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# A Survey and Research on the Reading Habits of Middle School Students in Mathematics—Taking X Middle School in Wucheng County as an Example

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***Abstract:*** *Reading is a fundamental skill essential for junior high school students, and it is not a patent for Chinese language learning. The study of mathematics also relies on reading. In the process of primary school mathematics teaching, students' mathematical reading habits are crucial for the development of their reading abilities, and they play a pivotal role in improving their mathematical academic performance. This article reviews the latest theoretical literature and draws on the cutting-edge achievements of extracurricular reading research. Using questionnaire survey and interview methods, students and teachers from X Middle School in WuCheng County are selected as research subjects, aiming to study the relationship between mathematical reading habits and mathematical academic performance. Based on the research results and the interview process, some guiding strategies are proposed to address the problems in students' mathematical reading: correct the attitude towards mathematical reading and cultivate mathematical reading motivation;Optimize the mathematics reading environment and guide students to cooperate and communicate; Expand the content of mathematics reading and emphasize the continuity of mathematics teaching; Improve math reading methods and strengthen math reading guidance.*

***Keywords:*** *Mathematics Reading; Junior High School Students; Mathematics Academic Performance*

## 1. Preface

### *1.1 Research Background*

Reading is an essential skill in human daily life and communication. By reading subsets of ancient Chinese classics and history, we can learn about the excellent traditional culture of China for over 5000 years, acquire useful knowledge in daily life, and develop our wisdom. With the development of information technology, the Internet is integrated with medical, education and logistics industries. The society is in the era of digital information, and mathematics reading plays a pivotal role in it. Everyone can not live without mathematics, and everyone needs mathematics.

According to the "Mathematics Curriculum Standards for Compulsory Education (2022 Edition)", students are able to describe the world using mathematical language. Mathematical language is a concise and rigorous language that can train students' logical thinking ability and develop their language expression ability. The proportion of the "Read One Read" module in junior high school textbooks has increased, and the amount of information read has greatly increased. This not only requires the cultivation of students' language recognition ability, but also the cultivation of their ability to extract and transform useful information. Under the new curriculum standards, it is particularly important to cultivate students' reading habits and develop their mathematical reading abilities. Under the background of the new curriculum reform, the concept of mathematics education has undergone significant changes. From teachers' teaching to students' learning, the status of teachers has changed from lecturers to guides. This requires students to have a certain ability to self-study and read mathematics, independently extract relevant mathematical information, understand mathematical information, and propose valuable mathematical problems. By analyzing the meaning of the problems, they can solve them.

### *1.2 Research significance*

Theoretical level: Mathematics reading has always been a hot topic in the field of mathematics

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education, and the attention and research on mathematics reading have never stopped. In recent years, various countries have paid increasing attention to mathematical culture, which has been applied to mathematical reading question types and given more and more importance. Scholars at home and abroad have produced numerous research results on mathematical reading, but they only stay at empirical discussions. However, there is relatively little research on mathematical reading habits. This article aims to use data analysis methods to quantitatively analyze the relationship between mathematics reading and mathematics academic achievement, and explore the impact of mathematics reading habits on mathematics academic achievement, which is in line with the current research trend of the new curriculum reform.

On the practical level, under the concept of quality education, teachers should pay more attention to the cultivation of students' thinking and abilities, so that students' various qualities can be well developed. However, in the process of educational practice, high scores do not necessarily mean high energy, and low scores do not necessarily mean low energy. Teachers often use "scores" as a command stick, focusing on the high and low scores of students, and often neglecting the cultivation of other aspects, especially the cultivation of students' reading habits. Therefore, in educational practice, teachers should not only focus on students' scores, but also pay attention to their math reading habits. Good reading habits have a positive promoting effect on students' overall development.

### *1.3 Research Tatus*

By consulting relevant literature, it can be concluded that scholars both domestically and internationally have conducted research on mathematical reading, initially focusing on psychologists studying its related concepts. With the continuous deepening of their research, most scholars have realized that reading is not limited to Chinese language reading, and reading is also needed in the teaching of various disciplines, especially in mathematics learning, which cannot be separated from mathematical reading. Mathematical reading makes the understanding of the essence of mathematics more thorough.

Jingqian Pan and Yingkang Wu believe that mathematical reading comprehension is the sum of a series of processes, which is the process of acquiring meaning in writing, including the understanding of mathematical material words and phrases, as well as the understanding of the entire material[2]. Yang Hongping believes that the structure of mathematical reading ability is influenced by age. As age increases, the number of factors in the ability structure gradually increases, and the relative position of more complex and higher-level factors in the entire structure continues to strengthen[3]. Wu Youchang believes that mathematics teaching is the teaching of mathematical language, and it is necessary to cultivate students' mathematical language abilities in listening, speaking, reading, writing, translation, and other aspects[4]. Yu Ping believes that "mathematics reading generally includes reading mathematics textbooks, mathematics problems, and mathematics extracurricular books. The psychological process of mathematics reading includes four stages: internalization, understanding, reasoning, and reflection[5]." Shao Guanghua believes that mathematical language has characteristics such as accuracy, simplicity, and wide application, and can be formally divided into three categories: textual language, symbolic language, and graphic language, with expressive, applied, and thinking functions[6].

With the increasing attention of scholars on mathematical reading habits and the development of students' self-learning abilities through mathematical reading, domestic and foreign scholars have conducted educational practice research on mathematical reading. These teaching practices have placed mathematical reading in an important position, and these studies mainly focus on the definition, characteristics, influencing factors, abilities, and teaching of mathematical reading. The relevant research on mathematical reading mainly focuses on the level of speculative experience, lacking empirical research on mathematical reading. Many scholars in China have conducted extensive research on the definition of mathematical reading. Representative scholars, such as Shao Guanghua, believe that the process of mathematical reading is not very different from other reading processes, and it also includes various psychological factors of readers in the reading process, such as recognition of language symbols, assimilation and adaptation of new concepts, understanding and memory of reading materials[1].The research on mathematics reading is not very abundant, but its exploration and research have not stopped. Although the research content related to mathematics reading is true and reliable, it is still vivid and lively. However, most of the research only stays at the level of summarizing experiences, which is relatively scattered, lacks depth, and lacks systematicity. There are few quantitative studies on the habits of mathematics reading in primary and secondary schools, especially the lack of systematic quantitative research on the relationship between mathematics reading habits and academic performance.

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## 2. Research Design and Implementation

Taking "Investigation and Research on the Reading Habits of Middle School Students in Mathematics" as the theme, this paper sorts out and classifies the domestic and foreign literature reviews. Based on an understanding of the relevant research, it uses theoretical speculation and quantitative analysis methods to analyze the current situation of middle school students' mathematics reading, explore the underlying reasons for its existence, and put forward reasonable suggestions to provide ideas for the teaching of front-line teachers.

### *2.1 Research Objective*

This article is based on extensive reading and mastery of mathematical reading theories, with a focus on middle school students in a school. The aim is to investigate the relationship between mathematical reading habits and academic performance, and to propose corresponding teaching and reading suggestions based on the research results.

On the one hand, conducting a questionnaire survey on students to understand the current situation of middle school students' mathematics reading and their attitudes towards mathematics reading, analyzing the problems that students have in mathematics reading, and proposing relevant suggestions for improving their mathematics reading ability and cultivating good mathematics reading habits. On the other hand, collect data on students' daily math reading habits and analyze the correlation between their daily math reading habits and their academic performance. At the same time, by comparing students with poor and excellent reading habits in mathematics, analyzing the relevant characteristics, summarizing and generalizing the reading habits of excellent students, identifying the problems in mathematics reading of students with poor academic performance, and proposing targeted and constructive suggestions, teaching students according to their aptitude to help them improve their reading ability and develop good reading habits.

### *2.2 Research Object*

The survey targets frontline mathematics teachers and students in grades one, two, and three of junior high school in Dezhou City. Firstly, interviews were conducted with three mathematics teachers and four students from a middle school in Dezhou City. Based on the interviews, the survey was expanded to include junior high school students from a middle school in D City, S Province as the research subjects. In order to make the research data more representative and combined with relevant practical situations, students' choices covered three levels of learning status: high, medium, and low. A more comprehensive and detailed survey was conducted on junior high school students in the form of questionnaires. Random sampling and stratified sampling were used, and a total of 117 questionnaires were distributed and collected, of which 110 were valid questionnaires, accounting for 94.02% of the total questionnaires.

### *2.3 Design and Implementation of Survey Questionnaire*

This study mainly adopts the form of a survey questionnaire, supplemented by classroom observation, using anonymous methods. In order to avoid the influence of survey questions, ensure the originality and authenticity of the data, the title of the survey questionnaire has been modified to "Learning Questionnaire". When designing a specific survey questionnaire, this study first extensively read and analyzed relevant literature, effectively organized and comprehensively utilized the research results of predecessors such as Yang Hongping and Yu Ping. The evaluation tools were mainly selected from Professor Yu Ping's "Mathematics Reading Status Survey Questionnaire" and Professor Yang Hongping's "Mathematics Reading Learning Status Survey Questionnaire". Based on the physical and mental development characteristics of junior high school students, the questionnaire was further modified and divided into four dimensions: mathematics reading attitude dimension, mathematics reading content dimension, mathematics reading environment dimension, and mathematics reading method dimension, ensuring the scientificity and effectiveness of the questionnaire. The questionnaire consists of 26 questions, mainly focusing on the following aspects: firstly, paying attention to students' subjective cognition and psychological foundation of mathematics reading; 2, Pay attention to students' specific behavior and practical methods in mathematics reading; 3, Pay attention to the teacher guidance that students receive during the reading process, their metacognitive abilities, and the obstacles they face.

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### *2.4 Design and Implementation of Interview Outline*

Four students (hereinafter referred to as Student 1, Student 2, Student 3, and Student 4) were randomly selected to participate in the questionnaire survey for interviews. Three mathematics teachers with different teaching experience and honors were selected for interviews with teachers, hereinafter referred to as Teacher A, Teacher B, and Teacher C). The dimensions of the interview outline are basically the same as those of the survey questionnaire. Based on the questionnaire, a targeted interview outline will be set up for the interview. A student interview outline will be prepared according to the results of the survey questionnaire, and a teacher interview outline will be prepared according to the current situation of students' mathematical reading. Conduct group interviews with students in the conference room of the school. Conduct individual interviews with teachers at the teacher's office. During the interview, record the interview process according to the interview outline and make a good interview record.

## 3. Results and Discussion

### *3.1 Questionnaire survey analysis*

#### *3.1.1 Overall Analysis of Middle School Students' Mathematics Reading Habits*

The author conducted a descriptive analysis of the questionnaire data on mathematics reading among middle school students based on the Likert five point scale scoring criteria proposed by Oxford and Burry Stock (1995) (see Table 1). First

*Table 1: Scoring Criteria for the Likert Five Level Scale*

| score value | level |
|---|---|
| ≤2.4 | low |
| 2.5-3.4 | middle |
| >3.4 | high |

*Table 2: Descriptive Statistics of Mathematics Reading Habits of Junior High School Students in Various Dimensions*

| | N | minimum value | maximum value | mean value | Standard value |
|---|---|---|---|---|---|
| Dimension of Mathematics Reading Attitude | 117 | 4.00 | 8.00 | 6.00 | 1.41 |
| Dimension of Mathematics Reading Environment | 117 | 3.00 | 6.00 | 4.42 | 1.08 |
| Dimension of Mathematics Reading Content | 117 | 5.00 | 11.00 | 7.42 | 1.83 |
| Dimension of Mathematics Reading Methods | 117 | 6.00 | 12.00 | 7.75 | 1.82 |

According to Table 2, the average values of the attitude dimension, environment dimension, content dimension, and method dimension of middle school students' mathematics reading are 6.00, 4.42, 7.42, and 7.75, respectively. Except for the low level of the mathematics reading environment dimension, the average values of the other three mathematics reading dimensions are generally above the medium level, and the differences between each dimension are small. The average dimension of the mathematical reading environment is relatively low, indicating that the environment for junior high school students' mathematical reading is not ideal, and teachers should pay attention to the reading environment. A good reading environment is the guarantee for cultivating reading habits. Teachers can create a positive reading environment and a quiet reading atmosphere to cultivate students' reading habits. The average dimension of mathematical reading methods is relatively high, indicating that middle school students have ideal reading methods and diverse reading styles, which can attract students' interest in reading. Teachers can utilize the diversity of their reading methods to cultivate students' reading habits.

To test whether the proportion of various dimensions of mathematical reading habits is consistent with the past, a chi square test is conducted on each dimension of mathematical reading habits. The results show that there is no significant difference in the proportion of various dimensions of mathematical reading habits compared to the past, $p>0.05$. The results are shown in Table 3.

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*Table 3: K-S test of middle school students' math reading habits sample*

| Math reading habits |
|---|
| Chi square of statistics 9.333[a] |
| Df .7 |
| Asymptotic significance .230 |

### *3.1.2 Analysis of Gender Differences in Mathematics Reading for Junior High School Students*

Through independent sample testing of middle school students' reading habits (see Table 4), the significance (bilateral) of mathematics reading attitude, mathematics reading content, and mathematics reading style dimensions were 0.098, 0.785, and 0.317, respectively, all greater than 0.05, indicating that there were no significant differences between males and females in these dimensions; The significance (bilateral) of the mathematical reading environment is 0.026, which is less than 0.05, indicating a significant difference between males and females in the dimension of mathematical environment. In summary, the reading habits of junior high school students exhibit a normal distribution, and there are significant gender differences in the mathematics reading environment, with girls performing better than boys; There is no significant gender difference in attitudes towards mathematics reading, mathematics reading content, and mathematics reading methods.

*Table 4: t-test of the mean equation for gender differences in various dimensions of mathematical reading*

| | T | Df | Sig.(2-tailed) | Mean Difference |
|---|---|---|---|---|
| Dimension of Mathematics Reading Attitude | -1.823 | 117 | .098 | -1.37 |
| Dimension of Mathematics Reading Environment | -.280 | 117 | .785 | -.314 |
| Dimension of Mathematics Reading Content | -2.621 | 117 | .026 | -1.342 |
| Dimension of Mathematics Reading Methods | -1.054 | 117 | .317 | -1.114 |

### *3.1.3 Summary*

After analysis, it was found that the overall reading level of the participants was relatively low. On the one hand, traditional question types tend to focus on the application of computational and thinking abilities, neglecting the cultivation of students' ability to recognize and extract written language. On the other hand, most students are exposed to relatively short and often use graphic language and symbolic language as the carrier for proposition. When students face complex and reading intensive questions, they find it difficult to extract effective information and develop a fear of difficulty. Some students lack problem-solving awareness and are prone to rejection, making it difficult for them to complete the problem.

There is no significant difference in overall reading habits between males and females. In terms of mathematics reading environment and attitude, females have a higher overall level than males. There is no significant difference in mathematics reading content and methods. The main reason is that girls have stronger autonomy than boys. Girls can actively regulate their math reading behavior, choose suitable reading environments, and form good math reading habits.

## *3.2 Analysis of Interview Results*

### *3.2.1 Analysis of Student Interview Results*

Based on the interview, the author has the following conclusions:

1) Students generally have a clear understanding of mathematics reading, and their scope of mathematics reading is mainly focused on problems, lacking reading of mathematics textbooks and extracurricular books.

2) Students have strong utilitarianism and purposefulness, and their reading content mainly focuses on mathematical knowledge. The interview results are consistent with the survey questionnaire on mathematical reading attitudes.

3) Students' reading methods are not systematic enough and require guidance from teachers.

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4) Students' reading difficulties mainly focus on understanding the questions, and they have the ability to think independently. After independent thinking, they seek help from teachers, parents, and classmates.

#### *3.2.2 Analysis of Teacher Interview Results*

Overall, teachers have a comprehensive understanding of mathematics reading, indicating that the school attaches great importance to cultivating mathematical reading habits. The teacher pointed out that during the process of solving application problems, students lack patience in reading and do not have good reading habits. Based on the answers, it can be seen that the teacher can recognize the importance of mathematical reading. Good reading habits not only help students better understand the textbook, but also cultivate the habit of independent thinking. Teachers patiently guide and teach reading methods during the reading process, emphasizing the importance of reading and annotating while solving problems. This also confirms the survey results on the dimensions of mathematical reading methods.

## 4. Conclusion and Suggestions

### *4.1 Maintain a positive attitude towards mathematics reading and cultivate motivation for mathematics reading*

Students are in a dominant position in mathematics learning and are the "masters" of learning, while teachers are in a supportive position in the teaching process and are the guides of learning. Teachers should fully respect the subject status of students, return the classroom to students, stimulate their enthusiasm, and cultivate their motivation for mathematics reading. Firstly, teachers should guide students to have a clear and distinct understanding of mathematics reading. The improvement of mathematics reading ability is not achieved overnight, but a long-term process. Teachers should provide real-time guidance to students' reading, guide them to have a correct understanding of mathematics reading, correct their attitudes towards mathematics reading, and cultivate their motivation for mathematics reading.

### *4.2 Optimize the math reading environment and guide students to collaborate and communicate*

Under the background of the new curriculum reform, teachers should not only learn knowledge in class, but also actively read mathematics knowledge outside of class. In the classroom, teachers should give students time to actively read and understand the content of mathematical materials. Teachers should create a reading environment for students, and students should share their understanding of the problem in class, identify known conditions, conditional relationships, and solving objectives in the problem, and guide students to cooperate and exchange their ideas independently. Teachers should encourage and support extracurricular math reading, regularly hold math reading seminars, share stories of math reading outside of class, discuss the origin of math knowledge, change attitudes towards math reading, and cultivate students' interest in math reading.

### *4.3 Expand the reading content of mathematics and focus on the continuity of mathematics teaching*

The learning of mathematics is a holistic "project", and teachers should pay attention to the coherence of knowledge in mathematics teaching. The introduction section is the beginning of unit teaching and plays a guiding role in the learning of this unit. Teachers should consciously guide students to have a detailed understanding of the introduction section and grasp the overall context. For the explanation of knowledge, teachers should pay attention to the understanding of mathematical definitions, concepts, and other knowledge, and strengthen the integration between knowledge. Mathematics reading outside of class is very important. Teachers can recommend relevant mathematics reading materials, guide students to read, understand the culture of mathematics, learn about famous mathematicians in the history of mathematics, and learn their mathematical spirit.

### *4.4 Improve math reading methods and strengthen math reading guidance*

Students have stereotypes about math reading. Most people think that math reading content is dull and boring, and math reading methods are its "seasoning". Changing the way math reading is done can effectively arouse students' interest in reading. Enriching students' reading methods requires not only rote memorization of mathematical formulas, concepts, and other knowledge, but also the adoption of diverse mathematical reading methods to stimulate students' interest in reading. At the same time, teachers should

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provide relevant guidance for mathematical reading.

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