

Research and Practice of Mathematics Teaching in College Entrance Examination

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Abstract: Under the background of the new curriculum standard and the new college entrance examination, the influence of junior high school mathematics connection on the college entrance examination is more and more great, many students in junior high school to high school, mathematics results do not rise but fall, because junior high school mathematics connection is not good. The mathematics teaching of the college entrance examination has higher requirements for the connection of knowledge points. The deep reason is that the knowledge points of middle and high school mathematics exist blind areas, faults and knowledge difficulties are not unified. Based on this, this paper takes the connection of mathematics knowledge points as the problem point, explores and studies the connection of mathematics teaching in the college entrance examination from the perspective of mathematics teaching, combined with the new ideas and ideas in the UGS collaborative education model.

Keywords: Mathematics; Teaching practice; UGS collaborative education; High school entrance examination

1. Introduction

UGS collaborative education model was first proposed by Northeast Normal University in 2007. Based on collaborative education, UGS collaborative education model advocates that universities (U), governments (G), primary and secondary schools (S) jointly carry out systematic teaching practices and in-service research and training. In 2014, the Ministry of Education issued Opinions on the Implementation of Excellent Teacher Training Plan, which emphasized and deepened the UGS collaborative education model [1]. UGS collaborative education mode is actually a new interactive mode, aiming to realize the sharing, cooperation and complementing of teachers' teaching practical ability through teacher exchange. Based on the teacher professional certification system, the community is formed between university teachers and elementary education teachers in guiding practical teaching from middle schools. Construction of teaching material analysis, problem solving research, classroom teaching quality improvement in one of the new model of collaborative education, in improving the quality of basic education teaching, at the same time, strengthen the quality of teacher training. The high school entrance examination is an important practice of education teaching, which not only tests the students' learning results, but also tests the teachers' education results; Mathematics is the main subject of the college entrance examination. The mathematics examination of the college entrance examination is comprehensive and requires higher mathematical thinking, which is the important and difficult point of the examination. How to improve the quality of mathematics teaching in the college entrance examination and enhance the quality of mathematics teacher training is an important content of modern teaching reform. In the modern mathematics teaching system, middle and high school mathematics is the most difficult for students to learn, and also the most difficult for teachers to teach. The content of mathematics in the middle school entrance examination is not only related, but also very different. The most typical example is that in the teaching of mathematics in high school, there are some contents that the teacher of high school mathematics will default that you have mastered, but the teaching of middle school mathematics has not taught. In addition, there are some conceptual differences in knowledge in junior and senior high school mathematics teaching, such as real numbers and imaginary numbers. When the knowledge of real numbers and imaginary numbers appears in a problem, students tend to be confused. The above problems, in fact, are related to the college entrance examination mathematics connection teaching problems, how to solve this problem or solve similar problems, has been the key in the teaching practice of middle and high school mathematics teachers. UGS cooperative education model provides a new way for middle and high school mathematics connecting teaching. Therefore, from the perspective of the new curriculum standard, combined with the teaching research and teaching practice of the UGS collaborative education model, this paper explores the relevant problems of the middle school entrance

examination mathematics connecting teaching.

2. The correlation between UGS collaborative education mode and mathematics teaching practice of college entrance examination

In essence, UGS collaborative education mode is a new concept of teacher mutual assistance. Generally speaking, G in UGS means that the government (education related departments in general) plays a guiding and supporting role, and U (colleges and universities) and S (primary and secondary schools) combine with each other, share resources and complement advantages under the function of the internal mechanism of this model, so as to jointly promote the improvement of talent training quality. To explore and study the innovative reform of mathematics teaching in the middle school entrance examination under the UGS collaborative education model, and effectively solve the problem of mathematics connecting teaching in junior and senior high schools, the first thing is to clarify the internal mechanism of the UGS collaborative education model. At present, based on the existing research results, some scholars have summarized and classified the internal mechanism of the UGS collaborative education model [2]. Specifically in middle and high schools, the author quotes its concept and summarizes three elements of the internal mechanism of the UGS collaborative education model according to specific needs: coordination and communication mechanism, resource integration mechanism and collaborative cultivation mechanism. From the perspective of UGS, the relationship between these three elements is shown in Figure 1

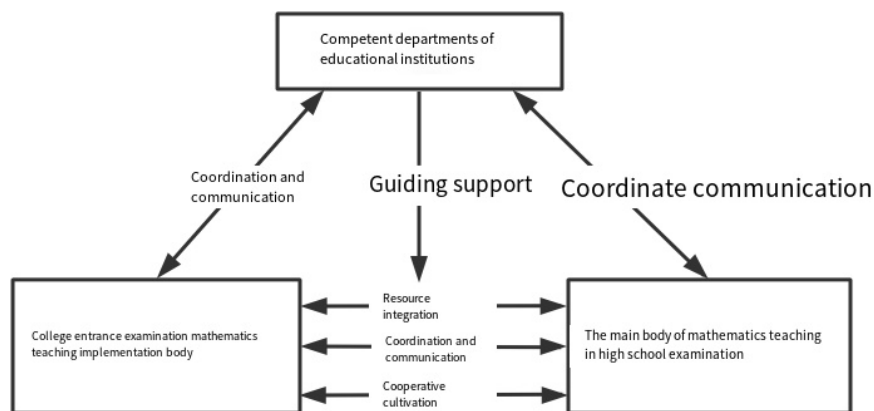


Figure 1 Operation mechanism of coordinated education in UGS mode

In Figure 1, the competent departments of educational institutions mainly play a guiding and supporting role. Specifically, they provide financial and policy support for the implementing body of mathematics teaching in the college entrance examination, formulate specific plans, and guide the implementing body of mathematics teaching in the college entrance examination to carry out resource integration, coordination and communication, as well as coordination and cultivation.

2.1 Communication and coordination is the foundation

Communication refers to the communication between junior high school mathematics teaching groups and senior high school mathematics teaching groups, including both public organizational communication and private communication between members. Not only the communication between two groups, but also the communication between three groups. The contents include communication of information, opinions, emotions, thoughts and other aspects, so as to realize mutual understanding and support among the three parties and promote their cooperation. The functions of the competent departments of educational institutions are mainly manifested in three aspects: control, decision-making and incentive. Coordination and communication complement each other. Communication is to achieve unity in thought, while coordination is unity in action. Therefore, only the organic combination of the two can establish a good cooperative relationship, match and merge to achieve the set goals.

2.2 Resource integration is the means

Resources, in a broad sense, include natural resources and social resources. Social resources also include human resources, information resources, technical resources and intellectual resources [3]. Among them, only social resources are related to the research in this paper. The mechanism of resource integration is the concrete form of mutual support and help between the implementation subjects on the basis of communication and coordination under the UGS model. For both of them, resource sharing, reference and joint efforts can maximize the advantages of resource integration, improve the efficiency of resource use, and obtain the maximum benefits.

2.3 Collaborative cultivation is the purpose

The collaborative cultivation mechanism should be based on the premise of talent training, from the construction of teacher team, talent training plan and information platform construction. This is not a simple exchange of teaching experience or teaching cooperation, but all-round in-depth collaborative cooperation, on the basis of mutual benefit and trust, give full play to the advantages of resource integration, achieve complementary advantages, and form an organic whole of high-quality education. At the same time, it should not blindly emphasize unity and mold, but should strengthen and highlight the characteristics, allow individual characteristics to play, encourage innovation, avoid the overall rigidity and solidification.

In summary, from the perspective of UGS collaborative education model, the mathematics teaching of college entrance examination should be comprehensively implemented under the overall framework of communication and coordination, resource integration and coordinated cultivation, and the mathematics teaching strategy of co-education and mutual assistance. This paper mainly aims at the connecting teaching of mathematics in the college entrance examination, and explores and studies the relevant problems of mathematics teaching in middle and high schools under the UGS cooperative education mode. Therefore, the discussion on the mathematics teaching practice of the college entrance examination is mainly carried out around the implementation of the teaching practice in middle and high schools, without considering the influence of the competent departments of educational institutions.

3. Specific measures of mathematics teaching practice in middle school college entrance examination under UGS collaborative education mode

3.1 On the basis of communication and coordination, identify the knowledge blind area

Knowledge blind area is a common problem in mathematics teaching of middle school entrance examination. As mentioned above, some knowledge is the default student union of high school mathematics teachers, but junior high school teachers do not teach knowledge points, such as the perfect cubic formula of sum and difference, as well as cubic sum and cube variance formula, etc. Students from junior high school to senior high school, with the accumulation of knowledge, more and more methods to solve the problem, the idea of solving the problem is more and more broad. At the stage of high school entrance examination, students need to have enough association and observation ability to have the ability to solve problems, but all these need to be based on solid basic knowledge, otherwise, knowledge blindness will cause obstacles to the integrity and system of problem-solving thinking.

For example: $x^2 - x + 1 = 0$ $x^{2015} - x^{2014}$

At first glance, this problem belongs to the operation of rational number in middle school, but to solve this problem, we need to extract the common factor first. In addition, we need to convert, calculate, and substitute according to the known conditions, combined with the cubic and formula, and then we can calculate the result is -1.

$$x^{2014}(x-1) = x^{2016} \quad x^2 - x + 1 = 0 \quad x^3 + 1 = (x+1)(x^2 - x + 1) \quad x^3 = -1$$

This title is a typical junior high school entrance examination, but it involves the cubic and formula knowledge blind area, the knowledge point for junior high school students is a little complex, will not focus on, for high school students, and is relatively common knowledge point, the teacher will default that students have mastered. Therefore, there will be loopholes in the students' mathematical knowledge system.

For this kind of knowledge blind area problem, the use of UGS collaborative education model can be a good solution. Through communication and coordination, junior and senior high school teachers will explain this content in detail in junior high school class to consolidate students' basic knowledge, and then review or supplement it in senior high school class, which can be the right remedy for the case, which can not only improve the classroom efficiency, but also solve the problem of knowledge blind area.

3.2 Take resource integration as a means to unify knowledge and difficult points

From the perspective of experience, junior middle school mathematics knowledge points are generally extended from real life, which can not only guide students from concrete to abstract, form mathematical thinking, but also concreteness of mathematical knowledge, help students consume mathematics classroom content. However, although the knowledge points of high school mathematics are the deepening and extension of the knowledge points of middle school mathematics, they are more abstract, and solving problems requires more careful logical thinking and keen observation ability. The content of the textbook obviously only considers the former, and it is not expected that the unity and coordination of knowledge will cause great trouble to students' learning. For example, when it comes to the knowledge of functions, the junior high school textbooks describe the direct causal relationship of objects through the function relationship between independent variables and dependent variables. However, the content of the knowledge of functions is not mentioned in the junior high school textbooks, and variables are generally defined with unknown quantities. When it comes to senior high school, they begin to mention the content of function, usually using function expression to construct the function relationship. When multiple variables are involved, many students will be confused. $f(x)$ Obviously, identifying a function with a single unknown quantity in junior high school has obvious limitations and is unclear in meaning. However, when learning functions in high school, it will be divorced from the practicability of variable knowledge in middle school, so that the knowledge difficulties are difficult to connect and continue. Therefore, we can combine the new concept of UGS collaborative education, integrate the teaching resources such as middle and high school classroom information and textbook content, and extend the concept of function in the variable relation class of junior high school, so that students can have certain functional thinking in junior high school; In the stage of function learning in high school, mathematics teachers can extend and teach from the knowledge of middle school, and the effect will be better than the teaching effect of ruthless implanting.

3.3 With the purpose of cooperative cultivation, the problem of knowledge disjunction can be solved

In the process of mathematics teaching practice in junior and senior high schools, the problem points of knowledge fault are obvious and specific, such as the absolute value problem in junior high school and the number set problem in senior high school. The correlation is poor, and it is easy to form knowledge fault, or the lack of inheritance relationship. This is because there is a certain deviation in the thinking of mathematics cultivation in middle and high school; First of all, the teaching materials and curriculum contents of junior high school mathematics pay more attention to the cultivation of mathematical literacy, such as absolute value, quadratic equation of one variable, function concept, etc. In junior high school, logical reasoning, mathematical operation, intuitive imagination and mathematical abstraction are emphasized. And this is the knowledge point to the high school stage, the emphasis on mathematical thinking such as classification and discussion, transformation and transformation, number and form combination and other mathematical thoughts. This kind of deviation is easy to cause the gap of knowledge, which is not conducive to the improvement of teaching quality.

Under the UGS collaborative education model, middle and high school mathematics teachers can seek unity and coordination from the teaching concept, curriculum setting and teaching rhythm. They can also seek unity and coordination from talent training plan, teacher team construction and information platform construction. Junior and senior high school teachers can seek common ground while reserving differences in teaching concepts, so as to achieve a closer link between junior and senior high school mathematics knowledge. In the curriculum setting, take the overall situation into account, fully consider the students' grasp of basic knowledge, and effectively check the gaps and fill in the gaps; In the teaching rhythm, the full consideration of junior high school stage of knowledge leakage, avoid driving motion sickness and affect the learning effect of students.

4. Summary

UGS cooperative education mode is a new mode of cooperative education for teachers. Its core concept and educational thoughts play a great enlightening role in the cultivation of talents. Based on the perspective of UGS collaborative education model, this paper summarizes and analyzes the internal mechanism of collaborative education model. Based on the knowledge connection problems in the process of mathematics teaching practice in the middle school entrance examination, it explores the correlation between communication and coordination, resource integration and collaborative cultivation and teaching practice. Aiming at the problems such as knowledge blind area, knowledge difficulty and knowledge fault in mathematics teaching of college entrance examination, this paper elaborates in detail, and puts forward corresponding implementation measures based on UGS collaborative education concept, which provides certain reference for the majority of teaching workers.

References

- [1] Lin Zhihui. *Research on Collaborative training of General education teachers in primary schools under U-G-S model [D]*. Guizhou Normal University, 2022.
- [2] Yang Guang. *Discussion on the measures of Connecting Mathematics teaching in junior and senior high schools [J]*. *Mathematics Learning and Research*, 2021(17):31-32.
- [3] Zheng Minhui. *The Importance of Bridging teaching in Middle and high School Mathematics for High School Mathematics Learning [J]*. *Educational Observation*, 2019, 8(17):123-124.