Research on After-school Delay Service Countermeasures of Information Technology in Primary Schools from the Perspective of "Double Reduction"

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Abstract: The information literacy requirement for talents in modern society is constantly improving, as a result, the improvement of primary school information technology teaching quality has become a concern of all sectors of society. With the implementation of the national "Double Reduction" policy, the after-school teaching and learning of information technology courses in primary schools have posed new challenges. Based on practice and research, we should draw lessons from deep learning theory, attempts to explore the main factors affecting primary school information technology class delay service. We will explore the countermeasures to promote the effective operation of after-school delay service of information technology in primary schools, in order to promote the effectiveness of after-school delay service of information technology in primary schools, and improve the information literacy of students by using after-school delay service of information technology.
***Keywords*:** "double reduction", primary school information technology, after-school delay service, deep learning, countermeasures

1. Introduction

Good information literacy is an important prerequisite to promote the rapid development of today's information society. Primary school is an important stage for the initial formation of students' innovative consciousness and comprehensive quality, and the cultivation of information literacy of primary school students is an important task[1]. However, the current after-school delay service of information technology in primary schools is confronted with many problems. Against the background of "Double Reduction" policy, all provinces and cities are carrying out the reform of after-school delay service of information technology, integrating multiple elements into the courses of information technology clubs, including robot, artificial intelligence, 3D printing, visual programming, innovation and creative fun competitions, etc.It is helpful to cultivate students' information awareness, computational thinking, digital learning and innovation, and information social responsibility[2]. It is very important to carry out relevant research on after-school delay service of information technology in primary schools.

2. Related concepts

2.1 Double Reduction policy

The double reduction policy is an education policy issued by the General Offices of the CPC Central Committee and The State Council in 2021, with the aim of easing students' homework burden. "Three management" refers to managing the education and teaching order, managing the examination and evaluation, and controlling teachers who violate the rules to make up lessons. "Three Improvements" is to improve the quality of education, improve the level of homework management, improve after-school delay service level.Due to the need to return the time out of class to the students,discipline training institutions are forbidden to open cram schools in winter and summer vacations and no longer approve new discipline training institutions to manage students' participation in off-campus training with real-name system[3]. After the double-reduction policy takes effect, how to improve students' information literacy with shorter after-class service time of information technology is a problem worthy of study[4].

2.2 After-school delay service of information technology in primary schools

After-school delay service of information technology in primary schools is also called primary school information technology 4 o 'clock class or extended course. The students are from grades three through six. From 4 PM to 6 PM

every day, information technology teachers mainly adopt project-based teaching and inquiry-based teaching methods, allowing students to complete the projects assigned by teachers through hands-on operation and independent exploration of information equipment and software, so as to effectively improve students' independent learning ability, innovation ability and information literacy.

3. Status quo of after-school delay service of information technology in primary schools

3.1 Analysis on domestic status

Only a small number of scholars in China have conducted researches on after-school delay service of information technology in primary schools. The author searched 22 literatures on CNKI with "Information technology extended courses" and "Information technology after-school delay service" as keywords. This study summarizes the literature related to after-school delay service of information technology in primary schools to get the relevant status quo.

3.1.1 Relevant theoretical research

There are few theoretical studies on the after-school delay service of information technology in primary schools. Most scholars only put forward the idea of development and practice. The true meaning of after-school delay service theory of information technology in primary schools has not been unified, so further research is needed.

3.1.2 Research on system construction

There is no unified standard for the construction of after-school delay service curriculum system of information technology in primary schools, and there is a lack of related researches. It is recommended to develop from a variety of aspects, such as theory and practice, material categories, learning sections, or development paths. However, the structure of the curriculum system needs to be considered from different levels and types, so as to meet the personalized and diversified learning needs of students.

3.1.3 Course design and development

Most of the researches on after-school delay service design and development of information technology in primary schools focus on primary and secondary schools, and there are many researches on curriculum development and curriculum resource development. For the aspect of curriculum development, most scholars study from the four aspects of curriculum content, curriculum implementation and evaluation, curriculum objectives and guarantee mechanism as the breakthrough point. In the design and development, we should pay attention to students' deep learning, that is, to design a variety of teaching methods and make students use a variety of learning strategies to connect old knowledge and new knowledge across disciplines, so as to cultivate students' information technology core literacy [5]. Therefore, in the follow-up research, relatively complete and multidisciplinary integration of primary school information technology after-school delay service curriculum resources can be designed.

3.1.4 Relevant teaching implementation

As domestic scholars continue to deepen the teaching research on after-school delay service of information technology in primary schools, and some research has been done on the concept of information technology after-school delay service, course teaching content, teaching implementation strategy and teaching evaluation mechanism, but the number is still far from enough. The follow-up application and strategy research of information technology after-school delay service in primary schools needs further exploration

3.2 Existing deficiencies or problems

3.2.1 Insufficient teaching hardware and software resources

The after-class delay service teaching project of information technology in primary school can be done in many perspectives, including Arduino intelligent design, Python artificial intelligence, 3D creative design, Scratch graphical programming and so on. At present, the hardware and software resources provided by primary schools in developed areas in eastern China are sufficient, while those provided by primary schools in less developed areas in western China are generally insufficient. For example, the equipment configuration of maker classrooms is incomplete, and some software in computer rooms is equipped with trial versions, with some functions limited. In addition, most of the parents of students do not have the financial ability to buy equipment, only a small number of parents can buy equipment for students, resulting in students do not have the conditions for practical operation and inquiry learning.

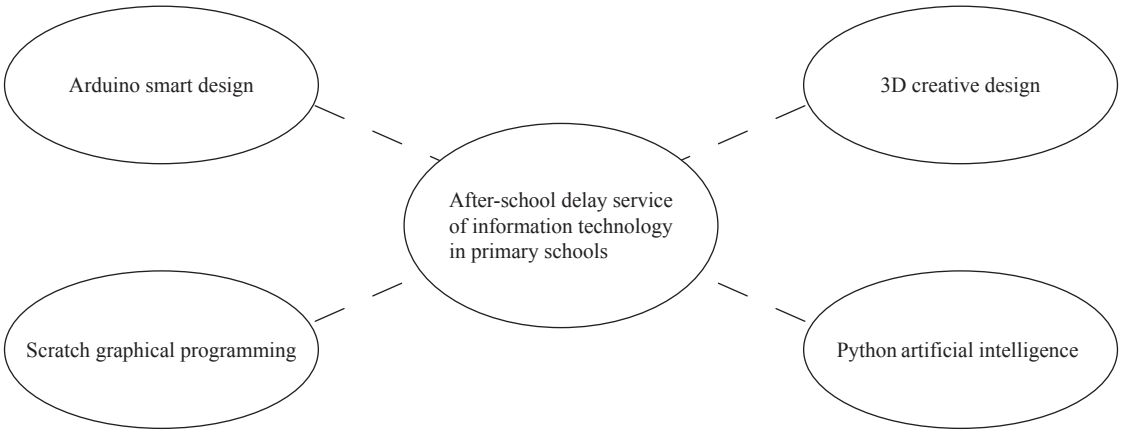

Figure 1. Teaching project of after-school delay service of information technology in primary schools

3.2.2 Insufficient course resources and teaching materials

Primary school teachers are exclusively responsible for the teaching of subjects they teach, such as Chinese, mathematics, information technology and other subjects, while there are no teachers who are specifically responsible for project-based teaching, leading to the lack of in-depth integration of knowledge and skills of various subjects in lesson preparation. There is basically no unified teaching material for after-school delay service of information technology in primary schools, and teachers can only design some relatively micro and simple projects. The relevant departments did not systematically develop after-school delayed service courses of information technology in primary schools, leading to the fact that teachers need to prepare lessons independently for each class, and the quality of course resources prepared by teachers is uneven and time-consuming, leading to low teaching efficiency. Due to the lack of teaching materials, students do not pay enough attention to after-school delay service of information technology in primary schools, and their learning efficiency is relatively low.

3.2.3 Students lack innovative thinking

Students should create creative works based on the knowledge they have learned and their existing cognitive experience with the help of a variety of information materials. However, in the delayed service teaching of information technology in primary schools, most students follow the tutorials step by step to make their works with similar design ideas, and thus lack of innovative thinking. For example, in terms of Scratch for "Making a lottery wheel", some students can only follow the teacher or tutorial step by step without giving initiative of their own brains for programming. In addition, the students' foundation is generally weak, and they cannot combine their own foundation to induce, summarize, refine and innovate the ideas and characteristics of programming. Only a few students can develop their thinking and write mature programs.

3.2.4 The class lacks the creation of real situations

The creation of the real scenario of information technology in primary schools is beneficial to stimulate students' senses, which can make them more impressed by learning new knowledge. But in primary school information technology class delay service in the classroom, the teacher usually directly cut into the theme or simple import, coupled with the lack of education resources, students are not integrated into the real situation of informatization in learning, which fails to stimulate their learning enthusiasm, and fails to produce learning interaction.

3.2.5 The evaluation methods of students are relatively simple

Most of the evaluation methods of after-school delay service of information technology in primary schools are summative evaluation based on students' performance, which emphasizes the evaluation of students' final works and neglects the evaluation of students' design and exploration process. In addition, most primary schools do not pay attention to the reform of evaluation methods in after-school delay service of information technology in primary schools, nor do they combine various evaluation methods such as process evaluation, teacher evaluation, student self-evaluation, peer mutual evaluation, formative evaluation and summative evaluation, so as to comprehensively and objectively evaluate students.

4. Main influencing factors of after-school delay service of information technology in primary schools

The quality of after-school delay service of information technology in primary schools is influenced by many factors. From the perspective of schools, the influencing factors include school hardware and software resources, curriculum resources and school-based textbooks. From the teacher's point of view, the influencing factors include the quality of lesson

preparation, situation creation and classroom evaluation. From the perspective of students, the influencing factors include the basic level of information technology, learning initiative, interest, innovation ability and so on. Among them, it is particularly important for teachers to integrate deep learning into unit learning design, and the precision of learning task design will also affect students' learning effect [6]. To sum up, in order to improve the after-school delay service quality of information technology in primary schools, schools should provide an information platform, which is conducive to teachers' training of students' information literacy in teaching work and their personalized development, so as to comprehensively improve the after-school delay service quality of information technology in primary schools.

5. Countermeasures to improve after-school delay service of information technology in primary schools

5.1 Strengthen the input of teaching hardware and software resources

Relevant departments to strengthen the investment of funds, more conducive to the construction of information technology hardware and software resources and the smooth development of primary school information technology after-school delay service. Schools purchase relevant equipment for information technology teaching according to their own needs. Hardware resources include 3D printers, robot series sets, open source hardware, etc. Software resources include 3D One, Scratch, Star Sanhao graphical programming software, etc. Try not to install the trial version of each software, because the trial version can only use some functions. Only when the required hardware and software resources are well configured, under the guidance of information technology teachers, students can have the opportunity to practice hands-on inquiry learning.

5.2 Vigorously develop curriculum resources and enrich school-based textbooks

According to the information technology foundation and characteristics of local primary school teachers and pupils, relevant departments can build a series of school-based information technology after-school delay service textbooks in various forms. Information technology after-school delay service school-based teaching materials can help students acquire knowledge systematically and make project-based teaching more routine. Schools can strengthen communication and coordination with relevant departments, strive for financial support, and constantly improve the funding guarantee mechanism, so as to ensure the smooth publication of a series of school-based textbooks on after-school delay service of information technology in primary schools[7]. For example, according to the local characteristics, the development of science and technology practice activities, is conducive to the relevant teachers in the science and technology practice activities of primary school information technology after-school delay service special school-based textbooks. The specific steps of carrying out scientific and technological practical activities are shown in Figure 1, including questionnaire survey, drawing up activity plans, field trips, practical activities and experience reflection.

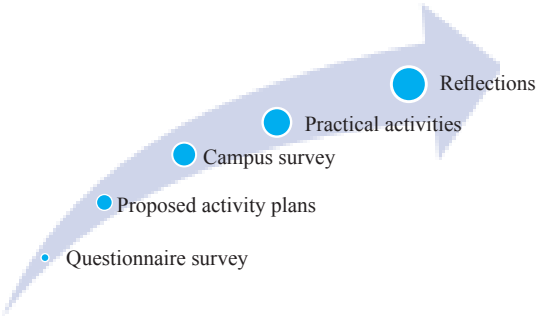

Figure 2. Steps of scientific and technological practice activities

5.3 Carefully design projects and develop students' creative thinking

Only by designing projects can teachers cultivate students' innovative thinking. Therefore, in the course of lesson preparation, teachers should first determine the project, but also carefully design the project, prepare the relevant experimental equipment, and then repeatedly operate the experiment, and summarize the knowledge and skills that students are not easy to grasp from the experiment. Only in the formal class can they face all kinds of emergencies of students, which is conducive to students to obtain greater harvest. The steps of project design generally include project determination, design scheme,

cooperative practice, exchange and evaluation, adjustment and optimization. On the basis of pre-cognitive concepts, new knowledge breaks pre-cognitive concepts and causes cognitive conflict. Students acquire new knowledge and new skills through cognitive conflict, which reflects the spiraling process of students' learning [5]. Such as science and technology innovation contest of the creative class project "panda huan gambols circle", namely, can let the panda, huanhuan from left to right in turn to the fourth equal size, shape, the parallel arrangement of hollow oval, the students in the class based on the actual basis for adjustment and modification of the project, when students are in the wrong appeared in the process of operation, the teacher wants to use the right way to guide students to think about, Cultivate their innovation ability.

5.4 Create real scenario in class and improve classroom efficiency

The real scenario is conducive to breaking the barriers between school, society and family, improving the education ecology and effectively promoting the collaborative education between school, society and family. At present, many regions and schools in China vigorously carry out project-based learning of multiple subjects based on real situational problems. In the real context, students are more conducive to integrating relevant knowledge and skills of information technology, and can also give play to their subjective initiative to find and propose problems and solve problems in the spiral learning process Therefore, the creation of real situation is conducive to the effective absorption of knowledge and the construction of students' schema, and to the improvement of the teaching quality of after-class delay service of information technology in primary schools[8]. For example, in the "high-altitude egg throwing" project, students studied and designed the egg protection device to ensure that the egg does not break when the device falls from the fifth floor and lands to the designated position. The materials needed for the project are easy to obtain, including eggs, balloons, plastic bags, newspapers, barbecue sticks, string, plastic bottles, rubber bands and foam. Students can also conduct experiments at home, so students can learn in real situations at school and at home, which is conducive to students' initiative to learn knowledge and skills.

5.5 Integrate various evaluation methods and evaluate students in all aspects

It is very important for students and teachers to evaluate the after-school delay service of information technology in primary schools. The student team can report and show the results in front of the whole class and teachers. The process of raising questions, communicating, presenting and giving suggestions is also the process of evaluation and reflection of each group[9]. We adopt a combination of various evaluation methods to evaluate the after-school delay service of information technology in primary schools, such as self-evaluation by students and peer evaluation Teacher evaluation can also be combined with formative evaluation and summative evaluation. On the one hand, it can objectively and fairly evaluate students' learning, and on the other hand, it can reduce students' psychological burden caused by summative evaluation.For the study of artificial intelligence, the basis of the students is uneven, so how to undertake to the student individuality is a problem worthy of studying, such as boys generally choose robots and model aircraft production, but girls are more likely to choose the speech recognition, artificial intelligence, therefore suggest related elementary school to delay the required service organizations to create and diversified evaluation after class as a whole and the way of planning.

6. Conclusion

Under the double reduction policy, primary school information technology after-school delay service is faced with many problems, such as insufficient teaching hardware and software resources, insufficient curriculum resources and teaching materials, lack of innovative thinking of students, lack of the creation of real situations in class, and monotonous evaluation methods for students. Project-based teaching and inquiry-based teaching are popular teaching modes in current education and social development, which are of great help to solve many problems existing in after-class delay service of information technology in primary schools. Therefore, primary school information technology teachers should effectively use information technology after-class delay service to cultivate students' information literacy, give play to students' enthusiasm and initiative, cultivate students' innovation ability and independent learning ability, and promote the development of students' personality.

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