

Application of Flipped Classroom Teaching Mode in Sports Anatomy

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Abstract: Flipped classroom teaching model is a new teaching model, it changes the traditional classroom teacher's single output situation. It changes the problem that students only learn after class and lack resources and guidance. Flipped classroom teaching is a modern teaching method to meet students' individual learning needs as much as possible and to cultivate students' ability of active learning and innovative thinking. This study combines qualitative research with quantitative research to explore the application effect of flipped classroom teaching model in the teaching of Sports Anatomy, and put forward feasible schemes. The results showed that there was no significant difference in the students' knowledge of sports anatomy before and after the test. After 8 weeks of application of traditional teaching method and flipped classroom teaching method, the scores of the two groups of students improved compared with the pre-test data, and the scores of the flipped classroom teaching group were significantly different from the pre-test. It can be seen that flipped classroom teaching method can effectively help students master knowledge, so as to improve the learning effect and teaching quality.

Keywords: flipped classroom teaching; Motor anatomy; Teaching design; practice

1. Introduction

With the development of science and technology, education has also changed. As a new teaching concept, flipped classroom teaching mode has attracted great attention from scholars at home and abroad. In the Outline of the National Medium and Long Term Education Reform and Development Plan (2011-2020), the Ministry of Education proposed to deeply integrate education and teaching with information technology, change inherent teaching concepts, and improve traditional teaching methods under the background of education informatization. As a paradigm of education reform in the information age, flipped classroom, a new teaching model, has been concerned by many educators and put into teaching practice. Its biggest advantage is that it breaks the teaching routine, combines online learning with offline teaching, and enables students to take the initiative in learning, which has a positive effect on the improvement of students' independent learning ability and the improvement of teaching quality.

In 2018, the Ministry of Education of China issued the Notice on Implementing the Spirit of the National Conference on Undergraduate Education of Colleges and Universities in the New Era, proposing that all colleges and universities should comprehensively sort out the teaching content of various courses and effectively improve the quality of course teaching. On February 13, 2023, Mr. Huai Jinpeng^[1], Minister of Education of China, pointed out in his keynote speech: "Digital transformation and the future of education", at the World Digital Education Conference, digital transformation is an important carrier and direction of education transformation in today's world. The Chinese government attaches great importance to the development of digital education and regards it as an important way to develop digital education and an important part of Digital China. After years of continuous efforts, China's education informatization has achieved leapfrog development. The cross-border integration of sports and digitalization is promoting the reform of physical education teaching mode. Sports Anatomy belongs to sports human science, which is a basic theoretical compulsory course for physical education majors. It is a morphological discipline to explore the shape structure of the human body and the influence of sports on the shape structure of the human body.

Sports anatomy is a fore running course for many professional courses such as exercise physiology

and sports health science. Sports anatomy has remarkable disciplinary characteristics, which are mainly reflected in the rich terminology, fragmentary knowledge points and difficult to understand individual content. Nowadays, the teaching mode of sports anatomy in sports colleges and departments in China mainly uses multimedia courseware for centralized teaching, and students watch the display content of multimedia courseware for learning under the guidance of teachers^[2]. This study has important practical and theoretical significance for exploring the impact of flipped classroom teaching on sports anatomy teaching. The main line of studying the teaching effect of sports anatomy in sports colleges and universities under the guidance of flipped classroom teaching is not only in line with the development trend of education modernization, but also conducive to the development of sports anatomy course teaching effect. In order to meet the requirements of sports anatomy teaching, under the background of national education reform, how to introduce intelligent and scientific digital means into sports anatomy classroom teaching in sports colleges and universities has attracted extensive attention from scholars.

2. Literature review

2.1 Flipped Classroom

The flipped classroom teaching model first originated from a high school in the United States (Woodland Park High School), which was first proposed and used by two chemistry teachers of the school, Jonathan Bergmann and Aaron Sams. This flipped classroom stems from their history of experimentation with blended learning and problem-based learning concepts, using active learning techniques and new technologies to engage students^[3]. Flipped classroom teaching mode completes two learning space transfers: the classroom is successfully transferred to the outside of the classroom; By using some electronic visualization, practical work (previous homework) is transferred to the classroom^[3].

Flipped classroom needs to rely on modern and information-based means. In terms of learning space, traditional classroom teaching is transformed into students' active use of modern information technology means to obtain required learning resources, while traditional classroom is transformed into teacher-student discussion, interaction and homework. Flipped classroom changes the situation of teachers' single output in traditional classrooms. It has changed the problem that students only study after class, lack of resources and guidance. Flipped classroom teaching is a modern teaching method to meet students' individual learning needs as much as possible, and to cultivate students' active learning and innovative thinking ability.

2.2 Traditional teaching methods

The traditional method of teaching is an old way of teaching where teachers are the main players in the classroom while students are mere listeners. The common ways of teaching are the use of chalk and talk, visual aids, reporting, and different activities that lead to teacher-student interaction.

Traditional methods of teaching are a thing of the past in which teachers are the controller of the class where they teach and take complete responsibility for the learning environment. All the duties and powers are vested in the teacher and they, being the lecturer in the class, play the role of an instructor for the students and also the decision maker for taking the decision of what to teach and how to teach. In the traditional method of teaching, teaching happens within the four walls of the classroom. Here, the teacher is the sole source of knowledge. It's a teacher-centric method that promotes the supremacy of the teacher within the classroom setup. Also, every aspect of learning proceeds as per their will. The teacher: Has full control over the learning environment. Teachers can fully control the learning environment and choose teaching methods according to the teaching content and can innovate the curriculum if necessary.

2.3 Teaching design

Teaching design is to arrange teaching elements in an orderly manner according to the requirements of curriculum standards and the characteristics of teaching objects, and to determine the assumption and plan of appropriate teaching programs. It generally includes teaching objectives, teaching key and difficult points, teaching methods, teaching steps and time allocation.

Teaching design is the process of determining the appropriate starting point and end point of teaching according to the teaching object and the teaching goal, arranging the teaching elements

orderly and optimally, and forming the teaching plan. It is a science that uses systematic method to solve teaching problems scientifically. It aims at optimizing teaching effect and solving teaching problems.

3. Research object and method

3.1 Research object

This study selected 100 freshmen majoring in physical education in Baoshan University as the research object, and their average age was 18.5 years old. They all just passed the college entrance examination and have similar subject bases. Through the pre-test data, it was found that there was no difference in their knowledge of sports anatomy.

3.2 Research method

This study uses experimental method, quantitative research method and questionnaire method to understand the effectiveness of flipped classroom teaching in physical anatomy teaching. Experimental methods: 120 freshmen from physical education major of Baoshan University were divided into 2 classes to participate in the experiment for 8 weeks. One class was the control group and traditional teaching methods were used. The other class is the experimental group, which adopts the flipped teaching method.

Data collection tools included sports anatomy knowledge questionnaires and interviews.

According to the course outline, I designed a questionnaire test. The questionnaire consisted of 40 multiple choice questions, including knowledge of the motor system, respiratory system, digestive system and cardiovascular system. There are 15 low level questions, 15 medium level questions and 10 difficult questions. The exam takes a single choice format. We mainly used the Learning APP to issue questionnaires and sent test questions to 120 research subjects. In order to ensure the authenticity and accuracy of the data and the effectiveness of the questionnaire, relevant experimental instructions and questionnaire filling instructions were given to the subjects before filling in the questionnaire.

According to the interview outline designed for the research questions, two teachers in the same field, the director of the basic theory teaching and research department and the deputy dean in charge of teaching were interviewed.

4. Construction of the flipped classroom teaching model of Sports Anatomy

Through the high-quality demonstration courses produced by the school's information technology and resource-sharing course construction modules and website generation tools, I quickly built my own course website, and then constructed a hybrid teaching model of sports anatomy flipped classroom. The structure of the flipped classroom teaching model of sports anatomy mainly includes three parts: first, the online module of the teacher; Second, students online module; The third is the classroom teaching module, the three complement each other and connect with each other.

4.1 Teacher online module

Teachers carefully design the teaching resources and teaching activities of sports anatomy course. According to the teaching objectives of sports anatomy course, teachers develop online teaching resources, including course introduction, syllabus, teaching calendar, teaching videos, micro-lessons, teaching courseware and other types of multimedia teaching resources. The teaching video divides the teaching content of sports anatomy into sections as units, and records a video resource for each section. Around the teaching content of the textbook, students can click the video to learn according to their actual situation, such as the human anatomy posture and its positioning terms, the definition and classification of the actuator muscle and how to determine it. In order to facilitate students' independent learning, each video contains relevant knowledge points of sports anatomy and puts forward corresponding thinking questions for students' self-study and reflection after class to deepen their mastery and understanding of the knowledge points of relevant chapters. The duration of the entire video generally does not exceed 10min^[4].

In the process of teaching activities in the flipped classroom teaching mode, through online

communication with students, teachers can comprehensively track and grasp each student's learning status and learning effect according to students' homework and students' email feedback, and reflect on the shortcomings in the teaching process. It lays a foundation for teachers to implement targeted and personalized guidance in the classroom. In the Q&A discussion, students can find out similar problems in their own body in the common questions, and communicate with classmates in the course discussion area about their confusion in learning sports anatomy. Of course, they can also get answers through searching, and send some controversial questions to the teacher's email, the teacher will reply in time. Through course questionnaires and in-class suggestions, teachers can get learning feedback as soon as possible to better understand students' learning status and improve their learning results.

In the course work, teachers can enter the homework management bar to assign homework to students, only in the published state of the homework, students can see the homework content, students can turn in homework multiple times, but teachers can only see the homework after the due date. In the test paper library, the test paper in normal state can be referenced by online test. Teachers can also regularly remind and urge students to study before class on time, and remind them to complete quizzes and homework in time through email and website announcements. For some students who have difficulties in the video learning process or have suggestions on video production, teachers can schedule regular online communication with students, which is conducive to quickly dealing with some problems encountered in the pre-class learning stage.

4.2 Student online modules

On the network teaching platform, according to the teacher's teaching goals and tasks, students learn independently with the help of teaching resources such as teaching videos, micro-lessons and teaching courseware provided by the teacher on the platform or through Internet search, so as to achieve a basic understanding of the course content, and complete pre-class exercises or tests on the basis of understanding the course content. Students in the whole process of learning and practice encountered difficult problems, online communication with classmates and teachers, or raised in class, by the teacher to help solve, on the basis of mastering the course content before the class practice or test. In the student learning statistics, you can see each student's login times, course entry times, online duration, number of study notes, number of topics published in the course discussion area, etc. In order to better grasp the learning status and progress of each student, teachers will use scores to reward students' learning feedback in grade management, which can effectively improve students' learning initiative and enthusiasm [5].

4.3 Classroom teaching module

Teachers can arrange classroom teaching activities according to the teaching content and teaching hours. Classes are usually arranged twice a week. After online learning, students have mastered the basic knowledge points of sports anatomy. In class, teachers give sufficient explanations to the key and difficult knowledge points, so that enough time is provided for students to learn the key and difficult points in class, which is complementary to online learning, so that students can better master the unit knowledge and improve learning efficiency. Before teaching activities, teachers should summarize and sort out some difficulties encountered by students in teaching videos, after-class quizzes and learning. In the teaching process, teachers should pay attention to interaction and communication between teachers and students. Teachers should raise attractive questions to mobilize students for deep learning and communicate with students after explaining knowledge points in class. Teachers can understand the problems and shortcomings of flipped classroom teaching mode through various ways.

5. Data analysis

One hundred test questions were sent out, 100 test questions were retrieved, and 100 valid samples were collected. SPSS16.0 analysis software was used for statistical analysis of the theoretical examination results, and paired T-test was performed on each group of data. Meanwhile, variance analysis was performed on the difference between the two examinations of each group. The difference between the data between the groups was $P < 0.05$, indicating significant statistical significance, and $P < 0.01$, indicating very significant statistical significance.

Table 1: Comparison of results before and after experiment in Class 1.

	mean value	N	standard deviation	Standard error mean
before the experiment	27.25	60	4.93	2.14
post-experiment	32.44	60	4.39	3.09

Table 2: Comparison of results before and after experiment in Class 2

	mean value	N	standard deviation	Standard error mean
before the experiment	27.35	60	5.17	2.67
post-experiment	34.93**	60	3.46	2.55

** indicates significant difference ($P < 0.01$).

The experimental results showed that there was almost no difference in the pre-test data between the traditional teaching group (Class 1) and the flipped classroom teaching group (Class 2) before the experiment. The average score of Class 1 and class 2 was 27.25 and 27.35, and the average score of the two groups was 21-30. The students' knowledge mastery effect and knowledge application level are better. After two months (8 weeks) of experimental intervention, it was found that the average score of the traditional teaching group was 32.44, and the average score of the flipped classroom group was 34.93. Compared with before the experiment, the scores of both groups have been greatly improved, and the scores of both groups are 31-40, indicating that students grasp the knowledge effect is very good, can skillfully use knowledge. In particular, the flipped classroom group had a significant difference, $P=0.0073$; Compared with the traditional teaching group, the flipped classroom group had higher scores in the post-test, $P=0.0917$. There was no significant difference in scores before and after.

The post-test results of the flipped classroom teaching group were higher than those of the traditional teaching group, but it was not significant. This may have a certain relationship with the test question design. According to a large number of studies^[6], flipped classroom teaching mode can significantly improve students' dialectical thinking, which is beneficial for students to achieve excellent results in short-answer, essay and other questions. However, the test questions in this study were selected as multiple choice questions, which may be an important reason for the lack of significant difference in scores.

6. Conclusions and recommendations

6.1 Conclusion

6.1.1 Both the flipped classroom teaching mode of sports anatomy and the traditional teaching method can improve students' knowledge of sports anatomy

As can be seen from Table 1 and Table 2, students' achievement has been improved through both traditional teaching and flipped classroom teaching. Constructivism holds that knowledge is not an objective reflection of reality, but rather an assumption or interpretation of objective events. With the continuous improvement of human understanding level, the understanding of knowledge will also change. Therefore, learning through sports anatomy is not only a process of acquiring knowledge, but also a process of criticizing, reflecting on and reconstructing knowledge.

6.1.2 Through the two-month flipped classroom teaching of sports anatomy, students' performance is more effective than the traditional teaching method. The performance of the students improved significantly compared with that before the intervention

Flipped classroom teaching group is more beneficial to improve students' performance in sports anatomy, and the effect is significant. Many experts believe that flipped classroom teaching method can fully mobilize students' learning enthusiasm and initiative, enhance students' learning interest, improve students' self-learning ability, strengthen students' understanding, cognition and mastery of knowledge, and improve teaching quality and teaching effect^[7]. Constructivism emphasizes the importance of learning situations. Learning takes place in a specific social and cultural context, and the different situations will affect the process and outcome of learning. Flipped classroom teaching provides students with more situational models and teaching methods, which is conducive to students mastering knowledge.

6.1.3 High-quality teaching resources are needed in the flipped classroom teaching of sports anatomy, which puts forward higher requirements for teachers' information technology and comprehensive quality

The learning of sports anatomy in traditional classroom teaching is very difficult, and the flipped classroom teaching mode has emerged in line with the development of The Times, which is divided into online and offline teaching modes^[8]. The structure of the flipped classroom teaching mode of sports anatomy is divided into online module for teachers, online module for students and classroom teaching module, which complement each other and interact with each other to jointly promote the improvement of teaching quality^[9]. Flipped classroom requires teachers to have good professional knowledge, but also needs teachers to have better information technology and professional and information technology integration ability. This poses a challenge for teachers.

6.2 Suggestions

6.2.1 Actively promote the construction of sports anatomy online courses

By integrating internal and external resources, schools should actively promote the construction of high-quality courses, encourage teachers to strengthen cooperation, actively apply for high-level high-quality courses, constantly improve the teaching quality of sports anatomy courses, deepen the teaching reform of sports anatomy courses, and lay a foundation for promoting the improvement of the comprehensive quality of sports students.

6.2.2 Focus on individual differences and put the needs of students at the center

The value orientation of flipped classroom teaching model design needs to integrate student-centered and student-centered learning values, from subject knowledge-centered to student-centered, and oriented to student interest development and ability cultivation. Teachers should pay attention to the individual differences and needs of students and pay attention to the healthy growth of students.

6.2.3 Cultivate a professional team of high-level teachers with high comprehensive quality

The construction of teacher team is the key to improve the teaching quality. In view of the discipline characteristics of sports anatomy and the particularity of flipped classroom teaching, it is imperative to train a professional and high-level teacher team with high comprehensive quality. Through in-service teacher training and recruitment of teachers with high academic qualifications and professional titles, the comprehensive quality of teachers will be gradually improved.

6.2.4 Actively construct diversified curriculum evaluation programs

The evaluation method of flipped classroom is different from the traditional teaching method, and diversified evaluation methods should be adopted to evaluate the learning effect of students. This requires teachers to develop scientific evaluation standards and methods.

6.2.5 Support the discussion and implementation of flipped classroom teaching model at the school level

Schools should establish a learning environment that supports flipped classroom teaching mode, and provide corresponding information technology support; The school actively constructs the course management mechanism of flipped classroom teaching mode, and actively builds relevant platforms; Encourage teachers of relevant courses to build online course learning resources and protect teachers' intellectual property rights.

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