Original Research Article

Articulating the Problems Encountered of Pre-service Mathematics Teachers in Conceptual Teaching Training

Abstract: This study's participants consisted of 31 master students in a university.Open-ended interviews were used to collect data to investigate the challenges they face in their conceptual teaching training. The method of data processing is as follows: first, the interview audio is transcribed to textual data. Then, the text data is analyzed and encoded. Finally, the detailed table is generated through Excel. It was found that the problems existing in the conceptual teaching training of pre-service mathematics teachers were related totheir mathematical knowledge reserve, teaching and external conditions. It was found that specific challenges they face included: 1.apoor grasp of the system of mathematical concepts; 2. difficulties in explanation the relationship and application of concepts; 3. problems in the use of teaching language; 4. difficulties in integrating technology and teaching; 5. lack of understanding of the learning situation; 6.choice of methods, selection and organization of materials; 7. problems in introducing concepts; 8.lack of professional teacher guidance. Based on the findings, it is suggested that:1. Pre-service mathematics teachers need to work hard to learn mathematical concepts and gain a deeper understanding of the conceptual network system; 2. In the training process of conceptual teaching, pre-service mathematics teachers should ensure the accuracy of the teaching language and avoid over-emphasis the abstract definition language of concepts, and endeavor to learn relevant knowledge of technology and try to integrate it with the conceptual teaching; 3. Through the knowledge of psychology, the externship and mathematics exercises in senior high school, etc. to understand the learning situation and analyze the test points; 4. In the specific process of concept teaching, pre-service teachers can select materials from the history of mathematics and real life that can be linked to the concepts, and introduce concepts from examples, activities and relationships between concepts; 5. Colleges and universities should be equipped with professional teachers to provide guidance for pre-service teachers, increase the investment in micro classrooms and improve the efficiency of their use.

Keywords: Pre-service teachers, Conceptual teaching, Problem and recommendations

1. INTRODUCTION

Mathematical concepts can reflect the essential attributes of spatial forms and

quantitative relationships in the real world, and it is the core of mathematical thinking (Cai & Lin, 2009), therefore, mathematical concept teaching is the foundation of senior high school mathematics education, and it is of great significance for students to study mathematical concepts. Based on psychological research, there exists a series of operable methods and modes for teaching mathematical concepts (Zhang, 2005). Therefore, conceptual teaching training is necessary for better teaching, and it is the most important aspect for the pre-service mathematics teachers, which has a significant impact on the quality of conceptual teaching of pre-service mathematics teachers in the future. However, there are a lot of problems in mathematical conceptual teaching by pre-service mathematics teachers. These problems are the difficulties encountered by pre-service mathematics teachers in the process of conceptual teaching training that hinder them from enhancing the effectiveness of conceptual teaching training and improving the level of concept teaching.These problems could also constrain the enhancement of the conceptual learning effect of the students they teach in the future. Therefore, a study of the existing problems of the conceptual teaching training of pre-service mathematics teachers is of great significance. Therefore, this study sought to answer the following questions: what difficulties do pre-service mathematics teachers have in conceptual teaching training? What are the problems they encountered? How can we help pre-service mathematics teachers to improve on conceptual teaching?

2. LITERATURE REVIEW

Through the analysis of the literature, it is found that the existing research on the training of pre-service mathematics teachers in conceptual teaching focuses on the current status of conceptual teaching training and the current status of cultivation of pre-service mathematics teachers in conceptual teaching in universities.

2.1 Definition of related concepts

Pre-service mathematics teachers are mathematics teacher trainees who have not yet entered formal teaching positions, those who hold teaching qualifications but have not yet engaged in teaching work, and those who arereceiving induction training and aspireto work as teachers (Lai, 2004). The pre-service teachers studied in this paper refer to the mathematics students in normal colleges and universities who hold the mathematics teacher qualification certificate and aspire to work as teachers.

Mathematical concepts are the foundation of mathematics, therefore teaching mathematical concepts is the basis of mathematics teaching. Therefore, conceptual teaching skills are one of the teaching skills that pre-service mathematics teachers must master. Conceptual teaching is the process in which teachers use teaching media and vivid language to convey mathematical concepts to students in a visual way through analysis, comparison, reasoning, and other methods (Wang, 2011). There is no specific definition of concept teaching training for pre-service mathematics teachers in existing literature. Therefore, this paper draws on the description of classroom teaching skills training for pre-service mathematics teachers to elaborate on the conceptual teaching training for pre-service mathematics teachers. The concept

teaching training for pre-service mathematics teachers is the process that after the pre-service mathematics teachers have a certain understanding of the theory of the concept of teaching, they independently choose the appropriate teaching content, and carry out the teaching design and simulation teaching. Through training, pre-service teachers can continuously refine their conceptual teaching design and simulate teaching, improving their level of conceptual teaching (Liu, 2020).

2.2 Current state of conceptual teaching training

2.2.1 The lack of sufficient preparation in terms of knowledge

Scholars found that although pre-service mathematics teachers have learned a lot of knowledge about higher mathematics, the knowledge does not promote them to deepen their understanding of senior high school mathematics concepts, and it cannot help them to improve their ability of language expression in conceptual teaching , and as a result, it is difficult for them to speak clearly about the nature of mathematical concepts in the process of conceptual teaching training (Fan, 2013; Huang et al., 2010). After focusing on the specialized teaching skills in mathematics, Liu, Gao and Huang (2012) found that pre-service teachers' learning of mathematical knowledge has a strong highly utilitarian, and they do not have a deep understanding of mathematical knowledge, which leads to the fact that pre-service teachers do not have a complete and perfect network system of mathematical concepts, they lack a holistic conceptual outlook in the process of conceptual teaching training. Si (2019) pointed out that pre-service mathematics teachers are unfamiliar with mathematical textbooks, and they seldom take the initiative to study the textbooks, which makes it difficult for them to accurately grasp the design framework of the teaching materials in the textbook, they can only blindly learn from other people's teaching design when they conduct conceptual teaching training, which makes the conceptual teaching training inefficient; Wei (2018),after the case analysis and interviews, found that novice teachers do not have a high level of understanding of the essential characteristics of mathematical concepts, and they do not have a deep understanding of the concept's horizontal and vertical knowledge and the relationship between different concepts, and their familiarity with it is limited to the chapters before and after one point. They do not have a deep understanding of the connection between mathematical concepts and history, other disciplines and real life. They also seldom consider the position and role of a certain mathematical concept in the whole senior high school mathematics system.

2.2.2 Inappropriate choice of teaching modes, methods, activities

After investigation, it was found that in their daily study, pre-service mathematics teachers lack mastery of some teaching art and specialized mathematics teaching skills, the level of education and teaching knowledge is much lower than the level of knowledge of the professional disciplines, and they lack specific operational literacy in the process of conceptual teaching training, and their conceptual teaching skills are not at a high level (Pang, 2011; Wu et al., 2006; Wang, 2021); Zhang and Li (2016)also pointed out that pre-service mathematics teachers are not clear about how concept teaching can be taught more efficiently, and do not master the methods of concept teaching.

2.3 current status of the cultivation of pre-service teachers in conceptual teaching in universities

Li and Meng (2020), found that universities lacked effective strategies for the cultivation of pre-service mathematics teacher. The mastery of general teaching skills such as instructional design by pre-service mathematics teachers is generally average. For mathematics specialized teaching skills, such as conceptual teaching, they only have a little relevant theoretical knowledge and lack specific practical experience. Scholars pointed out that the current specialized teaching skills training for pre-service teachers has the problems: schools not paying attention to it, weak of good teachers, single training method and focusing on theory but not practice (Liu, 2014; Wu, 2011; Yang et al., 2019). After investigation, Huang (2012) pointed out that pre-service mathematics teacher mainly study professional and theoretical mathematics courses during school days, while education courses are few and mostly public courses, which results in many pre-service mathematics teachers failing to improve their mathematics teaching ability. In this regard, Lin (2016) proposed the "project-case" teaching model, which aims to improve the specialized mathematics teaching skills of pre-service teachers by combining project teaching and case teaching to guide pre-service teachers to think about and practice teaching.

As can be seen from the above studies, many scholars have studied the conceptual teaching training of pre-service mathematics teachers, but the studies have been limited to the two aspects of pre-service mathematics teachers' knowledge of the mathematics subject and teaching and the cultivation of them by universities, and there has been no special study on the problems encountered by pre-service teachers in their conceptual teaching training, nor have they put forward any targeted opinions. Whether the training of pre-service mathematics teachers in conceptual teaching is effective or not is related to the level of their conceptual teaching, which has an important impact on the future teaching of mathematics in senior high school. Therefore, understanding the problems in the conceptual teaching training of pre-service mathematics teachersare of great practical significance. Thus, the purpose of this paper is to understand the current problems encountered by pre-service mathematics teachers in their conceptual teaching training that hinder them from enhancing the effectiveness of their conceptual teaching training and give them suggestions to improve their ability of conceptual teaching through investigation and analyse.

3.RESEARCH METHODOLOGY

3.1 Sample and sampling procedure

In order to know exactly the problems of pre-service mathematics teachers in conceptual teaching training, 31 master students, 28 females and 3 males, majoring in Subject Teaching (Mathematics) in the class of 2023 at the Shandong Normal University, who have the intention of working as mathematics teachers in senior high schools, were selected as the research objects...please how did you select the sample?

3.2 Instruments for data collection

This study used an open-ended interview method with the question "As a pre-service mathematics teacher, have you encountered any problems in conceptual teaching training?" as the central question, asking questions from the dimensions of self, external, instructional design, instructional sessions, instructional methods, and instructional models. The open-ended interview method was used because it is flexible, and not limited by fixed questions and language. It provides a deeper understanding of the problems that pre-service teachers have in conceptual teaching training. Asking the central question from different dimensions is because it provides a more comprehensive understanding of the problems encountered by pre-service teachers in conceptual teaching training.

3.3 Data collection

To ensure the reliability of the study, the 31 master students were interviewed individually, one by one, using the open-ended interview method, and the interviews were fully audio-recorded with their consent.

3.4 Data processing and analysis

Considering the small sample size, traditional methods were chosen for encoding. The general process of data processing is as follows：

First, translate the interview audio into text materials one by one. Read and organize while highlighting with different colors, label various phrases, and summarize them. For example, simplifying the answers such as “I don't know how to express the concept vividly”, “I can't explain the concept clearly”, “The concept is too abstract to explain clearly”, etc., and summarizing them as “teaching language expression problems”.

Next, classify and encode the text into different themes. For example, categorizing “teaching language expression issues” as problems of general teaching skills.

Finally, reclassify the encoding result once again, and obtain the final encoding results. For example, encoding “Lack of in-depth understanding of concepts”“Problems in mastering the network system of concepts and explaining the relationship and application between concepts” and “Problems in explaining the deeper nature of concepts” as “mathematical knowledge reserve problem”.

4.FINDINGS

4.1Mathematical knowledge reserve issues

There are three mathematical knowledge reserve problems encountered in concept teaching. Fifteen pre-service mathematics teachers thought that the lack of in-depth understanding of concepts was the main problem encountered in conceptual teaching training, accounting for 48.39%. Also, 24 pre-service mathematics teachers(77.42%) of the total, thought that they had problems with mastering the network system of concepts and explaining the relationship and application between concepts. 3 pre-service mathematics teachers thought that they had problems with explaining the

deeper nature of concepts, accounting for 9.68%.

It can be seen that the biggest mathematical knowledge reserve problem encountered by pre-service teachers in conceptual teaching training is the mastery of the conceptual network system and the explanation the relationship and application between concepts. Please refer to Table 1 for detailed information.

Table1：Mathematical knowledge reserve issues

problems	encode	content	number	proportion
Mathematical knowledge reserve	A1	Lack of in-depth understanding of concepts	15	48.39
	A2	Problems in mastering the network system of concepts and explaining the relationship and application between concepts	24	77.42
	A3	Problems in explaining the deeper nature of concepts	3	9.68

4.2 Teaching issues

The teachingproblems encountered in conceptualteaching training were categorized into two dimensions, the first being problems of general teaching skills and the second being theproblems in the implementation of the concept teaching process.

4.2.1 Problems of general teaching skills

On the issue of general teaching skills, four pre-service mathematics teachers, (9.68%), mentioned the difficulty of integrating technology and mathematics teaching. They had difficulties in the dynamic presentation of certain concepts and the integration of technology and board writing; two pre-service mathematics teachers (6.45%) , raised the issue of integrating teaching aids and mathematics teaching, and they thought that they had difficulties in the preparation and use of teaching aids. Also, 22 pre-service mathematics teachers raised the issue of the expression of teaching language and they believed that they had difficulties in visualizing abstract concepts, accounting for 70.97% .

It can be seen that the biggest problem of general teaching skills encountered by pre-service teachers in conceptual teaching is the inaccurate and unimaginative expression of teaching language. Please refer to Table 2 for detailed information.

Table2 :Problems of general teaching skills

dimension	encode	content	number	proportion
B1 Problems of general teaching skills	B1.1	the difficulty of integrating technology and mathematics teaching	4	12.9
	B1.2	the issue of integrating teaching	2	6.45

		aids and mathematics teaching		
	B1.3	the issue of the expression of teaching language	22	70.97

4.2.2 Problems in the implementation of the concept teaching process

The specific implementation process of conceptual teaching is divided into two parts: the preparation and the classroom teaching.

In terms of the preparation before teaching, 19 pre-service mathematics teachers, (61.29%), suggested that they did not know how to effectively understand the learning situation. Again, 9 pre-service mathematics teachers, (29.03%) , suggested that there were difficulties in choosing methods for the concept teaching and did not know how to teach concepts. Also, 14 pre-service mathematics teachers, (45.16%), though that conceptual teaching ideas had been confined. Only 1 pre-service mathematics teacher thought that they did not know how to integrate the development of the concept into the teaching, accounting for 3.22%.Again, 19 pre-service mathematics teachers (61.29%), thought that there were difficulties in selecting and organizing teaching materials,whiles 11 pre-service mathematics teachers (35.48%), suggested that there were problems in helping students to identify and remember concepts.

It can be seen that pre-service mathematics teachers encountered manydifficulties in the preparationof the concept teaching, but mainly focused on how to effectively understand the learning situation and how to select and organize teaching materials. In the classroom teaching, 17 pre-service mathematics teachers accounting for 54.84% of the total, said that they had problems with the introduction of concepts, thinking that they didn't know what kind of introduction method was better and how to design interesting introduction situations; 7 pre-service mathematics teachers, accounting for 22.58% of the total, said that they had difficulties in choosing the corresponding exercises of the concepts; 4 pre-service mathematics teachers accounting for 12.90% of the total, pointed out that it was difficult for them to grasp the main points of the concept at the end of the class.

It can be seen that the biggest problem for pre-service mathematics teachers in classroom teaching is the introduction of concepts, the choice of conceptual teaching methods and the selection and organization of teaching materials. Please refer to table 3 for detailed information.

Table3：Problems in the implementation of the concept teaching process

dimension	category	encode	content	number	proportion
B2 Problems in the implementation of the concept teaching	B2.1 the preparation	B2.1.1	Problems in selecting and organizing teaching materials	19	61.29
		B2.1.2	problems in choosing methods	9	29.03
		B2.1.3	conceptual teaching ideas had been confined	14	45.16
		B2.1.4	problems in integrating	1	3.23

process			the development of the concept into the teaching		
		B2.1.5	problems in how to understand the learning situation	19	61.29
		B2.1.6	problems in helping students to identify and remember concepts	11	35.48
	B2.2 the classroom teaching	B2.2.1	problems with the introduction of concepts	17	54.84
		B2.2.3	problems in choosing the corresponding exercises of the concepts	7	22.58
		B2.2.4	problems in grasp the main points of the concept at the end of the class	4	12.90

4.3 External conditions issues

The external problems of pre-service mathematics teachers in the process of conceptual teaching training were mainly focused on 2 aspects. Two pre-service mathematics teachers,(6.45%) suggested that there was no special training classroom for skills training, while 7 pre-service mathematics teachers (22.58%) believed that the lack of professional teachers' guidance was one of the problems in the process of conceptual teaching training.

It can be seen that pre-service teachers encounter few problems in terms of external conditions, focusing mainly on the lack of professional teacher guidance. Please refer to table 4 for detailed information.

Table4：External conditions issues

dimension	encode	content	number	proportion
C External conditions issues	C1	no special training classroom for skills training	2	6.45
	C2	the lack of professional teachers' guidance	7	22.58

5.DISCUSSION

5.1Mathematical knowledge reserve

Many of the problems encountered by pre-service mathematics teachers in conceptual

teaching and training is due to their insufficient mathematical knowledge reserve. They do not have a deep understanding of concepts and do not have a structurally complete and logically smooth conceptual network system in their minds, so they cannot extract the deep essence of concepts.

This is in common with existing studies: pre-service teachers have a general level of mathematical competence literacy and a low level of understanding of mathematical knowledge, and their mathematical knowledge is weak. The total number and number of blocks of mathematical concepts are limited, and the ability to extensive teaching is insufficient(Chen, 2013), while concept teaching requires that teachers should have a comprehensive and systematic understanding of concepts, be clear about the essential characteristics of concepts, be clear about the whole process of concepts from their formation to their development, and grasp the concepts from the point of view of conceptual frameworks to teach concepts (Tan, 1995). The teaching of individual concepts cannot be pursued without the framework. Pre-service teachers' low mathematical ability does not meet the high requirements put forward by concept teaching, resulting in pre-service teachers encountering the above mathematical knowledge reserve problems in concept teaching.

5.2 Teaching issues

The problems of pre-service mathematics teachers in the process of conceptual teaching training also stem from their low level of teaching. The problems in teaching are manifested in two ways: problems in general teaching skills and problems in the implementation of the concept teaching process.

5.2.1Problems in general teaching skills

The problem of general teaching skills was mainly on poor expression of teaching language, which made it difficult to visualize abstract concepts. When introducing mathematical concepts, pre-service teachers only repeated the textual expression of the concepts, without letting students have a more visual and concrete understanding of the concepts. In addition, although pre-service mathematics teachers have learned relevant knowledge of technology, they still have problems in combining technology with board writing.

The results of this survey coincide with previous studies: The current pre-service mathematics teachers have a low reserve of subject teaching knowledge and do not know how to design effective teaching methods (Chen, 2013). Current pre-service mathematics teachers' language expression ability is not high, and there are many problems with the application of mathematical language; proficiency in technology and its appropriate combination with board books need practice, but the reality is that universities set educational technology courses as open courses, and due to time and equipment constraints, such courses become extremely confusing, and it is difficult for teachers to teach the content thoroughly, and pre-service teachers are not willing to invest a lot of energy in technology courses (Huang & Zhang, 2006), which leads to difficulties for pre-service mathematics teachers in integrating technology with mathematics teaching.

5.2.2 problems in the implementation of the concept teaching process

Difficulties in the implementation of concept teaching process are mainly on the selection and organization of teaching materials, the understanding of the learning situation, the choice of teaching methods and the introduction of concepts. Mathematical concepts are abstract and rigorous in nature, which makes it difficult for senior high school students with incomplete development of their thinking level and comprehension ability to understand the concepts. Pre-service mathematics teachers are well aware of this. They attach great importance to the selection and organization of teaching materials, the clearness of teaching logic, and they hope to use the scene and activities in real life to introduce concepts. However, as pre-service teachers, most of their conceptual teaching training stays theoretical, and the simulated trial lectures without real students make it difficult for them to combine relevance, enlightenment and interest in the selection and organization of teaching materials, the choice of teaching methods and the scene of conceptual introduction, and they teach according to the materials and methods provided by textbooks and instructors, which is one of the difficulties encountered by pre-service maths teachers in the conceptual teaching process.

Previous studies have shown that: the key to conceptual teaching is concept introduction, and the key to concept introduction is to establish the connection between abstract concepts and students' previous experience so that students can incorporate new concepts into their own knowledge system (Yu, 2012); mathematics concept teaching should provide students scene and activities that are figurative, rather than abstract description (Chen, 2017); pre-service teachers do not have an adequate understanding of the learning situation, which makes them do not innovate teaching design and the idea of teaching, the method (Han et al., 2016; Xie & Wang, 2019).

5.3External Conditions Issues

In terms of external conditions, the biggest difficulty is the lack of professional teacher guidance. Some pre-service teachers believe that after the conceptual teaching training, there is no professional teacher to point out what should be corrected, which makes it difficult for them to see their own strengths and weaknesses in conceptual teaching training. Therefore, they do not know where should be improved and how to improved, which make them have difficulties to improve their ability of conceptual teaching.

Previous studies have also shown that there are many unreasonable problems in the cultivation process of pre-service teachers in colleges and universities, on the one hand, theories are more important than practices, on the other hand, pre-service teachers' conceptual teaching training lacks detailed guidance from specialized teachers(Zhao, 2022).

From the above discussion, it can be seen that the main difficulties currently encountered by pre-service teachers in conceptual teaching training are centered on three aspects: mathematical knowledge reserve, teaching issues and external conditions issues. The problems focused on three areas:, apoor grasp of the system of mathematical concepts, difficulties in explanation the relationship and application of concepts; problems in the use of teaching language, difficulties in integrating

technology with teaching, the lack of understanding of the learning situation, choice of methods, selection and organization of materials, problems in introducing concepts; the lack of professional teacher guidance.

6.CONCLUSIONS AND RECOMMENDATIONS

It has been shown that concept teaching requires that teachers should be proficient in the conceptual network system, master the essence of concepts, and be able to visualize abstract concepts. However, the level of concept teaching for newly hired teachers is not high. Tracing back to the source, when there were pre-service teachers, they had problems in their training of teaching.After combining previous research and analysis of interview data, it was found that the difficulties pre-service mathematics teachers have in conceptual teaching training were mainly in the form of mathematical knowledge reserve, teaching issues and external conditions issues, which manifested themselves in the form of a poor grasp of the system of mathematical concepts, difficulties in explanation the relationship and application of concepts; problems in the use of teaching language, difficulties in integrating technology and teaching, lack of understanding of the learning situation, choice of methods, selection and organization of materials, problems in introducing concepts; lack of professional teacher guidance.
Based on these issues, the recommendations are made:

First, pre-service mathematics teachers should consciously strengthen their own understanding of mathematical concepts and gain a deeper grasp of the network system between concepts. Modern psychology believes that the prerequisite for students to truly master a new concept is to establish a new connection between it and the existing knowledge network. Therefore, teachers should consciously penetrate the conceptual network system when teaching concepts. Pre-service teachers should consciously study each mathematical concept during school, divide mathematical knowledge into different topics, and focus on the connection between topics while understanding the content of each topic in depth, so as to help students grasp mathematical concepts as a whole and establish their conceptual system. For example, pre-service teachers can make use of the exercises combining sequence of number and probability in the college entrance examination to expand their conceptual system and study how to infiltrate the connection between the two to students when conducting conceptual teaching training on sequence of number and probability.

Second, in terms of the improvement of general teaching skills, pre-service teachers should first ensure the accuracy of teaching language expression in the process of concept teaching training. Mathematical language is very rigorous, and pre-service teachers should fully dig into the meaning of each word in a concept and focus on teaching the deeper connotation and symbolic expression of the concept (Du, 2014). Then, pre-service teachers should pay attention to not overly highlighting the abstract definition language of concepts(Wang, 2012), they can choose to re-express the concepts in their own words or use the method of logical strings to help students

understand and master the concepts, pay attention to digging out the prototypes of the concepts in real life, and help students break through the constraints of abstract definitions of concepts by using real-life cases. In addition, pre-service teachers should actively absorb knowledge about technology during school, learn to use specialized mathematics teaching software, think about how to integrate technology with teaching, and take advantage of the time of practice in school to try to integrate technology with conceptual teaching, and effectively integrate conceptual teaching with technology on the basis of tapping into the deeper connotations of mathematical concepts (He, 2005).

Third, pre-service teachers should seize every opportunity to know about the learning situation. During the school period, they should actively study psychology and try to master the psychological development and thinking characteristics of senior high school students; they need to make good use of the opportunity of off-campus internships, recording their lessons and communication with students in the form of educational logs and analyzing the learning situation of the students so that they can carry out follow-up teaching in a targeted manner; they should actively exercise senior high school mathematics problems and make use of the mathematics exercises to understand the current examination points of senior high school mathematics on concepts, which can be targeted in the concept teaching practice for preparation and trial lectures.

Fourth, pre-service teachers can search for materials from the history of mathematics and real life that can be linked to the concepts being taught, and use the four ways of attaching, copying, conforming and reconstructing to organize them into teaching materials that are to be compatible with the concepts being taught, and integrate them into the concept teaching (Wang, 2012). In the introduction of concepts, pre-service teachers should be good at observing and introducing concepts with real examples, things, models and life activities, mathematical activities, helping students to complete the process from concrete to abstract, and improving students' ability to find and solve problems; they should pay attention to the connection between old and new concepts, and use the concept network to introduce concepts through the method of analogies on the basis of students' original concepts (Du, 2014). At the same time, pre-service teachers should constantly learn the operational results of concept teaching, such as concept assimilation teaching, concept compliance teaching, concept map teaching, seven-stage model of concept teaching (Tu, 2004), etc., and study the requirement of each method and which concepts it is more suitable for, so they can enrich their own understanding of the concept teaching methods, and be able to choose different methods for different concepts freely.

Fifth, universities should focus on the cultivation of their teaching teams in order to give targeted guidance to pre-service teachers in their conceptual teaching training. At the end of the training, instructors can lead pre-service teachers to conduct teaching seminars, encourage pre-service teachers to evaluate each other and self-reflect in

order to continuously improve their own conceptual teaching level. In addition, colleges and universities should provide support for the construction of micro classrooms, strengthen the hardware and software equipment, and formulate practical measures to simplify the use of micro classrooms and improve the efficiency of micro classrooms (Yan & Zhu, 2012).

The subjects of this survey were master students from the same year in a university, which is a small and narrow sample size and did not involve other groups of pre-service teachers. Therefore, in the paper, the sample scope needs to be further expanded, the problems encountered in the concept teaching of pre-service teachers should be further studied, and a variety of research methods should be used to obtain more comprehensive and detailed results.

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