Pre-service mathematics teachers' understanding of "being able to understand but unable to solve"

Abstract: As for the phenomenon that high school students "being able to understand but unable to solve" mathematics problems, existing studies mainly focus on front-line teaching, but no one has explored the understanding of pre-service mathematics teachers from the perspective of pre-service training. In this paper, 30 postgraduates and undergraduates from the School of Mathematics and Statistics of Shandong Normal University were interviewed to investigate their understanding of this phenomenon. The results showed that most pre-service mathematics teachers believed that "students' insufficient grasp of knowledge", "students' rigid problem-solving ideas, no effective problem-solving strategies" and "teachers' lack of emphasis on problem-solving methods" were the main reasons. "Teachers should let students pay attention to reflection and review and summary", "teachers should pay attention to training students' mathematical thoughts and methods" and "teachers should pay attention to the teaching of classic examples and multiple solutions to one problem" are the main countermeasures. Combined with previous studies, it can be concluded that: (1)Most pre-service mathematics teachers have shortcomings in rationality and comprehensiveness in their understanding of high school students' "being able to understand but unable to solve ". (2) It is necessary to train pre-service mathematics teachers.

Keywords: Senior High School Mathematics, Pre-service Teachers, being Able to Understand but Unable to Solve, Cognitive Degree, Cultivation Suggestion

1. Introduction

Ordinary High School Mathematics Curriculum ~~Standards(~~Standards (2017 Edition, 2020 Revision) (Formulated by the Ministry of Education of the People's Republic of China, 2020) points out that the academic quality is the basis of the corresponding examination proposition. Whether it is high school graduation examination, college entrance examination or college independent admission examination, it is inseparable from the form of examination questions to examine students. At present, many scholars have found in front-line teaching that many high school students appeared "being able to understand but unable to solve" phenomenon. Students reflect that they can understand the teacher's teaching in class, but always can not solve mathematics problems independently. This phenomenon not only frustrated students' self-confidence, affected

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students' learning, but also adversely affected teachers' teaching. Most of the current studies are from the perspective of front-line teaching, and no one has explored the reasons and countermeasures from the perspective of pre-service mathematics teachers. Pre-service mathematics teachers are the main force of mathematics teaching in high schools in the future. Whether their understanding of this problem is accurate will greatly affect the quality of mathematics teaching in high schools in the future. Therefore, it is necessary to study pre-service mathematics teachers' understanding of "being able to understand but unable to solve".

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2. Literature Review

It is a common teaching phenomenon that high school students "being able to understand but unable to solve" mathematics problems. Many scholars have done research on this phenomenon, and the existing research mainly focuses on "why students can't solve problems" and "how to cultivate students' problem-solving ability".

In terms of reasons, Li et al.(add year) believe that students do not grasp basic knowledge well (Li, 2024; Liang, &Zhang, 2024; Huang, 2024, Bai, 2024). Huang et al.(add year) believed that students' problem-solving ideas were rigid and there were no effective problem-solving strategies (Huang, 2024; Meng, 2024; Yang, 2024; Wang, 2024; Zhu, 2023; Li, 2023). Meng et al. believe that students lack the ability to examine questions and have difficulties in understanding the questions(Huang, 2024; Meng, 2024; Yang, 2024; Zhu, 2023). Yan et al. believe that teachers lack a variety of teaching methods(Huang, 2024; Yan, 2024). Wang et al. believe that teachers' professional quality and teaching ability need to be improved (Yan, 2024; Wang, 2023). Li et al. believe that students' mathematical thinking methods need to be improved(Yan, 2024; Liang, 2023; Li, 2023).

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In terms of countermeasures, Zhu et al. believe that teachers should pay attention to cultivating students' mathematical ideas and methods(Li, 2024; Liang, & Zhang, 2024; Meng, 2024; Yan, 2024; Yang, 2024; Fu, 2023; Huang, 2023; Liang, 2023; Zhu, 2023; Li, 2023; Wang, 2023). Bai et al. believe that teachers should pay attention to the teaching of classic examples and multiple solutions to one problem (Li, 2024; Bai, 2024; Wang, 2024; Li, 2024; Yang, 2024; Wu, &Wu, 2024; Zhou, 2023; Li, 2023; Li, 2023; Wang, 2023). Liang et al. think that teachers should pay attention to imparting basic knowledge (concept, theorem and formula, etc.) (Liang, & Zhang, 2024; Huang, 2024; Yan, 2024; Bai, 2024; Yang, 2024; Zhou, 2023; Cairang, 2023; Huang, 2023; Li, 2023; Li, 2023; Wang, 2023; Zhang, 2023); Huang et al. believe that teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.) (Huang, 2024; Bai, 2024; Yang, 2024; Liang, 2024; Zhu, 2024; Li, 2024; Li, 2024; Zhang, 2023). Yang et al. believe that teachers should pay

attention to cultivating students' ability of examining questions(Li, 2024; Liang, & Zhang, 2024; Huang, 2024; Meng, 2024; Yang, 2024; Yan, 2024; Bai, 2024; Yang, 2024; Zhou, 2023; Cairang, 2023; Yang, 2023; Huang, 2023; Liang, 2023; Zhu, 2023; Li, 2023; Li, 2023; Zhao, 2023). Liang et al. believe that teachers should select exercises and pay attention to variable exercises(Liang, 2023; Zhu, 2023). Yang et al. believe that teachers should pay attention to the teaching of problem-solving steps, methods and skills (Liang, & Zhang, 2024; Huang, 2024; Wang, 2024; Yang, 2024; Zhou, 2024; Zhang, 2023).

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After reading relevant articles, it can be found that there are many reasons and countermeasures for students' inability to solve problems. The following reasons have been mentioned more often in previous studies: students have rigid problem-solving ideas and no effective problem-solving strategies; students lack the ability to examine the questions and have difficulty in understanding the topics; teachers lack a variety of teaching methods; teachers' professional quality and teaching ability need to be improved; students don't have a solid grasp of basic knowledge; students' mathematical thinking and methods need to be improved. The details are shown in Table 1.

Table 1

Reasons summary

Reasons	Frequency
Students have rigid problem-solving ideas and no effective problem-solving strategies	6
Students lack the ability to examine the questions and have difficulty in understanding the topics	5
Teachers lack a variety of teaching methods	5
Teachers' professional quality and teaching ability need to be improved	5
Students don't have a solid grasp of basic knowledge	5
Students' mathematical thinking and methods need to be improved	4

Note: The number indicates the frequency with which an opinion appears in the article.

The following strategies are often mentioned in previous studies: teachers should pay attention to cultivating students' mathematical thoughts and methods; teachers should pay attention to the teaching of classic examples and multiple solutions to one problem; teachers should focus on teaching basic knowledge (concepts, theorems, formulas, etc.); teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.); teachers should pay attention to cultivating students' ability of examining questions; teachers should select exercises and pay attention to

variable exercises; teachers should pay attention to the steps, methods and skills of problem solving. The details are shown in Table 2.

Table 2

Cuntermeasure summary

Cuntermeasure summary	Frequency
Teachers should pay attention to cultivating students' mathematical thoughts and methods	18
Teachers should pay attention to the teaching of classic examples and multiple solutions to one problem	17
Teachers should focus on teaching basic knowledge (concepts, theorems, formulas, etc.)	16
Teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.)	16
Teachers should pay attention to cultivating students' ability of examining questions	15
Teachers should select exercises and pay attention to variable exercises	11
Teachers should pay attention to the steps, methods and skills of problem solving	11

Note: The number indicates the frequency with which an opinion appears in the article.

As can be seen from the above research, although there have been many researches on the phenomenon of high school students "being able to understand but unable to solve" mathematics problems, most of them are thought and summarized from the perspective of front-line teaching, which are some experiences gradually discovered and summarized by teachers after they enter the job. So far, no one has explored the reasons and countermeasures for this problem from the perspective of pre-service mathematics teachers (referring to undergraduate mathematics teachers and graduate students in mathematics education who will be engaged in the teaching profession).

Teachers are the inheritors and disseminators of knowledge, the developers of students' intelligence and the shapers of their personalities, and the "engineers of the soul". In the process of education, teachers are the educators, leaders and organizers of students' physical and mental development. Previous studies have mentioned that "teachers' professional quality and teaching ability need to be improved" is one of the main reasons for students' inability to solve problems. If mathematics teachers can clearly understand the reasons and countermeasures for high school students' "being able to understand but unable to solve" mathematical problems before taking office, they can timely deal with such problems after entering the office. This can not only reflect the professional quality

of teachers, but also help students to learn mathematics. Therefore, it is very necessary to study whether pre-service mathematics teachers can correctly understand the phenomenon that high school students "being able to understand but unable to solve" mathematics problems, so that they can improve their teaching skills and professional quality as much as possible before entering the job.

This paper aims to explore the problems existing in the training of pre-service mathematics teachers by investigating their understanding of the phenomenon of "being able to understand but unable to solve" mathematics problems in high school students, and provide solutions to this problem from the perspective of pre-service mathematics teacher training for the reference of educators.

The main research questions of this paper are:

(1) How aware are pre-service mathematics teachers of the phenomenon that high school students "being able to understand but unable to solve " mathematics problems?

(2) What are the current problems in the training of pre-service mathematics teachers?

(3) Based on questions 1 and 2, how should we train pre-service mathematics teachers?

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3. Research Method

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3. 1 Samples

This study selected 30 graduate students majoring in subject teaching (mathematics) and 30 undergraduate students majoring in mathematics and applied mathematics from the School of Mathematics and Statistics of Shandong Normal University as the investigation objects. As pre-service mathematics teachers, all of them have the idea of becoming front-line teachers in high schools in the future.

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3. 2 Tools

Interview method can obtain direct and reliable information and materials, easily provide in-depth and detailed information, and is not limited by written language. Combined with the research questions and contents, this study adopts the interview method to conduct the investigation, and the interview outline is designed as follows:

(1)In your study career, have you ever encountered the phenomenon of "being able to understand but unable to solve" mathematics problems? If so, how often?

(2)What do you think are the reasons for this phenomenon?

(3)How do you think this phenomenon should be solved?

The interview ~~above~~ questions can directly reflect the pre-service mathematics teachers' understanding of the phenomenon of "being able to understand but unable to solve" mathematics problems, which is convenient for further investigation and research.

3. 3 Data collection

In order to make the collected information more reliable and credible, the author interviewed all the survey subjects one by one. The interview contents were recorded in the whole process with the permission of the survey subjects, and sorted out one by one after the interview.

3. 4 Content Processing

The first step is to transcribe all the interview recordings of the survey subjects into text materials, and arrange them in strict accordance with the original words during the transcription process. These texts are then encoded, with letters representing their meanings, and those with similar meanings are grouped together. For example, the letter A stands for "students' insufficient grasp of knowledge", so that similar ideas such as "students' incomplete grasp of knowledge" and "students' insufficient understanding of knowledge" can be expressed by the letter A. Then, the percentage of the occurrence was calculated to obtain the understanding of the reasons and countermeasures for the phenomenon of pre-service mathematics teachers.

The second step is to compare the contents of the survey with previous studies. If the meaning expressed in the survey result is the same or similar to that expressed in the previous studies, it is considered that the survey object is aware of this view; otherwise, it is considered that the survey object is not aware of this view. Count how many times each item is mentioned and make a statistical table for analysis.

The third step is to analyze the answers of pre-service mathematics teachers and explore the comprehensiveness and rationality of pre-service mathematics teachers' views.

4. Result Analysis

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4. 1 Preservice mathematics teachers' understanding of the reasons for this phenomenon

According to the survey, 93. 33% of pre-service mathematics teachers think that "students' grasp of knowledge is not enough", 56. 67% think that "students' ability to use knowledge is not enough", 43. 33% think that "students do not do enough questions and lack training", 36. 67% think that "students have problems in learning methods". 3. 33% think that "students do not understand their own problems", 23. 33% think that "mathematics problems are difficult", 26. 67% think that "teachers do not emphasize the method of solving problems. "The details are shown in Table 3.

Table 3

Preservice mathematics teachers' understanding of the reasons

Aspect	Implication	Frequency	Percent
Students	Students' grasp of knowledge is not enough	28	93. 33
	Students' ability to use knowledge is not enough	17	56. 67
	Students do not do enough questions and lack training	13	43. 33
	Students have problems in learning methods	11	36. 67
	Students do not understand their own problems	1	3. 33
Mathematical problems	Mathematics problems are difficult	7	23. 33
Teachers	Teachers do not emphasize the method of solving problems	8	26. 67

Among the reasons mentioned in previous studies, 93. 33% of pre-service mathematics teachers could realize that "students don't have a solid grasp of basic knowledge ", 56. 67% could realize that "students have rigid problem-solving ideas and no effective problem-solving strategies", and 26. 67% could realize that "students' mathematical thinking and methods need to be improved ". Other points of view are not recognized by most pre-service mathematics teachers. The details are shown in Table 4.

Table 4

Comparison of reasons

The reasons mentioned before	Percent
Students have rigid problem-solving ideas and no effective problem-solving strategies	56. 67
Students lack the ability to examine the questions and have difficulty in understanding the topics	0
Teachers have a single teaching method	0
Teachers' professional quality and teaching ability need to be improved	0
Students don't have a solid grasp of basic knowledge	93. 33
Students' mathematical thinking and methods need to be improved	26. 67

4. 2 Preservice mathematics teachers' understanding of the countermeasures of this phenomenon

The survey found that 73. 33% of pre-service mathematics teachers believed that "students should increase the amount of practice", 56. 67% believed that "students should reflect and summarize in time", 33. 33% believed that "students should listen carefully in class", 16. 67% believed that "students should preview before class", 13. 33% believed that "students should communicate more with teachers and classmates". 6. 67% think that "students should think independently", 3. 33% think that "students should carefully examine the questions", 30% think that "teachers should pay attention to the inspiration of students' ideas and methods", 20% think that "teachers should pay attention to the teaching of typical examples", 6. 67% think that "teachers should give students enough time in class". 3. 33% think that "teachers should pay attention to variable practice". The details are shown in Table 5.

Table 5

Preservice mathematics teachers' understanding of the countermeasures

Aspect	Implication	Frequency	Percent
Students	Students should increase the amount of practice	22	73. 33
	Students should reflect and summarize in time	17	56. 67
	Students should listen carefully in class	10	33. 33
	Students should preview before class	5	16. 67
	Students should communicate more with teachers and classmates	4	13. 33
	Students should think independently	2	6. 67
	Students should carefully examine the questions	1	3. 33
Teachers	Teachers should pay attention to the inspiration of students' ideas and methods	9	30. 00
	Teachers should pay attention to the teaching of typical examples	6	20. 00
	Teachers should give students enough time in class	2	6. 67
	Teachers should pay attention to variable practice	1	3. 33

It can be seen that pre-service mathematics teachers mentioned more countermeasures for students, although there are also countermeasures for teachers, but the overall number is less than that for students. In other words, most pre-service mathematics teachers believe that the solution to the problem is to get students to change more.

Among the countermeasures given, 56. 67% of pre-service mathematics teachers could realize that "teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.)", 30% could realize that "teachers should pay attention to cultivating students' mathematical thoughts and methods", 20% could realize that "teachers should pay attention to the teaching of classic examples and multiple solutions to one problem". Only 3. 33% can realize that "teachers should pay attention to cultivating students' ability of examining questions" and "teachers should

select exercises and pay attention to variable exercises". The other views are almost unknown to most pre-service mathematics teachers. The details are shown in Table 6.

Table 6

Comparison of countermeasures

The reasons mentioned before	Percent
Teachers should pay attention to cultivating students' mathematical thoughts and methods	30. 00
Teachers should pay attention to the teaching of classic examples and multiple solutions to one problem	20. 00
Teachers should focus on teaching basic knowledge (concepts, theorems, formulas, etc.)	0
Teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.)	56. 67
Teachers should pay attention to cultivating students' ability of examining questions	3. 33
Teachers should select exercises and pay attention to variable exercises	3. 33
Teachers should pay attention to the steps, methods and skills of problem solving	0

5. Result Discussion

The following will discuss the understanding degree of pre-service mathematics teachers from the perspectives of comprehensiveness and rationality.

5. 1 The discussion for the reasons

The following will be discussed from two aspects: comprehensiveness and rationality.

5. 1. 1 Comprehensiveness

The "students' poor grasp of basic knowledge" mentioned in previous studies is highly consistent with the "students' insufficient grasp of knowledge" in interview materials,

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which is also the most mentioned reason by pre-service mathematics teachers, accounting for 93. 33%. In this regard, the vast majority of pre-service mathematics teachers have a good understanding. The meaning of "students' rigid problem-solving ideas and no effective problem-solving strategies" mentioned in previous studies is similar to that of "students' insufficient ability to use knowledge" in interview materials. 56. 67% of pre-service mathematics teachers were aware of this. The meaning of "students' mathematical thinking and methods need to be improved" mentioned in previous studies and "teachers do not emphasize the problem-solving methods in place" mentioned in interview is similar, but only 26. 67% of pre-service mathematics teachers can realize this point. However, "students lack the ability to examine questions and have difficulties in understanding the topics", "teachers have a single teaching method", and "teachers' professional quality and teaching ability need to be improved", were not reflected in the interview materials, that is to say, basically all pre-service mathematics teachers were not aware of these points.

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From the comparison between the survey results of pre-service mathematics teachers and the previous studies, it can be seen that most pre-service mathematics teachers are more consistent with their predecessors on the three viewpoints of "students do not grasp basic knowledge", "students have rigid problem-solving ideas and no effective problem-solving strategies" and "students' mathematical thinking and methods need to be improved". However, most pre-service mathematics teachers did not realize the three viewpoints mentioned by predecessors, "students' ability to examine the problem is insufficient and it is difficult to understand the topic", "teachers' teaching method is single" and "teachers' professional quality and teaching ability need to be improved".

As for students' problem-solving ability, Meng believes that the cultivation of problem-solving ability has always been a key point in high school mathematics teaching, as well as a prerequisite for improving students' problem-solving efficiency and accuracy (Tang, 2024). Mathematics has a high degree of abstraction and logical rigor. Only with enough ability of examining and reading questions can we clarify the known conditions, the results to be obtained and the hidden information in the questions. If teachers ignore the cultivation of students' ability of examining questions in the course of teaching, it will not help students to solve problems independently. Liang and Zhang (2024) believe that teaching with a single teaching method may lead to boredom in the classroom, which is not conducive to students' independent problem-solving. ~~(Liang, &Zhang,~~

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2024). The use of various teaching methods by teachers can better meet the needs of different students, enhance the enthusiasm of students in learning, and improve the teaching effect, such as inquiry learning and cooperative learning. In *the Opinions on Carrying Forward the Spirit of Educators and Strengthening the Construction of High-quality Professional Teachers in the New Era*, the State Council clearly proposes to improve teachers' professional quality, improve teachers' discipline ability and discipline accomplishment, and enhance teachers' teaching and educating ability. A highly professional teacher can obviously have a more professional way of dealing with students who can understand but cannot solve mathematics problems.

5. 1. 2 Rationality

In addition to the above, some pre-service mathematics teachers also put forward some other views on the reasons:

Some pre-service mathematics teachers think that the current mathematics problems are very difficult, which is reflected in the various types of questions, high flexibility, strong comprehensiveness, etc. The new college entrance examination focuses on students' thinking and ability, and pays attention to the achievement of students' core literacy in mathematics. Therefore, the difficulty of mathematics problems will indeed be higher than before.

However, most pre-service mathematics teachers think that the students do not practice enough. That is to say, teachers advocate the so-called "question sea tactics". This view is obviously unreasonable.

Firstly, "question sea tactics" may not be able to achieve the ideal effect. The number of questions in the new college entrance examination in 2024 has been reduced, and the comprehensions have been further increased. The last multiple-choice question is an innovative comprehensive examination of the properties of functions and plane analytic geometry, which does not belong to any graph (line, circle, ellipse, hyperbola, parabola, etc.) that students have learned. A new definition of fractional series is given, and a comprehensive investigation is carried out in combination with the knowledge of probability and counting principle. The examination of conic curve in the solution question is placed in the position of 16 questions, and it's less difficult than before. All these

changes show that the college entrance examination pays more and more attention to the investigation of students' mathematical thinking and mathematical ability, and pays more attention to the achievement of students' mathematical core accomplishment. In the so-called "question sea tactics" in a large number of exercises will inevitably have a lot of repetitive and homogeneous content, which is easy to solidify students' thinking, the formation of a thinking set, which is not conducive to the cultivation of students' creative thinking and thinking divergence, it is difficult for students to play their own strength in the new college entrance examination situation.

Secondly, "question sea tactics" itself has drawbacks that can not be ignored. Cheng believes that the question-sea tactics will cause students' anxiety, wear down students' patience and inhibit students' creativity (Cheng, 2024). A lot of exercises are bound to take up a lot of time for students and teachers. Students have to spend a lot of time to solve the problems, teachers also have to spend a lot of time to explain the problems, which will undoubtedly increase the teacher's teaching pressure and students' learning pressure. Students immersed in the "question sea tactics" for a long time may feel tired, leading to a decline in interest in learning, and then affect the enthusiasm and initiative of learning.

we cannot deny that with the increase of the amount of practice, students' mastery of knowledge will be improved, but to solve the phenomenon of "being able to understand but unable to solve" by "question sea tactics" is not feasible.

Some pre-service mathematics teachers also mentioned problems with students' learning methods. As mentioned in the teaching suggestions of *Ordinary High School Mathematics Curriculum Standards(2017 Edition, 2020 Revision)* (Formulated by the Ministry of Education of the People's Republic of China, 2020), "In teaching practice, we should constantly explore and innovate teaching methods, pay attention not only to how to teach, but also to how to learn, guide students to learn mathematics and develop good learning habits. " In other words, the problem of students' learning is essentially the problem of teachers' teaching. Therefore, the idea that there is something wrong with students' learning methods is not profound enough.

5. 2 The discussion for the countermeasures

The following will be discussed from two aspects: comprehensiveness and rationality.

5. 2. 1 Comprehensiveness

The "teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.)" mentioned in previous studies is relatively consistent with the "students should timely reflect and summary" in the interview materials, and 56. 67% of pre-service mathematics teachers can realize this point. The "teachers should pay attention to the cultivation of students' mathematical thoughts and methods" mentioned in previous studies is relatively consistent with the "teachers should pay attention to the inspiration of students' thoughts and methods" in interview materials, and only 30% of pre-service mathematics teachers can realize this point. The "teachers should pay attention to the teaching of classic examples and multi-solution of one problem" mentioned in previous studies is relatively consistent with the "teachers should pay attention to the teaching of typical examples" in the interview materials, and only 20% of pre-service mathematics teachers can realize this point. The two points mentioned in previous studies, "teachers should pay attention to cultivating students' examination ability" and "teachers should select exercises and pay attention to variable exercises", were only mentioned once each, that is to say, almost all pre-service mathematics teachers did not realize these two points. "Teachers should pay attention to the teaching of basic knowledge (concepts, theorems and formulas, etc.)" and "teachers should pay attention to the teaching of problem-solving steps, methods and skills" mentioned in previous studies have not been mentioned by pre-service mathematics teachers. According to the data, although 71. 43% of the seven countermeasures can be recognized by the majority of pre-service mathematics teachers, except for the view that "teachers should let students pay attention to reflection, review and summary (wrong questions, knowledge points, etc.)", the remaining proportion is low. 28. 57% of the views are not realized by the majority of pre-service mathematics teachers.

From the comparison of the survey results of pre-service mathematics teachers and the previous studies, it can be seen that the three viewpoints of "teachers should let students

pay attention to reflection, review and summary (wrong problems, knowledge points, etc.)", "teachers should pay attention to training students' mathematical thoughts and methods" and "teachers should pay attention to the teaching of classic examples and multiple solutions to one problem" can be recognized by some pre-service mathematics teachers. Almost no one can realize that "teachers should pay attention to cultivating students' examination ability", "teachers should select exercises and pay attention to variable exercises", "teachers should pay attention to the teaching of basic knowledge (concepts, theorems and formulas, etc.)" and "teachers should pay attention to the teaching of problem solving steps, methods and skills".

Mathematical thoughts and methods refer to the basic concepts, principles and ideas adopted in solving mathematical problems, which can help us understand and explore the structure of mathematical problems and point out the direction of solving problems. Li believes that teachers need to strengthen the penetration of mathematical ideas to help students correctly understand mathematics and effectively solve problems (Li, 2024).

Examples of mathematics are the application of mathematical knowledge, the means to help students understand and consolidate mathematical knowledge and form basic mathematical skills, and the main channel for students to master problem-solving skills and techniques. In the course of teaching, most of the mathematical ideas and methods are reflected in the examples explained by the teacher. Multiple solutions to one problem can fully mobilize students' thinking enthusiasm, improve students' ability to use knowledge to solve problems, and help students' thinking divergence and creative thinking training. By changing the condition, conclusion or form of the problem, variable training enables students to deeply understand mathematical concepts and master problem-solving skills in the process of solving different problems, so as to improve students' mathematical literacy and problem-solving ability.

5. 2. 2 Rationality

In addition, some pre-service mathematics teachers also put forward some other views in terms of countermeasures:

Some pre-service mathematics teachers put forward the views of "students should preview before class", "students should listen carefully in class" and "students should communicate more with teachers and classmates", etc. These countermeasures may solve the phenomenon of "being able to understand but unable to solve" to a certain extent, but these countermeasures have not been implemented to the essence - how should we teach as teachers, that is, the countermeasures of teachers.

Guo believes that in teaching, teachers should reflect on the content of textbooks, students' learning situation, teaching process and other contents, so as to timely adjust teaching strategies according to the generation of classes, improving the effectiveness of teaching. However, under the constraint of exam-oriented education, most teachers focus their time and energy on knowledge teaching, examination paper commentary, homework correction and solution research, ignoring the value of reflection in teaching, which affects the improvement of teaching level(Guo, 2023).

6. Conclusion

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Senior high school students often have the phenomenon of "being able to understand but unable to solve" mathematics problems in mathematics learning. Many scholars have done a lot of research on this phenomenon, and given some reasons and countermeasures. This paper takes them as a reference to study the pre-service mathematics teachers' understanding of "being able to understand but unable to solve" mathematics problems. To this end, a total of 30 graduate and undergraduate students in the School of Mathematics and Statistics of Shandong Normal University were selected for interview. After investigation, it is found that the majority of pre-service mathematics teachers agree with the reasons such as "students' insufficient grasp of knowledge", "students' rigid problem-solving ideas and no effective problem-solving strategies" and "teachers' lack of emphasis on problem-solving methods". "Teachers should let students pay attention to reflection and review and summary", "teachers should pay attention to training students' mathematical thoughts and methods" and "teachers should pay attention to classic examples and the teaching of multiple solutions to one problem" were recognized by most pre-service mathematics teachers. The majority of pre-service mathematics teachers have insufficient understanding of the comprehensiveness and rationality of the phenomenon. The research object of this survey is 30 education masters and

undergraduates, and the sample distribution is concentrated in one university, and the sample size is not large. In the future, it is necessary to increase the number and scope of samples, ensure the objectivity and universality of investigation and analysis, and better help front-line teachers to solve problems in teaching.

Teaching ability is the core ability of normal university students for their future career development. As the backbone of basic education in the future, normal university students' teaching ability will affect the teaching level of basic education (Zhao, Lu, &Zhou, 2024). In order to improve the professional quality of pre-service mathematics teachers and build an excellent teacher team, based on the above findings, this paper gives some suggestions on the training of pre-service mathematics teachers:

(1) In the course of teaching should pay attention to the teaching of mathematical ideas.

Teachers should pay more attention to the teaching of mathematical ideas when they talk about the topic. After the implementation of the new curriculum standards, more emphasis is placed on the achievement of students' core literacy in mathematics, and the so-called core literacy refers to the essential character and key ability that students should have to meet the needs of lifelong development and social development. Mathematical thought can effectively improve students' mathematical ability and cultivate the quality of thinking, which is the key to improve students' core accomplishment. Students appear "being able to understand but unable to solve" phenomenon, it is very likely that the teacher in the course of teaching the topic did not fully emphasize the mathematical thoughts, nor deliberately train the students' mathematical thoughts.

(2)In the teaching of exercises, we should pay attention to the demonstration and summary of problem solving steps.

When teaching, teachers should pay more attention to the demonstration and summary of problem solving steps. Many students can understand the topics taught by the teacher in class and know what to do, but they still have problems when they do the questions independently. It is very likely that the teacher did not emphasize the method summary in place. Therefore, in the teaching of examples and exercises, teachers must pay attention to showing the steps of solving problems, and summarizing in time, which can help students form a good cognitive structure.

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