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RESEARCH ARTICLE

Discussion and Practice of *Blended and Flipped* Teaching Application Strategy Supported by Cyberspace

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Abstract: For the hybrid teaching supported by the network, combined with the characteristics and teaching practice of students in higher vocational colleges, based on the analysis of the advantages and disadvantages of MOOC and SPOC, this paper integrates the concept advantages of MOOC and SPOC with traditional classroom teaching, compares the teaching situation between the online and offline in two semesters. By using SPSS statistics, analyzes the feasibility of modern online teaching.

Keyword: MOOC; SPOC; blended learning; advanced mathematics; paired T test; independent-sample T test

1. Introduction:

Since the outbreak of COVID-19 in 2020, the Ministry of education proposed that "ceasing teaching, stopping classes and not stopping school". Schools are committed to integrating teaching resources, optimizing teaching design, ensuring teaching quality, selecting teaching platforms, and implementing online.

During the epidemic period, the Ministry of Education organized 22 online course platforms to open more than 24000 online courses free of charge, covering 12 disciplines of undergraduate courses and 18 majors of junior college and higher vocational colleges. From 2018 to 2019, nearly 1300 "national high-quality online open Courses" identified by the Ministry of education provided teaching guarantee for online teaching, played a demonstration and leading role, and provided guidance and teaching services to the teaching team of national Mu class. On December 9, 2020, the Ministry of Education announced and identified 99 National high-quality online open courses (Higher Vocational Education) in 2020. At the same time, the supporting platforms of online courses are becoming more and more prosperous. Various online learning platforms such as Tsinghua online, Shanghai Jiaotong University good university online, China University MOOC, NetEase cloud classroom and love course network came into being. Based on this, this paper focuses on the necessity, supporting conditions and feasibility of hybrid teaching supported by cyberspace.

MOOC (massive open online course) is a network teaching model with the characteristics of large-scale, openness, autonomy and diversity. Since its appearance in the United States in 2011, MOOC has attracted widespread attention of educators all over the world. In May 2014, MOOC platform appeared in China. Based on the fact that many universities in the world have started or are preparing to join the large-scale open online course platform, the Ministry of education love course network cooperated with NetEase to jointly launch the MOOC platform with Chinese intellectual property rights (Li et al., 2014). The huge capital investment of society and schools reflects the objectivity of MOOC's commercial value and development prospect.

SPOC was first proposed by Professor Armando fox, program director of the University of California, Burkeley and mooclab in 2013. Compared with open and massive in MOOC, SOPC emphasizes private and small. In short, it is a small online teaching, which not only restricts students' enrollment, but also has dozens to hundreds of students participating in the course, which can better apply the content of MOOC to physical campuses. SPOC not only uses the scale effect of MOOC to share the teaching cost, but also analyzes students' learning behavior through big data, which is an optimization of traditional teaching and a supplement to MOOC (Xu et al., 2014).

As the founders of online courses, MOOC and SPOC provide reference and reliance for schools and teachers to implement hybrid teaching supported by the network on the basis of providing a large number of effective teaching resources(Wei et al., 2014).

The online teaching of Advanced Mathematics should highly integrate the new teaching modes such as MOOC and SPOC with the previous traditional teaching modes. It's not only the product of teaching reform, but also the inevitable result of the development of the times. However, as some scholars put forward to that "the advantages of online education such as MOOC are obvious , but too much is better than less"(Yellow, 2013). Simply applying MOOC or SPOC is just "imitating others". Especially in higher vocational colleges where students are generally not self-conscious and have weak self-learning ability, their learning effect will be greatly reduced. For this reason, we should make use of the existing rich and high-quality

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MOOC resources to establish a more school-level SPOC platform. Combined with traditional teaching and the assistance of mathematical statistics software such as SPSS and MATLAB, we should turn the classroom to realize the mixed course teaching of Advanced Mathematics, with complementary advantages and better effect.

2. The necessity of vigorously promoting Blended Learning supported by cyberspace.

2.1 The improvement of teachers and the change of educational objects

Blended Learning supported by cyberspace is an unprecedented challenge for the development of education in the 21st century. Some people even predict that MOOC and other online teaching modes will eventually replace traditional teaching. It is undeniable that the emergence of various online teaching will at least urge teachers to constantly reflect on themselves. First of all, from the perspective of teachers themselves, we now advocate lifelong education, which means that even if we graduate from doctoral students, we still can't stop learning. At the same time, the development of network informatization makes our lifelong education more convenient and possible.

At the same time, our teaching object - "young students" has higher and higher requirements for teachers and curriculum quality. The students taught in the Internet age are quietly changing. If we are "immigrants" in the mathematics age, the students we teach are "aborigines" in the digital age (Zhang & Yang, 2018). These students will use mobile phones and computers since childhood, and even know better than us how to use the Internet to obtain information and develop social activities. Many well-known universities across the country and even around the world have launched Mu classes, which has not only brought great challenges to our teaching, but also brought us opportunities. In the current classroom, many students have brought tablets and computers to the classroom. How to make students rationally "play" mobile phones and "play" tablets and integrate various learning tasks into mobile phones is only the primary stage of Hybrid Teaching(Zhang, 2018). The change of educational objects also forms a downward pressure on the teaching reform of colleges and universities.

2.2 The urgent need for high-quality talent training in the era of big data

From the cultivation of knowledge-based technical talents to innovative talents, social development has higher and higher requirements for talent quality, so that today's talents must have the ability of critical thinking and problem-solving, effective communication, innovation, cooperation and big data analysis. It can be seen from the National College Students' mathematical modeling competition in recent years that big data is gradually approaching colleges and universities. Since 2007, one of the topics in the “Contemporary Undergraduate Mathematical Contest in Modeling” is basically focus on t big data. In 2020, even two topics are about big data, and the data scale is getting larger and larger. This virtually forces teachers to continuously improve their data processing ability in order to meet the changing needs of the times.

3. Supporting conditions of hybrid online classroom

Blended Learning classroom resources are mainly divided into nine categories, of which the most important is media materials, including text, graphics, images, audio, video and animation. In addition, there is test question bank. Third, there should be test standards, network courseware and cases, literature, resource directory index, network courses and so on. Online teaching platforms are also becoming more and more abundant, such as DingTalk, Tencent, Learningpass, Wisdom tree, Vocational education cloud, campus network teaching and other platforms at all levels, forming a curriculum platform system with wide coverage and various levels. It provides an important platform guarantee and resource base for the online teaching of "non-stop teaching and non-stop learning".

3.1 Be in the "deep integration" of Hybrid Teaching and traditional teaching mode, rather than "shallow combination". The school provides a good platform for teachers: on the one hand, build a digital campus, take advantage of the school's advantages in information-based education, and establish a cloud platform with its own intellectual property rights as far as possible, so that teachers can establish their own teaching space in the platform, and students can enter the independent and free elective courses of the cloud platform, Teachers can also use this platform to establish an interactive virtual community with students. On the other hand, transform the traditional classroom into an information-based classroom, make full use of the smart classroom, and emphasize teacher-student interaction, man-machine interaction and student-student interaction (Huan et al., 2016).

3.2 Improve teachers' teaching ability and digital resource production ability in the information environment, train teachers to carry out heuristic, inquiry, discussion and participatory teaching, from concept to technology, from classroom teaching mode to teaching method, carry out all-round training and learning, carry out regular and irregular teaching discussion, and improve students' autonomous learning ability in the information environment. Although students have strong acceptance of information teaching, However, it does not mean that students have strong autonomous learning ability, which requires us to teach students to form the habit of autonomous learning, master the ability of autonomous learning, set up freshman seminar courses, teach students to discuss learning, cooperative learning, inquiry learning and practical experience learning, and adapt to the new learning methods. As a guide, teachers only need to teach students how to learn.

Change of assessment method: the assessment of assessment method highlights the importance of usual performance, changes the traditional guidance based on result evaluation, combines process and result evaluation, and pays more attention to process evaluation, up to 80%. We must pay attention to the investment in the process of students' autonomous learning. Through background data analysis, students can watch videos for a long time and speak in the background, Advocate students to invest more in "interactive learning". During online teaching, many students who were less involved in the actual classroom are quite active in the virtual platform. They are very active in speaking or answering questions online, which can better promote the interaction between teachers and students. By flipping the classroom, students can learn at home. What they don't understand can be mentioned in the classroom. It's not the teacher's "one word, full house", but to discuss students' problems. In this way, learning is more targeted and accurate.

4. **Feasibility analysis of Blended Learning online.**

In the spring semester of 2020, due to the impact of the epidemic, all colleges and universities basically focus on online teaching. During this period, in addition to the task of online teaching, teachers also have the need to continuously improve their online teaching ability. Therefore, various online teaching ability training courses also came into being. On the one hand, it is conducive to the cultivation and adaptation of teachers' modern teaching ability, and on the other hand, it also reflects the imperative of hybrid teaching. What we are extremely concerned about is whether the quality of online teaching and students' acceptance are significantly different from traditional teaching? In this regard, this paper makes the following comparisons:

4.1 Through a semester of online teaching, a comparison is made between the midterm and final higher mathematics scores of the four classes of grade 19 taught by the same teacher. Generally speaking, the average scores of the four classes at the end of the term and the midterm are statistically different. See Table 1 for the specific data.

4.2 By comparing the final scores of online and offline semesters of the corresponding classes of the same major taught by the same teacher in spring and autumn, it is found that there are statistical differences in the final scores of four classes in the next semester (online). The final scores of classes 1 and 2 in mid-term 19 are reduced, but the scores of classes 1 and 2 in field 19 are improved (see Table 2 for detailed data).

4.3 An independent sample t-test was conducted for the online and offline scores of the same major taught by the same teacher in the autumn semesters of different academic years: Class 3 of level 17 field affairs completely adopted the offline traditional teaching mode in the second semester of freshman year, while class 1 of level 19 field affairs completely adopted the online teaching mode in the second semester of freshman year due to the impact of the epidemic. The two classes adopted the complete one to one

Class		Computer application1	Computer application2	Airport Management1	Airport Management2
N		39	42	46	43
$\bar{x} \pm S$	Midterm	83.88±10.38	82.12±14.39	74.53±11.84	71.29±14.71
	Final	57.61±10.45	58.60±18.05	69.74±10.00	67.83±13.33
T		12.654	9.151	2.087	2.726
P value		.000	.000	.043	.009

Table 1 Comparison of midterm and final grades of class 4, grade 19 in the second semester of 19-20

Class		Computer application1	Computer application2	Airport Management1	Airport Management2
N		39	42	46	43
$\bar{x} \pm S$	autumn	64.18±17.93	63.74±19.03	47.65±16.46	44.79±21.83
	spring	57.63±10.45	58.60±18.05	70.09±10.23	66.25±2.55
T		2.714	2.126	-9.172	-7.353
P-value		.010	.040	.000	.000

Table 2 paired- t Test of final scores of class 4, grade 19 in the first semester and the next semester in 19-20

4.2 Through paired t-test, the mid-term and final scores of classes 1 and 2 of computer application and class 1 and 2 of field affairs show that the P values of four pairs of samples are < 0.05, that is, the mid-term and final scores of the four classes are different before and after. On the one hand, there are more learning contents at the end of the term, and students forget some of the previous contents. On the other hand, there may be more types and questions in the final exam than in the mid-term, so students can't finish.

teaching materials and were taught by the same teacher. In contrast, first of all, from the perspective of classroom activity, online teaching is higher than traditional teaching. Under the guidance of teachers, many students who are ashamed to express in class actively interact with teachers on the online platform. Secondly, when the paper test with basically the same difficulty coefficient is adopted, there is

Class	Usual performance	T, P value	Final results	T, P value
17A-M3	92.39±3.59	6.348	51.58±14.05	-7.195
19A-M1	87.15±4.24	0.000	70.09±10.23	0.000

Table 3 Comparison of usual performance and final results of the first semester and the next semester of class 4, grade 19-20

a statistical difference between the peacetime performance and the final performance of the two classes. The peacetime performance is higher than the online work, while the final performance is higher than the online work (see Table 3 for detailed data).

The difference in usual performance just reflects that offline teaching can understand students' learning from more aspects, and teachers tend to be more strict in evaluation and scoring; When there is little difference between the question type and difficulty of the test paper, on the one hand, the difference in the final score is due to the open book form of the offline test, on the other hand, it also reflects that the offline test is necessary to strengthen the difficulty of invigilation. This further shows that as long as appropriate teaching methods are used, the hybrid teaching supported by cyberspace can play a good teaching effect.

5.Conclusion

Although the rise of network teaching such as MOOC does bring changes and impact to traditional teaching, the unsupervised Curriculum under the package of mechanized technology can only be a "flash in the pan". Only when teachers continuously improve themselves and effectively integrate network teaching into the traditional teaching mode, can they complement each other and achieve a win-win situation. In the era of educational informatization, college teachers should try their best to keep up with the tide of informatization.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

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