Exploration of artificial intelligence to enhance after-school services in the context of double reduction policy

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Abstract—In order to better realize the double reduction, to open up new teaching ideas with artificial intelligence-enabled after-school services. Purpose—To introduce artificial intelligence into after-school services to revitalize all kinds of school resources and change stereotypes so that after-school services can really reduce students' burden and improve classroom efficiency while optimizing homework structure and enhancing students' overall literacy. Methods—Expand the book knowledge in the way of artificial intelligence, make the raw knowledge in the textbook more vivid and lively, and decompose the classroom teaching task into several artificial intelligence projects, so that students can accept the new knowledge more intuitively. Results— Teaching AI projects can focus students' attention well and maintain concentration for a long period of time, allowing students' learning efficiency to be further improved. Conclusion—Artificial intelligence applications have an important exploration significance in enhancing after-school service teaching, and in the actual teaching process, make full use of its own advantages to help students learn better, so as to enhance their learning effect at the same time, to promote their overall development.

Keywords-information technology, artificial intelligence，After School Services

1 FROM THE WARMTH, UPGRADE THE SERVICE CONNOTATION

Welcome the new era of double reduction, with artificial intelligence big data and other popular information technology as the new direction, improve the teaching quality of after-school services to reduce the burden of secondary school students' homework, comprehensively improve the level of after-school services in schools as the main position to meet the information learning needs of secondary school students, making learning back to school, home learning the same desire to win [1]. Provide secondary school students and parents with more choices to meet the information cultivation requirements of the new century.

Integrating social training resources, working on enriching the connotation of information classes, forming a new model of "1+X" after-school service that meets the current national conditions, promoting the overall development of secondary school students, and reassuring parents and the country [2].In addition to opening the eyes of secondary school students, let them fall in love with high technology and information technology, so that learning and high

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technology complement each other, and the quality of improvement is closely integrated with modern technology, so that secondary school students win in the future.

2 USING ARTIFICIAL INTELLIGENCE TO IMPROVE THE EFFICIENCY OF TEACHING AFTER-SCHOOL SERVICES TEACHING

2.1 Use projects to lead secondary school students into teaching situations

Project teaching can help secondary school students quickly enter the learning state, understand the project content, and have a more thorough understanding of the knowledge required for the project. After-school services should be different from traditional teaching and interest-led [3], so that secondary school students know what the teacher is talking about from the beginning of the project, and understand the teacher's overall idea from the very beginning of the classroom, so that secondary school students can follow each project teaching session closely, and even if there are individual teaching sessions that are not followed, they Even if they don't catch up with individual sessions, they can catch up with the next session[4]. The after-school service for secondary school students uses animated characters or common objects in life as the theme to stimulate secondary school students' interest in project teaching, so that they have the enthusiasm to participate and thus focus on the teacher's language and the teaching process of the project.

2.2 Create illustrated PPT courseware

PPT into some creative text, set some key text as art words, or even flip a certain angle, so that the pictures and different colorful text are then added to the PPT courseware made by the teachers themselves, making the pictures and text cleverly combined, showing their moods to the fullest, helping secondary school students to master knowledge, stimulating their enthusiasm for IT learning, and facilitating them to swim in the the ocean of knowledge. Adding background music video to the PPT makes the PPT show the project with a sense of ritual, so it can well guide secondary school students to pay attention to the content of the teacher's project during the after-school service and immerse themselves in the fun brought by the project. The teachers' efficiency during the after-school service is greatly improved. The illustrated PPT courseware enables teachers to teach the project content in the classroom with just a click of the mouse, thus saving a lot of board time, which is also in line with the short time and heavy task of after-school service [5].

2.3 Physicalization of the explanation process

Although illustrated PPTs can bring many convenient benefits to teachers, the degree of gamification is too low to better enable secondary school students to understand the essence of IT-related concepts. The classroom should be student-centered, and the teacher's teaching activities should revolve around the students in the most reasonable way to keep their long-term interest in learning [6]. For example, in our school, we lead secondary school students in an artificial intelligence course and specifically adopt the idea of graphical programming for after-school service teaching according to the age of secondary school students [7]. Graphical programming is easy to understand and easy to use, which not only solves the students' interest

but also develops logical thinking skills, and at the same time exercises abstract thinking skills. A computer language is a language that a computer can understand, and students mastering a computer language even if it is a graphical language must let the computer know how the learner thinks about solving problems and the corresponding methods [8]. Graphical programming languages are similar to building block games, allowing students to learn programming languages as a game, and the pride of the learner is greatly satisfied when a program is run to completion. In recent years, graphical programming software has sprung up with Python as the primary language, such as Robotics Programming for Students at Lehigh High School, Love Radish Robotics Programming for Middle School Students, and Phoenix Robotics Programming [9].

In our school, we have a project teaching "small classroom of interest in fruit recognition based on machine vision". The project takes apple, banana, orange as the research object, takes pictures of these three types of fruits to build a data set, uses data enhancement technology to expand the original data, and adjusts the image format to 600*600 pixels, saves it as JPG format, and uses the labeling tool Labelimg was used to annotate and name all images, and saved in Pascal Voc format. The fruit detection model is constructed with the model of FasterR-CNN, and VGG16 is used as the feature extraction network. Under the migration learning method, training is carried out through PlantVillage public dataset, and the model and weight parameters are obtained at the end of training, and finally transferred to their own neural network. The classroom experiments show that the accuracy of the fruit recognition detection project reaches more than 90%, and the mAP is 91%. The teacher makes this project complete according to the above steps and then explains the programming ideas to the students in the form of graphical programming ideas. In this process the knowledge of artificial intelligence and visual recognition was integrated into the project teaching, so that students could see their fruits accurately identified by the computer in pictures and videos. This project not only aroused great interest from secondary school students, but also attracted high attention from school leaders and parents of secondary school students, and even some teachers came to learn how this project teaching was achieved. The results of the fruit recognition project are as follows: Figure 1 shows that the probability of the fruit being an orange (orange) is 95%, Figure 2 shows that the probability of the fruit being a banana (banana) is 97%, and Figure 3 shows that the probability of the fruit being an apple (apple) is 91%.

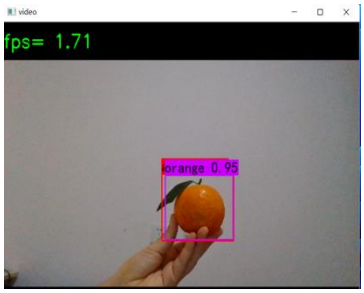

Figure 1 Orange identification

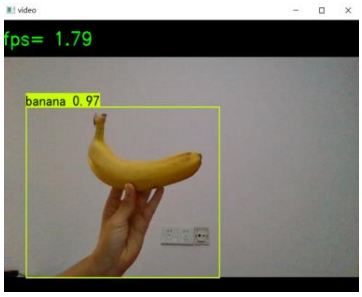

Figure 2 Banana identification

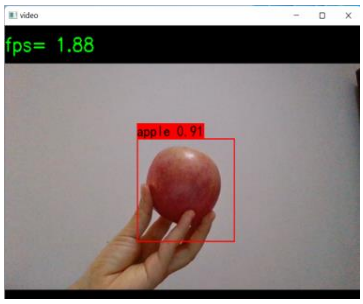

Figure 3 Apple recognition

To improve the level and efficiency of after-school services is an important measure to complete the work of double reduction, is an important path to highlight the characteristics of after-school services and promote the overall development of secondary school students, our school according to the actual situation to optimize the information technology curriculum, the implementation of interest clubs plus project guidance model, so that secondary school students learn building blocks like programming ideas, such as "physical graphic programming", "logical thinking", "artificial intelligence robot making", to achieve a good situation of after-school services teachers attentive parents assured students happy.

3 IMPROVE THE INSTITUTIONAL MECHANISM FOR SUPERVISION AND MANAGEMENT

3.1 Forming a management system of mutual supervision and cooperation in lesson preparation

According to the content of the project, the teachers of the IT after-school service project team should actively explore the practical operation mode that meets the high quality interest classroom, prepare lessons together, and organize the after-school service courses for each grade according to the age and psychological development characteristics of secondary school students using appropriate and efficient teaching models. Each teacher will propose a learning style for middle school students based on the learning characteristics of the grade level and the difficulties of middle school students, and the rest of the teachers can follow the learning process, reflecting the practice of independent and cooperative inquiry and other learning

models that are being promoted today. This is a long-term process that will test the patience and responsibility of all teachers who participate in the after-school program.

Based on the content of the project, we will study the curriculum materials in depth to make sure that we can sort out the important and difficult points of the project. The after-school service teachers of the project group discuss the course content and lesson time for grades 7 to 9 together, and they should have a good understanding of the basic knowledge and some corresponding skills that should be taught in each project, and even the basic knowledge that will be stocked in the next project, so that the whole system from the lower grades to the upper grades can be understood accurately. This requires the perfect cooperation of all teachers, in addition to improving the system of teachers in the group to push the door to listen to the lessons, on the one hand to learn the strengths of other teachers' lessons, and on the other hand to monitor the quality of service of all teachers, so as to achieve the effect of mutual supervision.

Supervise the preparation of lessons not only for the project reserve knowledge, but also for the learning methods of the students in the interest groups. To encourage the students to be the master of learning, and to be a small "project manager" in this case.

Carefully record the lesson plan, which should elaborate on the meaning of the project in life, so that students can do the project for practical use, rather than something out of the real life, the children feel very distant and can not achieve the task. The lesson plan can effectively play a guiding role for the extended service, and eliminate formalism. The lesson plan is open and transparent for teachers in the group to learn from each other.

3.2 Form an effective feedback mechanism among parents of secondary school students

The information technology course service team develops a practical and reliable feedback mechanism for secondary school students' IT course learning. It can infer the actual mastery of secondary school students from their classroom feedback, so that the after-school service curriculum of the grade group to which it belongs can be changed in a timely manner. Identify problems in a timely manner to solve them and improve the quality of after-school services for secondary schools in a comprehensive manner.

Establish a parent and learning management committee, parents and school leaders can understand all the course contents of IT after-school service in advance, and can grasp the progress of after-school service courses and course feedback in real time.

4 EFFECTIVENESS OF TEACHING REFORM

The AI project teaching in Chengguan Central School of Suixi County appeared in the after-school service in 2021, and has been running for a total of 2 semesters in 1 school year on a pilot basis so far. Compared with the traditional classroom teaching, the AI project teaching classroom experiments have been effective, the course assessment scores have increased significantly, and the percentage of subject competition awards has increased compared with the previous ones.

4.1 Promote students' independent learning skills

The data of voluntary participation in four teaching after-school services before and after the reform were randomly selected for analysis, and it can be concluded from the data in Table 1 that the students' learning interest increased after the reform, the classroom participation rate was better, and the students were able to complete the project contents in group cooperation according to the requirements carefully. Students' participation, learning interest, and completion were significantly improved due to the reasonable arrangement of experimental contents and the richer and easier to understand experimental contents after project classification.

Table 1 Voluntary participation rate

Classes	***Pre-reform voluntary participation rate/%***	***Post-reform voluntary participation rate/%***	***Growth rate/%***
Class 1	97.5	100	2.5
Class 2	98	99.5	1.5
Class 3	97	100	3
Class 4	98.5	99	0.5

4.2 Significant improvement in course assessment scores

Since the teaching of artificial intelligence project can join the after-school service, it obviously improves the learning interest of secondary school students and the performance of each subject is improved. According to the analysis of the after-school learning assessment of four teaching classes sampled from Chengguan Middle School in Suixi County, it can be seen that the excellent rate of students completing the course assessment has obviously increased gradually. The assessment results are shown in Table 2.

Table 2 Achievement Improvement Rate

Classes	***Pre-reform excellence rate/%***	***Post-reform excellence rate/%***	***Growth rate/%***
Class 1	90.5	98	7.5
Class 2	92	99	7
Class 3	91.5	100	8.5
Class 4	91	99	8

4.3 Academic Competition Awards

The students of Chengguan Central School of Suixi County won the gold medal in the middle school group of Suixi County "Kouzi Cup" Robotics Competition for two consecutive years, and won 4 first prizes, 5 second prizes and 6 third prizes in the 2022 Huaibei City Middle School Student Creativity Competition, as well as the award of winning school in the Huaibei City District.

5 SUMMARY

Since the implementation of the policy of double reduction in education, the school insists on taking after-school service as an important carrier of education, constantly exploring and optimizing the work path of after-school service, improving the quality of service and enhancing service awareness, creating information technology interest classes, deepening the after-school service model of "five education integration", reducing quantity without reducing quality while doing "articles" on information technology literacy enhancement, helping secondary school students to develop comprehensively and training successors for socialism.

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