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The Effect of Aided-study Class Teaching Mode on Mathematics Achievement of Grade 4 Students in Primary Schools

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Abstract

The objectives of this research were 1) Compare the mathematics achievement of grader 4 students before and after using "Aided-study Class Teaching Mode". 2) Compare the mathematics achievement of grader 4 students after using "Aided-study Class Teaching Mode", with a set criterion of 70 percent of the full marks. The samples used in this study was 30 grade 4 students from Primary School in Bayi Road, Zhoukou City, Henan Province. They were selected by random sampling. The research instruments were 5 lesson plans using "Aided-study Class Teaching Mode" on the topics of decimals, fraction, average number, parallelogram. The instrument was achievement test with the validity at 1.00, inter-rater reliability at 0.71, item difficulty (p) 0.68-0.80 and item discrimination (r) between 0.32-.40. The collected data were analyzed by computer software. The statistics of analysis were mean scores, standard deviation, t-test. The results of the study were as follows 1) Mathematics achievement of grade 4 students after using "Aided-study Class Teaching Mode" was higher than before at a statistically significant level of 0.05. 2) The mathematics achievement of grade 4 students after using Mode" were higher than the standard of 70% at the 0.05 statistical significance level (\overline{x} = 35.43 S.D. =2.62).

Keywords : Aided-Study Class Teaching Mode, Self-Directed Learning, Mathematics in Primary School, Mathematics Achievement

1. Introduction

Since the middle of the 20th century, the rapid development of modern information technology has greatly advanced the development of applied mathematics and mathematical applications, making mathematics penetrate into almost every scientific field and every aspect of people's lives. Mathematics as the language of science, an important tool to promote the forward

development of science. It has an irreplaceable role in the history of human development, and will play a greater role in the future development of society.

And primary school mathematics as a key starting stage of mathematics learning, the introductory learning of addition, subtraction, multiplication and division will have a profound impact on students' further learning in the future. As primary school teacher, in my daily teaching, I am deeply aware of some current unscientific and unreasonable teaching status, and have been reflecting on the current confusion and problems faced in primary school mathematics education and teaching, trying to find an effective way to solve the problem. In the process of teaching, I found that the current primary school teaching mainly exists in the following aspects.

1. Ignoring the main position of students in teaching

In 2020, the government of Henan Province issued the "Implementing Opinions on Deepening Education Teaching Reform and Comprehensively Improving the Quality of Compulsory Education", which proposed to "optimize teaching methods and teaching links, focus on inspiring, interactive and inquiry-based teaching, emphasized contextual teaching, and promote researchbased, project-based and cooperative learning", but in primary school mathematics classroom teaching activities, there are still many teachers using a single "indoctrination" teaching method to guide primary school students to learn mathematical knowledge. This single teaching guidance cannot meet the cognitive characteristics of primary school students, primary school students generally have a poor quality of learning mathematics course, is not conducive to the in-depth learning of mathematical knowledge of primary school students.

2. Not paying attention to the cultivation of students' interest in mathematics

In China, there is a famous saying "Interest is the best teacher". In primary school mathematics classrooms, teachers need to design teaching according to the personality characteristics of primary school students. Through a variety of classroom teaching activities, primary school students can quickly integrate into classroom learning and experience the fun of learning mathematics. However, at present, many teachers ignore the cultivation of mathematics interest, the classroom teaching atmosphere is relatively dull, and classroom teaching is often shrouded in a depressing atmosphere.

3. Ignoring the effective interaction of classroom teaching

Under the new education guidance policy, teachers need to pay attention to the effective interaction of classroom teaching, create a good communication platform for primary school students, so that every primary school student can actively express and create, and at the same time pay attention to the cultivation of primary school students' comprehensive learning ability. However, many teachers currently ignore the value of effective interaction in classroom teaching. In classroom teaching activities, we only guide primary school students to learn knowledge and memorize knowledge, while ignoring the important influence of teaching

interaction on primary school students' mathematics knowledge learning, which has a certain hindering effect on the development of primary school students.

These problems have led to students' low motivation and initiative in learning, poor learning results and poor performance. Therefore, I think the mathematics classroom should focus on the cultivation of students' mathematical literacy and on the cultivation of creative consciousness and practical ability. Therefore, we introduce the "Aided-study class teaching model" in our classroom to ignite primary school students' interest in learning mathematics and improve their mathematical achievement.

2. Research objectives

2.1 To compare mathematics achievement of the students before and after receiving aided-study class teaching mode.

2.2 To compare mathematics achievement of students with the determined criteria set at 70 %.

3. Research Methodology

3.1 Samples

The sample for this study was 30 Grade 4 students of primary schools in Bayi Road, Zhoukou City, Henan Province, selected through cluster random sampling method.

3.2 Research instruments

Research instruments were the tools for conducting the research to collect data. The research instruments which were used in this study were:

Instruments for measuring mathematics achievement

1) Instructional innovation : Aided-study Class Teaching Mode which was comprised of three steps: 1) self-help, advocating research before teaching (Students learn independently through tasks assigned by teachers), under the guidance of help sheets to continuously improve students' independent learning ability; 2) mutual assistance (cooperative learning), setting appropriate task-driven situations, allowing students to fully demonstrate Through questions, supplementation, questioning, debates and other forms, the independent inquiry and group cooperation, peer exchanges and other forms of mutual aid learning can be implemented; 3) teacher assistance (the teacher helps students improve according to their learning situation), "the teacher changes the traditional method of all-inclusive teaching, based on learning to teach, on the basis of the correct diagnosis of the learning situation, delete the complicated and simplify, reasonable force, the implementation of targeted teaching and learning to match the needs of students. We will also make time and effort to develop students' higher-order thinking skills and put into practice their innovative spirit and practical skills. Specifically, the order of traditional

"teaching" and "learning" is reversed. The teacher will set up appropriate questions (help sheets) to let students explore first, and then let them show their learning results, discuss, question, and collaborate in the classroom, and then determine what to teach and how to teach after students' "different ideas" have fully stirred and collided in the classroom." (Zhong Guanggun, 2014)

2) Lesson plan: A total of five lessons and 6 hours of primary math instruction were assigned.

Instruments for collecting data

Instruments for measuring Mathematics Achievement, a test of mathematics.

Math test had a total of 40 items, and the Index of Item Objective Congruence (IOC) of each item in the evaluation form is higher than 0.5, the result of analyzing the IOC index showed that all test items were appropriate and could be used in the test difficulty (p) between 0.2-0.8 and discriminability (r) > 0.2 and an achievements test with a reliability of 0.71.

3.3 Data collection

The procedures of data collection were as follows:

1) A pre-test was conducted on the mathematics achievement of 30 sample students, and their pre-test achievements were collected.

2) The sample is taught using the aided-study class teaching mode.

3) After the teaching, 30 sample students will be post-tested using the same equipment as the pre-test.

3.4 Data analysis

The test data were subjected to the Paired-Samples T Test and One-Sample T Test using the Statistical Package for Social Sciences (SPSS for Windows). To analyze the pre-test and post-test, the item's difficulty index (P) was determined by testing a sample of 30 students, and the item's difficulty was analyzed. The results show that the test difficulty index is between 0.20 and 0.80, and the test discriminability (r) is greater than 0.2. A total of 40 items were tested, and each item's Item Objective Alignment Index (IOC) was higher than 0.5. In order to calculate the test reliability, calculated by Kuder and Richardson formula 20, the reliability is 0.71, which is greater than 0.7.

4. Research Results

The results were presented according to the research objectives as follows:

4.1 Section 1 Result of comparing mathematics achievement of the students before and after receiving aided-study class teaching mode by using t-test for dependent sample.



Table 1 Paired samples test

| Group | Ν | x | S.D. | t | р |
|--------------------|----|-------|-------|-------|---|
| Experimental group | 30 | 5.400 | 3.069 | 9.636 | 0 |

As shown in Table 1, Students had mathematics achievement after learning through aided-study class teaching mode (post-test) greater than before learning (pre-test) at .05 statistically significant level (t = 12.990, p < 0.05).

On average, Posttest scores were 4.26 points higher than Pretest scores (95%).

Thus, it was concluded that, mathematics achievement of Grade 4 students after receiving aided-study class teaching mode was higher than before.

4.2 Section 2 Result of comparing mathematics achievement of students with the determined criteria set at 70 % by using t-test for one sample.

Table 2

| Group | Ν | Full score | Criteria score | x | S.D. | t | р |
|--------------------|----|------------|----------------|--------|-------|--------|---|
| Experimental group | 30 | 40 | 28 | 35.433 | 2.621 | 15.528 | 0 |

Based on the results, we can state the following:

The average score for the Mathematics Achievement of Grade 4 Students after using aided-study class teaching mode was 35.43 from a full marks of 40 and the standard deviation was 2.62 which was statistically higher than the criterion of 70% at the .05 level of statistical significance.

Thus, it was concluded that, the mathematics achievement of the Grade 4 students who received aided-study class teaching mode was higher than 70%.

5. Discussion

Based on the findings of the study, the following points were discussed:

5.1 "The implementation of "aided-study class teaching mode" is not only a transformation of the classroom teaching process, but also a transformation of teachers' teaching concepts and students' learning methods. " (Guangqun, Zhong, 2013)In this study, teachers actively accepted the teaching concept of " aided-study classroom" and carried out teaching with students as the center. Therefore, using the "aided-study class teaching mode" for teaching can not only increase students' subject knowledge, but also cultivate students' emotional attitudes to learn to share, tolerate and accept, and truly realize the value of mathematics education.

5.2 In the implementation process of "aided-study class teaching mode", an important factor that cannot be ignored is whether students have developed the habit of self-study. Only when teachers and students are fully prepared can they be fully prepared for the implementation and development of the "aided-study class teaching mode" in the future.

5.3 The timely feedback of the "help study task list" provides a basis for classroom teaching. At the same time, the "help study task list" is also a timely feedback of students' self-learning achievements. Therefore, "whether it is online platform feedback or classroom communication, teachers need to summarize the classroom in a timely manner, because the difficult problems found in it will become a resource for classroom interaction. "(Jinfeng, Liu, 2018) Teachers design these questions as topics for group discussions and guide students to explore answers to the questions through independent discussion and group work. Classroom interaction always focuses on solving key problems in order to improve the pertinence of classroom interaction.

5.4 Interactive classroom teaching is the core link of "aided-study class teaching mode". Students' questions and discussions, teachers' guidance and help, realize the full interaction between teachers and students, and students and students, and experience the process of hypothesis, verification, and conclusion formation through problem situations, so that students can perceive the formation of mathematical knowledge. At the same time, group debates and discussions also foster tolerance and acceptance among students.

6. Conclusion

Through comparative analysis of grade 4 students using aided-study class teaching mode pre-test and post-test, according to the current situation of mathematics learning at the same level, after the intervention of aided-study class teaching mode, students' mathematics achievement significantly improved and statistically higher than the 70% standard, reaching the 0.05 level. Therefore, this teaching method was feasible in primary school mathematics teaching, which helped to improve students' learning effect and mathematics achievement. The experimental results verified the research hypothesis.

7. Recommendations

7.1 Due to the limitation of experimental time, the experimental part still needs continuous and more detailed observation, and the effect evaluation also needs to be further enriched and improved. As a teaching concept and teaching mode, how the "aided-study class teaching mode" can better promote elementary mathematics education still needs in-depth research and continuous observation.

7.2 "aided-study class teaching mode" has an impact on students' learning motivation, academic performance, comprehension ability and cognitive level. In which stage and which links



have the greatest impact, we need to further sort out and analyze the experimental process and data in the follow-up research.

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