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The Application Research of "3+1" Teaching Mode in High School Physics Teaching

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Abstract: In order to adapt to the social needs and keep up with the tideway of new curriculum reform, Linfen no.3 school bring forward the teaching model on the basis of online learning and field research，"3+1"teaching model is an efficient classroom teaching model. It contents four aspects : study independently before class，group communication and cooperation,teachers' guidance in class , characteristics of teachers and students.The actual teaching effect of this teaching mode is studied by the teachers and students of Linfen No.3 Middle School and Linfen No.8 Middle school.

The results show that the "3+1" teaching mode is more suitable for high school physics teaching. It can promote the further improvement of teaching quality and lay a solid foundation for the future development of students.

Keywords: New curriculum reform; High school physics; "3+1"teaching model; Efficient class

1. Introduction

The 21st century is known as the era of knowledge economy. Only by continuing to learn can people better adapt to this ever-changing era.At the turn of the century, all countries in the world have started a new round of basic education reform in order to occupy an advantage in talent competition. The Chinese government issued the Outline of Basic Education Curriculum Reform (Pilot) (Jichu jiaoyu kecheng gaige gangyao [shixing]), which launched the most recent curriculum reform for basic education (Ministry of Education, People's Republic of China 2001)(Li and Ni,2012). In recent years, the teaching mode has developed rapidly.In the history of educational development, educators have put forward different educational ideas.Confucius proposed the idea of "teaching students according to their aptitude",Socrates applied inspiration, dialogue, and questions to the classroom,Comenius proposed the class teaching system in his Theory of Great Teaching,Herbart's General Pedagogy expounded the importance of interest.Teaching effectiveness and classroom efficiency have always been the focus of educators.After liberation, Chinese educators began to explore "effective teaching", but only using whether it is conducive to the improvement of student achievement as a standard.Since the eighties of the 20th century, effective teaching research in our country already obtained some achievements, this kind of research in our country began formally.The new curriculum was gradually rolled out across the country in September 2001.With the continuous development and support of technology, the concept of education and teaching also continues to evolve and develop, and the teaching mode gradually presents a prosperous situation of "a hundred flowers blooming and a hundred schools of thought contending".

2. Research objects and methods

2.1 Research objects

The scope of the questionnaire is Linfen No. 3 Middle School and Linfen No. 8 Middle School.The geographical location of the two schools is relatively close, the quality of students, the reserve of teachers and the teaching environment are not very different, only the teaching model is different.Linfen No. 3 Middle School adopts the "3+1" teaching mode, while Linfen No. 8 Middle School mainly adopts the traditional teaching mode.

Physics teachers from both schools were interviewed.The author recorded the opinions of each teacher on the interview outline one by one, then sorted out, analyzed and summarized them, and timely consulted experienced teachers for the perplexities

2.2 Research Methods

Domestic and foreign literatures on "teaching model", "efficient classroom", "Physics efficient classroom" and "Effective teaching" were searched and consulted through relevant websites such as CNKI and Google Academic.

I have listened to a number of excellent teachers model lessons.In the students' free time, I conducted a case study and investigation of the students.I conducted a questionnaire survey among senior high school students. The experimental group adopted the "3+1" teaching mode, while the control class adopted the traditional teaching mode.

3. Process and analysis

3.1 Contents of the Questionnaire

The questionnaire refers to the requirements of physical concept, scientific thinking, experimental inquiry and scientific attitude and responsibility in the core literacy of physics.The questionnaire contains 30 questions, which are divided into two parts.The questionnaire was expressed on the Likert scale. For the description of the questions at the top, respondents could choose five levels: "completely disagree", "disagree", "uncertain", "agree" and "completely agree".

After the questionnaire was completed, the author sought the suggestions of 2 physics education experts and 5 middle school teachers in this city to ensure the quality of the questionnaire.Finally, according to the above suggestions and feedback, the author deleted some questions, added some questions, and modified the questionnaire.

3.2 Interview outline content

What are the specific practical measures you have taken to build the "3+1" physics efficient classroom teaching model?

What is your understanding of classroom interaction?

What do you think of the relationship between open courses and the construction of "3+1" physics efficient classroom teaching model?

How do you understand "teachers are members of the learning community"?

Combined with teaching practice, what do you think are the factors that cause the inefficiency or ineffectiveness of physics class?

How do you constantly reflect on teaching from practice?

Do you often encourage students to ask questions and use their imagination in class?

3.3 Process of investigation

The head teacher gave out the questionnaires to the grade two students during the self-study time in the evening, and told the students that the questionnaires were only for research and had nothing to do with the grades, and students were required to complete the questionnaires within 15 minutes.A total of 400 questionnaires were sent out, 387 were collected and 371 were valid.A total of 52 survey and interview Outlines of teachers were distributed and 45 were recovered.

3.4 Survey data and survey analysis

SPSS and Excle were used for statistical analysis of the survey data.Firstly, the collected questionnaires were distributed to several colleagues, and incomplete questionnaires and questionnaires with high repetition rate were removed. 371 questionnaires were valid, accounting for 92.75% of the total questionnaires.Then, SPSS software was used for project analysis, exploratory factor analysis and reliability analysis to test the reliability of the questionnaire items, verify the structural validity of the questionnaire, and determine the stability and reliability of the questionnaire design.

KMO value and Bartlett's spherical test in exploratory factor analysis are feasibility tests for factor analysis.The KMO value is judged as follows: When the KMO value is less than 0.5, it is not suitable for factor analysis. When KMO value >0.8, it is suitable for factor analysis. When the KMO value is greater than 0.9, it is suitable for factor analysis(Marley,2021).The methods for determining factor extraction in SPSS include principal component analysis, principal axis method, general least square method Alpha factor extraction, etc.

Tab.1 KMO and Bartlett test of "3+1" teaching model questionnaire

KMO and Bartlett test		
KMO sampling suitability quantity		.906
Bartlett's sphericity test	Approximate chi square	4655.059
	Degree of freedom	435
	significance	.000

3.5 Survey results and analysis of interview outline

The interviewed teachers have taken many measures when trying to build the "3+1" physics efficient classroom teaching model. For example, the teacher demonstrates the physics experiment,Students enjoy it, and teachers grow up in the breakthroughs.Although the open class can promote the growth of teachers and the improvement of students' core qualities, it also has some shortcomings, such as making a show, being divorced from reality and delaying the teaching progress.

3.6 Conclusion of Questionnaire

The conclusion of the questionnaire is that "3+1" teaching mode has a positive promoting effect on the cultivation of students' interest in learning physics, the growth of teachers, the construction of harmonious teacher-student relationship and the improvement of teaching effect.Under the influence of the "3+1" teaching model, students show more interest in classroom satisfaction, classroom concentration, inquiry spirit and physics scores.The results show that the number and frequency of students' regular preview before class are significantly increased, The teacher's explanation time is gradually shortened from 20-30 minutes to 10-20 minutes.In physics class, students are more willing to respond to teachers' questions and put forward their own doubts; Students can generate new thinking.It can be seen from the above survey that the "3+1" mode is conducive to building a good and harmonious teacher-student relationship.

3.7 Strategies and methods for building "3+1" Physics efficient classroom

Teachers create more motivation for students to learn.Only by combining traditional teaching methods with modern teaching methods can physics classroom shine a new light.Teachers should write a good teaching design before class preparation.Teaching design or learning plan writing is to write out one's own teaching presuppositions, which can use the form of mind map to list the main points of the class, so that it can be checked or modified efficiently.The mind map is intuitive.Through mind mapping, students can quickly analyze the role of the knowledge in this section in the whole book and chapter.

There are many ways of classroom import, direct import, review import, experiment import, video courseware import, etc., different import methods play different effects.Some import can catch students' eyes, some import can enhance students' participation, and some import makes people feel ordinary.The way of introduction reflects the teacher's attitude towards the class. The well-prepared way of introduction can always attract the attention of learners.The method of introduction should be based on what students need to "learn", rather than what the textbook requires teachers to "teach".Classroom introduction must match students' existing cognition, must be closely connected with the classroom objectives, and must be close enough to real life.Class introduction is the beginning of a class and plays a role in promoting classroom activities. It is an indispensable part of the class and should be connected with other links.The content of classroom introduction should conform to the objective reality, but it can not deviate from the scientific spirit.

The demand for talents in the society is multi-level, and the characteristics of students in all aspects are also very different. Under the current situation of class teaching system with a relatively large number of classes, stratified teaching is the main teaching method for difference.At present, in most areas of high school, classes of about 50 students are still used as units for teaching. The class system is still in its infancy, and the cognitive level and basic knowledge of different students are uneven. Traditional classroom will inevitably cause students to have a variety of learning difficulties.Therefore, stratified teaching can make up for the defects of large classes.

Ye LAN, a professor at East China Normal University, points out that the biggest problem with basic education in China is a lack of vitality.Therefore, the classroom teaching content must return to the reality of life， Practice and life are the living source of students' development.Physics comes from life, so physics class should return to the reality of life.Physics knowledge in high school has been characterized by multi-situation, multi-process, multi-angle, complexity and modeling.At present, the middle school physics curriculum reform draws on the experience of education in connecting science, technology and society, thus forming a new kind of physics education integrated into education.

Interaction in class can create a harmonious classroom atmosphere(Polivanova and Rivina,2009).As educator Zenkov said, "The effect of educational work is reflected in the relationship between teachers and students."Classroom interaction is the interaction between teachers and students in class. In the traditional sense, the teacher's "one word" can no longer adapt to the current society, and classroom interaction has been valued again.The interactive forms are more and more diverse, such as teacher-student Q&A, classroom experiments, interactive electronic whiteboard, mobile platform, etc.Various forms of interaction mobilize students' various organs to participate in the classroom.The interaction between teachers and students is two-way. Teachers provide scaffolding assistance for students' learning, and students' views and opinions become interactive or conversational topics.

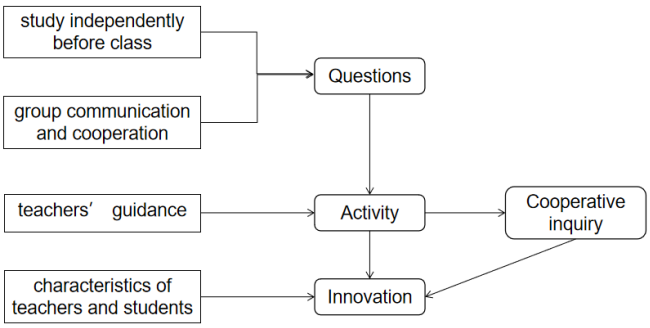

Fig.1 The frame diagram of "3+1" teaching mode

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