An Investigation and Strategic Study on Mathematical Reading and Writing Abilities for the Students in Normal Schools

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Abstract: The new curriculum standards put forward new requirements for mathematics reading and writing ability, therefore, mastering these abilities of normal university students is becoming more important. Through the questionnaire, the mathematics reading and writing ability of the students majoring in mathematics were investigated. There are the following problems: lack of interest, lack of effective methods and skills in mathematics reading and writing; the abilities of reading and solving problems need to be improved. And they can't transform the mathematical language. In order to solve the above problems, this paper puts forward the corresponding improvement measures and methods.

1. Problem Raising

The new curriculum standards puts forward the idea that it is particularly important and necessary for the future teachers (the students in normal schools) to pay attention to the cultivation of mathematical reading and writing ability and master certain reading and writing ability. In order to improve students' reading and writing abilities, it's necessary to understand the status quo of mathematics reading and writing abilities of the students majoring in mathematics. It promotes the development of mathematical language level and mathematical communication ability. Meanwhile, effective mathematical reading helps students to have a deep understanding of mathematical knowledge and mathematical problems. The improvement of mathematical writing ability can help students to develop the habit of being good at reviewing, summarizing and self-reflecting, and promote the overall development of students.

2. Results Analysis of Mathematics Reading and Writing

2.1. Respondents

Students in normal schools (who major in mathematics and applied mathematics)

2.2. Investigation Methods

Subjects selecting: there are 12 classes of mathematics and applied mathematics in our school, including 4 freshman classes, 4 sophomore classes, 2 junior classes and 2 senior classes. 10 students from each class of four grades were selected for investigation, 120 students in all, including 40 boys and 80 girls.

Survey method: this survey adopted the method of questionnaire survey. The questionnaire survey was used to investigate the status quo of reading and writing of students whose major is mathematics.

2.3. Analysis of the Results of the Mathematics Reading Questionnaire

A total of 20 problems were set in the mathematics reading questionnaire, all of which were multiple choice questions. The questionnaire was conducted in an anonymous way, and the commissary in charge of studies of each class was responsible. The students completed the

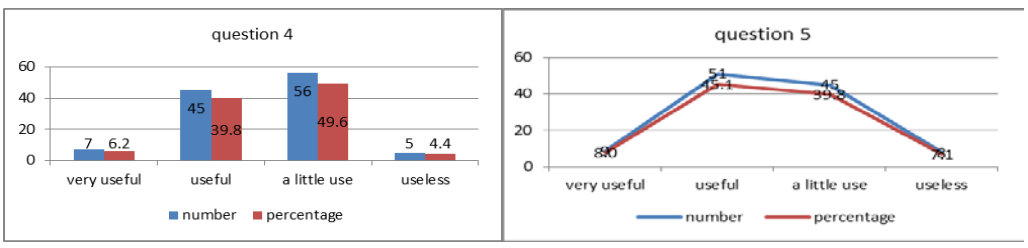
questionnaire very carefully and the answers were true, so the survey results were relatively reliable. A total of 120 questionnaires were handed out and all questionnaires were collected. 7 invalid questionnaires were removed from the later processing data, resulting in 113 valid questionnaires in total. And SPSS software was used for data processing. The results are shown in table 1 below:

Table 1. Statistical table of questionnaire survey on mathematics reading status quo of the students majoring in mathematics

Option	A		B		C		D		E	
Question No.	Number of people	%	Number of people	%	Number of people	%	Number of people	%	Number of people	%
1	39	34.5	39	34.5	17	15	18	16		
2	6	5.3	24	21.2	57	50.4	26	23		
3	7	6.2	33	29.2	51	45.1	22	19.5		
4	7	6.2	45	39.8	56	49.6	5	4.4		
5	9	8	51	45.1	45	39.8	8	7.1		
6	17	15	46	40.7	4	3.5	27	23.9	19	16.8
7	10	8.8	35	31	49	43.4	19	16.8		
8	45	39.8	42	37.2	21	18.6	5	4.4		
9	61	54	33	29.2	15	13.3	4	3.5		
10	32	28.3	10	8.8	13	11.5	58	51.3		
11	11	9.7	78	69	24	21.2				
12	19	16.8	82	72.6	12	10.6				
13	2	1.8	14	12.4	52	46	45	39.8		
14	33	29.2	63	55.8	17	15				
15	25	22.1	74	65.5	14	12.4				
16	7	6.2	51	45.1	55	48.7				
17	4	3.5	30	26.5	34	30.2	45	39.8		
18	5	4.4	26	23	33	29.2	49	43.4		
19	6	5.3	32	28.4	45	39.8	30	26.5		
20	33	29.2	60	53.1	6	5.3	14	12.4		

In terms of the role of mathematics reading, a total of two questions were set in the questionnaire, and the survey results showed that most students hold a positive attitude towards the role of math reading, while only a few college students hold a negative attitude. In question 4, "Do you think it's useful to have mathematics reading?" Among them, those who think "very useful" and "relatively useful" accounted for 46% of the total, and think mathematics reading is "Useless" accounted for only 4.4% of the total. In question 5, "Do you think math reading is good for improving your math results?" Only 7.1% of the students said it was "useless". Therefore, we can see that students can realize the function and effect of reading in this way. The results are shown in figure 1:

Figure 1: Students' understanding of the role of mathematics reading.

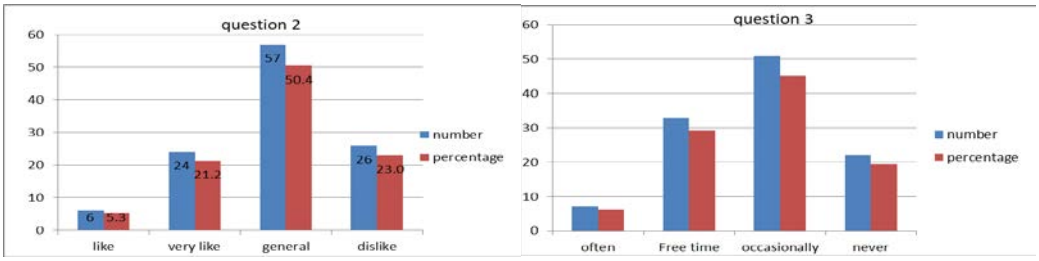


In question 2, "Do you like reading math books?" Only 5.3% of the total chose the "like" and those who said they "don't like" it accounted for 23 percent of the total. In question 3, "Do you often read math books in math learning? Only 6.2 percent of the total chose "often" and 19.5

percent of the total chose “hardly”.

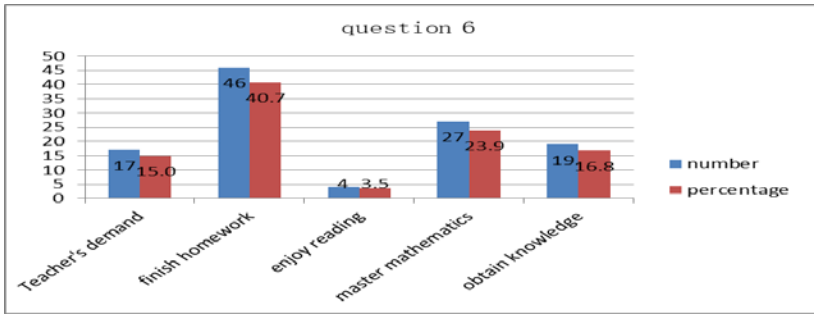
The specific situation is shown in figure 2 below.

Figure 2: The attitude of the students majoring in mathematics towards mathematics reading.



It is not profound enough and mathematics is determined by rigor, simplicity, abstraction which is different from other subjects and lacks the internal motivation.

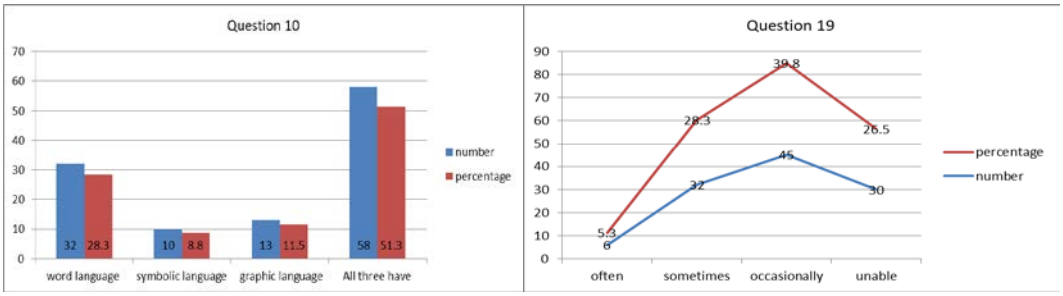
Figure 3: Motivation level of mathematics reading for the students majoring in mathematics



As it can be seen from the data in the figure, among the five reading motivations, "finishing homework" accounted for 40.7% of the total, which had the highest proportion of all the motivations; Only 3.5% of students " read math because of “like math reading” , it showed that students lack interest in math reading again. It is conceivable that if teachers do not assign homework after class and students are not forced to read mathematics, quite a few students would read mathematics books actively. Therefore, students do not have the consciousness of actively reading mathematics, they are under the influence of objective conditions and they have to read mathematics. Math reading comprehension ability is poor, dyslexia is obvious.

In order to understand the difficulties and obstacles encountered by students in the process of reading, a total of two questions were set in this questionnaire. The specific situation is shown in figure 4:

Figure 4: The performance of math dyslexia in the students majoring in math



In question 10, "What do you think of the mathematical knowledge expressed in mathematical words, mathematical symbols and mathematical figures, which one is harder to understand and accept?" As many as 51.3 percent of the students said they felt three methods of mathematical words, mathematical symbols and mathematical figures all were difficult to understand and accept; And in question 19, "Can you convert mathematical languages to each other?" Only 5.3% of the students were able to convert among the three mathematical languages, while the remaining 94.7% were having more or less difficulties and obstacles in the conversion of mathematical languages, students lack the ability of conversion of mathematical languages.

In order to understand the measures and methods adopted in the mathematical reading better, 7 questions were set in the questionnaire. The situation is shown in table 2 below:

Table 2: The way of reading math for the students majoring in math

Question 9	Read again and again in context where you got problems.	Ask teachers or classmates for help immediately.	Skip over the difficult contents	Give up reading
Number of people	61	33	15	4
percentage	54%	29.2%	13.3%	3.5%
Question 11	often	occasionally	never	
Number of people	11	78	24	
percentage	9.7%	69%	21.2%	
Question 12	often	occasionally	never	
Number of people	19	82	12	
percentage	16.8%	72.6%	10.6%	
Question 14	never	not often	often	
Number of people	33	63	17	
percentage	29.2%	55.8%	15%	
Question 15	never	not often	often	
Number of people	25	74	14	
percentage	22.1%	65.5%	12.4%	
Question 16	often	occasionally	never	
Number of people	7	51	55	
percentage	6.2%	45.1%	48.7%	
Question 20	extracurricular tutoring materials	math textbooks	math magazines	web
Number of people	33	60	6	14
percentage	29.2%	53.1%	5.3%	12.4%

Thus it can be seen that students are only at the level of reading comprehension and do not explore mathematics reading, so the reading efficiency at this time is low.

2.4 Analysis of Writing Questionnaire Results.

A total of 10 questions were set in the writing questionnaire, all of which were multiple choice questions, 120 questionnaires were handed out and all the questionnaires were collected. In the later processing data, 10 invalid questionnaires were removed. There were 110 questionnaires in total. The results of the questionnaire are shown in table 3 below:

Table 3: Statistical table of questionnaire survey on the status quo of mathematical writing of mathematics majors

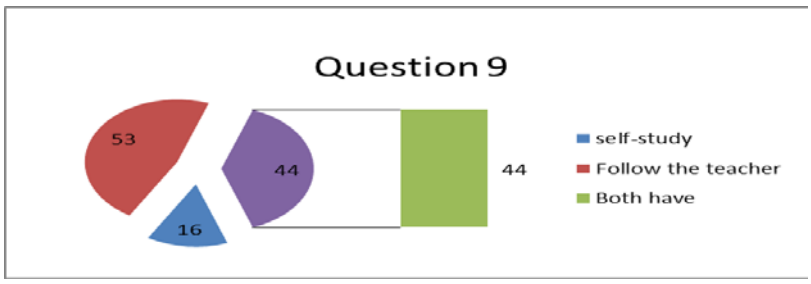
Option	A		B		C		D	
Question No.	number of people	%	number of people	%	number of people	%	number of people	%
1	38	34.5	37	33.6	18	16.4	17	15.5
2	6	5.5	20	18.2	26	23.6	58	52.7
3	6	5.5	15	13.6	30	27.3	59	53.6
4	10	9.1	40	36.4	35	31.8	25	22.7
5	3	2.8	15	13.6	21	19.1	71	64.5
6	67	60.9	16	14.5	21	19.1	6	5.5
7	2	1.8	6	5.5	10	9.1	92	83.6
8	78	70.9	10	9.1	6	5.5	16	14.5
9	16	14.5	50	45.5	44	40		
10	16	14.5	46	41.8	34	30.9	14	12.8

There are two questions on interest in mathematical writing. In the third question, "Do you like mathematical writing?", more than half, 53.6 percent of the total chose "dislike" , only six people

make up 5.5%. It can be seen that students are not very interested in mathematical writing. In question 6, “What's the reason for your interest in mathematical writing?" 60.9 percent of those asked were "forced" to take an interest in mathematical writing because they had to write papers and lack initiative.

In order to understand the measures and methods in math reading taken by the students majoring in math better, question 9 of this questionnaire is "What kind of learning way to mathematical writing do you like?" In this question, only 14.5% of students were able to look up information actively and learned mathematical writing by themselves, while the remaining 85.5% of students took the method of learning mathematical writing from teachers. Specific situation is shown in figure 5 below:

Figure5: Methods of mathematical writing used by students majoring in mathematics



2.5 Existing problems.

(1) Lack of intrinsic motivation and interest

Interest is the best teacher, but students are not interested in math reading. The idea of most people of reading only shows in Chinese and English learning, and math learning is just solving problems. On the one hand, college students have a strong sense of self awareness and lack of intrinsic motivation; On the other hand, mathematical language has its unique rigor, simplicity, abstraction. Because mathematical terminology is dull and boring, students are easily bored.

(2) Poor ability of reading problems and lack of effective writing methods

The survey found that the students lack reading problems and obtaining information abilities, when students have a longer text problem, most of them are tired of reading, which affects their ability of reading. The time and energy students spend on mathematical writing is less, they haven’t form the habit of mathematical writing, there is no good writing method to write mathematical writing, and they can’t overcome difficulties and obstacles encountered in mathematical writing.

(3) Lack of ability to convert mathematical languages

Mathematical language includes text language, symbolic language and graphic language, and it was found in the survey that most students can’t do this, and the text language, the symbolic language and the graphic language are very important in mathematical reading. Only by mastering the three mathematical languages and being able to translate the three languages can we do math reading better.

3. The Cultivation Strategy of Mathematical Reading Ability and Mathematical Writing Ability

3.1 Motivate Mathematical Reading

(1) Optimize the reading environment.

A good reading atmosphere is the basis of cultivating interest. In order to create an atmosphere, the class can have a "mathematics reading activity", the rule is that every day students spend 20 minutes to do mathematics reading and the student are required to take some good mathematics magazines to the class study room to develop a “Good book recommendation show” .

(2) Engage in reading communication

It is an important way to stimulate the interest in mathematics reading to exchange reading experiences, introduce reading methods and introduce new books. To edify the students with the

famous scholars' words, it's useful to tell the story of mathematicians (such as Loo-Keng Hua, Chen Jingrun) to inspire students and let students know the importance of mathematics reading, and also let students know that learning is their own business, gradually they will develop interest in learning mathematics. Let the students have a change from "ask me to read" to "I want to read."

(3) Collect materials reasonably

Teachers actively organize students to collect materials related to mathematics and enrich students' reading materials. For example, articles written by various ancient and modern Chinese and foreign masters and scholars; Beautiful sentences seen in daily reading; articles on TV or the Internet, etc. Therefore, it's important to make full use of the advantages of information technology, the use of multimedia, computer and other modern tools for reading to provide more vivid, visual, intuitive, appealing mathematical information for students.

3.2 Reflect On Problem Solving and Train Students' Ability to Draw Inferences from One Example

Due to the particularity of mathematics textbooks, in the process of mathematics reading, we often encounter theorems, formulas and corresponding examples and proof. In class, students are passively accepting the knowledge taught by the teacher, or directly look at the proof and the derivative process of teaching materials, so they lack the spirit of active inquiry. Ask the students to write the proof and derivation by themselves, and then compare them and reflect, try to change the conditions of the example and change to the same type of questions so that students can think and achieve the goal of drawing inferences from one example.

3.3 To Improve the Ability of Conversion of Mathematical Languages

The transformation of mathematical language refers to only changing the presentation form of the mathematical language on the premise of keeping the meaning or essential properties of mathematical objects unchanged.

In the former investigation, it is found that there are some certain difficulties and obstacles in the conversion of students' mathematical language. Previous surveys have found a shift between students' mathematical languages the text language become symbolic and the symbolic language become graphic.

3.4 Stimulate the Motivation of Mathematical Writing

(1) Make full use of feedback information and properly reward and punish students.

Use feedback to keep students informed of their writing. Paying attention to their success and progress, they will increase their confidence so that they can increase interest in writing; after knowing their shortcomings, they can correct them in time and work harder to achieve success.

Reward and punishment is a kind of reinforcement for students' writing results and attitude of position and negation.

(2) Guide the attribution of results correctly and promote the improvement of ability.

There are two ways to change students' incorrect attribution and improve their writing motivation

The one is that "success or failure is the result of one's own efforts". The second is "realization attribution", which refers to some specific problems method and can improve students' ability to overcome difficulties and enhance self-confidence.

3.5 Read Professional Excellent Articles and Practice Writing Frequently

(1) Study excellent journal articles

Excellent writing, content and form are in a high degree of perfection, the writing skills are often skilled and creative.

Read more excellent articles, pay attention to their writing skills and see what writing skills the author used to express ideological content and achieve writing intention. Analyze the specific application of these writing methods and the writing effect achieved. And on that basis, students should also combine the reality to think further and see which method can be transformed for their use. In this way, students' writing skills will naturally be improved over time.

(2) Form the habit of writing regularly

There is an old saying that "practice makes perfect". We can be more familiar only by writing practice, and only practice makes perfect. Only by frequently and repeatedly writing can we improve our writing skills and writing level.

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