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Problems and Countermeasures of Mathematics Teaching at Transition from Kindergarten to Primary School

-- Survey based on City X

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Abstract: The state attaches great importance to the articulation between kindergarten and primary school, and there is an objective "vacuum" in the teaching of mathematics in kindergarten and primary school. Through questionnaires and interviews, we understand the current situation of mathematics teaching in X city, and summarize the five problems of mathematics teaching in the early childhood and primary school convergence according to the current situation. although the overall awareness of the early childhood and primary school convergence is high, the participation of both sides is not balanced; the convergence of educational objectives is superficial; the educational content is repetitive; the convergence of educational methods is not strong; and the educational evaluation lacks scientificity. By analyzing the problems, this study gives suggestions in five ways, namely, cohesion must have a basis, cohesion must have talent, cohesion must have a method, cohesion must have a sequence and cohesion must have an effect, hoping to promote the effective articulation of ECE and primary mathematics teaching.

Keywords: Mathematics Teaching; Early Childhood Connection.

1. Introduction

The transition from a kindergarten culture that focuses more on the "child as a person" to an elementary school culture that focuses more on the "intentions of society" is a critical period in children's development, and it sets the tone and direction for their future school careers. In recent years, the State has also attached great importance to the interface between kindergarten and primary school, and from the 2002 "Guidelines for Kindergarten Education (Trial)" to the 2022 New Curriculum, the interface between kindergarten and primary school has always been a key point emphasized in various government documents. Moreover, there is a vacuum in the teaching of mathematics at the ECE level. For example, the Learning and Development Guidelines for Children Aged 3-6 require students aged 5-6 to "be able to recognize their right and left sides", but do not require them to write "left" and "right". "However, in Grade 1 (above) Mathematics, students are required to answer questions by writing "left" and "right". This shows that there is still a vacuum in the early childhood connection of math teaching. This study hopes to understand the current problems of mathematics teaching ECE in X city through investigation, and analyze the causes based on the problems, so as to provide strategies for exploring and practicing ECE in mathematics teaching in X city.

2. Research Design

(1) Subject of the study:

Four kindergartens and four elementary schools were selected for this questionnaire. The kindergartens were public in urban areas, private in urban areas, public in townships, and private in townships, and the first-grade math teachers of these four kindergartens were selected as survey respondents. The elementary school also consisted of two township elementary school and two urban elementary school, and the first grade teachers of these four elementary school were selected as the respondents.

The interviews were conducted with a representative sample of eight teachers from each of the above schools.

(2) Research tools

In order to grasp the real situation of mathematics teaching in X city, the author designed the "Questionnaire Survey on Mathematics Activities in the Second Semester of Kindergarten Children" and "Questionnaire Survey on Mathematics Activities in the First Semester of Grade 1" based on the teaching objectives, teaching contents, teaching methods, and teaching evaluation. "Both questionnaires have six dimensions, including basic information, overall understanding of mathematics teaching and learning in transition from kindergarten to primary school, understanding of the educational objectives of mathematics teaching and learning in transition from kindergarten to primary school, understanding of the educational content, understanding of the educational methods, understanding of the educational evaluation and a suggestion. A total of 129 questionnaires were collected for both.

Semi-structured interview outlines were also designed and two representative math kindergarten teachers and two first grade math teachers each were randomly selected for interviews. The teachers' interview outlines mainly included their views and suggestions on teaching mathematics at the Kindergarten and Primary levels, and their views on various aspects of mathematics teaching.

3. Findings and Analysis

Questionnaire results:

(1) Basic information:

A total of 78 questionnaires were collected from the questionnaire on the math activities of kindergarteners in the second semester of the first grade. Of these, 2.56% were male

and 97.44% were female, 56.41% were from kindergartens in urban areas and 43.59% were from kindergartens in towns and villages. 19.23% were from private schools and 80.77% were from public schools.

A total of 51 questionnaires were collected from the questionnaire on mathematics activities in the first semester of elementary school. The ratio of male to female was 11.76% and 88.24% with a large gender difference. 78.43% of the teachers were from urban areas and 21.57% were from townships.

(2) The overall awareness of transition from kindergarten to primary school is uneven: more than 90% of kindergarten teachers are aware of the mathematics in teaching transition from kindergarten to primary school, and most of them have carried out activities such as "home and family interaction" and "offering bridging courses". However, when the first grade teachers answered the question "Have you ever conducted any activities for teaching math at the transition from kindergarten to primary school level?", more than 41.18% of them answered "Have you ever conducted any activities for teaching math at the transition from kindergarten to primary school level? More than 41.18% of the teachers did not. This shows that kindergarten teachers attach much more importance to transition from kindergarten to primary school and conduct activities more frequently than first grade teachers.

(3) The articulation of teaching objectives is not clear: most kindergarten teachers determine the objectives according to the "Outline" and "Guidelines", while first-grade mathematics teachers mainly refer to the "Mathematics Curriculum Standards", both based on the educational concepts of "student as the main body" and "education for life", and so on. Both sides put forward some macro and vague teaching objectives, but lack of clear teaching objectives. Secondly, the two sides do not understand each other's teaching objectives, kindergarten math activities are more inclined to obtain direct experience of mathematics in specific operational activities, while the elementary school attaches importance to the form of students' systematic knowledge, which are two diametrically opposed to the teaching system, but in the specific educational practice, the two sides of the teachers did not understand the difference between the two, lack of communication and exchange, so that the convergence of kindergarten and primary school in the form of a practical and unrealized. The lack of exchange and communication makes the articulation of transition from kindergarten to primary school a mere formality and not a reality.

(4) Irregularities in the articulation of teaching content: more than half of the kindergarten teaching materials are prepared by specialized agencies, 29.49 per cent are originally developed, and 10.26 per cent are collected by the kindergarten teachers themselves. The teaching of mathematics in Grade 1 is based on the people’s education press textbooks, which makes the foundation of kindergarten students to enter elementary school uneven, and creates problems in the interface between kindergarten and elementary school. A first-grade teacher said in an interview, "When first grade first started, there was an arithmetic test, and the students in our class had particularly large differences in their scores, with some getting perfect scores, but at the same time there were many scoring below 60 points, and some even scored only 40 or so points. I found out that many of the students who scored a hundred points were graduates of a nearby private kindergarten, and I heard that they had already learned addition and subtraction within twenty in kindergarten, and that their teachers often came up with problems for them to do. Another important reason for the unsatisfactory performance of some children is that some kindergartens strictly implement the requirements of the higher education authorities to "prohibit primary schooling", and throughout the kindergarten stage, play is the main focus, which makes the cognitive ability of children low." It can be seen that the content of what students learn in different kindergartens is inconsistent, making the students' foundations less uniform and making it difficult for teachers to grasp the teaching progress.

(5) The convergence of teaching methods is not in-depth: only 17.94% of the kindergarten teachers did not know much about the teaching methods of mathematics in the convergence of kindergarten and primary school, and in the selection of specific teaching methods, the two most frequently used methods were the game method and the demonstration method; when it comes to the nature of the teaching methods, 62.82% of the kindergarten teachers chose the method of "focusing on activities and games, and consciously converging to the lecture method", indicating that the kindergarten teachers have the educational concept of the convergence of kindergarten and primary school. When it comes to the nature of teaching methods, 62.82% of the kindergarten teachers chose to "focus on activities and games, and consciously move closer to didactic methods," indicating that the kindergarten teachers have the educational concept of bridging the gap between kindergarten and primary school; two first-grade math teachers said in the interview, "After entering elementary school, teaching methods are mainly through the didactic method and the practice method, and more lectures and more practice are needed for the students to better grasp the knowledge." "Children because of their age is very small, it is difficult to maintain a long time to maintain a strong concentration, elementary school and lecture-based, so in the beginning I will often take the children to engage in concentration training, and gradually the children adapted to the lecture method." It can be seen that although kindergarten teachers have the awareness of bridging the early childhood and primary school, they lack specific bridging methods.

(6) The articulation of teaching and evaluation is not sound: the current kindergarten evaluation methods are relatively diversified and rich. 84.62% of kindergarten teachers chose the "classroom observation method"; 79.49% chose the "growth record bag method"; 56.41% chose the "test method"; and 67.95% chose the "conversation method". The method of "classroom observation" was chosen by 79.49% of the kindergarten teachers; the method of "growth record bag" by 56.41% of the kindergarten teachers; the method of "quiz" by 67.95% of the kindergarten teachers; and the method of "conversation" by 67.95% of the kindergarten teachers. However, only a small proportion of kindergarten teachers were aware of the articulation. The results showed that 57.69% of the kindergarten teachers used descriptive and positive assessment methods to encourage children's motivation, while 29.49% of the kindergarten teachers used descriptive and positive assessment methods, which were close to the summarizing and grading methods used in elementary school. However, only 12.82% of them used mainly summarizing and hierarchical assessment methods to make young children adapt in advance.

First-grade teachers' assessment of students' learning in

mathematics focused more on quantitative assessments such as tests and measurements. Two first-grade math teachers said during the interview, "Evaluation of first-grade elementary school students, I think the knowledge and skills are in the first place, the first grade of elementary school to lay a good foundation, in order to make the child in the back of the math of the study more smoothly." "The Education Bureau is now gradually reducing the test, but we can only through the test to better understand the students to grasp the bad place, or to moderate to use the method of testing, of course, also have to pay attention to the performance of the students usually learn." From the above, it can be seen that the educational evaluation of transition from kindergarten to primary school has structural differences.

4. The Main Reasons for the Problem of Early Childhood Transition in Math Teaching in X city

(1) allowing Sloganeering to overwhelm practical education policies and shirking of responsibilities among articulated subjects

It may seem that the convergence between kindergartens and elementary school is in full swing, but in fact, the dual subject of convergence between kindergartens and elementary school has fallen into a false prosperity. Between kindergarten and elementary school "not convergence", "false convergence". The author believes that this situation is mainly due to the education policy slogans, for the articulation of articulation, so that early childhood and primary articulation superficial, formalized, in fact, the effect is not good. In recent years, education departments around the world have established pilot kindergartens and elementary school to try to promote the articulation work in the form of pairing of kindergartens and primary schools. Although these administrative measures have, to a certain extent, clarified the responsibilities of the articulation subjects and provided channels for their cooperation, they have not fundamentally clarified the relationship between articulation and children's learning and development, which has made the practice of articulation superficial and superficial.[5] .

(2) The objectives of teaching and learning are very different, and the curricula of the early childhood and primary schools are very different.

The reasons for the lack of close articulation between early childhood and primary school are varied, but the author believes that the most fundamental and direct reason is the differences in the curricula of early childhood and primary school, resulting in differences in teaching objectives. The articulation content of elementary school mathematics textbooks mainly emphasizes basic mathematical knowledge and basic skills. The specific contents of the various versions of textbooks include basic counting, classification and comparison, identifying positions and common mathematical facts of life, etc. However, these curricula only emphasize part of the knowledge of elementary school, neglect the rich content learned in kindergarten, and do not effectively mobilize the cognitive experience accumulated by students in kindergarten, resulting in the two sides working on their own, so that the bridging of the early childhood and primary school levels of mathematics teaching becomes a formality and fails to be put into practice.

(3) Weak awareness of content articulation and duplication of educational content

There are several reasons for the poor convergence of teaching content. The first is that kindergartens teach more math in order to attract more students and cater to the demands of parents, resulting in a high degree of duplication of teaching content between kindergartens and elementary school. A kindergarten director said: "the township's student population is getting smaller and smaller, several kindergartens are competing for students, parents due to the concept of not strong, in the wait-and-see comparison to choose the kindergarten that can learn more knowledge, although the Education Bureau are advocating to play as the main teaching and learning activities, and at the same time strictly prohibit the elementary school. However, in order to meet the needs of parents, we have to teach elementary school knowledge. This is how we can attract more students." The second is that there is no unified teaching content at the kindergarten level in China, and kindergartens are prone to deviation when they choose their own teaching content according to their own characteristics. Some kindergartens choose teaching materials that are not authoritative, and some kindergartens even use first-grade math teaching materials directly, which can easily result in the teaching content of elementary school. Thirdly, teachers do not understand the differences between kindergartens and elementary school. On the surface, there is a lot of overlap between the contents of kindergarten and elementary school, but in fact, the focuses of the two sides are not the same. In kindergarten, children need to master the simplest mathematical knowledge, and he pays more attention to the children's mathematical learning experience, in order to cultivate their interest and enthusiasm in learning mathematics. Elementary school mathematics aims to form a systematic mathematical knowledge system, focusing on the acquisition and accumulation of knowledge. Teachers are often not clear about the difference between the two, and in the actual teaching of mathematics, they all think that it is for the acquisition of knowledge, which leads to the repetitive nature of the teaching content of mathematics teaching early childhood and primary school convergence. In turn, some drawbacks have emerged.

(4) Teachers' lack of awareness of their responsibilities and their teaching methodologies are crippling

At present, the bridging of early childhood and primary education among the goals of preschool education is not a task that teachers have to accomplish, and the current Education Bureau strictly prohibits the primaryization of early childhood education. To innovate and reform in teaching methods is a big risk to take as a teacher. The best way is to use the traditional game method, even if it is not successful in the articulation, but still successfully complete the teaching activities that should be completed between. Therefore, kindergarten teachers choose the game method without thinking when choosing the method of bridging kindergarten and primary school, and do not guide the students to explore and continue the "mathematical elements" from the game and other activities, to make it clear, so that the students can be able to initially understand the concepts of mathematics.[7]

(5) Entrenched teaching to the test and poor evaluation of education

Under the influence of exam-oriented education, the phenomenon of "score-only theory" is still common. Although we often mention that we can't rely only on the score to evaluate students, but in practice, the standard of talent selection in China is still the score of the high and low, in this context invariably formed a test, score-based education

evaluation. Teachers are the decision makers and implementers of teaching evaluation, and in this process, teachers' own concepts are crucial to the effectiveness of teaching evaluation. Due to the lack of advanced evaluation concepts and the awareness of articulation, kindergarten teachers usually use qualitative evaluation methods such as observation and file bag evaluation, while elementary school teachers only use a single evaluation method such as tests. This creates a dilemma in the evaluation of mathematics teaching at the interface between kindergarten and primary school.

5. Strategies for Improving the Interface between Early Childhood and Primary Education in Mathematics Teaching and Learning

Through the above analysis of the main problems and reasons arising from the process of mathematics teaching in the early childhood and primary school convergence, this study puts forward some countermeasures and suggestions in five aspects, namely, evidence-based convergence, talented convergence, methodical convergence, orderly convergence and effective convergence, in the hope of promoting the effective convergence of mathematics teaching in the early childhood and primary school.

(1) Articulation on the basis of a good top-level design and the construction of a system for the articulation of early childhood and primary schooling

First, strengthen the top-level deployment. The state formulates policies and regulations to promote the convergence of mathematics teaching and learning, strengthens the top-level design, and does a good job of national policy guidance, which can not only have an impact on the school and family systems, and improve the quality of education in China.[2] At the same time, it can also promote the development of children's values and concepts of education, constantly update China's education concepts, and improve the education system. Secondly, the micro-practice is refined. The Outline and the Guidelines are the guiding documents for kindergarten curriculum, and the Objectives of Mathematics Curriculum are the guiding documents for elementary school curriculum, which play a coordinating role.[1] The objectives of the Mathematics Curriculum are the guiding documents for the kindergarten curriculum. However, since the new Outline and Guide and the Mathematics Curriculum Objectives are highly generalized, it is difficult for teachers to put them into practice. Therefore, the Outline, the Guide and the Mathematics Curriculum Objectives are refined. This requires the relevant authorities to make clear provisions on the articulation of the four aspects of mathematics teaching and learning.

(2) Bridging with talent: optimizing teacher training and improving the team for bridging early childhood and primary education

First of all, teachers should set up a correct concept of articulation, and regard the work of transition from kindergarten to primary school as the promotion of children's overall development, the unity of quantitative and qualitative changes, and also the process of mutual adaptation between children and the environment.[8] Secondly, teachers should have a comprehensive and three-dimensional view of transition from kindergarten to primary school. Secondly, teachers should have a comprehensive and three-dimensional understanding of mathematics teaching and learning in transition from kindergarten to primary school, including learning, emotional, social and other aspects of articulation, and understand that mathematics teaching and learning in transition from kindergarten to primary school is not only focusing on the articulation of mathematical knowledge, but also to cultivate students' core mathematical literacy. Finally, teacher training should be strengthened to improve the quality of teachers.[1]. Teachers should not only master subject-specific knowledge, but also learn psychology-related knowledge and understand the characteristics of students' psychological development, so kindergartens and elementary school should take lectures, thematic training and other ways of training for the teaching staff, the smooth transition of young children's articulation as a short-term goal, and to promote the lifelong development of the students as a long-term goal, to do a good job of articulation work.

(3) Articulation: focusing on mathematics teaching and learning, and the solid implementation of various links

First, the differences in teaching objectives should be clarified and the articulation of objectives should be strengthened. Students from kindergarten to elementary school are in the period of transition from the preoperational stage to the concrete operational stage, which is a unification of stage and continuity, as well as quantitative and qualitative changes, so teachers must take into account the students' existing level of knowledge and acceptance, and strengthen the articulation of teaching objectives[3] . Secondly, choose the teaching content reasonably and do a good job in the articulation of content. In the kindergarten stage, the teaching content should be oriented to young children's mathematical learning experience, cultivate young children's interest in learning mathematics, and always observe students' motivation to learn mathematics. In elementary school, we should be oriented to master the systematic knowledge system, cultivate mathematical thinking, improve problem-solving ability, develop good mathematical learning habits, and lay a good foundation for the study of mathematics. Thirdly, choose educational methods carefully and take into account the needs of articulation. In the articulation period, although the kindergarten class is mainly based on games, it should also moderately adopt the lecture method, practice method, etc. In the first grade, while lecturing and practicing, it should also appropriately introduce games, activities and other methods. Finally, the evaluation method should be chosen scientifically to improve the articulation system. Kindergarten teachers mainly use qualitative descriptive evaluation, in order to meet the articulation needs, teachers also need to consciously approach the quantitative evaluation of the elementary school, similarly, elementary school teachers can also introduce qualitative evaluation to improve students' motivation to learn, and to understand the problems of students in the learning process. Cooperate with each other to continuously improve the articulation system.

(4) Effective articulation: enriching early childhood and primary school assessment, improving the effectiveness of articulation.

Kindergarten and lower elementary school should form a united front to focus on comprehensive assessment based on core literacy, scientifically assessing students' developmental levels in the areas of knowledge and skills, affective attitudes, and problem solving, using core literacy as a link, and realizing process-based developmental tracking for young children.[7] The students' developmental level in the areas of

knowledge skills, emotional attitudes, and problem solving is scientifically assessed to realize the process of developmental tracking for the children. In particular, we should not neglect the evaluation of students' enthusiasm and initiative in participating in activities, and the evaluation of their social development such as interpersonal interaction, cooperation and sharing with peers. In addition, we should also enrich the evaluation methods and break the shackles of the "score-only" ECE evaluation.[6] In addition, we should pay attention to the combination of formative and summative assessment, emphasize the continuous attention to the process of children's development, not only consider the children's past, but also pay attention to the children's present, and even more focus on the children's future. The main body of the assessment to kindergarten teachers, elementary school teachers, parents to participate, based on the evaluation results of the feedback, teachers can put forward each other constructive, targeted adjustments, in the atmosphere of mutual help and mutual learning to continuously improve the quality of the work of early childhood and primary school articulation, and improve the evaluation system of early childhood and primary school articulation.

(5) Articulation: strengthening tripartite cooperation and optimizing the supply of exchange platforms

First, strengthen cooperation between the early childhood and primary schools and establish a long-term cooperation mechanism.[5] . Through the survey, at present, many areas of China's kindergartens and elementary school to establish cooperation between kindergartens, kindergartens will organize similar visits to elementary school, invite elementary school teachers to give lectures and so on, but the results are very little. There is no guarantee of systematic before and after, and it is difficult to ensure long-term effectiveness. Therefore, kindergartens should get closer to elementary school and slowly penetrate through the long-term cooperation mechanism to carry out solid and effective bridging education and avoid formalization. At the same time, elementary school teachers should also often contact with kindergarten teachers, regular exchanges and communication, and jointly discuss the teaching methods, and focus on the kindergarten "up" articulation at the same time to strengthen the elementary school "down" articulation. Secondly, strengthen the cooperation between home and school, and emphasize the role of parents in the articulation between kindergarten and primary school. Parents have a great influence on children's behavior, character traits, self-care ability, and learning attitude. As parents, they should master scientific child-rearing methods and constantly update their education concepts, so that parents and teachers can form a synergy of education and help their children's growth together. Finally, build a communication platform to enhance the ability of coordinated development. Due to time and space differences, it is difficult for the three parties to have time to communicate and interact offline, so you can build a family and school communication platform, set up a special topic of early childhood convergence, parents and schools are standing on their own point of view to put forward their own suggestions and put them into practice, to ensure that math teaching and learning of early childhood convergence of the smooth progress of the school.

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