

A Study on the Teaching Status of Science Experiment Course in Guangdong Province

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Abstract: This article conducts a research on the current situation of science experimental course teaching in primary schools in Guangdong Province, and conducts a survey and research from five dimensions: teacher resources, teaching resources, teaching content, student development ability, and teaching evaluation. The research results show that there are the following problems in the teaching of science experimental courses in primary schools in Guangdong Province. Experimental courses mainly rely on teacher explanations, lacking interest and practicality, insufficient cultivation of students' experimental abilities, lack of practical opportunities and training in experimental skills.

Keywords: Science Curriculum; Scientific Experiments; Scientific Experimental Teaching; Questionnaire Survey

1. Research Background

The Curriculum Standards for Primary School Science in Compulsory Education (2022) point out that it advocates for diversified learning methods that focus on exploration and practice^[1]. The development of primary school science experimental teaching is an indispensable link, and experimental teaching provides students with an intuitive and practical learning environment. By participating in experiments firsthand, students can better understand and master knowledge, which not only helps to expand their knowledge, but also effectively cultivates practical abilities and innovative spirit. Therefore, the implementation of scientific experimental teaching in primary schools is of great significance for the comprehensive development of students.

2. Research Status

Compared with China, developed countries such as Europe and America have more complete

science education environments and conditions. Scientific experiments are seen as a process of practice and exploration. Under the guidance of teachers, students independently explore problems and draw conclusions through observation, questioning, hypotheses, experiments, verification, and other steps. In order to comply with the trend of science education reform, China has significantly increased its efforts in science education curriculum reform, emphasizing the development and utilization of science education resources. In 2023, the country issued the "Opinions on Strengthening Science Education in Primary and Secondary Schools in the New Era", which clearly stated "to stimulate students' curiosity, imagination, and curiosity, acquire knowledge in the process of exploration, cultivate scientific spirit, consolidate scientific knowledge, lead dreams, and strive to plant the seed of science in children's hearts, guiding them to weave their dreams of becoming scientists."^[2] Since the beginning of quality education, the status of scientific experiment teaching has been improved, and the importance of scientific experiment teaching has been widely recognized.

3. Research Design

Based on the literature viewpoints on scientific experimental teaching in various fields, this paper refers to the standards for primary school scientific experimental teaching in Zou Xuan's (2019) research^[3]. We will conduct a survey and research from five dimensions, examining whether the school has dedicated science teachers to conduct experimental course teaching in terms of teacher resources; In terms of teaching resources, examine whether the school has professional experimental classrooms, experimental instruments, and equipment, and whether it has specialized scientific experimental funds; In terms of teaching content, examine whether teachers have comprehensive

experimental teaching abilities and experimental course teaching plans; In terms of developing abilities, examine whether students are interested in the course content and improve their abilities in certain areas; In terms of teaching evaluation, examine whether teaching evaluation has effectiveness and diversity.

3.1 Questionnaire Design

The questionnaire consists of two parts, namely the teacher questionnaire and the student questionnaire. The survey dimensions of teacher questionnaires mainly focus on teacher resources, teaching resources, teaching content, and

teaching evaluation, in order to comprehensively understand the teaching status of science teachers. The student questionnaire mainly focuses on investigating the development ability of students, aiming to gain a deeper understanding of their growth and development.

3.2 Research Subjects

The research subjects of this study are science teachers and students from some cities in Guangdong Province, including 13 representative cities in Guangdong Province as shown in the figure.

Table 1. Analysis of Basic Sample Information

province	city	frequency	Percentage (100%)
Guangdong	Jiangmen City	7	8.641
	Foshan City	12	14.814
	Zhanjiang City	18	22.223
	Shaoguan City	2	2.469
	Guangzhou City	5	6.172
	Huizhou City	6	7.407
	Zhuhai City	5	6.172
	Maoming City	5	6.172
	Shenzhen City	4	4.938
	Zhaoqing City	4	4.938
	Dongguan City	8	9.877
	Yunfu City	3	3.703
Zhongshan City	2	2.469	
total		81	100

3.3 Data Sources and Reliability and Validity Analysis

The author conducted an anonymous questionnaire survey on teachers and students. The teacher questionnaire was in electronic form, while the student questionnaire was in paper form. A total of 336 questionnaires were distributed, including 81 teacher questionnaires and 255 student questionnaires. A total of 336 valid questionnaires were collected, with a response rate of 100%.

The reliability was tested using the Cronbach consistency coefficient. The Cronbach coefficient of the teacher questionnaire was 0.801, while the Cronbach coefficient of the student questionnaire was 0.855, which is greater than 0.80. Therefore, the scale has reliable reliability.

4 Data Analysis

4.1 Teacher Resources

The survey results show that in the question of

"Is it a full-time science teacher?", the proportion of full-time science teachers is 45.68%, and the remaining part is part-time science teachers from other disciplines. On the surface of the data, this does not meet the requirements of the curriculum standards, and the teaching staff of science teachers has not reached the target level. The number of full-time science teachers is relatively small, which may have a certain impact on the development of experimental courses and the cultivation of students' scientific literacy.

4.2 Teaching Resources

The survey results showed that in the investigation of the allocation of experimental teaching facilities, "Does the school have a fixed science laboratory?" "Does the school have a scientific practice base (plantation, ecological park)?" These two questions indicate that the proportion of the situation in the school is 80.25% and 71.60%, respectively. In the question "Are science classes held in science laboratories?", only 25.93% of school science

courses are almost entirely conducted in laboratories, 51.85% of schools are occasional, and even 22.22% are absent. In the question of "Does the school have funding for scientific experiment teaching?", 81.48% of schools have funding for scientific experiments, while 18.53% do not. Regarding the situation of experimental equipment, "Does the school's experimental equipment and teaching supplies meet the needs?" "Does the school maintain, supplement, and maintain laboratory equipment?" 20.99% of the school's experimental equipment is very suitable for the experimental curriculum, of which 55.56% are basically satisfied. Although 28.40% of the schools regularly update experimental equipment, occasional or rare still account for the majority. Although the school has funding for scientific experiment teaching, there is still a shortage of experimental equipment. Most schools in Guangdong Province do not fully meet the requirements of the new curriculum standards for experimental equipment.

4.3 Teaching Content

The survey results showed that in terms of experimental teaching ability, only 20.99% of teachers had a complete understanding of the actual content of the science textbook, 50.62% had a majority understanding, and 28.4% only had a limited understanding. From this, it can be seen that the full-time science teachers in Guangdong Province are not specialized enough, and their corresponding experimental teaching abilities need to be improved^[4]. In terms of the experimental course teaching plan, only 41.98% of teachers will write teaching designs based on the experimental course teaching content, while "not knowing" and "occasionally" account for the majority. In the issue of using teaching methods, 38.27% of teachers will use the teaching method in experimental classes, 28.4% of teachers will use the demonstration method, and only 30.86% of teachers will use the experimental method. In the frequency survey of using inquiry based teaching mode, 56.79% of teachers occasionally use inquiry based teaching, 32.1% of teachers frequently use it, and 11.11% of teachers never use it. From this, it can be seen that most teachers prefer to use the teaching method for teaching, which is not conducive to cultivating students' exploration of scientific experiments and the cultivation of thinking abilities.

4.4 Student Development Ability

The survey results showed that in terms of student interest in course content, 83.53% of students prefer science classes with experiments, while 16.47% of students do not like conducting experiments. Students hope to do more scientific experiments. 74.51% of students conduct experiments more than five times in a semester, far exceeding half of the number. At the same time, 83.53% of students want to conduct experiments by themselves, indicating that the majority of students have shown a strong interest in the course content. In terms of student attitudes towards experimental courses, 83.53% of students believe that experiments will help them learn more, and 16.47% of students believe that experimental courses may increase their learning burden, leading to a decrease in learning efficiency. 28.63% of students believe that the purpose of the experiment is to verify patterns, 31.37% observe phenomena, and 23.53% explain problems. The distribution is relatively average, and in primary school, students tend to be more inclined to observe phenomena. Through investigation, it was found that the majority of students are enthusiastic about experimental courses. In terms of improving student abilities, most students believe that scientific experiments have helped improve their own abilities. The proportion of observation, thinking, hands-on, and problem-solving abilities.

4.5 Teaching Evaluation

The results showed that in terms of diversified teaching evaluation, most science teachers adopt more than one method. Among them, 72.84% of teachers use the testing method, 66.67% of teachers use the experimental method, and 61.73% of teachers use the observation method. From this, it can be seen that although the evaluation methods tend to be diversified, some are still focused on testing methods. In terms of students' views on teaching evaluation, 65.88% prefer classroom performance evaluation methods, 70.20% prefer experimental results, and 62.35% prefer work presentation. Similarly, 16.08% of students prefer evaluation through exam scores, and 36.47% prefer group evaluation methods.

5. Research Conclusions

After this study, the current situation of science

experiment teaching in primary schools in Guangdong Province is as follows:

(1) Teacher resources: The situation in Guangdong Province where schools have full-time science teachers to teach experimental courses is not good. Among the 81 science teachers surveyed, only 45.68% of them are full-time science teachers, and nearly half of them are taught part-time by other subjects such as language, mathematics, and English;

(2) Teaching resources: Schools in Guangdong Province have professional experimental classrooms and equipment, and the overall situation is good. Most schools have scientific laboratories and practical bases, and the experimental equipment can basically meet the needs of course teaching;

(3) Teaching content: Science teachers in Guangdong Province have comprehensive and structured experimental teaching abilities, and the situation of experimental course teaching plans still needs to be improved^[5]; Science experiment courses are mainly taught by teachers, with 38.27% of teachers using the teaching method, lacking interest and practicality. Only 32.10% of teachers frequently use exploratory teaching models;

(4) Development ability: Among the 255 students surveyed, the vast majority of them were interested in the content of scientific experiments, believing that scientific experiments can help understand scientific knowledge and improve their observation, thinking, hands-on, and problem-solving abilities. Each ability accounted for an average of nearly 40%;

(5) Teaching evaluation: From the perspective of teachers, the evaluation methods they adopt tend to be diversified and practical, but the main evaluation method still tends to be exams,

accounting for 72.84%. From the perspective of students, the evaluation methods also tend to be diversified, but the difference lies in the fact that students are more inclined towards evaluating actual abilities rather than written assessments.

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