culture questionnaire.

Table 3: Mathematics Culture Questionnaire KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.861
Bartlett's Test of Sphericity	Approx. Chi-square	5605.972
	df	120
	Sig.	.000

The KMO value, Bartlett's sphericity test result, the value of the determinant of the correlation matrix, and the anti-image correlation matrix for the mathematics culture questionnaire all met the requirements for factor analysis, indicating that the compiled mathematics culture questionnaire is reasonable.

Tables 4 and 5 present the KMO and Bartlett's sphericity test results for the situational and individual interest questionnaires, respectively.

Table 4: Situational Interest Questionnaire KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.910
Bartlett's Test of Sphericity	Approx. Chi-square	7407.455
	df	78
	Sig.	.000

Table 5: Individual Interest Questionnaire KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.828
Bartlett's Test of Sphericity	Approx. Chi-square	3007.656
	df	15
	Sig.	.000

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The statistical results indicate that the KMO values, Bartlett's test results, the values of the determinants of the correlation matrices, and the anti-image correlation matrices for both the situational and individual interest questionnaires all met the requirements for factor analysis, further confirming the rationality of the questionnaires.

B. Accelerating Role Transition for Normal University Students

To perform confirmatory factor analysis (CFA) on the dimensions of the evaluation indicators, the mathematics culture questionnaire was analyzed. The results are shown in Figure 4.

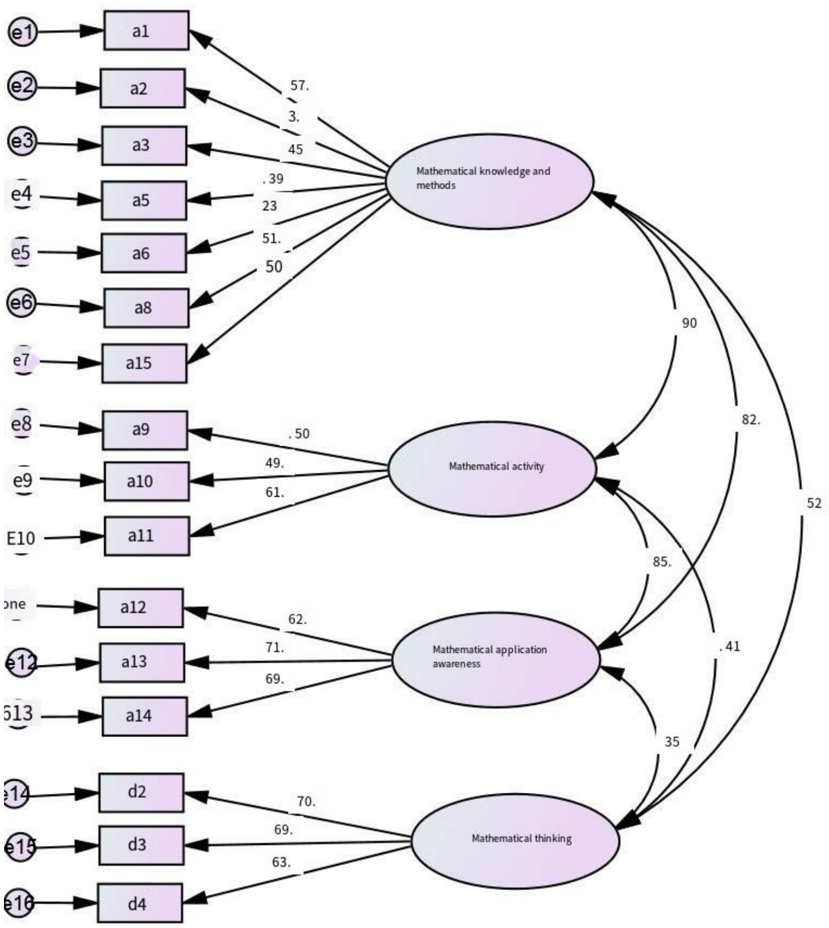

Figure 4: The Standardized Estimation Output

Figure 4 illustrates the standardized estimation output. The model outputs standardized regression coefficients, all of which are positive, with no negative values observed. This indicates that the influences are all positive. The model fit indices are shown in Table 6.

Table 6: Model Fit Indices

Fit Indices	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Values	5.542	.075	.964	.950	.903	.961	.919	.901	.919	.049

The model shows a good fit, indicating that knowledge and methods of mathematics, activities, application awareness, and mathematical thinking are the latent constructs of the four-dimensional model of mathematics culture.

Similarly, CFA was conducted on the situational interest questionnaire, and the standardized estimation results are depicted in Figure 5.

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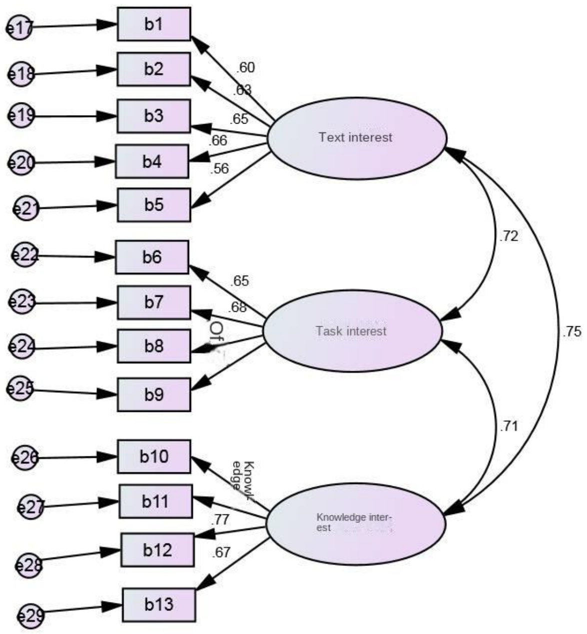

Figure 5: The Standardized Estimation Results

Figure 5 shows the standardized estimation output. All standardized regression coefficients were checked, and no negative values were found. The model fit indices are summarized in Table 7.

Table 7: Model Fit Indices for Situational Interest

Fit Indices	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Values	6.535	.051	.968	.953	.945	.931	.953	.941	.953	.054

The model fit indices indicate that the situational interest questionnaire can extract three factors, and the construct validity of the model is confirmed.

For the individual interest questionnaire, a CFA was performed, and the model is shown in Figure 6.

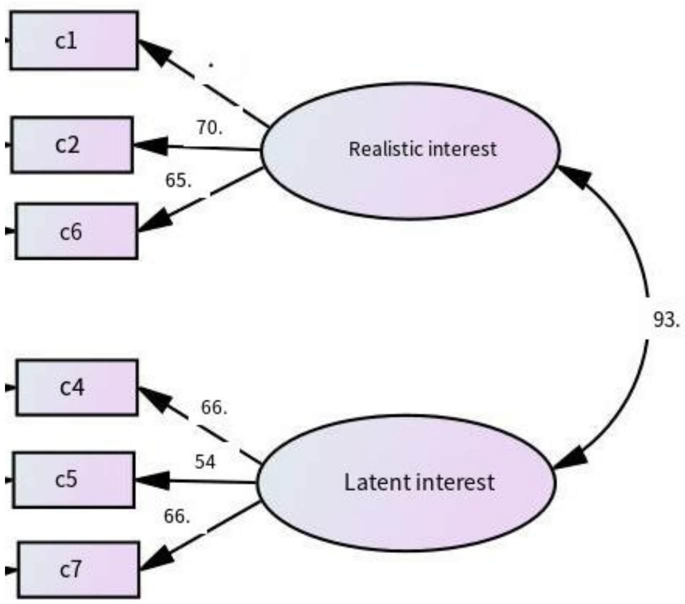

Figure 6: Standard Estimation Output

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Figure 6 depicts the standardized estimation output. The correlation between current interest and potential interest was found to be high. This could be due to either of two reasons: first, the questions in the questionnaire may lack sufficient distinction to clearly differentiate these two factors, or second, even though the theoretical framework divides individual interest into current and potential interest, it is difficult to empirically distinguish these two interests during testing. The model fit indices are shown in Table 8.

Table 8: Model Fit Indices for Individual Interest

Fit Indices	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Values	18.06	.046	.975	.935	.952	.910	.955	.915	.954	.08

From Table 8, it can be observed that the fit indices for the individual interest model are relatively reasonable. The correlation coefficient between current interest and potential interest is 0.93. Given this high correlation, it can be concluded that individual interest is a higher-order latent construct comprised of current and potential interest.

C. First-Order Model

To analyze the influence of the dimensions of mathematics culture on situational and individual interest, an evaluation model was constructed. The model examined the influence of various dimensions of mathematics culture on students' situational and individual interest in mathematics learning. The standardized estimation results from AMOS are presented in Figure 7.

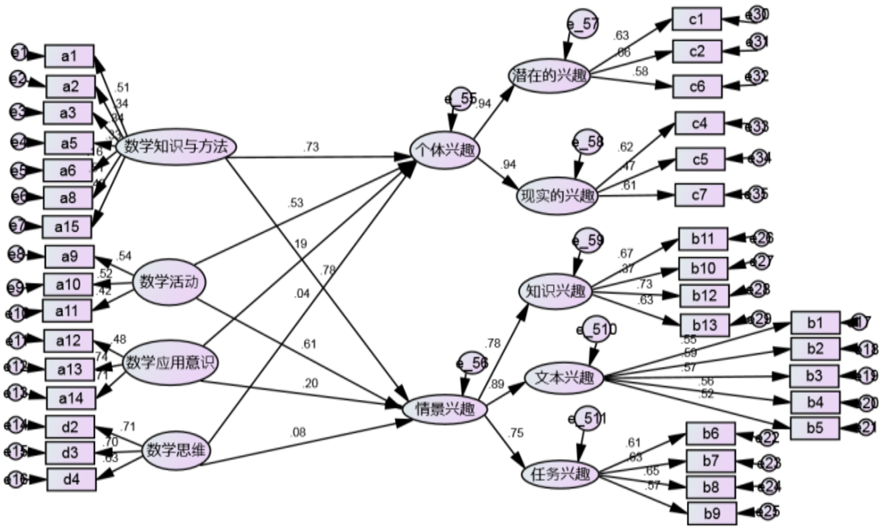

Figure 7: First-Order Model

The first-order model in Figure 7 illustrates that all dimensions of mathematics culture have a positive and constructive influence on both situational and individual interest in mathematics learning. This confirms the four specific hypotheses proposed earlier. The model fit indices are presented in Table 9.

Table 9: Model Fit Indices for First-Order Model

Fit Indices	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Values	5.606	.087	.906	.895	.901	.892	.915	.901	.900	.051

The model fit indices are all within acceptable ranges, indicating that the model reasonably explains the influence of mathematics culture dimensions on situational and individual interest. The influence equations for individual and situational interest are as follows:

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Influence Equation for Individual Interest: gtxq=0.73sxzsyff+0.53sxhd+0.19sxyyys+0.40sxsw+ ε ,where ε is the error term. Here, "gtxq" stands for individual interest, and the first letters of the Chinese words are used for mnemonic purposes.

Influence Equation for Situational:Interest:qjxq=0.78sxzsyff+0.61sxhd+0.20sxyyys+0.08sxsw+ δ ,where δ is the error term.

Using the formula $(\frac{k_i}{\sum_{i=1}^{4} ki})$ for standardization, the coefficients in the influence equations can be reduced to the following:

Standardized Influence Equation for Individual Interest: gtxq=0.39xzsyff+0.29sxhd+0.10sxyyys+0.22sxsw+ ε ,where ε is the error term.

Standardized Influence Equation for Situational Interest: qjxq=0.47sxzsyff+0.36sxhd+0.12sxyyys+0.05sxsw+ δ ,where is the error term.

D. Higher-Order Model

Mathematics culture is a higher-order latent construct that includes measurable constructs such as knowledge and methods of mathematics, activities, application awareness, and mathematical thinking. A higher-order model test was conducted on mathematics culture and mathematics learning interest, and the model is shown in Figure 8.

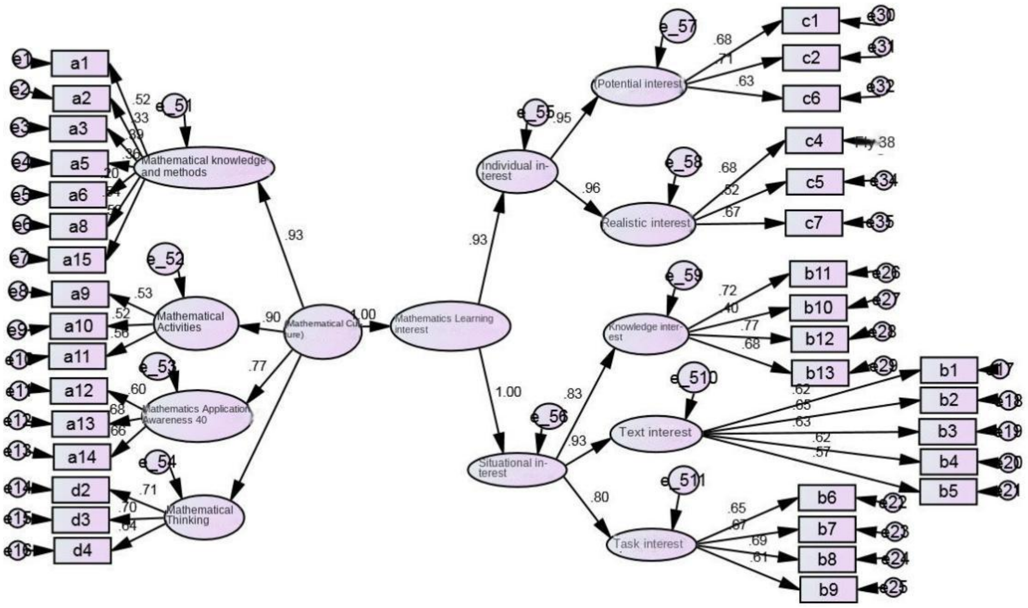

Figure 8: Second-Order Model

The statistical results were significant, and all regression coefficients were positive, indicating a statistically significant difference. The model fit indices are presented in Table 10.

Table 10: Model Fit Indices for Higher-Order Model

Fit Indices	CMIN/DF	RMR	GFI	AGFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Values	4.333	.066	.928	.918	.883	.873	.907	.900	.907	.042

The model fit indices for the influence of mathematics culture on mathematics learning interest indicate that the model has a good fit.

Based on the results, it can be concluded that mathematics culture has a positive and constructive influence on students' interest in mathematics learning, confirming the overall research hypothesis.

V. CONCLUSIONS AND DISCUSSION

The findings from this study provide valuable insights into the relationship between mathematics culture and students' interest in mathematics learning. To further understand the implications of these findings, it is important to distill the conclusions and critically reflect on the broader educational significance. In this section, we present the key conclusions of this research, discuss their relevance, and identify areas for future exploration that may build upon the current findings.

A. Conclusions

The study yields the following conclusions:

The research hypothesis is confirmed, indicating that mathematics culture has a positive impact on mathematics learning interest.

An initial evaluation index system for assessing the influence of mathematics culture on primary school students' mathematics learning interest has been constructed. Mathematics culture includes four dimensions and sixteen items, while learning interest is divided into five dimensions and nineteen items.

A preliminary evaluation model has been constructed to assess the impact of mathematics culture on individual and situational interest.

Influence Equation for Individual Interest:

gtxq=0.39xzsyff+0.29sxhd+0.10sxyyys+0.22sxsw+ ε ,where ε is the error term.

Influence Equation for Situational Interest:

qjxq=0.47sxzsyff+0.36sxhd+0.12sxyyys+0.05sxsw+ δ ,where δ is the error term.

B. Discussion

The research, based on literature analysis, expert interviews, and surveys, used factor analysis to construct an evaluation index system for assessing the influence of mathematics culture on primary school students' mathematics learning interest. This study provides valuable insights into understanding how mathematics culture affects students' interest in mathematics. However, it is important to note that measuring cultural influence is inherently complex, and future research on the measurement of mathematics culture must consider modifying evaluation dimensions and items based on specific target groups.

The constructed evaluation model explores the mechanisms through which mathematics culture influences students' interest in mathematics learning. Educational research is often influenced by the characteristics of the sample population, and because the participants in this study were primarily from Chongqing, this may limit the generalizability of the model. Nevertheless, the study empirically demonstrates that mathematics culture has a positive influence on students' interest in learning mathematics. Currently, many regions and schools are exploring the use of mathematics culture to enhance primary school students' mathematical literacy. This research provides theoretical support for such practices.

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Appendix: Survey on Mathematics Culture and Primary School Students' Mathematics Learning Interest (Partial)

The primary purpose of this section is to understand your interest in primary school mathematics culture. Please indicate the extent to which you agree or disagree with the following statements based on your actual situation. Please read each statement carefully and be careful not to misalign your answers!

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. I enjoy reading the "Mathematics Culture" and "Mathematical Perspectives" sections in the mathematics textbook.	①	②	③	④	⑤
2. I enjoy reading extracurricular books about mathematics culture.	①	②	③	④	⑤
3. The "Did You Know?" and "Origin and Development of Mathematics" sections in the textbook are varied in form.	①	②	③	④	⑤
4. The "Did You Know?" and "Origin and Development of Mathematics" sections in the textbook are rich in content.	①	②	③	④	⑤
5. The presentation of mathematics culture in the classroom is engaging.	①	②	③	④	⑤
6. Reading about mathematics culture helps me learn interesting facts about mathematics.	①	②	③	④	⑤
7. Reading about mathematics culture helps me learn a lot of knowledge.	①	②	③	④	⑤
8. Reading about the content of mathematics culture helps me understand the origin and development of mathematics.	①	②	③	④	⑤
9. Reading about the content of mathematics culture helps me learn about the application of mathematics in daily life.	①	②	③	④	⑤
10. Reading about mathematics culture is helpful for exams.	①	②	③	④	⑤
11. I feel curious about the topics introduced in mathematics culture.	①	②	③	④	⑤
12. I am curious about the mathematical knowledge discussed in mathematics culture.	①	②	③	④	⑤
13. I am curious about the mathematical methods presented in mathematics culture.	①	②	③	④	⑤