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Research on the Teaching Mode of "BOPPPS+PAD Class" Based on "Three Micro Integration" under the Internet Background

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Abstract
Under the background of the Internet, new educational resources, new forms and new models such as Muke class, micro class and flipped class emerged, and "three micro integration", BOPPPS and "PAD class" came into being. In the new era, we are vigorously promoting teaching reform, emphasizing on further optimizing teaching and learning activities on the basis of the integration of "micro classroom, micro interaction, and micro experience", and creating the teaching mode of "BOPPPS+PAD class". Its core is to promote the introduction of micro lessons, leave fine lectures blank, students' independent learning, group discussion, and teachers' comments in the process of teaching and learning, so as to guide students to strengthen self-discipline learning and interactive learning, and broaden students' learning thinking, Help students to define the best learning method, so that students can understand relevant knowledge more thoroughly and grasp the content more accurately. Therefore, based on the overview of "three micro integration" and "BOPPPS+PAD class", this paper takes the teaching of Computer Application Fundamentals as an example to deeply study and analyze the construction of "BOPPPS+PAD class" teaching mode under the background of "three micro integration".
Keywords: *Internet; "Three micro integration"; "BOPPPS+PAD Class"; Research on Teaching Mode.*

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I. INTRODUCTION

In 2020, the Ministry of Education issued a notice on the postponement of the start of the spring semester in 2020, and proposed the initiative of "utilizing online platforms to carry out suspension without suspension". In the context of the normalization of epidemic prevention and control, in order to do a good job in education and teaching, it is necessary to fully tap into and leverage the role of the Internet. It is also necessary to restructure teaching models and flexibly organize and carry out online education and teaching activities. In recent years, with the reform of traditional teaching models, stimulation of students' learning motivation, improvement of classroom fun and teaching effectiveness, the split classroom and BOPPPS teaching models have quietly emerged and been loved by teachers and students, rapidly developing into one of the more popular online teaching models in various schools. Under the background of the Internet, the teaching model of "BOPPPS+ PAD classroom" based on the integration of "three micro integration " aims to guide students to actively ask questions and think, systematically learn and practice, accumulate knowledge, and cultivate quality in the reconstruction of teaching mode, starting from the teaching of teachers and students.

1. Overview of "Three Micro Integration"

1.1 The concept of "three micro integration"

The "three micro integration" refers to the integration of micro classrooms, micro interactions, and micro experiences in online teaching (Figure 1), aiming to design, produce, or search for micro classroom resources suitable for the course based on the teaching content, and use mobile device terminals for course push, teacher-student micro interaction, and course micro testing practice activities. Among them, the micro course time is controlled within 8 minutes, emphasizing the role of teachers, recording and playing teaching videos with a focus on a certain knowledge point or teaching process, achieving the concentration of teaching content and good transmission of students' learning; Micro interaction mainly refers to online micro communication and interaction between teachers and students in online teaching. Teachers conduct teaching, management, Q&A, and communication through the network, while students learn, share, ask questions, and discuss through the network. Teachers and students can communicate and interact in different spaces and jointly solve problems; Micro testing emphasizes the creation of teaching scenarios for teachers in online teaching, with the core being

to teach students according to their aptitude, allowing them to internalize knowledge and learning into practical experiences and learning actions.

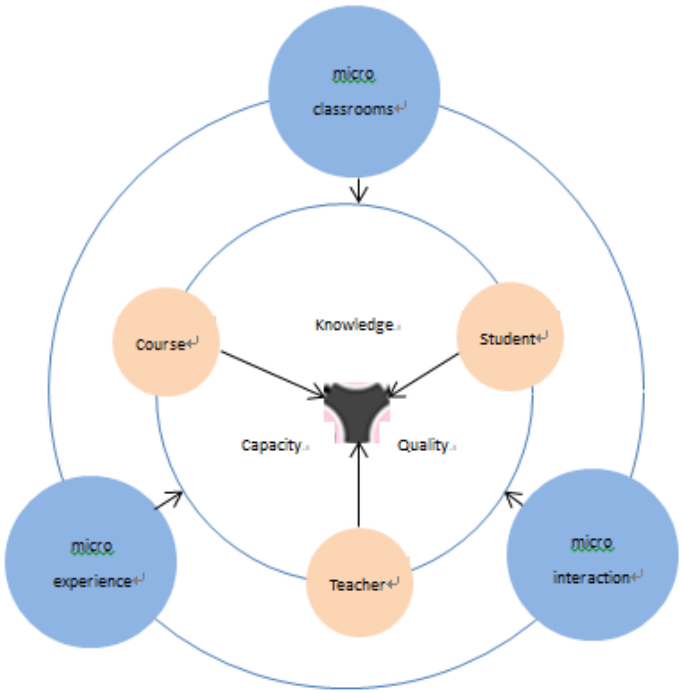

Figure 1: Three Micro Models

1.2 The application advantages of "three micro integration"

The "three micro integration" has been widely applied in online teaching, truly building a visual micro classroom, feasible micro interaction and micro experience, allowing students to truly learn independently. Firstly, the application of "three micro integration" further clarifies the teaching theme of micro courses. Compared to traditional teaching models, the teaching content is less, the teaching time is shorter, the teaching structure is simplified, and the teaching process is complete. At the same time, with the help of network platforms, a small capacity of teaching resources can be generated, which not only increases the diversity of data sources for teaching content, but also refines the course content, Make communication between teachers and students more convenient and fast, and enable repeatable online mobile knowledge learning for students at different levels. The integration of the three micro platforms not only presents dynamic and visual teaching content for students' online learning, but also creates a teaching classroom that adapts to the laws of online learning in the micro era, reducing students' cognitive load to a certain extent and improving their learning efficiency. Secondly, micro interaction allows students to freely, flexibly, quickly and conveniently engage in learning on a variety of media platforms, creating a new type of interactive platform between teachers, students, or teachers. Through interactive feedback, students are guided to learn independently, which not only solves their learning problems in a timely manner, consolidates their learning effectiveness, shares knowledge in discussions, but also stimulates their learning enthusiasm. Finally, the rich and colorful micro experiences make students' learning more interesting, vivid, and concrete, and can also be closer to life, forming a learning concept that originates from practical innovation. At the same time, through practical experience activities, students' sense of participation, creativity, and acquisition can be mobilized.

2. Overview of " BOPPPS+PAD Class "

2.1 The concept of " BOPPPS+PAD Class "

PAD class is based on the issues of limited teacher-student interaction, passive acceptance by students, low learning initiative, and low discussion and teaching efficiency. The teaching and learning activities are divided into four steps: precise lecture and blank space, student independent learning, group discussion, and teacher Q&A, emphasizing student-centered deep learning. As a new locally original teaching model, the core is teaching and learning activities. When using the PAD classroom, it is necessary to follow the learning objectives Design and implementation of student output and learning effectiveness evaluation. The split classroom is suitable for innovative teaching of critical thinking ability, aiming to create a classroom that combines teacher teaching with student discussion. Students can independently arrange learning and internalization absorption

after class, achieving content presentation, internalization absorption, and discussion and exchange. Compared with traditional teaching classrooms, divided classrooms can promote the transformation of teachers' roles and improve classroom teaching efficiency. Teachers only need to explain the key points, key points, and difficulties, reducing the pressure on teachers to prepare lessons, and students are more autonomous in learning, achieving a more balanced "teaching" and "learning"; At the same time, divided classrooms can enhance students' learning enthusiasm and improve their learning efficiency. Students no longer passively accept knowledge and learning, but have space and opportunities for active exploration, and their learning enthusiasm and efficiency naturally increase; Divided classrooms can also further liven up the classroom atmosphere through interactive communication between teaching and learning. Through group discussions and exchanges, interactive communication is introduced into the classroom, forming good interaction between students and between teachers and students. Students' expression ability is exercised, and the emotions between students and teachers are enhanced, which can inspire and promote each other between teachers and students. At present, the split classroom has been widely applied in university teaching.

2.2 The concept of the "BOPPPS" model

The teaching structure of BOPPPS originated from Canada, which divides the teaching process into six steps: Bridge-in、Learning objective、Pre-assessment、Participatory learning、Post-assessment and Summary (Figure 2). A BOPPPS process is a lesson, usually lasting 10-15 minutes, and teachers can implement microteaching based on their knowledge points. It is also possible to involve students in the overall design of teaching objectives, teaching activities, and teaching evaluations in a procedural manner, which can effectively help teachers carry out student-centered teaching. However, considering the application of BOPPPS in practical teaching, there are some challenges for teachers to proficiently use BOPPPS. The incorporation of BOPPPS teaching structure into lesson preparation results in slightly stiff classroom teaching, and it is difficult to effectively balance teacher teaching and student activities in participatory learning. Using BOPPPS teaching structure alone is difficult to achieve active learning, peer cooperation, and deep learning for students.

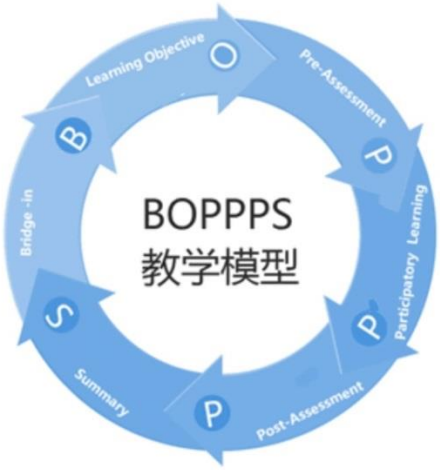

Figure 2: BOPPPS Teaching Model

2.3 How to Add BOPPPS in PAD Class

Although the BOPPPS teaching model emphasizes that teachers should encourage students to actively participate in the teaching process, it does not propose effective measures to encourage students to actively participate. We have organically integrated the effective teaching modes of PAD and BOPPPS for innovative teaching design. Students are divided into several learning groups of 3-4 people according to the split method for teaching, and the participatory learning in BOPPPS is replaced by the four stages of the PAD class. Therefore, the fusion method is to Bridge-in – Objective – Pre-assessment – Participatory Learning – Post-assessment – Summary (Figure 3).

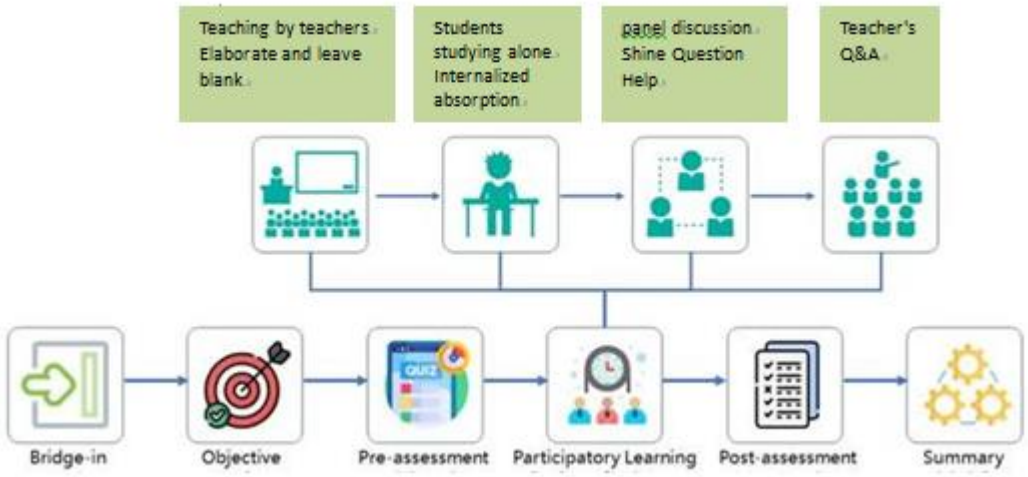

Figure 3： "BOPPPS+PAD class" teaching mode

2.4 Advantages of "BOPPPS+PAD class"

Integrating "BOPPPS" and PAD class " for application not only supports each other but also enhances strengths and avoids weaknesses. In the divided classroom, teachers give precise lectures and leave blank spaces, students learn independently and internalize absorption, group discussions are helpful in exams, and teachers answer questions to strengthen transfer, which is conducive to students' autonomous learning and deep learning. Among them, the BOPPPS model plays a role from the perspective of "teaching" and can effectively promote students' active participation in classroom learning, greatly improving the efficiency of classroom teaching while investing as little time, energy, and material resources as possible. The "PAD class" plays a role from the perspective of "learning", by redefining and designing teaching classrooms, reshaping the relationship between teachers and students in online teaching, effectively integrating various methods such as combining teaching and practice, precise teaching and practice, cooperative learning, flipped classroom, autonomous classroom, efficient classroom, project-based teaching, etc. The reasonable use of "BOPPPS+PAD class" is an important teaching mode to improve students' classroom participation and learning depth, as well as improve teaching quality.

II. DISCUSSION

3．Exploration on the Construction of the "BOPPPS+ PAD class " Teaching Model for "Fundamentals of Computer Application" under the Background of " Three Micro Integration "

3.1 Introduce micro lessons before class, clarify learning objectives, and stimulate students' interest in learning

3.1.1 Clarify learning objectives

Computer applications have penetrated into various fields. To stimulate students' independent and deep learning of basic knowledge related to computer applications, it is not only necessary to grasp the background of "three micro integration", but also to combine the advantages and disadvantages of "BOPPPS+PAD class", and clarify the learning objectives and requirements of computer applications. Through the "BOPPPS+PAD class" learning of "Fundamentals of Computer Applications", students not only need to have a systematic understanding of the development, classification, characteristics, and current application status of computers, but also need to understand the composition and working principles of computer systems through group discussions and other systems, understand information coding, carry counting system, PC composition, main performance indicators, keyboard operation, mouse operation, multimedia applications, computer virus concepts and prevention knowledge.

3.1.2 Understand the learning situation

Through further communication with student teachers and teaching assistants through internet platforms, summarize students' understanding, questions, and suggestions on learning computer applications, grasp students' learning situation and personality characteristics, and facilitate the construction of the "BOPPPS+PAD class" teaching mode for computer applications, as well as the teaching and improvement of teaching content.

3.1.3 Choose knowledge

Computer application teachers should systematically analyze students' online learning environment, knowledge level, learning habits, and learning abilities before class. The knowledge points in the first chapter of the micro classroom should be easy to understand and self-learning, mainly through story introduction or video introduction to help students understand the history of computer development and stimulate their interest in learning. Secondly, further deepen the content and carry out the expanded module teaching of "BOPPPS+PAD class", adding knowledge related to epidemic online learning to the learning of basic computer application knowledge.

3.1.4 Design scheme

Under the background of the Internet, the challenge of online learning for students at home is enormous. To design a "BOPPPS+PAD class" plan based on the "three micro integration", it is necessary to combine the selected computer application knowledge to determine the teaching objectives and methods of computer application. Based on the teaching concept, implementation steps, and time allocation of "BOPPPS+PAD class", innovative online teaching design for computer application should be carried out, To attract students to create a teaching model that conforms to the characteristics of computer application courses and students' learning characteristics.

3.1.5 Create micro courses

The pre class preparation stage is a prerequisite for the "three micro integration" and online teaching in the context of the Internet. Teachers should scientifically select computer application knowledge points, reorganize computer application teaching resources, adjust computer application teaching design and online course layout, record and edit computer application micro classroom videos, conduct pre class micro lesson introduction, clarify learning objectives, and stimulate students' interest in learning based on the actual situation of the course "Computer Application". In the design of computer application micro courses, links such as problem introduction, classroom experience, classroom summary, and post class promotion should be set up to make the teaching process of computer application rich in hierarchy and fluency. At the same time, the system implements "BOPPPS+PAD class", which requires reasonable layout of computer application teaching audio and video materials, learning materials, and other external links. The online teaching design scheme is the foundation of the "BOPPPS+PAD class". Teachers use Camtasia Studio, Youya Animation, and other tools to create micro courses on computer applications, clearly conveying key knowledge points of computer applications, perfectly displaying computer application content, allowing students to feel the image of computers, understand the content of computer teaching, and master computer application knowledge points by browsing the same micro course multiple times.

3.2 Built a knowledge learning framework, teachers provide precise lectures with blank spaces, and students learn independently

3.2.1 Built homework and discussion areas

Building a learning framework for computer application knowledge requires the construction of homework and discussion areas, allowing teachers to give precise lectures with blank spaces and students to learn independently. This is an important way to construct the "BOPPPS+PAD class" teaching model. Firstly, construct a computer application homework area and select different levels of homework for teachers to quickly understand students' computer application learning situation. Secondly, construct a computer application discussion area and select valuable and meaningful questions in the field of computer application. Students first create questions to present their answer ideas to the teacher, then guide classroom discussions on computer application and keep records. After class, the computer application teacher then goes to the discussion area to reply to questions and provide correct answers for students to check.

3.2.2 Test before class（8min+2min）

Due to students having a certain understanding of computer application knowledge, under the background of the Internet, teachers need to provide students with an 8-minute+2-minute test. Students can freely do the test, which can help them understand their mastery of computer application knowledge and also serve as a means for teachers to understand their mastery of computer application knowledge. Before class, conduct an 8-minute test on students' computer application knowledge. After scoring the students, spend 2 minutes leading them to browse the answers to computer application knowledge. Based on targeted explanations, students can learn computer application knowledge more targeted. This is also an important means of guiding students to strengthen independent learning through the "BOPPPS+PAD class" under the "three micro integration".

3.2.3 Elaborate and leave blank（30min+15min）

Under the background of the Internet, we will carry out the "BOPPPS+PAD class" teaching of " three micro integration ", which will focus on the composition and working principles of computer systems (10 minutes), information encoding and main performance indicators (15 minutes), keyboard and mouse operations (5 minutes), summarize key content words, and strengthen students' effective interactive response to online classes (15 minutes). The teacher's precise explanation of blank space actually refers to the framework of computer applications, without involving specific details of computer applications. At the end, students assign computer application thinking questions and form effective interaction. Fine speaking and blank speaking can generally be done through live or recorded broadcasting, forming sensory memory, working memory, and long-term memory through repeated learning and watching, thus achieving deep learning of computer applications.

3.2.4 Students study alone（15min）

Based on the key content of the teacher's live or recorded lectures, combine with the content provided by the teacher in the "BOPPPS+PAD class" module before class, guide students to learn independently through computer application of electronic textbooks and network resource links (15 minutes). Student independent learning refers to returning some of the classroom time to students, without discussing or communicating, and students independently complete thinking questions. When encountering problems, they consult textbooks, online learning resources, and collect questions online.

3.3 Strengthen micro interaction between teachers and students in online teaching, group discussions, and online exams

3.3.1 Notify login and communication

Strengthening the micro interaction between teachers and students in online teaching is an important foundation for mutual cooperation between teachers and students in the online teaching process. Notification login and communication are based on the teacher's precise and blank lectures and students' independent learning. Teachers initiate online discussions in advance through We Chat, QQ class groups, and teaching platforms, allowing students to share the results of independent learning and completing homework with the entire class.

3.3.2 Online discussion and testing

After students complete the autonomous learning of computer application thinking questions, an online test is immediately organized to test their self-learning achievements and knowledge mastery level. Through comprehensive evaluation of the exam results, the situation of students' autonomous learning of computer application knowledge is understood, so as to adjust the teaching progress or content of the "BOPPPS+PAD class" for computer application, and summarize and provide feedback on students' learning, Guide students to adjust their learning state and join the problem discussion.

3.3.3 Group Discussion and online exams

Group discussions are an extension of self-directed learning and thinking, and are the core content of the "BOPPPS+PAD class". Under the background of the Internet, organize students to open a group live broadcast room and discuss computer application thinking questions according to the shine-question-help process. Teachers take turns entering the group live broadcast room built by students to listen and observe their knowledge learning, viewpoint exchange, and discussion process. Furthermore, each group of students enters the divided discussion area for discussion, where each student responds with at least one message to answer relevant questions, while the teacher views the discussion situation of each group in real-time. The "BOPPPS+PAD class" is a predetermined approach for small and medium-sized group discussions. Students should conduct group discussions, and "shine" should ask group members to explain the knowledge or skill points they have gained the most. "question" should ask group members to answer the questions provided to the group. "Help" should ask fellow students who do not know how to ask group members for help. If other students do not know how to do so, they should focus on asking questions to the teacher in the Q&A section.

3.4 Teacher feedback and Q&A, learning process monitoring, and post class testing to enhance micro experience

3.4.1 Teacher comment

Teachers answer questions left by students after self-study and group discussion in live streaming rooms or related platforms, correct errors in the self-study and discussion process, and provide a summary explanation of the content of computer application knowledge learning in the group discussion process. Emphasis should be placed on students' basic learning experience in computer application in the review, as

learning also comes from various forms of practice. Therefore, after reviewing and answering questions, teachers should also create and design computer application knowledge micro courses that are close to teaching content and actual life situations through vivid micro videos, micro roles, micro contexts, and micro themes after class. They should actively guide students to expand and extend computer application related knowledge points, and encourage students to participate in various computer practice and experience activities.

3.4.2 Post-test

After class test (8 min) can more intuitively show teachers the advantages of "BOPPPS+PAD class" teaching mode, especially after group discussion and teachers' comments and questions, to provide students with the same pre class test questions, we will find that students' score rate has increased significantly. The comparison of computer application knowledge between post class testing and pre class testing can test the precision, internalization, and discussion of the "BOPPPS+PAD class" teaching mode, and also determine the effectiveness of the "BOPPPS+PAD class" teaching mode.

3.4.3 Evaluation feedback and summary

The evaluation, feedback, and summary of the "BOPPPS+PAD class" teaching model require teachers to include students' online testing, discussion, and homework completion of computer application knowledge in the total score evaluation, and complete online evaluation and feedback between teachers and students through online teaching satisfaction surveys and personal interviews on the online teaching platform. Through evaluation feedback, understand the actual application effect of "BOPPPS+PAD class" in computer application teaching under the "three micro integration", in order to make up for the shortcomings in online teaching and better serve the exploration of the "BOPPPS+PAD class" teaching mode. At the same time, summary is a sublimation of the feedback and Q&A process. Each student in the sub group is given a minute to summarize, or a representative of the selection group is selected to summarize in the entire class, allowing students to summarize what computer application knowledge I have learned, what computer application knowledge I have learned, and what computer application knowledge I also want to learn.

III. CONCLUSION

Under the background of the Internet, online teaching is not simply moving "offline courses" to the online, but rather deeply integrating internet technology with online teaching, focusing on enhancing students' micro learning, micro interaction, and micro experience, and improving the quality and effectiveness of online teaching while reducing students' online learning load. The application advantages of "three micro integration" and "BOPPPS+PAD class" in teaching are obvious. They truly rely on rich teaching resources, flexible teaching forms, strong interactivity, and gradual requirements to achieve innovation in teaching methods and processes, and fully play a role in ensuring and improving the quality of online teaching. Of course, based on the "three micro integration" exploration of the "BOPPPS+PAD class" teaching model, we will further study the details of the "BOPPPS+PAD class" in micro classrooms, micro interactions, and micro experiences.

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