

# A Study on the Current Situation of After-School Science Services in Primary Schools under the Double-Decrease Policy and Strategies for Improvement

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**ABSTRACT**

In the context of the Double Reduction Policy, the current situation of science after-school services in a randomly selected primary school in Province G was studied. The study found that the current situation of science after-school service is generally in the process of development and has not yet reached a mature stage. The quality of teachers, venues and curriculum resources in schools is scarce. The importance of student and parent participation is low. Based on the current situation of science after-school services and the realities of the dilemma, we propose effective enhancement strategies to improve and perfect the school science after-school service system.

**KEYWORDS**

Double-decrease policy; After-school service; Primary science; Questionnaire survey

## 1 Research background

The Standards for Compulsory Science Curriculum (2022 Edition) emphasizes that emphasis should be placed on the practical attributes of science, providing students with ample time for inquiry, promoting students' practical ability of inquiry, scientific literacy, shaping scientific modes of thinking, and enhancing scientific concepts<sup>[1]</sup>. It is believed that science education is a key path to cultivate students' innovative spirit and practical ability, and has a far-reaching impact on promoting scientific and technological progress. As the basic stage of science education, the development trend of primary school science programmed reflects the updating of education concepts and the transformation of education goals.

By analyzing the actual science after-school service activities of a primary school in Province G, we analyze and identify the problems and causes of the primary school science curriculum, and propose optimization strategies accordingly. The aim is to provide practical methods for the improvement of science after-school service in the case school, and to promote the high-quality development of science after-school service in primary and secondary schools with effective measures.

## 2 Research design

This section will be designed based on the analysis of the survey subjects, compilation basis and data sources of the questionnaire.

### 2.1 Research target

The survey respondents were selected from a primary school in Province G. Considering the limited cognitive ability and thinking development level of primary school students, in addition to the restricted understanding and expression ability of students in the lower age group, in order to improve the accuracy of the research content, the respondents were randomly selected from some classes in grades 3, 4, 5, and 6, and the specific number of students is shown in the table below.

In order to gain a deeper understanding of the current situation of the implementation of after-school service activities in the school and to analyze the problems existing in the implementation of the science after-school service programmed

Table 1 Sample base information analysis table

| Name  | Options      | Frequency | %   |
|-------|--------------|-----------|-----|
| Grade | Third grade  | 48        | 24% |
|       | Fourth grade | 48        | 24% |
|       | Fifth grade  | 54        | 27% |
|       | Sixth grade  | 50        | 25% |

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in the school, the in-service science teachers in the school were exchanged through dialogue in the form of interviews, which were used to supplement the discussion of the deep-rooted problems and influencing factors faced by a primary school's after-school service for science in the implementation of the curriculum in Province G. The interviews were conducted with the following subjects. The details of the interviewees are shown in the table below.

Table 2 Analysis of Basic Information of Interviewed Teachers

| Workplace                      | Interviewee   | Duties              | Length of teaching experience |
|--------------------------------|---------------|---------------------|-------------------------------|
| A primary school in Province G | Mrs. Su/T1    | Science Team Leader | 15 years                      |
|                                | Mrs. Liu/T2   | Science teachers    | 10 years                      |
|                                | Mrs. Huang/T3 | Science teachers    | 4 years                       |

## 2.2 Questionnaire development

Combining the views of the literature on the current situation of after-school services in primary schools, the current situation of after-school extended hours services in primary schools, and the research on extracurricular activities in primary school science, as well as based on the self-understanding of the literature, the questionnaire is centered on the four parts of the basic situation of the students, the current situation of the after-school services in schools, the quality of after-school service activities in schools, and the strategies for improving the after-school services. The design of a few questions in the questionnaire was borrowed from the questionnaire in Yang Xue jiao 's "Curriculum-based Status and Optimization Strategies of Primary School After-school Services in the Context of "Double Reduction" [2].

The questionnaire consisted of 20 questions, with 14 single-choice questions and 6 multiple-choice questions, and 1 of the 6 multiple-choice questions included an open-ended question. Considering the fact that the respondent group is involved in after-school services but not in science after-school services, blank questions were allowed for some of the questions in the two sections of the questionnaire, namely, the current status of after-school services and the quality of after-school services.

## 2.3 Data sources

The survey was conducted by distributing a paper-based questionnaire to find out the implementation of science after-school service in a primary school in Province G from students' feedback. The research data were collected during the author's internship in a primary school in Province G. After communicating with the school's internship instructor and consulting with the permission of some classroom teachers, some of the classes were selected as the target of the survey.

Therefore, this questionnaire data response included a random selection of students from the school's Year 3 (1)(2)(3), Year 4 (3)(6)(7), Year 5 (1)(2)(4) and Year 6 (5)(6) classes. Details are given in the data analysis section below. A total of 200 questionnaires were distributed and 200 valid questionnaires were returned.

## 2.4 Reliability testing

The total Cronbach's alpha coefficient for the scale questions was greater than 0.9, indicating that the data reliability quality of the study was high, and the CITC values for each of the analyzed items were greater than 0.4, indicating that there was a good correlation between the items analyzed, which suggests an ideal level of data reliability. In summary, this indicates that the data reliability is of high quality and can be used for subsequent analyses.

Table 3 School science after-school services

| Name (of a thing)                                                                                                    | Correction term total correlation (CITC) | Deleted alpha coefficients of line | Cronbach's alpha coefficient |
|----------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------------------------|------------------------------|
| 13. Satisfaction of teachers teaching science after-school services                                                  | 0.887                                    | 0.910                              | 0.935                        |
| 14. Satisfaction with the content arrangement of science after-school services                                       | 0.915                                    | 0.903                              |                              |
| 15. Satisfaction with the equipment and premises of science after-school services                                    | 0.885                                    | 0.934                              |                              |
| 16. Degree to which science after-school services foster interest in science, practical skills and creative thinking | 0.870                                    | 0.914                              |                              |

## 2.5 Validity check

The KMO and Bartlett's test yielded a KMO value of 0.864, where the approximate chi-square value of Bartlett's test of sphericity was 861.024, free 6,  $p < 0.001$ .

The information measured was tested using the structural validity index in SPSS Advanced Tutorial on Statistical Analysis (3rd Edition), and it was concluded that this scale has good validity. The KMO values were in the range of 0.8 to 0.9, which indicates that the coefficient of variation of this scale correlates with the factors, which means that this scale is

feasible, and it shows that the factor structure of this questionnaire is significant, i.e., it is statistically significant.

Table 4 KMO test and Bartlett's test

|                               |                                |         |
|-------------------------------|--------------------------------|---------|
| KMO test and Bartlett's test  |                                |         |
| KMO value                     |                                | 0.864   |
|                               | approximate chi-square (math.) | 861.024 |
| Bartlett's test of sphericity | df                             | 6       |
|                               | P                              | <0.001  |

### 3 Data analysis

The survey was conducted in four dimensions: basic information of students, current status of school science after-school services, quality of school science after-school services, and strategies to improve school science after-school services.

#### 3.1 Student basic information

The student base information dimension was investigated in four areas. Exploring the sample's grade level, whether or not they participated in after-school services, reasons for participation, and length of service, collectively, the data sample covered all grade levels, with sixth graders having the highest participation rate. Sixty-eight percent of students in the participation rate participated in after-school services, and although interest was the main driver at 45 %, the influence of parents and peers was also more significant. The current length of time that after-school services are conducted is generally 30 minutes-45 minutes or 50 minutes-1 hours, which is in keeping with the nature of the double-decrease policy.

#### 3.2 Analysis of the current situation of science after-school services

"Primary and secondary school science education work guide" requires to improve the long-term mechanism of primary and secondary school science education work, primary and secondary school science education into the education supervision system, supervise the implementation of the national curriculum for science education<sup>[3]</sup>. The dimension of the current status of science after-school services in schools is investigated from 3 aspects, The school offers after-school service activities in science at all grade levels. Sixty-four % of students' grade level classes offered weekly science afterschool services. The data suggests that the school has a reasonable arrangement for science after-school service. However, about 36% of students still had occasional science afterschool services. In the survey on whether students participated in the science after-school service, about 37% of the students participated in the science after-school service, with the majority of them in the third and fourth grades. The number of those who did not participate in science after-school services was high, accounting for about 63 %. This is related to students' interest preferences and academic pressures. It was also mentioned in the interviews with the school's in-service science teachers that the number of students who have participated in science after school services is now collected as the maximum number of students in the school.

In the survey on the impact of students' participation in science after-school services, 58 students believed that participation in science after-school services had fostered their interest in learning science, 10 students believed that participation in after-school services basically had no impact on their studies and 6 students said that it had lightened their burden of study and broadened their horizons outside the classroom. While the after-school service had a positive effect on the majority of students, there is a need to pay attention to the problems of some students.

#### 3.3 Quality analysis of science after-school services

Hong Shengwei, a Chinese scholar, defines service quality in his book Quality Management System of Educational Services as "the collective attributes that determine a service's capacity to fulfill both stated and implicit customer needs. Higher service quality is achieved when a service consistently meets or exceeds customer expectations"<sup>[4]</sup>.

By investigating several dimensions of the science after-school service teachers, the quality-of-service content, the quality of equipment and places and the evaluation of after-school services, the results show that after-school services in schools are divided into two types: paid educational institutions and free of charge for school teachers, and that teachers arranged for different programmed are planned by the school arrangements. Therefore, there are some differences in the quality of services. Among the 75 students who participated in the science after-school service, about 55% of the science after-school service they participated in was conducted by in-service teachers in schools. In contrast, 45% of the after-school services were provided by out-of-school tutors. More than 90% of the students were satisfied with the after-school service, reflecting that the quality of the teachers of the school science after-school service is at a good level and meets

the students' expectation of the quality of the after-school service.

In terms of satisfaction with the content of the after-school service, about 11 % of students are still not interested in the content provided in the after-school service, while about 25 % of students think that the content of the after-school service is not rich enough. Both of these situations are not conducive to the effective implementation of after-school services, and there is a need to improve students' satisfaction with the content of after-school services.

Students were divided in their satisfaction with the facilities and location of the school's science after-school service. The number of those who considered the facilities in the school to be average and less than satisfactory was over 40, leaving 34 students who considered them to be meeting the needs of the lessons. The views of several students were sought in response to the polarization. Some students considered that the current limited space of the school's science after-school service, the old equipment for teaching and the science materials involved in the after-school service had to be purchased on their own, were unable to meet the demand for the service.

### **3.4 Student feedback and dilemmas about science after-school services**

The survey on what students would like to participate in science after-school services in the future showed that students clearly preferred technological inventions and science experiments, and Lego programming. Currently, schools only provide basic theory programmed and some science experiments. Despite the fact that after-school science services have been implemented since the "Double Reduction" policy was enacted, the influence of the general environment and the lack of resources still limit the forms of after-school science programmed.

Regarding the equipment and venues for after-school services expected by students in the survey, outdoor nature accounted for about 30 % of the total number of students, and the school science room accounted for 31 % of the total number of students, which were the main preferences of students. About 27% of the students expected that the venue for after-school service in science should be an out-of-school creative science space, and 12% expected that the school could establish a science and technology museum to provide more choices for the development of after-school service activities in science. The amount of money involved in the after-school service has led to the waning interest of some parents and students, At the same time, the lack of equipment and the insufficient space for the implementation of the activities limit the development of science after-school services to a certain extent.

### **3.5 Teachers' feedback and dilemmas about science after-school services**

Firstly, although the school has carried out and implemented science after-school services under the relevant policy, the space and quality of the service equipment and the content of the services provided can hardly meet the needs of students. Secondly, the main problems of the current after-school science service are that parents do not attach importance to the service and few students participate in the service. Thirdly, teachers are unable to secure benefits from participating in science after-school services under the burden of their daily teaching duties.

## **4 Research proposal**

The analysis of the improvement strategy will be described from the following three parts.

### **4.1 Integration of educational resources and enhancement of the diversified development of after-school services in science**

With the rapid development of science and technology, competition in science and technology is ultimately a competition for talents. Primary school is the initiation stage for the cultivation of scientific and technological innovation talents. Carrying out organized and planned science and technology education activities in primary schools can effectively enhance students' interest in science and improve their scientific literacy<sup>[5]</sup>. Schools are the main place to carry out after-school services and the main body to provide science after-school services. In the future, schools and teachers should increase the number of programmed of practical courses, as well as standardize the form of implementation of after-school services, so that more students can exercise themselves, develop their horizons and enhance their abilities in after-school service activities.

Through the combination of school-based curriculum resources of science after-school service programmed; while expanding the content of students' classroom learning, it can be extended in the after-school service teaching to promote the enhancement of scientific literacy. It can make full use of the school's resources, but also can maximize to meet the diversified service needs of students. Strengthen the diversified construction of science after-school services, systematically integrate the content of the programmed to form a complete after-school service system, and co-ordinate the planning of after-school service time and implementation venues.

## 4.2 Co-ordinating the development of the teaching force and upgrading of its competence, and safeguarding the rights and interests of teachers

To co-ordinate the arrangements for teachers within the school, and to reduce the burden of establishment and improve the motivation of teachers, schools should take into account the working hours of teachers within the school, and follow the willingness of teachers to participate in the reasonable planning of the length and form of the arrangements for scientific after-school services, and at the same time set up the relevant incentive system to stimulate the motivation of teachers to participate in the after-school services through a combination of actual incentives or spiritual incentives. A shift system has been adopted, whereby teachers take turns providing science after-school services to ensure that they have personal time off.

Training opportunities for science after-school service teachers can be increased. It is necessary to ensure that the professional knowledge and teaching level of teachers responsible for after-school services are up to a certain level in order to provide better teaching guarantee for after-school services in science. Therefore, it is particularly important to strengthen the skills training of teachers. Schools can regularly provide opportunities for overseas study or relevant training courses, and invite professional educational institutions or professionals in the field to come to the school for counselling and exchanges, so as to improve the teachers' strength and teaching ability.

## 4.3 Co-ordinated planning of time and place for after-school science services

Finally, schools can broaden the form of after-school services, introduce a variety of educational channels to provide students with comprehensive and diversified quality after-school services. The essence of after-school services in science is to provide students with more practical opportunities, which can effectively make up for the lack of hands-on practice and creative imagination in the traditional classroom, and at the same time, after-school services pay attention to the cultivation of innovative thinking and creativity of the students, and encourage them to put forward new ideas and try out new methods. encouraging them to come up with new ideas and try new methods.

## 5 Concluding remarks

The study only investigates the current situation of science after-school service in the case school, with limited experience and ability, there are still many deficiencies, and it is unable to understand the current situation of other schools, further collect a large amount of data and analyze the causes of the problem, and it is not representative enough, but to a certain extent, it reflects the real status quo of the development of after-school service for primary school science under the double-reducing policy in some areas of China and the dilemma difficulties it encounters. The proposed optimization strategies can still provide some reference for most schools.

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